

The UK Renewable Energy Strategy





The UK Renewable Energy Strategy

Presented to Parliament by the
Secretary of State for Energy and Climate Change
by command of Her Majesty

July 2009

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Contents

Foreword	3
Executive Summary	7
Chapter 1: The Case for Renewable Energy	23
Chapter 2: Delivery in Electricity, Heat and Transport	35
Chapter 3: Greater Financial Support	51
Chapter 4: Swifter Delivery	69
• Better Planning for Delivery	72
• Stronger Renewable Industry	90
• Quicker, Smarter Grid Connection	96
• Using More Sustainable Bioenergy	103
Chapter 5: New Resources and Technologies	131
Chapter 6: A Role For Everyone	151
Chapter 7: Benefits and Impacts	173
Chapter 8: Implementation	189

ANNEXES

Annex A:

Analysis of Responses to Consultation 208

Annex B:

Summary Action Plan for Delivery 211

Annex C:

Glossary of Terms 221

Annex D:

Related Documents and Links 226

Annex E:

Choosing the 'Lead Scenario' for Delivering the Renewable Energy Target 231

Foreword

Foreword by the Secretary of State

To meet the challenge of climate change, we need to save carbon in every sector of the economy – this will mean a rapid transition to renewable energy. This Strategy shows how we can reach our goal of 15% of energy from renewables by 2020.

Doing so will help the UK to lead the industries of the future. According to recent analysis the renewable energy sector could support up to half a million jobs in the UK by 2020.

It will help safeguard the security of our energy system. The plans here can help reduce the UK's use of fossil fuel by around 10%, and so stem the rise in the UK's use of imported fossil fuels, with our need for gas imports 20-30% lower than they would have been in 2020.

This Strategy shows how we can achieve this transformation. It will involve producing enough energy from renewable sources by 2020 to supply the equivalent of nearly all 26 million homes in the UK with their current electricity needs, and 4 million homes with their current heating needs.

Already, renewable electricity has doubled in the UK in five years, and in the last year alone, onshore wind capacity grew by almost a third, and offshore by two thirds. We already have more offshore wind power than any other country. The natural resources are there and waiting to be harnessed: two independent reports found the UK has the largest potential for wind energy in Europe, and one of the greatest natural wave power resources in the world.

Government action can shape the market to drive further progress. By next year, for example, the obligation on energy suppliers to get a rising proportion of electricity from renewable sources, combined with the exemption from the Climate Change Levy, will be worth around £1 billion a year to the renewable electricity industry. Planning decisions and access to the grid are becoming quicker and easier. Households, communities, public services and business will be able to generate their own renewable energy, through the introduction of a new Renewable Heat Incentive and 'Feed-In Tariffs' to provide guaranteed payments for energy they produce.



With cleaner energy, new opportunities for jobs and greater security of supply, this plan shows a clear route to a cleaner, better energy system. It makes a significant contribution to tackling climate change. I look forward to working with businesses and communities to put these actions into practice.

A handwritten signature in black ink that reads "Ed Miliband". The signature is written in a cursive style with a prominent underline.

The Rt. Hon Ed Miliband MP
Secretary of State for Energy and Climate Change

Executive Summary

Summary

We need to radically increase our use of renewable electricity, heat and transport. This Strategy explains how and why we will do so. It sets out the path for us to meet our legally-binding target to ensure 15% of our energy comes from renewable sources by 2020: almost a seven-fold increase in the share of renewables in scarcely more than a decade.

This Strategy will help us tackle climate change, reducing the UK's emissions of carbon dioxide by over 750 million tonnes between now and 2030. It will also promote the security of our energy supply, reducing our overall fossil fuel demand by around 10% and gas imports by 20–30% against what they would have been in 2020. And it will provide outstanding opportunities for the UK economy with the potential to create up to half a million more jobs in the UK renewable energy sector resulting from around £100 billion of new investment. In parallel with energy saving, nuclear and carbon capture and storage, this is a key element of our overall transition plan for setting the UK on the path to achieve a low-carbon, sustainable future that helps address dangerous climate change.

Our target is very ambitious. We consulted last year on proposed measures for meeting it; this document confirms our strategy for doing so.

Our lead scenario suggests that we could see:

- **More than 30% of our electricity generated from renewables**, up from about 5.5% today. Much of this will be from wind power, on and offshore, but biomass, hydro and wave and tidal will also play an important role.
- **12% of our heat generated from renewables**, up from very low levels today. We expect this to come from a range of sources including biomass, biogas, solar and heat pump sources in homes, businesses and communities across the UK.
- **10% of transport energy from renewables**, up from the current level of 2.6% of road transport consumption. The Government will also act to support electric vehicles and pursue the case for further electrification of the rail network.

Such a scenario will only be possible with strong, co-ordinated efforts from a dynamic combination of central, regional and local Government and the Devolved Administrations, as well as other public groups, the private sector and dedicated community groups and individuals. To deliver this we will:

- **Put in place the mechanisms to provide financial support for renewable electricity and heat worth around £30 billion between now and 2020:** We will extend and expand the Renewables Obligation for large-scale renewable generation; amend or replace the Renewable Transport Fuel Obligation to increase use of sustainable biofuels; and introduce a new Renewable Heat

Incentive and 'Feed-In Tariffs' to provide guaranteed payments to individuals, business and communities for renewable heat and small-scale electricity generation.

- **Drive delivery and clear away barriers:** We have established the Office for Renewable Energy Deployment to drive delivery of our targets, including through stronger supply chains and through the planning system. We will also ensure quicker grid connections and more sustainable bioenergy supplies. We will work collaboratively with our delivery partners and in doing so respect their concerns. We have already made significant strides to decarbonise our energy supply and in getting the rest of the way, we will protect our environment and natural heritage through the application of relevant controls.
- **Increase investment in emerging technologies and pursue new sources of supply:** We will provide greater support for developing key technologies we expect to contribute to our renewable goals. We are increasing investment in wave and tidal generation, making improvements to offshore wind technologies, and developing more sustainable advanced biofuels. We are confirming the schemes under consideration to generate energy from the Severn Estuary. This will lead to a decision next year on whether to seek to harness the potential of Severn tidal power to supply up to 5% of the UK's electricity needs.
- **Create new opportunities for individuals, communities and business to harness renewable energy:** We will introduce new, simple mechanisms to support investment by businesses, communities and householders in small-scale renewable heat and electricity generation. Alongside this we will make extra funding available to ensure that people unfamiliar with renewable technologies get the advice they need to generate their own energy. We are publishing guidance on approaches that developers could take to share the benefits of large-scale projects with local communities. We will encourage greater adoption of renewables in central Government and the wider public sector.

Meeting our renewable ambitions will be challenging, and has a cost. But as Lord Stern made clear in his 2007 Review of the Economics of Climate Change the costs of inaction are much greater. And there will be significant benefits. Our goal is to maximise the environmental, economic and employment opportunities for the UK from renewables. We want the UK to be the location of choice for inward investment and a world class centre of energy expertise. This Strategy – and our wider UK Low Carbon Transition Plan published in parallel with it – will enable us to build the UK low-carbon economy, promote energy security and take action against climate change.

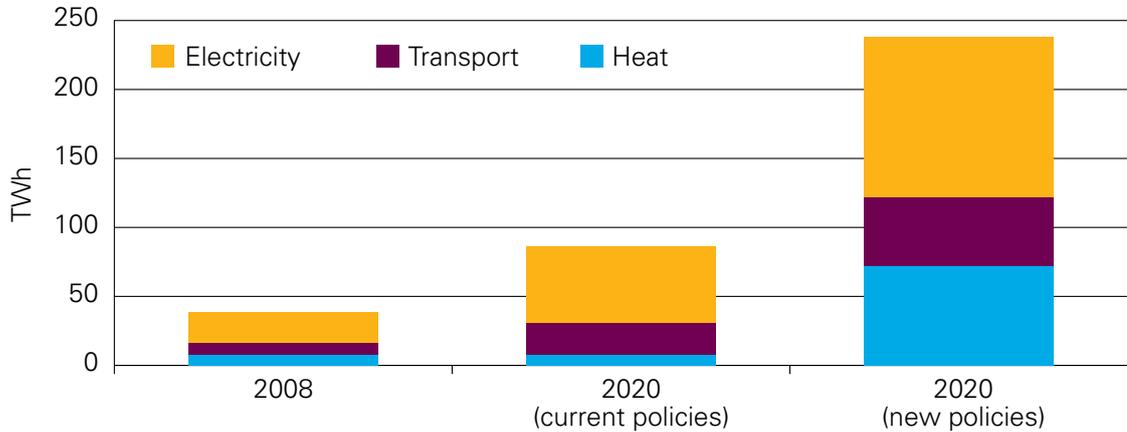
The UK Renewable Energy Strategy

- 1.1 The UK needs to radically increase its use of renewable energy. First, the impending threat of dangerous climate change means we urgently need to reduce our emissions of carbon dioxide and other greenhouse gases. A new focus on renewable energy will play a key role in this, together with nuclear power, carbon capture and storage and policies such as the EU Emissions Trading System and energy saving measures. At the same time, the growth in global demand for energy over the next few decades, and the depletion of our North Sea oil and gas resources, mean that we need to re-think our approach to sourcing and using energy. Turning to renewables will help the UK recover some of its energy self-sufficiency, while assuring that more of our imported energy comes from reliable sources. Finally, as the entire world gears up for the transition to a new, low-carbon future, the UK needs a robust and thriving renewable energy sector to maximise the economic and employment opportunities this will inevitably bring.
- 1.2 For these reasons, and as part of EU-wide action to increase the use of renewable energy, the UK has committed to sourcing 15% of its energy from renewable sources by 2020 – an increase in the share of renewables by almost a factor of seven from about 2.25% in 2008, in scarcely more than a decade.
- 1.3 This document, which is a response to last year's consultation, sets out our comprehensive action plan for delivering this renewables revolution. It explains:
 - The path to 2020, and the balance of fuels and technologies that is most likely to achieve our challenging goal;
 - The strategic role the Government will adopt and the specific actions it will take to lead delivery;
 - The opportunities for individuals, communities and businesses to harness renewable energy and contribute to action against climate change.

The Path to 2020

- 2.1 The precise breakdown of the 2020 renewable energy target between technologies will depend on how investors respond to the incentives we put in place. However, our modelling suggests that renewables could provide more than 30% of our electricity (compared to around 5.5% today); more than two-thirds of that could come from on and offshore wind, but there could also be important contributions from hydro, sustainable bioenergy, marine sources and small-scale technologies. 12% of our heat could come from sustainable biomass, biogas, solar and heat pumps, supplying the equivalent of 4 million households with their current heating demands. And renewable sources could provide 10% of our road and rail transport energy. Chart 1 illustrates these shares in our 'lead scenario', in comparison to 2008 renewable energy use and projected 2020 levels based on current policies (i.e. before the measures in this Strategy are implemented).

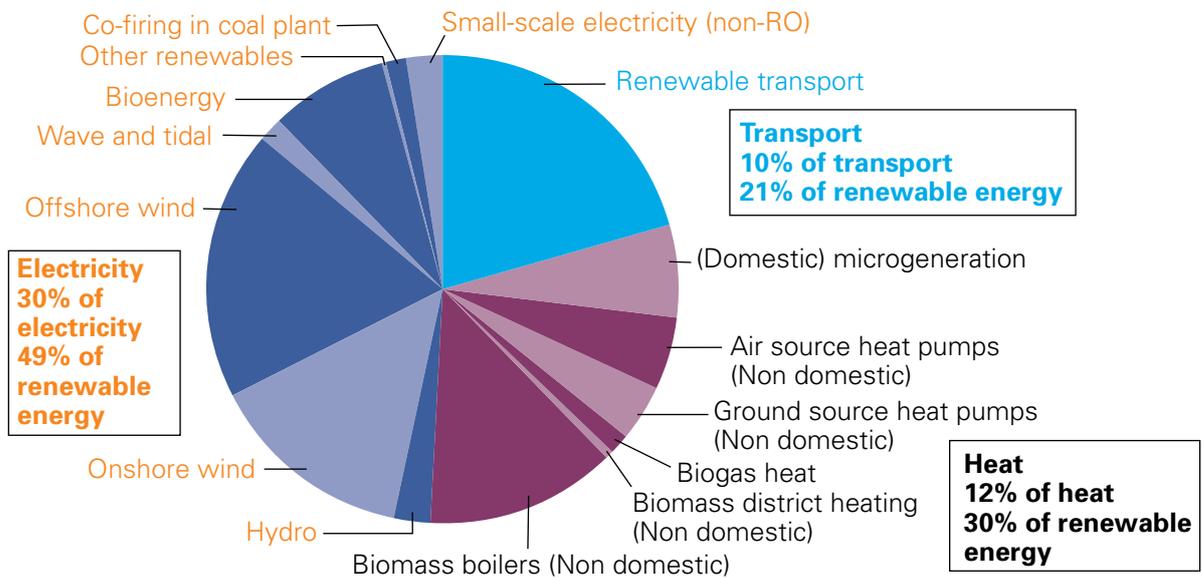
Chart 1:
The size of the challenge: A potential scenario to reach 15% renewable energy by 2020



Source: Energy Trends June 2009 and DECC internal analysis

2.2 Chart 2 presents an illustrative breakdown of the final shares of different types of renewables technology in 2020 based on the analysis for our ‘lead scenario’. As the next decade progresses we will learn more about the costs, benefits and potential of different technologies, so the 2020 target might be delivered differently across the sectors. But whatever the precise breakdown, we are putting in place the framework and taking the actions necessary to ensure that we meet our renewable goals. Our analysis indicates that the policies set out in this Strategy will put us on track to deliver 15% of our energy consumption from renewable sources by 2020.

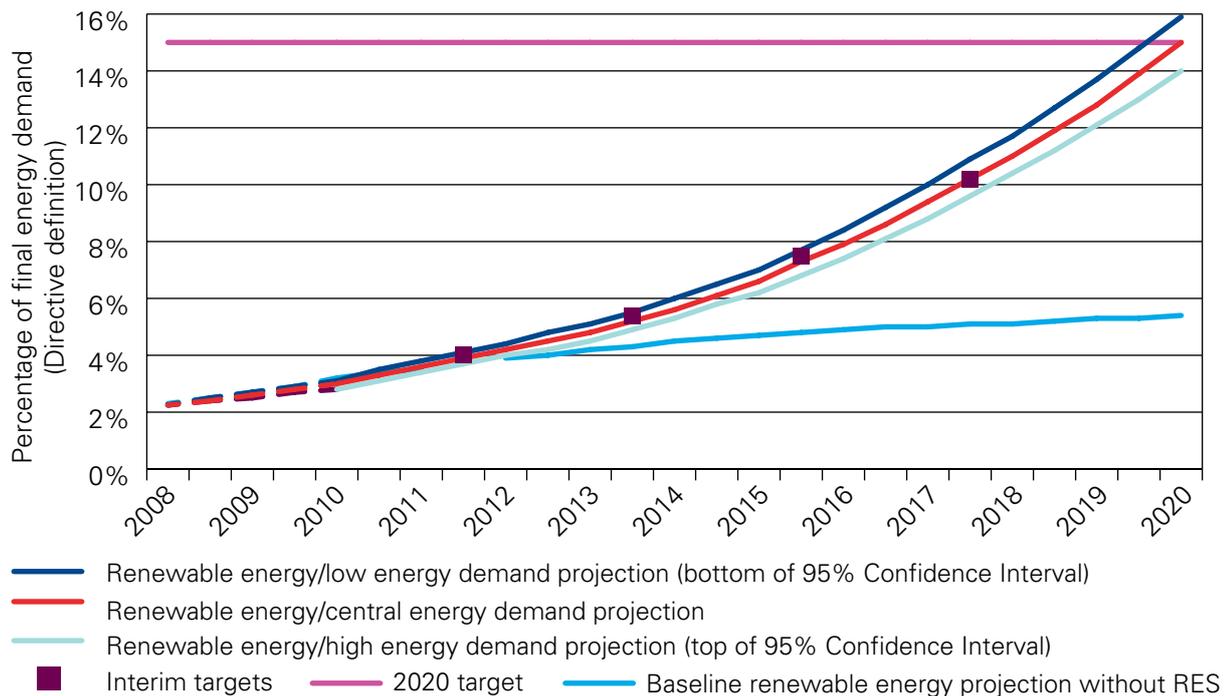
Chart 2:
Illustrative mix of technologies in lead scenario, 2020 (TWh)



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

2.3 The Commission has set indicative interim targets for the delivery of renewable energy to 2020. The first interim target (2011-12) will be the most challenging to meet, because of the time required to plan, finance and build renewable energy infrastructure. However, as presented in Chart 3, we expect that progress will accelerate towards 2020 as our new financial incentives take full effect.

Chart 3:
Lead scenario trajectory and interim targets



Source: DECC internal analysis

Notes:

1. The transport figures are based on the current trajectory for the Renewable Transport Fuel Obligation. DfT will be working with stakeholders to develop policy options and indicative trajectories for meeting the 2020 targets and will consult in early 2010.
2. The range of projections for demand represent the higher and lower estimates from the DECC energy model.

2.4 Delivering such a significant level of renewable energy will be very challenging, but we are fully committed to making it happen. With concerted efforts from all stakeholders, we firmly believe that we will achieve our renewable energy objectives for 2020 and beyond in a cost-effective way that is consistent with our wider objectives, including environmental sustainability. Everyone has a part to play. In particular, there will be a more active and strategic role for the Government, exploiting the dynamism of business to invest and build, while mobilising individuals and communities across the country.

A Strategic Role for Government

- 3.1 The Government will take a strategic role, ensuring that the right long-term regulatory and financial framework is in place to enable the market to deliver the increase we need in renewable energy. We will also work with delivery partners and stakeholders to overcome some of the key issues that affect the deployment of renewable technology. To deliver this renewables revolution we will need to provide:
- Greater financial support, targeting a wider range of technologies and groups in society;
 - Swifter delivery, including in the planning system, supply chains, grid connection and sustainable bioenergy;
 - A stronger push on new technologies and resources, to help reduce the cost of meeting our targets for 2020 and beyond.

Greater financial support

- 3.2 Tackling climate change and ensuring continued security of energy supply are increasingly urgent concerns. Market forces on their own will not achieve the necessary change towards a low-carbon energy mix sufficiently quickly and radically. The core of our strategy to overcome these market failures involves putting a price on carbon emissions through the EU Emissions Trading Scheme. But, as the Stern Review¹ emphasised, carbon pricing alone will not be sufficient to reduce emissions at the scale and pace required and more support is needed for renewable and innovative low-carbon technologies.
- 3.3 This Strategy sets out a framework of long-term, comprehensive and targeted financial support. The Renewables Obligation, which requires electricity suppliers to source a specified and increasing proportion of their electricity from renewable sources, is our key current mechanism for incentivising renewable electricity. Last year we introduced a Renewable Transport Fuel Obligation to require an increasing level of sustainable biofuels for road transport. We will now reform these instruments, or introduce new ones, to further increase renewable energy use. We have also taken steps to respond to the short-term impacts of the global financial crisis.
- 3.4 To achieve this we will:
- *Expand and extend our long-term incentive for major renewable electricity developments – the Renewables Obligation – to ensure that it can deliver around 30% renewable electricity by 2020. This will provide continued support for large-scale, centralised renewable electricity generation. We will consult on proposals to increase financial support for offshore wind.*

1 Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press

- *Introduce 'clean energy cash-back' for households, industry, businesses and communities to use renewable heat and small-scale clean electricity generation*, by introducing new guaranteed payments through Feed-In Tariffs from 2010, and a Renewable Heat Incentive by 2011. We have committed a further £45 million of additional grants to cover the interim period before the new incentive schemes take effect. This marks an important extension of our efforts to support non-centralised (or 'distributed') renewable energy generation.
- *Amend or replace the Renewable Transport Fuel Obligation* to impose an obligation designed to deliver 10% renewable energy consumed in transport by 2020, subject to sustainability controls. This will ensure that transport fuels contain a rising level of renewable biofuels automatically at the pump without the driver needing to take any specific action.
- *Deal with immediate pressures* resulting from the global financial crisis through facilitating up to £4 billion of lending from the European Investment Bank for renewable and other energy projects. This will help renewables industries to secure the necessary loans for deployment and provide the supply chain with greater confidence to grow their operations and take a share of the developing market.

Swifter delivery

- 3.5 Many parts of our infrastructure and industries were established for a world of incremental change. To achieve the rapid transformation that we will need over the next decade, the planning system, supply chains, connection to the grid and bioenergy supply will all have to step up their pace of change dramatically.
- 3.6 We have set up the Office for Renewable Energy Deployment (ORED) to work with all relevant stakeholders to make that change of pace happen. ORED has a clear remit to address deployment issues including working alongside the Department for Communities and Local Government (CLG) on planning and stimulating greater investment, and supply-chain development. ORED will work with a number of organisations that have a role to play in the delivery of these measures, including central Government, local and regional authorities, Government Offices, stakeholders such as the Carbon Trust and National Non-Food Crops Centre and planning bodies such as the Planning Advisory Service and Planning Inspectorate.
- 1) **Better planning for delivery:** Our planning system must enable renewable deployment in appropriate places, at the right time, and in a way that gives business the confidence to invest. Thus we must speed up the system and make it more predictable, while ensuring that we continue to protect our environment and natural heritage and respond to the legitimate concerns of local communities. Clearly we do not want to see large-scale renewable deployment in places where it is inappropriate. But in many more places where

such deployment is both appropriate and desirable, we are determined to make faster progress. We will:

- *Improve the planning process*, including through setting up an independent Infrastructure Planning Commission to take decisions on nationally significant projects in England and Wales, providing clear guidance for planners that recognises the national need for renewables, and streamlining the planning process.
- *Ensure a strategic approach to planning*, working with all the English regions to help ensure they have robust evidence-based strategies for delivering their renewable potential in line with our 2020 target. We will also work with the Devolved Administrations to ensure a UK-wide approach. Offshore, we have recently completed a full Strategic Environmental Assessment and concluded that 25 GW of development would be permissible. This is in addition to existing plans for 8 GW of offshore wind.
- *Support swifter delivery*, helping the planning community as they develop and implement local and regional energy planning and handle renewable and low-carbon energy applications, for example through supporting skills development and by building capacity.
- *Address the impacts of renewables deployment* by doing more to resolve spatial conflicts and develop generic solutions to mitigate the impacts of renewable technologies, notably air quality, environmental, navigational and aviation radar impacts.

2) **Stronger renewable industry:** We need to ensure that the renewables industry and its supply chain can deliver the unparalleled deployment required. We want to maximise the economic and employment opportunities for the UK in doing so, putting us at the forefront of global competition in the low-carbon economy. The UK must make the most of its strengths as one of the world's largest manufacturing economies, as a world class centre of expertise and as a leading location for inward investment. We will ensure this in part by setting a long-term vision as well as by providing finance. We are:

- *Investing in the UK renewables industry*, to develop the wider renewables supply chain; support next-generation technology development and demonstration, including substantial new capital grant funding and support for a new offshore wind testing facility; and build up the necessary infrastructure to support a growing renewables manufacturing sector, such as work to stimulate investment in UK ports.

-
- *Supporting large-scale investment* in the UK renewables sector by working with the financial sector, major manufacturers and potential investors to communicate UK energy policy and sell the strengths of the UK as a manufacturing base, and providing direct financial support for major investment in offshore wind manufacturing.
 - *Developing a comprehensive Renewables Skills Strategy* covering the full scope of the UK renewables sector, which will help provide the skilled workforce that the rapidly growing sector will need.
- 3) **Quicker, smarter grid connection:** We will invest in and manage the electricity grid so that new renewable and other forms of generation can connect when they need and on the terms they need. Therefore our actions will achieve:
- *More strategic investment in the grid.* We have agreed with industry a detailed vision of how the grid must be structured for 2020 and beyond. Ofgem is developing the incentives to encourage grid companies to invest the £4.7 billion required to deliver this, and we will shortly publish for consultation a Grid National Policy Statement to speed up planning approval.
 - *Investment in a new offshore grid.* We have launched an entirely new offshore transmission regime to provide clear, cost-effective and co-ordinated delivery of the grid connections needed for our growth in offshore wind. This will present opportunities for investment worth up to £15 billion.
 - *Quicker and fair connection to the grid.* We now have an interim 'connect and manage' approach to grid access to ensure new generators can connect to the grid. We are working closely with industry to develop longer-term grid access reforms and will use powers in the Energy Act 2008 to implement new rules urgently.
 - *A smarter grid.* We are leading work to develop the grid of the future that will automatically manage the variability of renewable sources, save energy and reduce costs. We are investing to develop the technologies to deliver this and later this year we will publish a vision for the smart grid, drawing on wider work for the 2050 vision.
- 4) **Using more sustainable bioenergy:** We will ramp up the supply and use of biomass for heat, power and transport while ensuring sustainability and protecting the environment. We will do this through:
- *Increasing supply* through bringing more woods back into management; incentivising energy crops and researching new ones; and making better use of biomass waste.

- *Ensuring sustainability* through better accounting for the sustainability of biomass and biofuels; developing robust sustainability criteria with the EU and internationally (including pressing for criteria relating to indirect sustainability impacts); and researching new opportunities for sustainable production.
- *Enabling the use of bioenergy* by ensuring improved fuel quality standards, protecting air quality, overcoming barriers to using biogas and developing the capability of road and other transport to use higher levels of biofuels.
- *Identifying new applications and sectors for bioenergy* through enabling the injection of renewable gas into the gas grid and looking at other transport sectors where biofuels could be used such as rail, aviation and shipping.

A stronger push on new resources and technologies

3.7 New sources of renewable energy supply can reduce the cost of meeting our targets and broaden and strengthen the UK supply base. We must analyse all possible sources of supply, and swiftly exploit those that can deliver energy affordably, securely and sustainably. To support new renewable energy sources, we will:

- *Decide whether to go ahead with a Severn tidal power scheme.* Alongside this Strategy, we are publishing the shortlist of potential Severn tidal power projects. Also announced today are the innovative proposals being developed through the Severn Embryonic Technologies Scheme. The Government has committed an additional £500,000 to help develop these new ideas.
- *Ensure a strategic approach,* working with industry to develop a clear vision of the technologies we need to deliver our low-carbon goals for 2020 and beyond, coordinating the mechanisms that already exist to support this, and developing detailed action plans for the key renewable and other technology families involved.
- *Support investment in key emerging technologies with total funding from DECC of around £450 million over two years and with substantial funding from other parts of Government.* We are supporting technologies which could make a significant contribution to our longer-term energy and climate needs. Marine energy is one such technology, which is why we intend to develop a Marine Action Plan and are increasing investment by up to £60 million to help accelerate development and deployment in wave and tidal generation. We are also supporting offshore wind, advanced biofuels and electric vehicles.

The Role of Communities, Individuals and Businesses

- 4.1 Through the policies in this Strategy, the Government is creating the markets and rules to encourage renewables investment and development, remove the hurdles to development and pull forward new technologies. However, making this radical transformation a reality will require us all to play a part.
- 4.2 Every community will have an opportunity to harness renewable resources and the benefits they bring. The Government will help households, communities and businesses who want to install renewable generation by introducing new mechanisms for financial support, improving advice and ensuring robust industry standards. We will explore how this can be structured to allow everyone to access these benefits, not just those with capital to invest.
- 4.3 At the heart of our Strategy is an approach that is based on an assessment of the renewables capacity and constraints to deployment in each region and which seeks to ensure willing engagement by regional bodies, Local Authorities and communities. Through the planning system, communities will play an integral role in decisions on where renewable generation is located. Developers of large-scale projects will be encouraged to share the benefits of those developments with local communities, and the Renewables Advisory Board will publish a new toolkit to help them do so. We will also ensure that the public sector leads by example, through tough low-carbon targets for Government Departments, robust assessment of renewable potential, and increasing the incentives for renewable deployment on its own land.

What this Strategy will Deliver

- 5.1 There is no low-cost, high-carbon option for the future. The Stern Review made it clear that the costs of inaction on climate change far outweigh the costs of action today. A high-carbon world is one with more extreme weather, where we and our children are faced with the costs of adapting the way we live and the infrastructure and systems that support us. We must face up to these challenges and make the necessary investment to move to a low-carbon economy now. We estimate that this Strategy will:
 - Set us on a path towards decarbonising the production of energy in the UK, alongside nuclear and carbon capture and storage. It will provide cumulative savings of 755 MtCO₂ between now and 2030, of which 535 MtCO₂ will help us to meet our Emissions Trading System caps and 220 MtCO₂ will provide additional CO₂ reductions. Within these additional savings, the 73 MtCO₂ saved over the third carbon budget period (2018–2022) will deliver about a sixth of the abatement needed to meet this third budget.

- Contribute to the security of energy supplies in the UK through reductions in our demand for fossil fuels of around 10%, and gas imports by between 20-30% against our forecast use in 2020.
- Bring outstanding business opportunities and enable the UK to restructure into a low-carbon economy, providing around £100 billion of investment opportunities and contribute to the creation of up to half a million more jobs in the UK renewable energy sector.

5.2 However, delivering action against climate change through greater use of renewables will come at a cost and bring risks that need to be managed. In particular:

- The new package of measures announced in the UK Low Carbon Transition Plan, which includes not just the Renewable Energy Strategy but also a number of other policies, will add on average an additional 6% to today's household energy bills by 2020. Including all previously announced climate policies will increase this figure to 8%. The Government estimates that, taken in isolation, the measures included in this Renewable Energy Strategy would increase household electricity bills by 15% and gas bills by 23% by 2020 compared to what they would have been without these measures. The overall bill impacts of the UK Low Transition Plan are considerably lower primarily because they include policies for greater energy efficiency, and hence reduce energy bills. The Government is also continuing to take action to ensure that the most vulnerable are protected. More detail on the Government's action to tackle fuel poverty is set out in the UK Low Carbon Transition Plan.
- The increase in wind generation implied by this Strategy could have implications for the security of the electricity supply. However, our analysis suggests that the issues can be managed under current arrangements to at least 2020; that the necessary flexible fossil-fuel generation remains economically viable; and the key determinants of how much new nuclear will be built are likely to be nuclear capital costs and future expectation of fossil fuel prices and particularly carbon prices rather than renewable deployment. We will continue to keep these issues under close review, and take any necessary action to ensure this continues to be manageable. National Grid has also recently held a consultation on operating the electricity system to 2020, which looks at how to meet the challenges of physically balancing the system, and concludes that these are manageable.²

2 National Grid (2009): 'Operating the Electricity Transmission Networks in 2020: Initial Consultation'

- While this Strategy will have significant environmental benefits, in particular by contributing to global action against climate change, there will also be some pressures on the local environment and natural heritage from new infrastructure and increased use of bioenergy. We will seek to minimise negative impacts through proper application of planning and environmental controls.

5.3 This Renewable Energy Strategy is an integral part of the Government's overall UK Low Carbon Transition Plan³ delivering the clean, secure and affordable energy of the future. We believe that the actions set out in this Strategy – and associated policies for nuclear, carbon capture and storage, heat and energy saving and transport – will deliver the decarbonised energy system we need to tackle climate change; maximise our economic opportunities; spread the costs fairly; and keep our energy supplies safe and secure.

3 DECC (2009): 'The UK Low Carbon Transition Plan'



Image: Thames Barrier
Source: Environment Agency

Chapter 1:

The Case for Renewable Energy

Summary

Accelerating the uptake of renewable energy will help us meet our goal of decarbonising energy production in the UK, while ensuring secure and safe energy supplies and exploiting the significant economic opportunities of the move to a low-carbon economy. It will also enable us to meet our EU renewable energy target to source 15% of our energy from renewables by 2020.

Renewable energy is therefore a key part of the overall UK Low Carbon Transition Plan, and sits alongside our ambitions for other low-carbon technologies such as nuclear and carbon capture and storage.

The UK has an abundance of renewable energy resources. We have made good progress to date but will need much greater levels of renewables if we are to deliver our vision for 2020 and beyond.

The Role of Renewable Energy

1.1 The UK needs a radical increase in the use of renewable energy. This is an integral part of our strategy to decarbonise energy production in the UK, to ensure secure and safe energy supplies, spread the costs fairly and to exploit the significant economic opportunities of the move to a low-carbon economy. Meeting our goals over the coming decades will be a significant challenge. But renewable energy has a key role to play in enabling us to meet this challenge, alongside energy saving, nuclear power, carbon capture and storage and other low-carbon technologies.

Decarbonising the UK

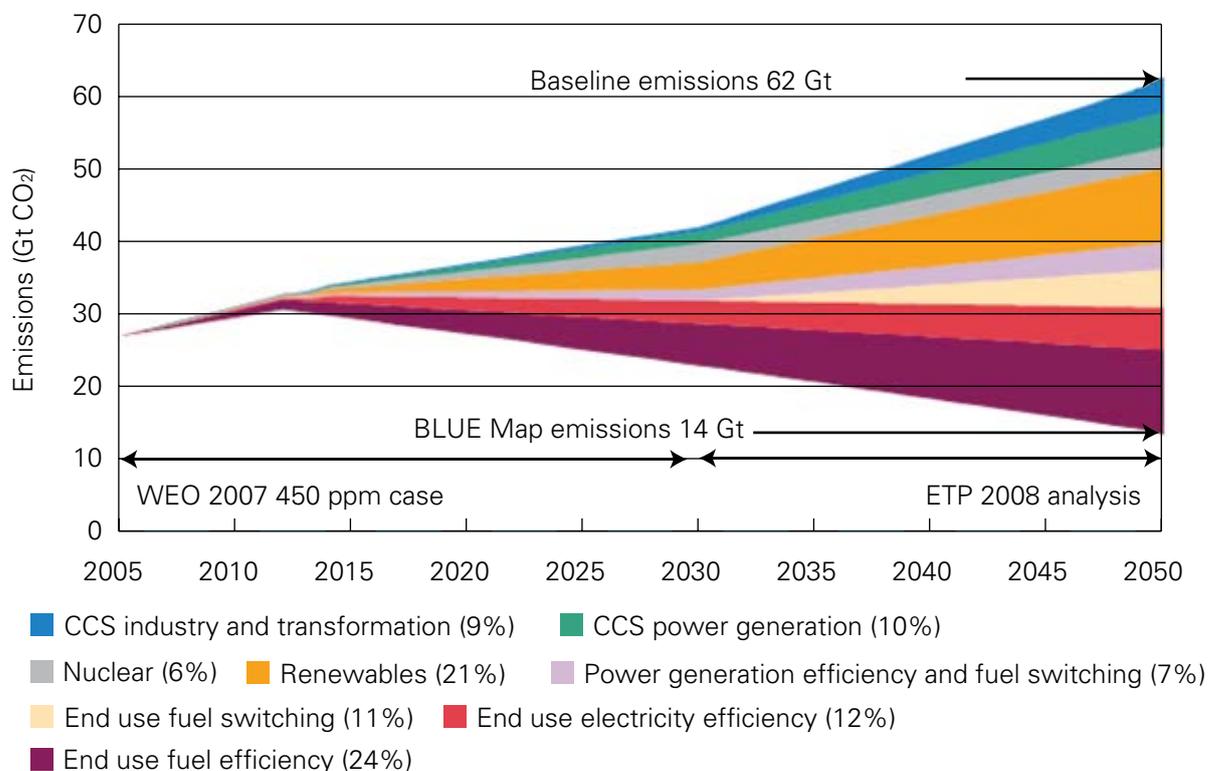
1.2 Climate change threatens the way of life of all citizens in the UK and the rest of the world. Rising sea levels will threaten coastlines and put millions of people at risk. Temperature rises and extreme weather events such as flooding and drought will affect people's health and way of life and cause irreversible loss of many species of plants and animals. The UK will have to adapt to a climate with more extreme events including heat waves, storms and floods as well as more gradual changes, such as in the patterns of the seasons. The Stern Review⁵ has shown that there is a clear business case, as well as a moral one, to take action to reduce the risks of dangerous climate change.

1.3 We are already locked into a significant degree of climate change. We need to take urgent action globally and domestically to tackle the causes of climate change and minimise the risk of this rising to dangerous levels. This means radically transforming the way that we generate and use energy: energy production currently accounts for the largest share of UK emissions of all greenhouse gases.

⁵ Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press

- 1.4 More efficient use of energy across all sectors of the economy provides the most immediate, cost-effective way to reduce our emissions. But it is also crucial that we change the mix of fuel used in the generation of energy. There is a much greater role for low-carbon and renewable forms of energy generation.
- 1.5 The importance of renewables in this transition has been widely recognised. For example, in the International Energy Agency’s ‘BLUE Map’ scenario (see Chart 1.1 below) for meeting a 50% reduction in global greenhouse gas emissions by 2050, 21% of the reduction comes through the use of renewables.⁶

Chart 1.1:
Contribution of global emission reduction options 2005-2050⁷



- 1.6 For the UK, the Government recognises that most analysis, including recent work by the CBI and the Committee on Climate Change,⁸ points to the need to aggressively reduce emissions from electricity generation, and will continue to act to do so. Later decarbonisation of the heat and transport sectors could potentially come in large part through electric heat and electric transport. This could significantly increase electricity demand, boosting the requirement for low-carbon electricity, including renewable electricity, still further.

6 International Energy Agency (2008): ‘Energy Technology Perspectives 2008’

7 Source: IEA Energy Perspectives 2008

8 Committee on Climate Change (2008): ‘Building a low-carbon economy – the UK’s contribution to tackling climate change’

Box 1.1: International and domestic framework

International framework

The UK plays a leading role in tackling climate change at the international level, working through the EU, G8 and UN Framework Convention on Climate Change. Crucial to achieving our climate change goals is securing a global agreement to a realistic, robust, durable and fair framework for the post-2012 period, when the first set of targets under the Kyoto Protocol expire. At the UN Bali Climate Change Conference in December 2007, agreement was reached to launch negotiations for a global and comprehensive agreement, to be concluded in December 2009 at the UN Climate Change Conference in Copenhagen.

UK carbon budgets

The Climate Change Act, which came into force in November 2008, creates a new legal framework for the UK to reduce, through domestic and international action, greenhouse gas emissions to at least 80% below 1990 levels by 2050. The Government is required to set five-year carbon budgets, which place binding limits on greenhouse gas emissions and define the trajectory towards the 2050 target.

Following advice received in December 2008 from the independent Committee on Climate Change, the Government announced the level of the first three carbon budgets (2008-2012, 2013-2017, and 2018-2022) and published its response to the Committee on Climate Change's advice alongside the Budget on 22 April 2009.⁹ The levels of the first three carbon budgets were approved by Parliament in May 2009, and are now set in law. They require greenhouse gas emissions to be reduced by at least 34% in the third budget period, relative to 1990 levels.

The Government's UK Low Carbon Transition Plan, published alongside the Renewable Energy Strategy, responds in more detail to the Committee's advice and meets the requirement in the Act to set out its proposals and policies for meeting the first three carbon budgets.

Secure and safe energy supplies

- 1.7 At the same time, over the next few decades, the growth in global demand for energy and the depletion of our North Sea oil and gas resources mean that we need to re-think our approach to sourcing and using energy. By reducing fossil fuel demand, the Renewable Energy Strategy will help mitigate the trend towards greater dependency on imported fossil fuels we expect to 2020. The Government estimates that achieving the 15% renewable energy target will lead to a reduction in overall fossil fuel demand by around 10% and gas imports by between 20–30% against what they would have been in 2020. This will make a significant contribution to the security of fuel supplies. However, as the majority of the

9 HM Treasury (2009): 'Building a low carbon economy: implementing the Climate Change Act 2008', TSO

increase in renewable electricity generation is likely to come from wind, whose supply is intermittent, back-up capacity will be required from flexible fossil-fuel power stations.

Maximising Economic Opportunities

- 1.8 Climate change is not only one of the most significant challenges of our generation; it also presents a huge opportunity. Supplying the demands of a low-carbon economy offers a significant potential contribution to the economic growth and job creation in the UK, not only as part of our short-term economic recovery but also through sustainable growth over the decades to come. The Government has set out its plans for this economic transformation with the publication of the UK Low Carbon Industrial Strategy¹⁰ which will develop the UK's approach for delivering the maximum economic benefits.
- 1.9 We estimate that up to half a million additional jobs might be generated in the UK renewables sector and its supply chains.¹¹ The current economic difficulties make this even more important: now is not the time to scale back our ambitions on tackling climate change and securing our energy supplies. The increased levels of investment in renewable energy in the UK and across Europe over the next decade and beyond will involve significant adjustment costs, but the high investment in renewable energy has the potential to boost our economy in the short term and will help kick-start our long-term transition to a low-carbon economy.

Taking Action

- 1.10 Government policy has long recognised the role for renewables in meeting our energy and climate change goals. The UK has substantial renewable energy resources (see Box 1.2), which we are already exploiting.

Box 1.2: Renewable resources in the UK

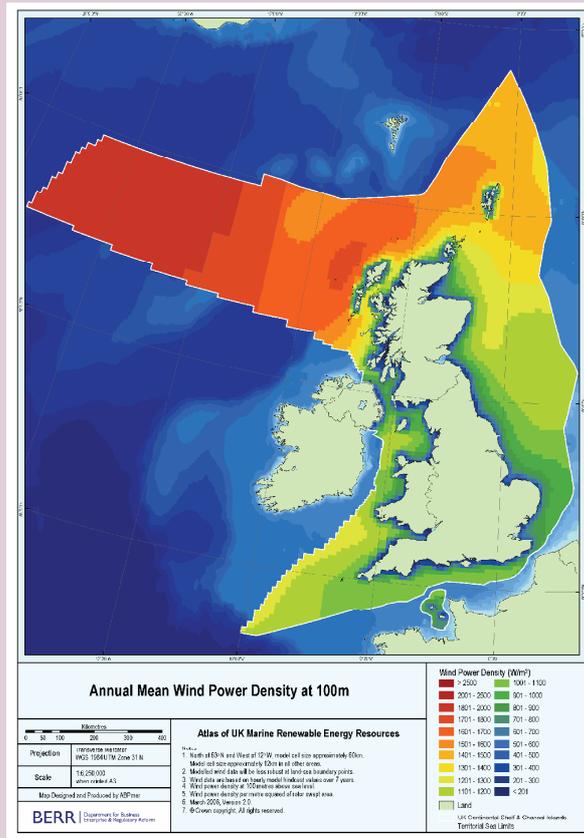
Wind power is currently one of the most developed and cost-effective renewable electricity technologies. The UK has the largest potential wind energy resource in Europe.¹² While offshore wind is more technologically challenging and more expensive than onshore wind, it has a larger potential due to a stronger and more consistent wind resource out to sea, leading to higher power outputs per turbine and more hours spent generating each year.

10 BIS and DECC (2009): 'The UK Low Carbon Industrial Strategy', Crown copyright

11 Renewable Energy Strategy estimate, explained in detail in Chapter 7

12 Sustainable Development Commission (2005): 'Wind Power in the UK'

Figure 1.2:
Offshore wind potential in the UK (measured by annual mean wind power density at 100m)¹³



Due to the direction of the prevailing winds and the size of the Atlantic Ocean, the UK has wave power levels that are among the highest in the world. **Wave energy** is still at an early stage of development, but in the long term it has as much potential exploitable resource as onshore wind.¹⁴

Tidal power could also make a valuable contribution to the UK’s electricity system. Although variable, it is reliable and predictable. There are two types of tidal power – tidal range (exploiting the size of the tides) and tidal stream (using the speed of tidal currents). Although well established, tidal range power remains relatively expensive and there are few applications worldwide. The UK, however, has extensive tidal range resource in the Severn Estuary and there are several other smaller sites along the west coasts of England and Wales. Like wave, tidal stream technology has yet to be fully commercialised, but has the potential to deliver some capacity by 2020.¹⁵

13 Source: BERR (2007): ‘Marine Energy Atlas’

14 SKM (2008): ‘Quantification of constraints on the Growth of UK Renewable Generating Capacity’, AEA/Sinclair Knight Merz

15 SKM (2008): ‘Quantification of constraints on the Growth of UK Renewable Generating Capacity’, AEA/Sinclair Knight Merz

The UK **biomass** sector has the potential to expand without detrimental effects on food supplies and the environment if done in a sustainable manner. Greater recovery of wood from managed and unmanaged woodland, increasing the planting of energy crops, and better exploitation of the existing supply of organic waste materials, could make a significant contribution to our energy targets, particularly in the electricity and heat sectors.

The UK **biofuels** industry is still relatively small and so far in 2008-09 has supplied just under 10% of biofuels consumed in the UK. However, there is great potential for the UK to expand its production of sustainable biofuel in the future, although we will expect to see a significant amount of biofuel to be imported from overseas. It is feasible that given the development of more advanced technologies for producing biodiesel and bioethanol we could use a greater range of biomass feedstocks (crops and waste), increasing domestic supply of biofuel further.

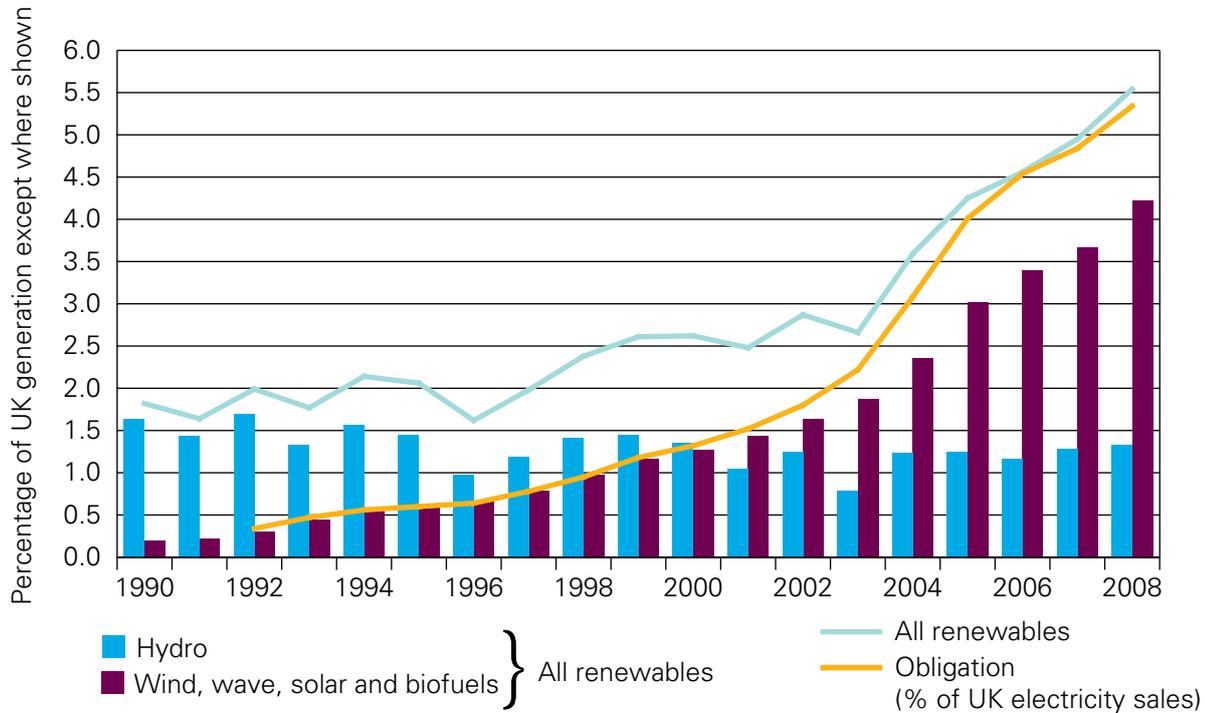
The UK has significant **solar and thermal resources**. In the UK, a solar thermal roof installation can generate a proportion of a UK household's annual demand for hot water. Photovoltaic panels can generate renewable electricity for on-site use, or for export to the grid, even when the sky is overcast. Thermal energy can also be harnessed through the use of heat pumps.

Hydropower is a reliable and generally predictable source of renewable electricity and one of the few that is not intermittent. Although the UK hydro sector is a mature sector, there remain good opportunities to exploit hydropower resources, for micro and small-scale hydro development.

- 1.11 Our key mechanism for delivering renewable electricity has been the Renewables Obligation (RO), which provides financial support to generators of renewable electricity. The introduction of the RO in 2002 incentivised rapid growth, with renewables now contributing to 5.5% of total electricity generation – see Chart 1.2. In 2008 the UK overtook Denmark as the world number one for installed offshore wind capacity. Furthermore, the UK is one of only a few countries operating more than 3 GW of wind, on and offshore – which is enough to supply around 1.5 million homes. The wind farms under construction today and those consented awaiting construction, will together produce enough electricity for another 5 million homes. In transport, the Renewable Transport Fuel Obligation started operation in April 2008, and approximately 2.6% of road transport fuel came from biofuels in 2008/09.¹⁶

16 HMRC Hydrocarbon Oil Bulletin, May 09; and Renewable Fuels Agency

Chart 1.2:
Growth in electricity generation from renewable sources¹⁷



1.12 But we need to do a lot more. In recognition of the benefits of renewable energy, in spring 2007 the Government helped secure EU agreement to an ambitious target to obtain 20% of the EU’s total energy consumption – a combination of electricity, heat and transport – from renewable sources by 2020 (see Box 1.3). Effort sharing of the overall target between Member States has now been agreed.¹⁸ The UK has committed to provide renewable sources for 15% of its total energy use by 2020 from renewable sources: the largest percentage point increase of any Member State.

¹⁷ DECC (2009): ‘Energy Trends’

¹⁸ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources

Box 1.3: EU Climate and Energy package

The EU Climate and Energy package, formally agreed in April 2009,¹⁹ commits the EU to achieving a reduction in EU greenhouse gas emissions of 20% by 2020, increasing to up to 30% in the event of an international agreement on climate change, compared to 1990 levels. The package includes a binding renewables target of 20%. The UK's share of this target is to deliver 15% renewable energy by 2020. Other key elements are proposals for strengthening the EU Emissions Trading System (EU ETS), proposed targets for each Member State to reduce emissions in sectors not covered by the EU ETS (16% for the UK, compared to 2005 levels) and plans both for promoting and regulating the deployment of carbon capture and storage technologies.

- 1.13 In June 2008, we launched a consultation on how best to meet this target. We received 748 responses to the consultation, which covered a wide range of issues and policies.²⁰ The summary of responses, published in February 2009,²¹ shows that the majority of respondents agreed with the assessments and proposals set out in the consultation document on most issues. There was also a consensus that Government should be doing more on the many issues raised. The executive summary is reproduced at Annex A.
- 1.14 Following our Renewable Energy Strategy consultation last year, we have made significant progress. We have:
- Announced that we will strengthen and extend the Renewables Obligation, and announced a new Renewable Heat Incentive for renewable heat at all scales and Feed-In Tariffs for small-scale renewable electricity as part of the Energy Act 2008;
 - Set out a strategic vision for the electricity grid needed to deliver our 2020 renewable and wider energy goals;
 - Introduced an interim 'connect and manage' approach to allow new renewable and other generation to secure faster grid connections;
 - Moved rapidly to implement the Planning Act 2008, including action to set up a new independent Infrastructure Planning Commission to determine nationally significant projects under the Planning Act 2008;
 - Adopted a plan for some further 25 GW of new offshore wind capacity and launched a new offshore transmission regime to deliver the grid connections this requires;

19 EU Climate and Energy package 2008

20 BERR (2008): 'UK Renewable Energy Strategy: Consultation'

21 DECC (2009): 'UK Renewable Energy Strategy: Analysis of Consultation Responses'

- Launched a consultation on a shortlist of potential Severn tidal power schemes, and agreed funding for the Severn Embryonic Technologies Scheme;
- Set out a means for increasing the scope and ambition of our energy saving measures, as well as decarbonising the generation and supply of heat in the Heat and Energy Savings Strategy consultation.²²

1.15 This Renewable Energy Strategy builds on last year's consultation and the responses received; sets out the range of practical measures taken since then; and presents updated analysis. It is one of a number of announcements that the Government will publish this year under its overarching UK Low Carbon Transition Plan (see Box 1.4). It also provides the basis for the national action plan to meet our target for renewables, which we will submit to the European Commission by July 2010.

1.16 We do not have all the answers: there are significant uncertainties surrounding factors such as future fossil fuel prices, technology costs, and carbon impacts that influence what carbon abatement route should be taken to 2050. The Government's approach is not to look for silver bullets, but rather to support a portfolio of high-potential technologies where Government intervention can be most effective.

Box 1.4: The UK Low Carbon Transition Plan²³

The UK Low Carbon Transition Plan establishes a roadmap for the decarbonisation of the UK. The White Paper sets out the actions we are going to take to achieve this in practice while maximising economic opportunities, spreading the costs fairly, and keeping energy supplies safe and secure. The approach will be based around measures to promote a competitive energy market, making polluters pay for the carbon they use, supporting technological development and helping people make low carbon choices. The Plan will require appropriate policies across a number of Government Departments; some policies are already in place, some are to be developed and some new ones to be created.

22 DECC (2009): 'Heat and Energy Saving Strategy Consultation'

23 DECC (2009): 'The UK Low Carbon Transition Plan'

The Strategy

1.17 This Renewable Energy Strategy sets out the actions that the Government and others will take to increase the share of renewable energy almost seven fold. The measures in this document will set a policy that will allow and encourage each sector to respond. The policy framework is made up of three key components: greater financial support, swifter delivery and new resources and technologies. Successful delivery will require leadership and partnership, with a role to play for everyone.



Chapter 2:

Delivery in Electricity, Heat and Transport

Summary

We need to understand how our 15% renewable energy target might be delivered across the three energy sectors of heat, electricity and transport – and the trajectory to 2020.

This chapter sets out a scenario for what each sector, could contribute and what that might mean. The trajectory sets out how we can meet our interim targets and our 2020 target for renewable energy.

Within the constraints for each sector, and looking at the least-cost technologies that can be delivered domestically, our analysis suggests that one way we might deliver the target would mean that, by 2020:

- **around 30% of our electricity supply is renewable (including 2% from small-scale generation)**
- **12% of our heat supply is renewable**
- **10% of our transport supply is renewable**

Introduction

- 2.1 The Government is committed to achieving the UK's 15% renewable energy target by 2020.²⁴ We need to understand how this target might be delivered across the three energy sectors of heat, electricity and transport. To do this we have modelled different 'scenarios' using updated analysis about the costs, carbon savings and the potential for deploying these renewable technologies.²⁵
- 2.2 The scenarios demonstrate how it might be possible to achieve our target and allow us to analyse some of the impacts, costs and benefits (discussed further in Chapter 7). They also help us shape the policy framework and the level of the financial incentives required to deliver in each sector.
- 2.3 Throughout this document we present the results of a 'lead scenario'. It is important to recognise that we may reach our renewable energy goals in different ways, depending on how the drivers to investment, supply chain and non-financial barriers evolve. As a result, the lead scenario presented in this Strategy should not be used as a sector or technology target.

24 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources

25 See Redpoint /Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform'; NERA/AEA (2009): 'The UK supply curve for Renewable Heat'; and Element/Pöyry (2009): 'Design of a Feed-In Tariff for sub-5 MW electricity in GB' – all publication pending

Energy Demand in 2020

- 2.4 The starting point of our analysis, and a key determinant of how much renewable energy is required to meet the 15% target, is the forecast of final energy demand in 2020.
- 2.5 Our central projections of energy demand in 2020, set out Table 2.1, indicate that achieving 15% renewable energy by 2020 would require an increase from nearly 40 TWh of renewable energy in 2008, to just under 240 TWh in 2020. This is a fall from the previous estimate of 263 TWh set out in the Renewable Energy Strategy consultation.²⁶ This change is due to reductions in the estimates of how much energy the UK will consume across all three sectors in 2020 and changes in how Member States measure the contribution of aviation to overall energy consumption (agreed in the Renewable Energy Directive). Projections are, of course, subject to uncertainty.

Table 2.1:
Final energy consumption in 2008 and projected for 2020

	2008		2020	
	All Energy (TWh)	Renewable Energy (TWh)	All Energy (TWh)	Renewable Energy for 'lead scenario' (TWh)
Electricity	387	22	386	117
Heat	711	7	599	72
Transport	598	9	605	49
Total final energy consumption (EU Definition)	1695	39	1590	239

Notes

1. The heat and transport sectors exclude electricity used in these sectors which is included in the electricity sector.
2. Under the provisions of the Renewable Energy Directive, the share of renewables in the transport sector is calculated in relation to total surface transport (road and rail) only, i.e. excluding aviation and shipping, but all forms of transport can count towards the target. Using this definition, the 49 TWh renewable energy from transport represents 10%.
3. Total energy and transport consumption figures are in line with the definition agreed in the EU Directive, which caps energy consumed in aviation.
4. Totals may not sum owing to rounding.

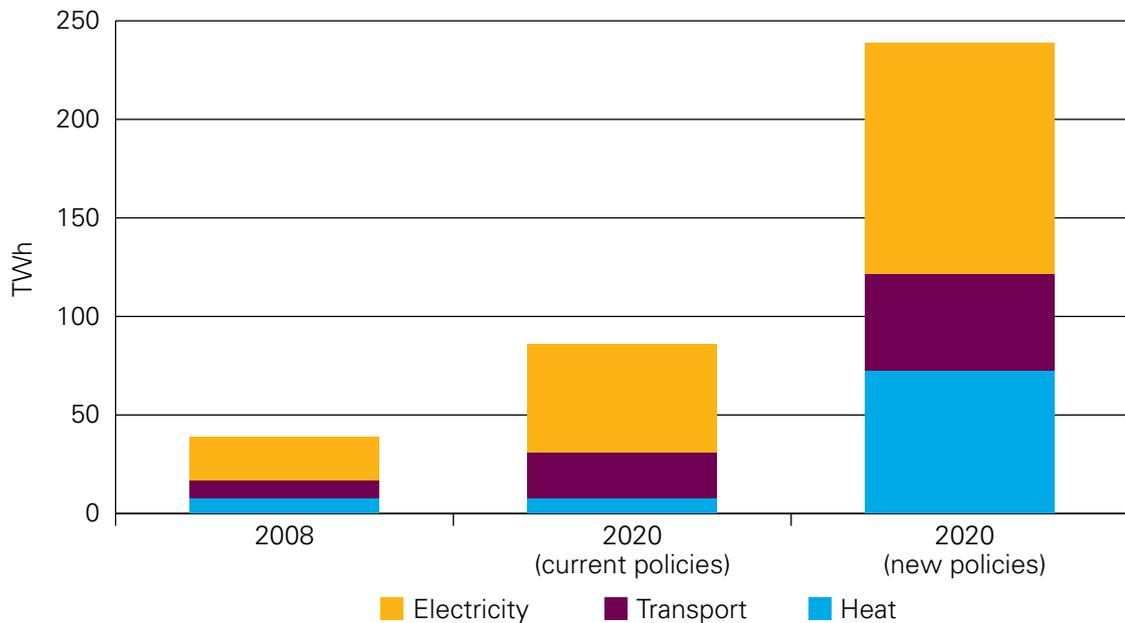
26 BERR (2008): 'The Renewable Energy Strategy: Consultation'

The Path to 2020

- 2.6 The increase in renewable energy required to meet the target could be achieved in a number of different ways, depending on the contributions from each of the three energy sectors of heat, electricity and transport, and the actual final energy demand in 2020. Here we present our 'lead scenario', but alternative scenarios are presented in accompanying Impact Assessments.
- 2.7 Our analysis indicates that delivering 15% renewable energy by 2020 is feasible and could be best achieved with the following proportion of energy consumption in each sector coming from renewables:
- About 30% of electricity demand, including 2% from small-scale sources (117 TWh);
 - 12% of heat demand (72 TWh);
 - 10% of transport demand (49 TWh).²⁷
- 2.8 This 'lead scenario' does not assume a role for joint projects (meeting part of the target through supporting deployment abroad, as is permitted under the Renewable Energy Directive). Chapter 8 sets out our policy on joint projects in more detail. The scenario also excludes the possible contribution from Severn tidal power as this is currently being considered in a feasibility study.
- 2.9 Chart 2.1 below shows the scale of the challenge involved in each sector, and that a radical increase in current rates of deployment will be required. Our analysis suggests that each sector will have to deliver at close to its maximum potential in order for the UK to meet the renewable energy target.

²⁷ As per the terms of the Renewable Energy Directive, consumption in aviation is capped.

Chart 2.1:
The size of the challenge – a potential scenario to reach 15% renewable energy by 2020

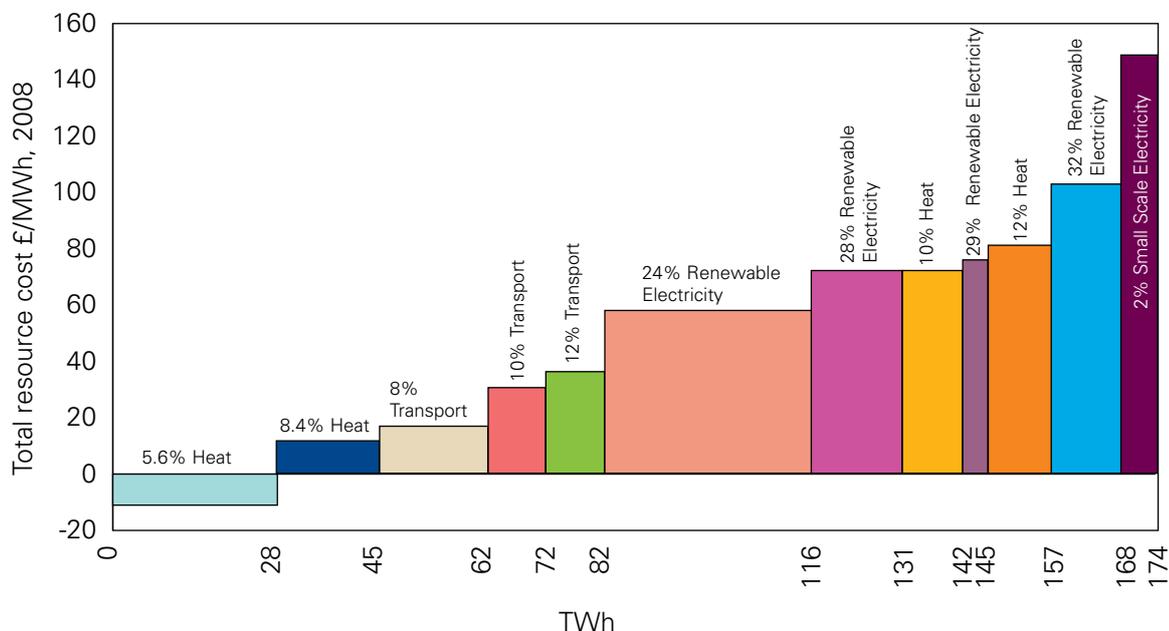


Source: Energy Trends June 2009 and DECC internal analysis

2.10 The choice of a lead scenario was made through balancing a number of key considerations including: cost-effectiveness, and the impact on consumer prices; sustainability; an assessment of the deployment potential of different technologies; the impact on electricity security of supply; the level of carbon abatement; compatibility with longer-term climate change goals; and the need to engage communities and individuals. More detail on this is given in Annex E. Cost-effectiveness was a key criterion. In order to judge this, we compared the cost per unit of renewable energy generated (MWh) of the different technologies and sectors. Chart 2.2 below illustrates the additional costs per MWh of using different levels of renewable heat, electricity and transport. These are based on results from modelling the cost of generation in each of the sectors. As costs are uncertain and will vary in the longer term, these relative costs may change going forward, and other technologies may prove to be more cost effective.

Chart 2.2:

Marginal resource costs for different levels of renewable generation by sector in 2020



Source: DECC and DfT internal analysis, based on: Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform'; NERA/AEA (2009): 'The UK supply curve for Renewable Heat'; Element/Pöyry (2009): 'Design of a Feed-In Target for sub-5 MW electricity in GB'.

Outcome for each Energy Sector

- 2.11 Since the publication of the Renewable Energy Strategy consultation document, the Government has engaged closely with stakeholders on the challenges and potential growth of sectors and individual technologies, as well as undertaking further independent consultancy work.²⁸ Using this information, we have updated our estimates of which individual technologies might be able to deliver the lead scenario most cost-effectively, given the constraints and our policy goals.
- 2.12 Chart 2.3 presents a breakdown for each sector and technology. This breakdown is purely illustrative, based on a range of assumptions including how industry growth rates can expand in the future, which new technologies will become commercially viable, and supply chain response rates. Because these are very difficult to predict, in practice it is likely that the level of each renewable technology will evolve differently, and the final mix in 2020 will differ from that shown here. Within the policy framework provided by this strategy, the market

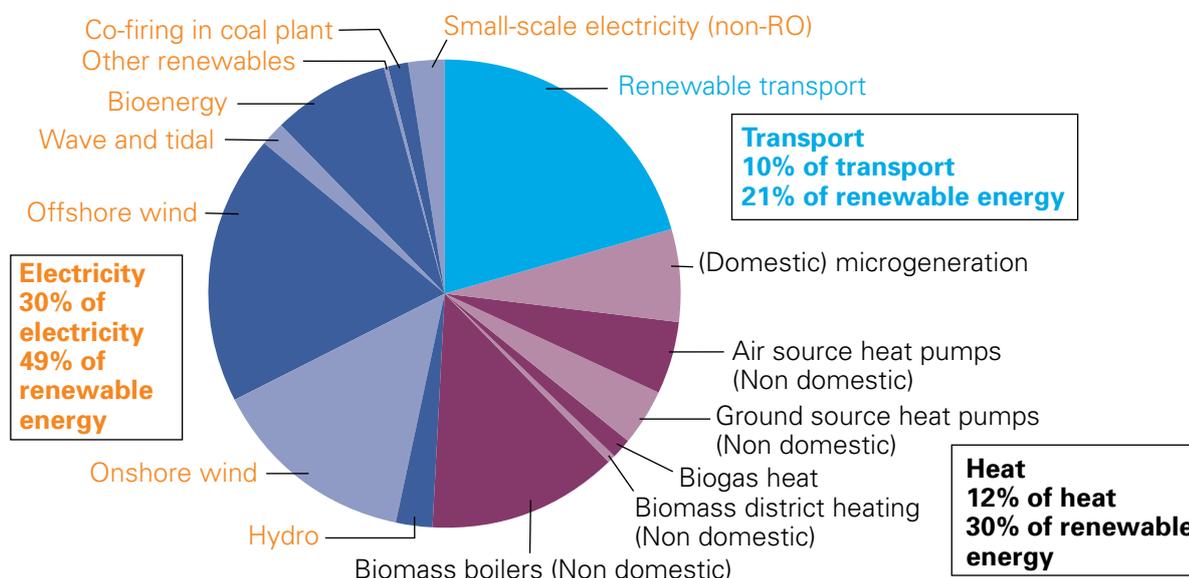
28 See Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform'; NERA/AEA (2009): 'The UK supply curve for Renewable Heat'; E4Tech (2009): 'Biomass supply curves for the UK'; and Element/Pöyry (2009): 'Design of a Feed-In Tariff for sub-5 MW electricity in GB'

will determine what technologies should be deployed and how quickly they can be put in place.

- 2.13 In the responses to our consultation, some stakeholders told us that they thought they could deliver more and some less than the illustrative mix shown at that time. As far as possible, we tried to take these views into account. But the key message is that the technology breakdown does not represent a target for individual technologies, rather it presents a particular outcome from modelling costs and build rates across a range of technologies. There is nothing to stop industry groups expanding further than this illustrative mix, if supply chains and build rates can deliver faster than the assumptions underlying the analysis.
- 2.14 In particular, in the case of offshore wind, our ambitions are for much greater levels of deployment than shown in Chart 2.3. Discussions with the offshore wind industry suggest that far higher levels may indeed be possible. Estimates of what is achievable are nearer to 20 GW²⁹ and the Strategic Environmental Assessment recently undertaken for offshore energy indicates that a further 25 GW is feasible by 2020, in addition to that already deployed.³⁰ In all cases, the estimated contributions for each technology in this lead scenario are in no sense an upper limit on our ambitions.
- 2.15 Given the uncertainty about how the market will respond to the policies set out in this Strategy and the challenging timescales for delivering our target, we may need to adjust and refine our interventions. We will update our forecasts periodically with new information, and as the actual level of renewables deployment emerges.

29 See Renewables Advisory Board (2008): '2020 Vision – How the UK can meet its target of 15% renewable energy' and BWEA (2009): 'Powering a Green Economy: Wind, Wave & Tidal's contribution to Britain's industrial future'

30 See the SEA website for full details and copies of all related reports: <http://www.offshore-sea.org.uk>. The figure of 25 GW relates to new capacity (on top of existing plans for 8 GW from previous leasing Rounds) in the UK Renewable Energy Zone and the territorial waters of England and Wales, in water depths of up to 60m. The Scottish Executive is in the process of assessing the potential for an additional 6.4 GW in Scottish territorial waters, which is subject to a separate SEA.

Chart 2.3:**Illustrative mix of technologies in lead scenario, 2020 (TWh)**

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

Delivering renewable electricity

- 2.16 Large-scale renewable electricity has provided the principal source for the exploitation of renewable energy in the UK to date. Introduction of the Renewables Obligation in 2002 has enabled rapid growth in onshore wind generation, (from about 1.3 TWh in 2002 to about 5.8 TWh in 2008),³¹ and the development of offshore wind to a point where we have now overtaken Denmark as the country with the largest offshore wind deployment in the world.
- 2.17 At present, less than 1% of the UK's electricity supply is met by small-scale renewable electricity generation.³² Uptake of renewable technologies at the sub-5 MW scale has been hampered by various factors, including relatively high capital costs, a resistance to long payback periods, and perceived uncertainty over future income from and the relative complexity of the Renewables Obligation.
- 2.18 Our lead scenario suggests that by 2020 about 30% or more of all our electricity (about 117 TWh) – both centralised and small-scale generation – could come from renewable sources, compared to around 5.5% today. We expect the majority of this growth to come from wind power, through the deployment of more onshore and offshore wind turbines. Bioenergy used in electricity is also likely to make an important contribution of about 22% of renewable electricity generation (7% of

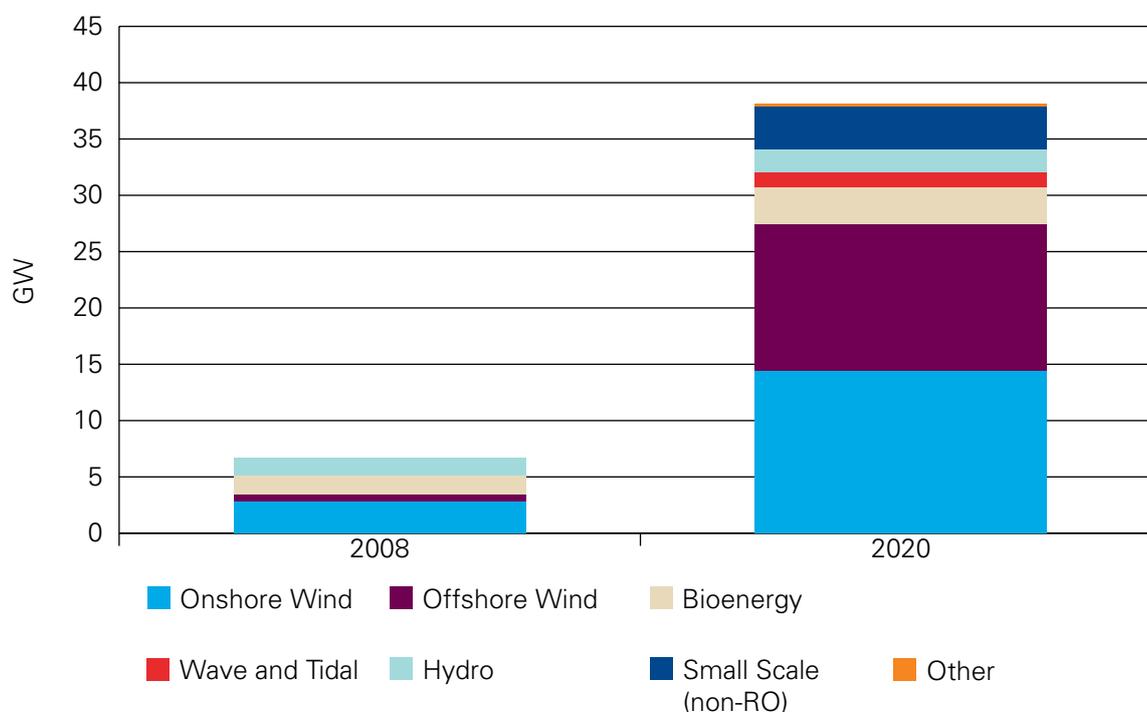
31 DECC (2009): 'Energy Trends: June 2009', and DTI (2002): 'Digest of United Kingdom energy statistics 2002' TSO

32 This figure does not include sewage gas and landfill gas technologies which will not be covered by Feed-In Tariffs as they are considered to be adequately supported under the Renewables Obligation.

total electricity demand).³³ Although major tidal range projects in the Severn Estuary or geothermal projects are not included in the lead scenario, they could contribute going forward.

- 2.19 We also expect small-scale generation to play a role. Although small-scale renewable electricity technologies tend to be more expensive than large-scale, they have the potential to play an important part in engaging households and communities into making a real contribution to a low-carbon economy. Moreover, they can be easy to deploy and minimise system losses as they are located close to the point of demand.
- 2.20 The Feed-In Tariffs (FITs) currently being developed for introduction in April 2010 will incentivise greater deployment of a range of small-scale technologies. These will provide an accessible financial support mechanism for private individuals and communities, as well as energy businesses and professional investors such as property developers and utilities. We hope that bringing renewable electricity generation into communities around the country will foster engagement and encourage behavioural change. It is a policy instrument that has been used widely throughout Europe with much success. For further details on the FITs see Chapter 3.
- 2.21 Chart 2.4 below shows the mix of renewable electricity technologies we expect to help meet our target in the lead scenario presented here.

33 This estimate is modelled by Redpoint Consulting and is based on dedicated biomass, co-firing, landfill gas and energy from biomass waste electricity and CHP plant incentivised under the RO. The first large biomass fired plant is under construction in Port Talbot. With a generating capacity of 350 MW, it could provide electricity for half the homes in Wales by 2010.

Chart 2.4:**Renewable electricity technologies – comparison between 2008 and projected to 2020**

Source: Energy Trends (June 2009) and DECC analysis based on Redpoint/Trilemma (2009) and Element/Pöyry (2009)

Note: Small-scale electricity not separately identified in 2008

2.22 These are major changes to the way electricity is generated, and they are likely to lead to significant changes to ways in which the electricity market operates. Network operators will need to develop infrastructure to accommodate this rapid growth in wind and a more distributed and community-based generation. Generators and network operators will need to manage the intermittent nature of renewable sources of supply; The National Grid consultation on operating the system to 2020 is contributing to the debate on how this should be done.³⁴ The broader implications for the electricity market are outlined in more detail in Chapter 7.

Delivering renewable heat

2.23 The UK's heat supply is currently dominated by non-renewable technologies, with around 1% (7.7 TWh) of total heat demand supplied by renewable sources. This is largely because of our historically cheap and abundant supply of fossil fuels, and because supply chains for renewable heat technologies are in their infancy. However we recognise that there could be greater contributions than

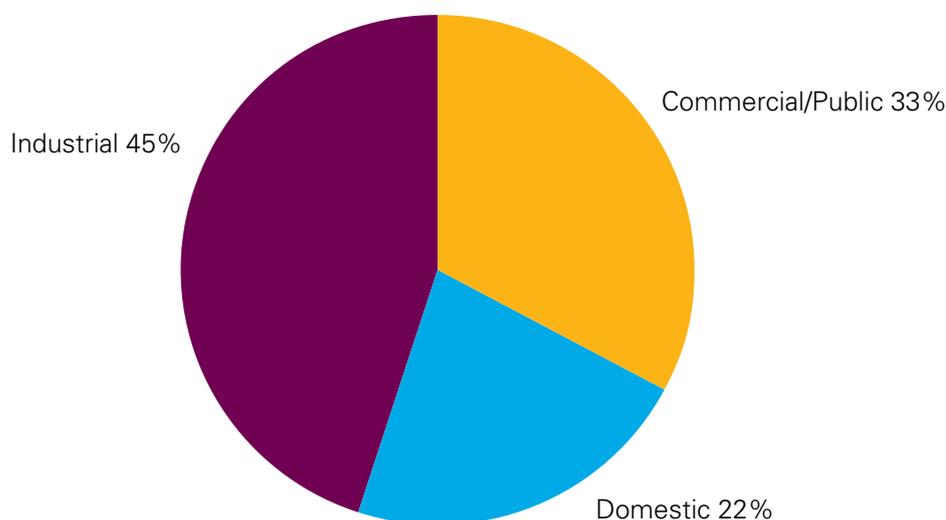
34 National Grid (2009): 'Operating the Electricity Transmission Networks in 2020: Initial Consultation'

envisaged from renewable heat technologies, including renewable Combined Heat and Power, which we are currently analysing in greater detail. The results of our modelling indicate that 12% (or 72 TWh) of heat demand in 2020 could come from renewable sources.

- 2.24 Some respondents to our Renewable Energy Strategy consultation last summer suggested that we might have under-estimated renewable heat potential, particularly from air-source heat pumps and biogas. However, our current analysis further underlines the uncertainties associated with significant deployment by 2020 due to the very low levels of current renewable heat use in the UK.³⁵ Given this, we considered it prudent to slightly reduce the contribution of renewable heat in our lead scenario. However, it is of course possible that renewable heat makes a greater contribution than we have envisaged: this would be extremely welcome.
- 2.25 Analysis by independent consultants (published alongside this Strategy) looked at possible ways of achieving increased deployment of renewable heat by 2020 in the least-cost way for the overall economy.³⁶ The analysis confirmed that there is a large cost-effective potential for biomass heat with significant potential in the non-domestic sector. Heat pumps could also play a more important role than previously estimated, while biomethane injection into the gas grid is also recognised as a technology which could offer significant levels of renewable heat.
- 2.26 Our latest modelling also suggests that solar heat may deliver less than we had envisaged in our Renewable Energy Strategy consultation last year. This is due to a reduction in our estimates of average heat output from this technology. However, we are aware that individuals may choose to fit solar panels and claim the Renewable Heat Incentive, as it has certain advantages over other renewable heat technologies. Deployment may therefore, in reality, be higher than our modelling suggests.
- 2.27 Some respondents to the Renewable Energy Strategy consultation also considered that there might be more cost-effective potential in the industrial heat sector than the original analysis suggested. Our modelling supports the view that larger-scale heat installations could make significant cost-effective contributions – both in the industrial and commercial/public sector. This is illustrated in Chart 2.5. We are currently also investigating the potential renewable heat opportunities from large-scale renewable Combined Heat and Power.
- 2.28 As we proceed with the design of the Renewable Heat Incentive over the coming months we will continue to seek stakeholders' views on sector and technology growth potentials that will help us design an efficient and effective Renewable Heat Incentive.

35 NERA/AEA (2009): 'The UK supply curve for Renewable Heat'

36 NERA/AEA (2009): 'The UK supply curve for Renewable Heat'

Chart 2.5:**Illustrative sector contributions to renewable heat in 2020 in the lead scenario**

Source: DECC internal analysis based on NERA (2009)

2.29 In addition to delivering enough renewable heat to allow us to meet the 2020 renewable energy target, the Government's ambition is to further decarbonise the heat sector. This will be necessary if we are to meet our 2020 and 2050 greenhouse gas targets. The Government's emerging thinking on future heat policy was set out in the recent consultation on a Heat and Energy Saving Strategy.³⁷ The consultation also sought opinions on how best to encourage district heating and Combined Heat and Power in the industrial and domestic sectors, and considered the role of renewable cooling. The Heat and Energy Saving Strategy, setting out the Government's considered intentions, will be published later this year.

Delivering renewable transport

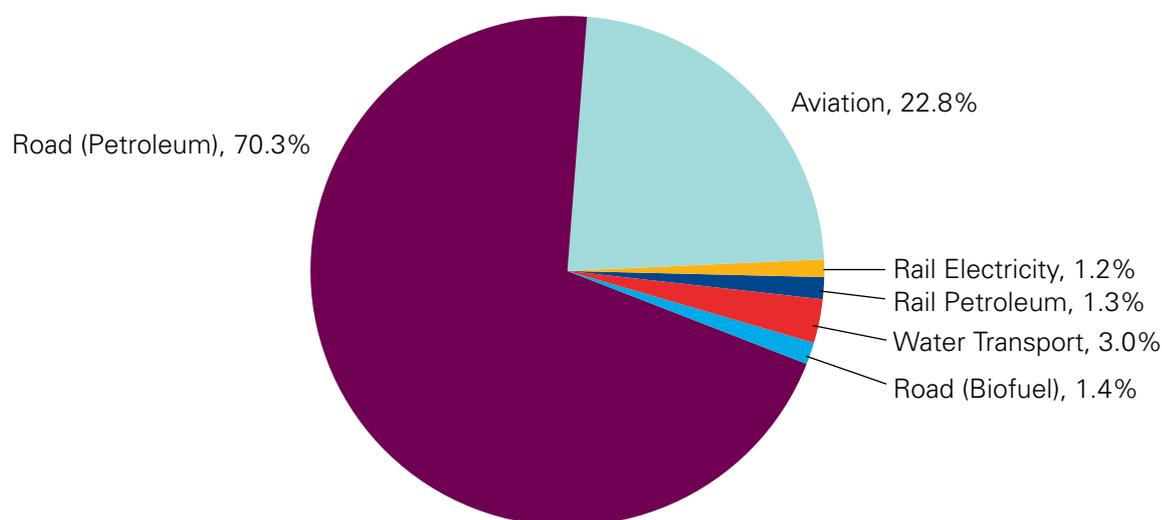
2.30 Our overall vision for the transport sector is set out in the Department for Transport's strategy for low-carbon transport, which is published in parallel with this document.³⁸ Looking at the transport system between 2020 and 2050, the fuels we use will be cleaner, the technology greener and we will have seen a shift to renewable sources of transport energy such as sustainable biofuels, electricity and hydrogen. Electric drive and alternatively fuelled vehicles for both public and private use will become common-place on our roads, resulting in a radical decarbonisation of the sector as a whole.

³⁷ DECC (2009): Heat and Energy Saving Strategy Consultation'

³⁸ DfT (2009): 'Low Carbon Transport: A Greener Future'

-
- 2.31 In the shorter term, the Renewable Energy Directive sets out that the transport sector should achieve 10% energy from renewable sources by 2020, measured as a percentage of energy consumed in road and rail transport. Because of the existing uncertainty surrounding biofuel sustainability, we have not assumed a greater contribution from transport at this stage.³⁹
- 2.32 Under the terms of the Directive, in calculating the transport sector's contribution, renewable energy consumed in all forms of transport including road, rail, aviation and national navigation (UK shipping) can be taken into account. The formula also enables certain biofuels to count twice and the renewable electricity used in electric and plug-in hybrid vehicles to count two and a half times towards meeting the transport target. However, these 'multiplied rewards' do not contribute to the achievement of the overall renewable energy target. It is therefore possible that we could meet the transport sub-target without contributing a full 10% towards the overall renewable energy target. However, the lead scenario set out in this chapter assumes that transport will contribute 10% to the overall target in real energy terms.
- 2.33 The lead scenario also indicates that the 10% target about 49 TWh will predominantly be met through biofuels. Other innovations, such as the potential increased electrification of rail and road transport, could play a more auxiliary role approaching 2020, becoming more significant in the longer term.
- 2.34 Electrification of rail transport is well progressed, although as illustrated in Chart 2.6, the share of rail in overall transport is small – and electrification is only renewable to the extent that the electricity is renewable. Aviation accounts for nearly a quarter of all transport energy consumption, and as set out in Chapter 4, we are encouraging development of renewable solutions in this sector, which could have important impacts in the longer term.

³⁹ The feasibility of reaching the 10% transport sub-target whilst ensuring sustainability will be subject to review by the European Commission by the end of 2014.

Chart 2.6:**Energy consumption by transport mode – 2008 (including international aviation and shipping)**

Source: DECC (2009): 'Energy Trends: June 2009'

2.35 The Government will be consulting on options for meeting the transport target in early 2010. This will enable us to set out more detailed policies in the national action plan to be submitted to the European Commission by June 2010.

Trajectories and Interim Targets

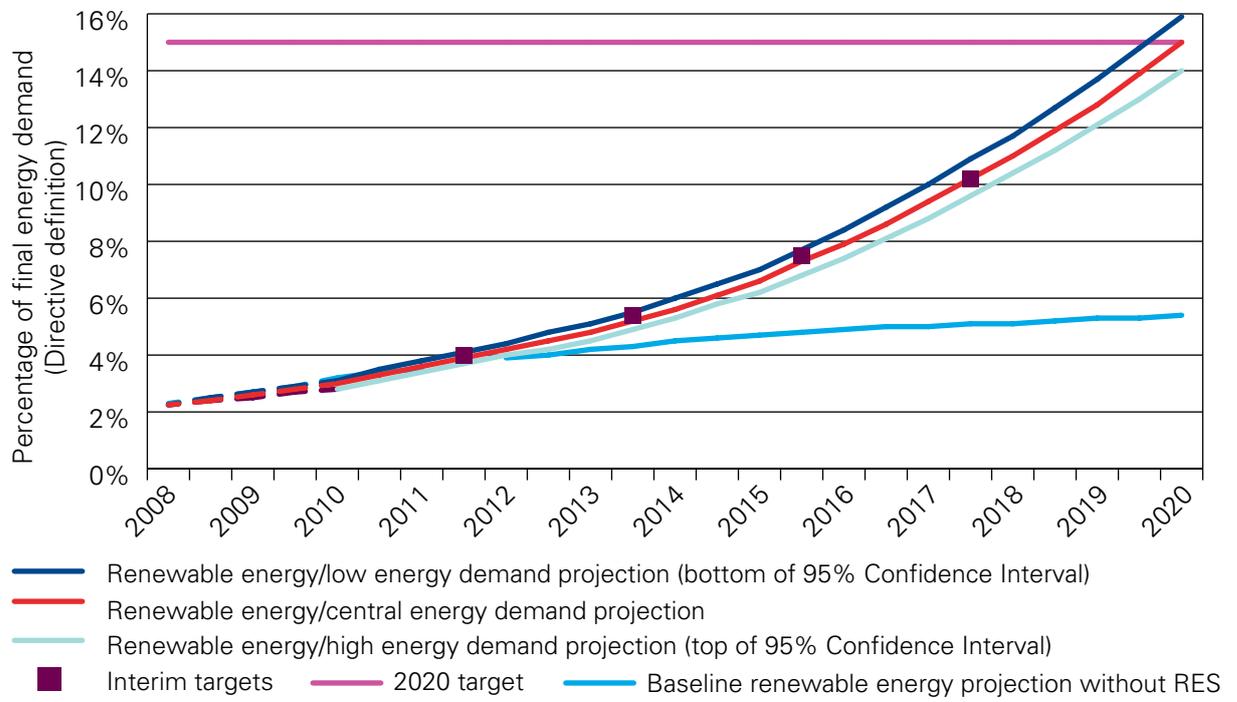
2.36 We need to ensure that we make sufficient progress each year to remain on track to achieve our 2020 target. Under the Renewable Energy Directive, the UK has interim targets to achieve the following shares for renewables in the energy mix:

- 4.0% in 2011-12;
- 5.4% in 2013-14;
- 7.5% in 2015-16;
- 10.2% in 2017-18.

2.37 Our most recent analysis suggests the level of renewable energy leading to 2020 will be sufficient to meet the interim targets if future energy demand is on the low side of our projections.⁴⁰ However, if energy demand is high, we are less confident about meeting the first three interim targets (see Chart 2.7).

⁴⁰ The interim targets are defined as percentages of final energy demand, and therefore our compliance with them will depend not only on the trajectory for total renewables deployment in TWh, but also on the level of final energy demand in TWh. The DECC energy model produces a range of projections for future energy demand (a 95% confidence interval). The lead scenario was compared to this range of final energy demand projections to assess its compliance with the targets, as shown in Chart 2.7.

Chart 2.7:
Lead scenario trajectory and interim targets



Source: DECC internal analysis

Notes:

1. The transport figures are based on the current trajectory for the Renewable Transport Fuel Obligation. DfT will be working with stakeholders to develop policy options and indicative trajectories for meeting the 2020 targets and will consult in early 2010.
 2. The range of projections for demand represent the higher and lower estimates from the DECC energy model.
- 2.38 The earliest interim target (2011-12) will be the most challenging, since the amount we are able to increase deployment over the next two years will be limited by the time it takes to plan, finance and build renewable energy infrastructure. Moreover, the heat sector is unlikely to start making a significant contribution until the introduction of the Renewable Heat Incentive in 2011.
- 2.39 The current transport trajectory is set at a cautious level because of concerns regarding the sustainability of biofuels. On this trajectory, renewable fuel must comprise 3.25% of total transport fuel supplied in 2009-10, rising to 5% by volume in 2013-14. The transport trajectory could potentially be increased ahead of the first interim target if greater sustainability can be assured. This is most likely to happen in the event of the European Commission proposing an appropriate methodology for accounting for the indirect impacts of biofuels (see Chapter 4).
- 2.40 The precise nature of our response if we fall short of any interim target will depend on the reasons for that shortfall. However, the Government will closely monitor deployment and take appropriate action to get us back on track and ensure that we meet our renewable energy goals. Chapter 8 sets out our approach to implementation including monitoring, reporting and governance arrangements.

Source: DECC



Chapter 3:

Greater Financial Support

Summary

The Stern Review emphasised that carbon pricing alone will not be sufficient to reduce emissions at the scale and pace required and more support is needed for renewable and innovative low-carbon technologies.

This chapter sets out our framework of long-term, comprehensive and targeted financial support. We have also taken steps to respond to the short-term impacts of the global financial crisis. To ensure that our Renewable Energy Strategy provides greater financial support we will:

- **Expand and extend the Renewables Obligation, our long-term incentive for large-scale renewable electricity developments, to allow it to deliver close to 30% renewable electricity or more; at the same time we will consult on changes to improve further the efficiency of the RO and ensure value for money for consumers;**
- **Introduce new incentives for households, businesses and communities to use renewable heat at all scales and small-scale clean electricity generation;**
- **Amend or replace the Renewable Transport Fuel Obligation to impose an obligation designed to deliver 10% renewable energy consumed in transport by 2020;**
- **Deal with immediate pressures resulting from the global financial crisis.**

Introduction

- 3.1 Achieving the UK's target of sourcing 15% of our energy from renewables by 2020 will require significant investment. But the Stern Review makes it clear that the costs of inaction on climate change far outweigh the costs of action.⁴¹ Renewables are a crucial part of our action and we must make the necessary investment to move to a low-carbon economy now. As part of that, we will need a state-of-the-art financial framework that provides robust incentives for renewables to allow the market to respond.
- 3.2 This Strategy provides the financial framework to meet that challenge. The Government's policies, set out in this chapter, will create one of the first truly comprehensive renewables incentives systems in the world. We have drawn on best practice from more than a decade of experience in the UK and across Europe, as well as breaking new ground by developing the first stand-alone renewable heat incentive.
- 3.3 Our objective is a financial incentives framework that is effective and efficient by providing long-term, comprehensive and targeted support. The framework will

⁴¹ Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press

apply across the full range of energy sectors – electricity, heat and transport. It will provide support to those in the energy business and other professional developers, but also others, such as (non-energy) businesses, community organisations and households. Finally, it will embrace a variety of technologies, including those such as onshore wind and biomass that have delivered most of the growth so far; other technologies needed to deliver the 2020 target such as offshore wind; and innovative technologies such as advanced biofuels and marine power, which could contribute to the UK’s longer-term climate and energy goals.

- 3.4 All announcements in this Strategy relating to support schemes are subject to Parliamentary clearance and State Aid rules.

Mitigating the Impact of the Global Financial Crisis

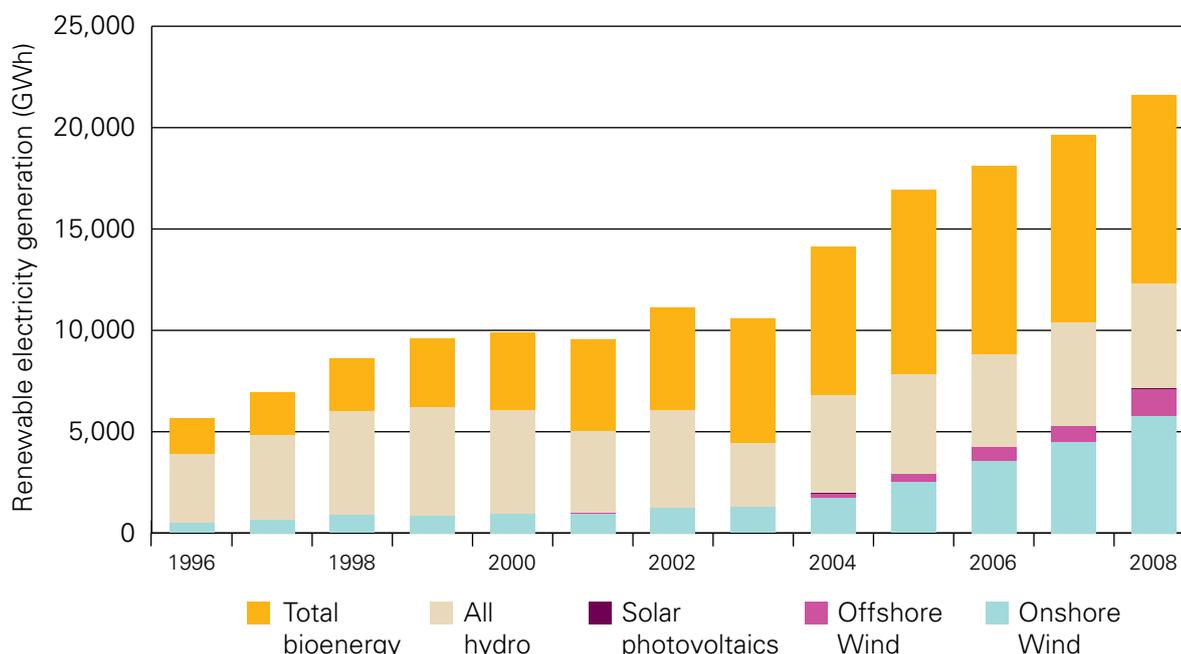
- 3.5 Our Strategy focuses on the path to 2020 and beyond. Delivering the 2020 target opens up huge business and job opportunities for the UK (see Chapter 7). At the same time we recognise that falls in carbon and energy prices, tight finance conditions and exchange rate fluctuations create risks for renewables and other infrastructure investment. Developers of small to medium-sized renewables projects in particular are currently finding it difficult to get access to loans. Resulting delays or failures of particular projects could also impact on the supply chain or on confidence in the sector overall. The Government is therefore acting to help protect investment in energy and renewables projects.
- 3.6 Action to support the economy as a whole through the downturn will help the energy sector. For example, we have doubled the rate of capital allowance relief available for new investment to 40% for one year, with effect from April 2009, to support the future growth of the economy and support around £50 billion of investment.
- 3.7 To help address this issue for energy projects more specifically, we announced in Budget 2009 that UK renewable and other energy projects stand to benefit from up to £4 billion of new capital from the European Investment Bank (EIB) through direct lending to energy projects and intermediated lending to banks. Eligible projects could include renewables, related grid improvements, as well as other projects such as gas storage. We believe that this initiative can bring forward £1 billion worth of consented small and medium-sized UK renewables projects to deployment. **We are bringing together the EIB, banks and developers, to ensure that new framework lending and other products deliver rapid and sustained investment for these small and medium-sized UK renewables projects.** We will announce further details later this month.
- 3.8 Renewable energy projects may need a more predictable income level with less exposure to volatile energy prices to be attractive to investors in the current risk-averse climate. We are considering options aimed at stabilising the revenue stream for renewable electricity projects within or alongside the Renewables Obligation (discussed further below).

Support for Centralised Renewable Electricity⁴²

3.9 We introduced the Renewables Obligation (RO) in 2002 as an incentive on energy companies to bring forward the most cost-effective renewable electricity. Under the RO, generators receive Renewables Obligation Certificates (ROCs) for renewable electricity. Electricity suppliers are incentivised to buy ROCs from generators. The value of the ROCs provides renewable generators with financial support above what they receive from selling their electricity in the wholesale market. Since April 2009 different technologies are receiving different numbers of ROCs per MWh of electricity generated, to reflect differences in technology costs.

3.10 The RO has so far increased RO-eligible renewable electricity generation in the UK from 1.8% of our electricity in 2002 to 5.3% in 2008.⁴³ The UK is now number one in the world for installed offshore wind capacity. By 2010 the RO (along with an exemption from the Climate Change Levy) should be worth around £1 billion a year to the renewable electricity industry.

Chart 3.1:
Renewable electricity generation 1996-2008



Source: DECC (2009): 'Energy Trends: June 2009'

42 The Renewables Obligation in Scotland and Northern Ireland is administered separately by the Scottish Executive and the Northern Ireland Executive. The announcements and proposals in this section are therefore subject to a separate decision-making process as regards their applicability in Scotland and Northern Ireland.

43 Some large hydro power is not eligible for RO support. The increase for total renewable electricity (including all hydro) is from 2.9% (2002) to 5.5% (2008).

Long-term support: extending the RO

- 3.11 Building on our Renewable Energy Strategy consultation during the summer of 2008 and our subsequent announcements made last November, we confirm our long-term commitment to the RO:⁴⁴
- The RO will continue to be our main support scheme for large-scale renewable electricity projects; and
 - **We will extend the RO beyond its current end date of 2027 until 2037 for new projects.** This will give project developers and lenders the confidence that projects built right up to 2020 will receive support from the RO for a sufficiently long period to make them commercially viable.
- 3.12 However, we want to avoid unnecessary additional support for existing projects. **We will therefore introduce a mechanism that will limit the period of RO support per project to 20 years.** Stakeholders strongly supported this approach in their responses to the 2008 consultation. Projects that started to generate before 26 June 2008⁴⁵ will continue to receive RO support until 2027. Projects beginning generation after this date will receive support under the RO for 20 years from first generation (but projects will not get support beyond the overall 2037 end date of the RO, even where this results in less than 20 years' support).
- 3.13 Respondents to the 2008 consultation strongly agreed that, given our 2020 target, we should not restrict the growth of renewable electricity by maintaining the maximum obligation level of 20% in the current RO. Replies were split between removing or increasing this cap. **We will remove the maximum obligation level of 20%.** This will allow the renewable electricity market to grow as much as possible between now and 2020 and will enable renewable electricity to play its full part in achieving the overall 2020 renewable energy target.

Targeted support: banding

- 3.14 Under RO banding, which came into force in April this year, different technologies now receive different numbers of ROCs per MWh generated. This reflects cost differences between technologies.
- 3.15 A planned review of banding will be completed by 2013. However, our banding policy sets out conditions under which bands can be reviewed early where there is a need for urgent action.

44 HM Treasury (2008): 'Pre-Budget Report – Facing global challenges: Supporting people through difficult times', TSO; BMRB Social Research (2009): 'UK Renewable Energy Strategy: Analysis of Consultation Responses', prepared for DECC by BMRB Social Research

45 The publication date of our Renewable Energy Strategy consultation, in which we first proposed extending the RO.

3.16 Accordingly, we committed in Budget 2009 to reviewing the band for offshore wind.⁴⁶ The UK is already the world-leader in offshore wind, but we want to ensure that investors are able to secure an appropriate level of return in the current economic climate, and that the UK remains an attractive destination for wind investment. **As part of the review we are consulting this summer on the evidence received to date and proposals to increase support from 1.5 to 2 ROCs/MWh for offshore wind projects meeting specified completion criteria if they place new orders in 2009-10, and from 1.5 to 1.75 ROCs/MWh for projects placing new orders in 2010-11.**⁴⁷ Any change is not intended to affect existing projects – providing additional support where projects are already commercially feasible would not represent best value for money for consumers who are bearing the costs in their energy bills.

Figure 3.1:

RO support for offshore wind: Scroby Sands wind farm off the coast of Norfolk (30 turbines, 60 MW total)



3.17 We believe there may also be a case to revisit the banding for wave and tidal stream technologies, and we will gather further evidence – see Chapter 5.

46 HM Treasury (2009): 'Budget 2009 – Building Britain's Future', TSO

47 DECC (2009): 'Consultation on Renewable Electricity Financial Incentives', published alongside this document

Stable revenue from selling ROCs

- 3.18 The RO operates by obliging suppliers to buy a set level of ROCs each year, or pay a buy-out price. We have set a trajectory of fixed annual obligation levels, rising to 15.4 ROCs/100 MWh of electricity by 2015. However, we recognised that a fixed trajectory, set years in advance, may not respond sufficiently to actual delivery of renewables projects on the ground. We therefore introduced (from April this year) a 'headroom' approach to allow the level of deployed renewables to rise above this trajectory, effectively changing the fixed annual obligation levels to minimum levels. Under headroom, the obligation will be set before the beginning of each year at a set percentage (currently 8%) above the expected number of ROCs to be issued that year. This helps ensure that the RO continues to incentivise greater deployment, but does not lead to excessive payments to operational projects.⁴⁸ We will maintain the headroom approach as the means of setting the trajectory to 2020 for the RO. We expect that the obligation level under the headroom mechanism will soon exceed the previously-set fixed targets.
- 3.19 The value of ROCs determines the support level renewable generators receive under the RO. If the actual renewables deployment level reaches or exceeds the obligation level, ROC prices would likely drop and generators would receive insufficient support. We want to ensure that headroom allows the obligation level to stay sufficiently ahead of actual deployment levels to prevent such a fall in ROC prices. As deployment under the RO accelerates over the coming years, the risk of deployment exceeding the current headroom level in any year increases. To mitigate this risk, **we are consulting this summer on proposals to increase headroom from 8% currently to 10% by 2014-15. We will also consider a ROC floor price as an alternative way to address a crash in the ROC price if the headroom level we set is exceeded.**⁴⁹ A ROC floor price might be implemented through a revenue stabilisation mechanism (discussed below).

Stable revenue from selling renewable electricity

- 3.20 In the past, the RO has been criticised for allowing excess profits in certain circumstances. Renewable generators receive revenue both from the RO and from selling their electricity in the wholesale market. When electricity prices are high, this means more revenue for generators. Maintaining an unchanged level of RO revenue in this situation may therefore not be best value for money for consumers. On the other hand, when wholesale prices are low, both new and existing projects may no longer be commercially attractive.
- 3.21 A more stable and predictable revenue level set through regulation would address both concerns. Under such a revenue stabilisation mechanism renewable

48 Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform'

49 DECC (2009): 'Consultation on Renewable Electricity Financial Incentives'

generators would not get the (full) benefit of extra revenue when wholesale prices rise, but they would also not bear the (full) risk when wholesale prices fall. Preventing generators from receiving excess profits when power prices are high could reduce the amount end consumers pay for electricity: our analysis indicates that for example if 2022 shows a rise of wholesale prices from £65 to £112/MWh, a revenue stabilisation measure might reduce the cost of the RO to consumers by £10/MWh and save consumers about 2.5% on their electricity bill in that year. At the same time, our analysis indicates that generators' reduced exposure to wholesale price falls and the risk therefore could deliver 2.5 GW more renewable generation by 2020 (at central wholesale price expectations), or even an additional 6.4GW at low wholesale prices of for example £35/MWh (compared to the RO without revenue stabilisation).⁵⁰

- 3.22 We will have to consider whether it is possible to implement such a scheme in a way that works with the electricity market and the existing RO and keeps the complexity of the scheme manageable. **We are consulting this summer on whether to introduce such a revenue stabilisation mechanism for the RO, and how.**⁵¹
- 3.23 The likeliest mechanism is a 'contract for difference' scheme (see Box 3.1) which would operate alongside the RO rather than as a change to the RO itself.⁵² The mechanism would probably not apply to biomass and co-firing generators.
- 3.24 We want to ensure that this option would not create uncertainty for those intending to build renewables projects over the next few years. If, following consultation, we decided to implement a revenue stabilisation scheme, we would do so on the following basis:
- We would want to introduce such a scheme as soon as possible, but we would not make it compulsory for RO projects that start generating before April 2013 at the earliest.
 - Projects that started generating between the date of this Strategy (15 July 2009) and the start date of such a scheme would have a one-off option of joining the scheme.
 - We would intend to announce key aspects of the scheme – particularly how the reference power price would be set – in 2010.
- 3.25 In the shorter term, as part of the Pan-Government Energy Project,⁵³ the Government is working across different Departments and public sector

50 Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform' for further details on our analysis.

51 DECC (2009): 'Consultation on Renewable Electricity Financial Incentives'

52 Similarly, we are currently consulting on a possible contract for difference scheme for carbon capture and storage, see DECC (2009): 'A framework for the development of clean coal: consultation document', TSO.

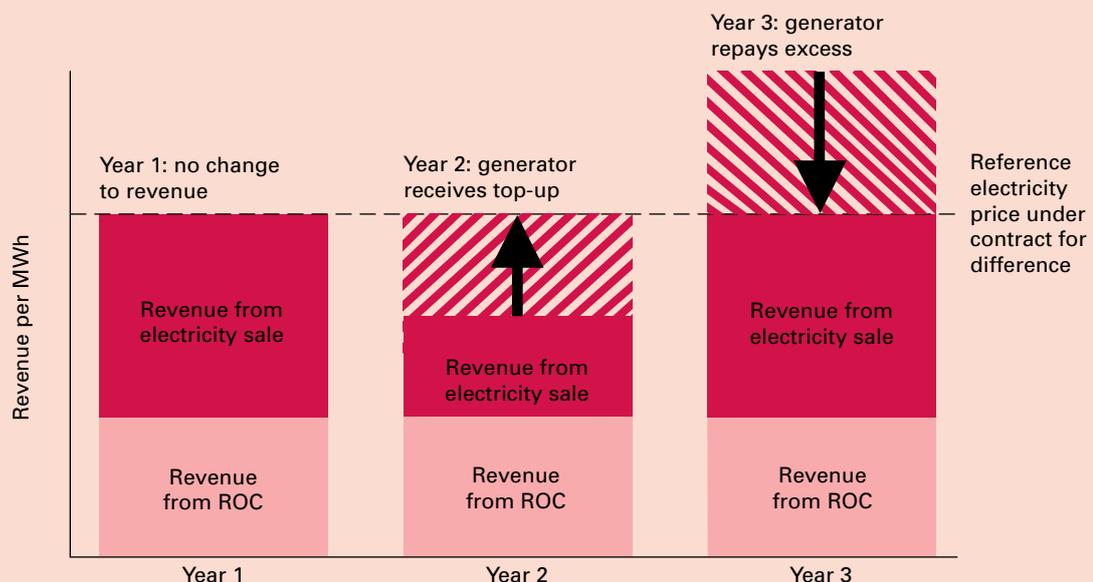
53 www.ogc.gov.uk/energy

organisations to take advantage of the public sector’s collective energy buying power. **We are investigating setting up power purchase agreements (PPAs) directly with generators for a percentage of the electricity volumes consumed by the public sector.** Such PPAs can offer fixed electricity prices, and if they are awarded to renewable generators, this could give them similar revenue certainty as a ‘contract for difference’ scheme. We expect to tender for the first PPAs under this Project by the end of this year through the EU Official Journal, for such contracts to be in place by summer 2010. The public sector as a whole consumes more than 6% of total electricity in the UK, so there is considerable potential for this Project to make a difference for generators.

Box 3.1: Contract for difference

A ‘contract for difference’ scheme could work alongside the RO as follows:

- In any chosen period of time (for instance yearly) when the wholesale value of renewable electricity exceeded a set level, generators would be required to make a corresponding payment into a fund.
- In any period when the value fell below the set level, generators would receive a corresponding payment from the fund.
- The fund’s cash flow from the above payments would be spread across electricity suppliers.



This graph shows how the scheme would shield generators against any deviation of the actual power price from a set reference price. Alternatively this could be implemented as a ‘cap and collar’ scheme, whereby the scheme only applies if a floor price (‘collar’) or ceiling (‘cap’) is breached. Similar schemes have already been implemented in a number of countries where renewables support is provided as a premium on top of revenue from electricity sales, notably Spain and the Netherlands.

Options to support a potential Severn tidal power scheme

- 3.26 We are studying financial support measures that might be appropriate if a Severn tidal power project were to go ahead (see Chapter 5 for more detail on the Severn tidal power study). Options include market-priced revenue support mechanisms, such as the RO or a separate 'Severn Obligation', as well as fixed-price support mechanisms, such as a feed-in tariff or contract for difference. Initial analysis suggests that a large Cardiff-Weston barrage could not be supported under the RO in view of the volatility this would create for ROC prices and the resulting impact on other renewable investments. Smaller barrages or tidal lagoons do however have the potential to be accommodated within the current RO. Initial studies also indicate that Government may need to take a more proactive role in the pre-construction phase than is normal for electricity generation projects.
- 3.27 We will decide on the financial incentive to be used if and when we should decide next year to go ahead with a Severn tidal power project.

Support for Renewable Transport

- 3.28 Our cars can run on a mixed blend of biofuel and conventional fuel. The Renewable Transport Fuel Obligation (RTFO) – introduced in April 2008 – ensures that transport fuels contain a rising percentage of renewable biofuels, without the driver needing to take any specific action. Under the RTFO as currently in place, 5% (by volume) of all transport fuels supplied in the UK will have to come from renewable sources by 2013-14.⁵⁴
- 3.29 The RTFO works by placing an obligation on suppliers of fossil fuel for road transport to prove that the appropriate percentage of the fuel they supply for use in the UK comes from renewable sources. Biofuel producers are awarded certificates for the volume of renewable fuels they supply. These can in turn be sold on to fossil fuel suppliers, resulting in financial support for those producers.
- 3.30 The EU Renewable Energy Directive⁵⁵ contains a mandatory 10% renewable transport target for each Member State. In addition the Fuel Quality Directive⁵⁶ requires fuel suppliers to deliver a 6% reduction in life cycle greenhouse gas emissions of petrol and diesel by 2020. Both Directives put in place sustainability standards for biofuels. (See Chapter 2 for details on the targets for renewable transport, and Chapter 4 for further information on biofuels sustainability.)

54 For more information on the RTFO see www.dft.gov.uk/pgr/roads/environment/rtfo

55 Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources

56 Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009

3.31 The Government will amend or replace the existing RTFO scheme to take into account the higher renewable transport and greenhouse gas reduction requirements of the Renewable Energy and Fuel Quality Directives. In doing so we will need to consider areas such as:

- The delivery trajectory to 2020;
- The mandatory sustainability standards for biofuels;
- The contributions from transport renewables other than biofuels, e.g. electric vehicles;
- Creating a reward mechanism that provides double support levels to advanced biofuels and two-and-a-half rewards to electric vehicles (in accordance with the Renewable Energy Directive);
- Sufficient flexibility to take account of emerging technologies.

We will consult in early 2010 on draft legislation on these issues, with such legislation expected to take effect in December 2010.

‘Clean Energy Cash-Back’: the Renewable Heat Incentive (RHI) and Feed-In Tariffs (FITs)

Distributed energy

3.32 Although the RO is available for all sizes of installations, it has encouraged mainly centralised renewable electricity generation. For distributed energy generation, where the RO alone was not the right instrument, the Government has provided grants, including through the Low Carbon Buildings Programme and the Bio-energy Capital Grants Scheme. We have made over £130 million available through these grant programmes. They have helped build an important foundation for non-centralised (or ‘distributed’) renewable energy generation, but they do not provide the long-term support framework needed to achieve widespread roll-out.

3.33 The decision to introduce FITs and the RHI in the 2008 Energy Act marks an important extension of our efforts to support distributed renewable energy:

- Heat is usually consumed near where it is generated, either on-site or in the form of a district heating network;
- FITs will support micro- and small-scale renewable electricity projects, where generation takes place either on-site or locally (for instance a community wind turbine).⁵⁷

⁵⁷ The 2008 Energy Act allows introduction of FITs for renewable and some other low-carbon technologies. We will consult this summer on eligible technologies to be included when the FITs scheme launches in 2010.

Through these 'clean energy cash-back' schemes (RHI and FITs) we will, for the first time, provide support for distributed renewable energy that is comprehensive and long-term. We will also work to design these schemes so they are simple, accessible and hassle-free for communities, households and businesses. For instance, a household with a well-sited photovoltaic installation could receive over £800 per year in FIT payments plus bill savings of around £140 a year.

3.34 Supporting such projects can have positive effects that go beyond the actual energy generated:

- Households, communities and businesses will be empowered to play their part in achieving the shift to a low-carbon economy, and will be properly rewarded for doing so.
- Where individuals or businesses generate their own energy on-site, this can help them with their energy costs by reducing exposure to increases in energy prices.
- The new incentives will help households take advantage of renewable technologies along with energy efficiency measures as part of a 'whole-house approach' to make buildings as low carbon as possible.
- Rolling out renewables as a part of everyday life – for instance a wind turbine at the local hospital, or solar panels on the neighbour's roof – can increase public acceptance of renewable energy projects such as wind farms, and encourage everyone to reduce their energy demand.

Box 3.2: Tax measures to help distributed low-carbon energy

A number of tax measures are in place to help make renewables more attractive:

- New zero-carbon homes benefit from stamp duty relief;⁵⁵
- Investment in certain energy-saving plant and machinery benefits from enhanced capital allowances;⁵⁶
- A reduced rate of VAT applies to professional residential installation of certain microgeneration technologies;⁵⁷ and
- Revenue from sales of electricity and ROCs from household microgeneration are exempt from income tax.⁵⁸

58 Further reading at www.hmrc.gov.uk/so/zero-carbon.htm

59 Further reading at www.eca.gov.uk/etl

60 Further reading at www.hmrc.gov.uk/vat/sectors/consumers/energy-saving.htm

61 Further reading at www.hmrc.gov.uk/pbr2006/pbrn19.htm and www.hmrc.gov.uk/budget2007/bn64.pdf

Supporting renewable heat: the Renewable Heat Incentive

3.35 Our Renewable Energy Strategy consultation in 2008 discussed whether a renewable heat incentive or a renewable heat obligation would be more appropriate as the means of supporting renewable heat. Two-thirds of respondents considered that a renewable heat incentive would be workable, against a majority indicating that an obligation would not be workable.⁶² Accordingly, the 2008 Energy Act provided the powers for the Renewable Heat Incentive.⁶³ The RHI will be the driver behind a massive increase in renewable heat from current levels below 1% up to around 12% by 2020 (see Chapter 2). Its objective will be to achieve maximum renewable heat deployment at least cost:

- The RHI will be available to a broad range of technologies and a broad range of target groups. It will cover all scales, from large industrial sites down to the domestic level.
- We intend to pursue cost-effectiveness by taking into account a balance between technology costs and generation yields (rather than carbon savings) when setting support levels.

We will consult towards the end of this year on the design and implementation of the RHI, including issues such as eligible technologies, support levels and a levy to raise the funding for this scheme.

Supporting small-scale clean electricity: Feed-In Tariffs

3.36 Our strategy is to have the right incentive in place for the right target group. The RO encourages renewable generation as part of the wider electricity market, but it is a complex scheme intended for professionals in the energy sector. We expect the simplicity and income certainty of FITs to complement this effort by enabling particularly those outside the energy business to get involved (see Box 3.3).

3.37 In response to our Renewable Energy Strategy consultation, a large proportion of stakeholders advocated FITs as the most appropriate support mechanism for distributed electricity.⁶⁴ This view was shared by Parliament, and as a result the 2008 Energy Act put in place powers for FITs for installations of up to 5 MW (or 5,000 kW) generation capacity per site.⁶⁵ The 5 MW limit makes it clear that the RO will continue to operate for large-scale projects. **We are minded to allow access to FITs for eligible technologies right up to the 5 MW limit – we are**

62 BMRB Social Research (2009): 'UK Renewable Energy Strategy: Analysis of Consultation Responses', prepared for DECC by BMRB Social Research

63 These powers apply to Great Britain. Northern Ireland has not yet taken a decision on a renewable heat incentive.

64 BMRB Social Research (2009): 'UK Renewable Energy Strategy: Analysis of Consultation Responses', prepared for DECC by BMRB Social Research

65 These powers apply to Great Britain. Northern Ireland has not yet taken a decision on feed-in tariffs.

consulting this summer on this basis.⁶⁶ This will allow the FITs to be effective not only for households but also for projects of a significant scale, such as wind turbines powering factories or supermarkets.

- 3.38 Like the RHI, the FITs will be designed to cover a range of technologies and different target groups in order to deliver a high rate of deployment. The scheme will also pursue broader aims of engaging the general public in renewable energy generation and the low-carbon society. **We are consulting this summer on the design and implementation of the FITs, including issues such as eligible technologies, support levels and distribution of the costs of this scheme between suppliers.**⁶⁷

Box 3.3: Feed-In Tariffs: a case study

Feed-in tariffs (FITs) are a legally guaranteed minimum payment per unit of electricity (p/kWh) for renewable electricity generation. FITs are already in operation in 19 other EU Member States as well as a number of other countries worldwide. In contrast to the RO, they can offer a hassle-free and guaranteed income stream. International experience indicates that these two aspects are attractive, in particular to small and non-professional generators.



'Citizens' Wind Farm Creussen', three kilometres east of Creussen (Bavaria, Germany)⁶⁸

The example of the town of Creussen in Germany (population around 5,000) illustrates how FITs can provide the financial support to help communities and individuals generate energy locally. In 2004, 80 local residents organised themselves in a partnership to build a 'citizens' wind farm' on a hill near the town. The site's three turbines have a total capacity of 4.5 MW, enough to power at least 2,500 households.

Nearby woodchip and biogas installations generate renewable heat (on-site for a fish farm and as a district heating network) as well as renewable electricity for the grid. Solar photovoltaics panels have been installed by a number of individual households in the town as well as on one of the municipal buildings. The power from these projects can be used close to where it is generated, minimising transmission losses.

In addition to the German FITs legislation, the delivery model of community energy generation 'by citizens for citizens' helped assure widespread support for and participation in the projects from locals and the Town Council.

66 DECC (2009): 'Consultation on Renewable Electricity Financial Incentives' published alongside this document

67 DECC (2009): 'Consultation on Renewable Electricity Financial Incentives'

68 SoWiTec Group

Making the benefits available to everyone

- 3.39 The costs of our current main renewables support schemes – the RO and RTFO – are ultimately borne by energy consumers. The same will apply to the FITs and the RHI. Chapter 7 provides details on our estimates of these costs. They are significant, but they are a worthwhile investment to allow renewables to play their role in avoiding much higher long-term costs resulting from climate change and security of supply problems. However, for households that are already struggling with energy bills such additional costs are a particularly heavy burden, and we are keen to look at options of how we might mitigate the impact on them.
- 3.40 An important part of our consultation this summer will focus on support levels to be set for the FITs. On the one hand, like under the RO, these will need to provide a return to investors on the capital they invest in renewable installations. However, householders in particular may be more interested in getting benefits from the new support in the form of lower energy bills. We want to explore whether we can design these schemes so they stimulate both on-site renewable deployment and help with energy bills at the same time.
- 3.41 Deliberation on such options is at an early stage. We will need to consider feedback from the upcoming consultations on RHI and FITs this year, as well as the interaction with other fuel poverty measures to avoid duplication and ensure we use the most appropriate mechanism to fight fuel poverty and mitigate distributional impacts. **We will consult on how we could ensure that the new support is available to everyone.**

Implementation date and transitional arrangements

- 3.42 Given the short time-frame to achieve our ambitious 2020 target, the RHI and FITs need to be in place as quickly as possible:
- **We are working to have the FITs in place by April 2010.** We believe this will be possible by making use of the international experience on feed-in tariffs and our own experience with supporting renewable electricity.
 - **We are working to have the RHI up and running by April 2011.** Designing the RHI will take a little more time. We are already ahead of most other countries in starting to design a mechanism of this type. But introducing and raising the finance for renewables support to the heat market, covering all scales and sectors, raises a range of new challenges for which we cannot draw on existing expertise.
- 3.43 **We will keep both the RHI and the FITs open for new projects until at least 2020.** This will provide the necessary long-term, stable framework for the renewables industry and supply chain. Once a project has started receiving support under the RHI or FIT it will participate for the full support period even where this would exceed the date on which the schemes close to new projects.

- 3.44 To ensure that projects can start building with confidence straight away, it is important to provide certainty and support to the market in the interim period until the start of the RHI and FITs. As announced in Budget 2009, we are continuing to fund existing grant schemes in the interim period, particularly through £45 million of new funds in Budget 2009 for the Low Carbon Buildings Programme. Bioenergy grant support will also continue to be provided. Small-scale renewable electricity installations will still be eligible for support under the RO – in particular microgeneration is now entitled to double the previous support level (2 ROCs per MWh).
- 3.45 **We will also allow eligible renewable installations, completed during the period between this Strategy's publication date (15 July 2009) and the respective dates the RHI and FITs become operational, to benefit from the new support as if installation had been completed on the date the relevant scheme launches**, i.e. at the same tariff level and (other than where they had already received RO support) for the same support period, from the start date of the incentive.⁶⁹ We will consult on the detailed treatment of any such renewable electricity⁷⁰ installations that start claiming and receiving ROCs during that period: we anticipate that in most cases they will be given a one-off choice to switch to the FITs, but smaller installations may be moved automatically into the FITs to reduce the burdens of administering them in the RO. When switching to FITs they may also see their support period under the FITs shortened to account for the fact that they already received ROCs.
- 3.46 These arrangements will also apply for householders if the heat or electricity installation in question receives a grant. Householders will not be required to pay back grants.⁷¹ However, for recipients other than householders we may require such grants to be paid back in order to receive RHI or FIT support. We will consult on this over the summer.
- 3.47 Existing renewable heat and small-scale renewable electricity installations have been built with the help of the RO, various grant schemes, or in some cases without financial support. **We will consult on how the new support schemes will affect installations already in place as of the date of this publication.**

69 As noted at the beginning of this Chapter, these statements are subject to Parliamentary clearance and State Aid rules; statements on the FITs are also subject to our statutory duty to consult on draft modifications to supplier licences.

70 Or other low-carbon electricity installations covered by the FITs.

71 Householders: properties as defined in Section 3 of the 'Low Carbon Buildings Programme Stream 1 – Household Conditions of Grant', see www.lowcarbonbuildings.org.uk/how/householders/

Source: DECC



Chapter 4:

Swifter Delivery

Summary

Many parts of our infrastructure and industries were established for a world of incremental change, rather than the rapid transformation of the next decade. The planning system, supply chains, connection to the grid and availability and use of sustainable bioenergy all require a radical change in pace, while protecting legitimate environmental and local concerns.

This Chapter sets out the actions that we will take to enable greater deployment of renewables over the coming decade. To ensure that the Renewable Energy Strategy provides swifter delivery we will:

- **Ensure better planning for delivery;**
- **Work to develop a stronger renewable industry;**
- **Provide, quicker, smarter grid connection;**
- **Enable more use of sustainable bioenergy.**

Introduction

- 4.1 If we are to achieve our 2020 renewables target we will need to identify and address in a co-ordinated way those issues that affect the timely deployment of new technology, in particular by stimulating investment and supply chain development and by addressing planning, grid and engagement issues. **It is for that reason we have set up from today the Office for Renewable Energy Deployment (ORED) to work with those organisations who will have a role to play in the delivery of the measures in this chapter**, including local and regional authorities, Government Offices, planning authorities, statutory advisors on the environment, stakeholders such as the Carbon Trust and National Non Food Crops Centre and planning bodies such as the Planning Advisory Service and Planning Inspectorate.
- 4.2 The Office, part of the Department of Energy and Climate Change (DECC), will significantly ramp up the deployment of established renewable energy technologies by addressing delivery issues across a range of technologies. The emphasis will be on facilitating investment in renewable energy and the supply chain to maximise the economic opportunity presented by the UK renewables target.
- 4.3 On the business development side, the Office will develop UK manufacturing, skills and jobs across all deployable renewable electricity and heat technologies. In collaboration with key partners including the Department for Business, Innovation and Skills (BIS), Regional Development Agencies (RDAs), Devolved Administrations (DAs) and UK Trade & Investment (UKTI), ORED will build up the capability of the UK supply chain and proactively support investment in manufacturing. ORED will also support relevant infrastructure development, such

as port facilities for offshore wind and manage programmes for large-scale demonstration projects. It will work closely with Sector Skills Councils (specifically Energy & Utility Skills), the National Skills Academies and key industry stakeholders to ensure the supply of skilled labour.

- 4.4 Meeting the UK's target will require investment of the order of £100 billion⁷² and create up to half a million jobs by 2020. To ensure that UK investment opportunities are fully realised ORED will promote active engagement and dialogue with the finance and investment community to raise awareness of the Government's policy on renewable energy technologies and increase investor confidence in the renewables sector.
- 4.5 Just as importantly, ORED will also focus on enabling rapid deployment, in partnership with the Department for Communities and Local Government (CLG) and a range of delivery bodies. It will take forward measures to support an effective and proactive planning regime at local and regional level that capitalises on the renewable opportunities and ensures an open and evidence-based process for communities, developers and planners.
- 4.6 This will include providing guidance on Government expectations for regional energy targets; supporting the development of robust evidence bases through the provision of expertise, skills support and advice; engaging with all tiers of Government, Devolved Administrations, statutory consultees and other relevant bodies to bring greater levels of visibility to the overall process and developing a number of measures to support delivery. The Office will also communicate facts about, and benefits of, renewable energy technologies to all stakeholders, and engage with communities and business.
- 4.7 DECC has established a Future Electricity Networks (FEN) team to reform the electricity network so that it can meet our needs in 2020 and beyond. ORED will work closely with FEN to ensure that wherever possible renewable projects are able to connect to the electricity grid in timescales consistent with their proposed development. ORED will also work closely with established delivery bodies for renewable technology such as the Carbon Trust, National Non-Food Crops Centre (NNFCC) and the Biomass Energy Centre to provide industry with a consistent and coherent picture of Government support. Deployment issues relating to renewable transport will continue to be addressed by the Department for Transport.
- 4.8 ORED will make use of private sector and other relevant external expertise where possible and appropriate. ORED will establish and then support the work of the Renewables Deployment Ministerial Taskforce. The Renewables Advisory Board (RAB), a Non-Departmental Public Body charged with providing advice to the Secretary of State on meeting the UK's renewables target, will also provide expert

⁷² Estimated capital investment (undiscounted) required to 2020 under the lead scenario in the renewable heat and electricity sectors.

advice to the Office. A recruitment process is under way to appoint a part-time non-executive Chair to oversee the strategic development of the Office.

Better Planning for Delivery

- 4.9 The planning system plays a central role in delivering the infrastructure we need to reduce our carbon emissions and ensure continued security of energy supply. Equally the planning system plays a vital role in safeguarding our landscape and natural heritage and allowing communities and individuals the opportunity to shape where they live and work.
- 4.10 We therefore need to ensure that the planning system properly reflects the range of interests in land use, applies existing safeguards to protect areas where development may not be appropriate, but delivers swift, consistent and effective decisions in areas where development is appropriate. Alongside this the Government needs to work with stakeholders to resolve particular areas of conflict and address some of the avoidable barriers to planning approval.
- 4.11 The measures in this chapter will help us achieve:
- a more consistent, transparent, timely and effective planning application process;
 - a strategic and evidence-based approach to energy related economic and spatial planning at regional and local levels; and
 - resolution of those generic factors that currently delay deployment.
- 4.12 Planning is largely a devolved issue. The measures in this chapter will therefore predominantly apply to England, although we describe later in the chapter areas where we are seeking a UK-wide approach.

Reforming the Planning Process

- 4.13 Decisions on applications for major energy infrastructure in the UK, by which we mean onshore electricity generation above 50 MW and offshore over 100 MW, are currently taken centrally by the relevant competent authority under the Electricity Act 1989 or, in future for nationally-significant infrastructure projects in England and Wales, the Planning Act 2008.
- 4.14 In England, the vast majority of planning applications for onshore renewable energy are 50 MW or less in size and decisions are taken by local planning authorities. The basic framework in which they are taken is set out in the Town and Country Planning Act 1990 (TCPA), which is constructed in three broad tiers. At national level the policy direction is set through a series of planning policy statements and guidance notes. These national policies are then built into regional

and ultimately local development plans, against which development applications are then judged.

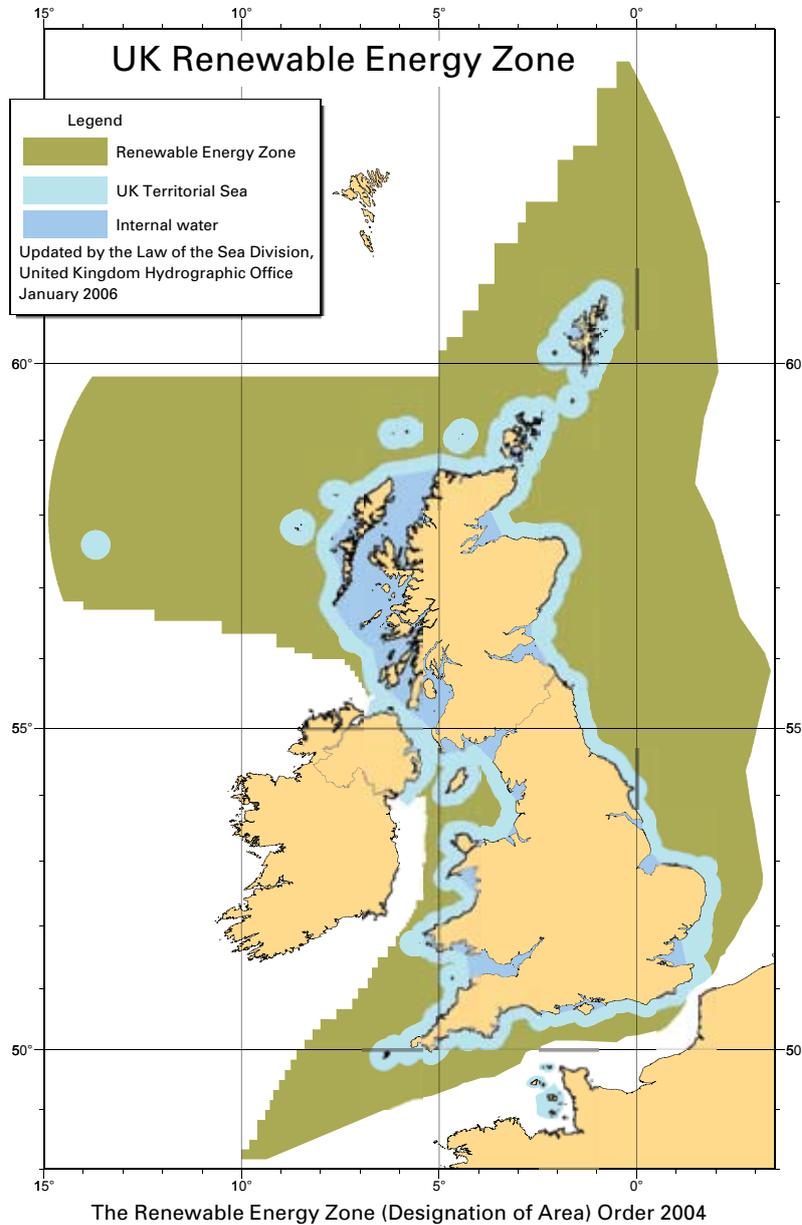
4.15 Below, we set out a range of actions to continue to reform both of these processes.

Establishing the Infrastructure Planning Commission (IPC)

4.16 The Planning Act 2008 enables the introduction in 2010 of an independent Infrastructure Planning Commission (IPC) to consider and decide upon planning applications for nationally significant energy infrastructure.⁷³ This will include renewable electricity generating plant greater than 50 MW onshore and 100 MW offshore in England and Wales and the adjacent offshore Renewable Energy Zone (REZ).

73 As defined in the Planning Act 2008.

Figure 4.1
The UK Renewable Energy Zone



4.17 The IPC is designed to ensure a more efficient and clearer process for translating national policy objectives into decisions on nationally significant energy infrastructure. It will also place a new duty on developers to ensure that applications are properly prepared and consulted on before they are submitted.

4.18 The IPC will help reduce the average time taken to decide an application for nationally significant infrastructure, by applying strict, pre-defined, timescales.

The IPC will have a tightly-drawn remit which require them to take decisions in accordance with the suite of Energy National Policy Statements.

Developing and implementing National Policy Statements (NPS)

- 4.19 The Planning Act 2008 provides for the Government to produce National Policy Statements (NPS). These documents will set out the Government's policy on energy infrastructure and be used as the primary consideration by the IPC when making decisions on proposed infrastructure. **The overarching NPS and suite of energy NPSs, including for renewable energy, will be published in autumn this year for consultation, and are due to be designated in 2010.**
- 4.20 The suite of energy NPSs will help ensure decisions on renewable energy infrastructure, whether this is large or small infrastructure, are taken consistently. Planning authorities, including responsible regional authorities preparing Regional Strategies, must have regard to these new NPSs when preparing development plans and, where relevant, when making planning decisions under the TCPA system. In London the Mayor should have regard to the need to ensure consistency with national policies including NPSs when undertaking revisions to any strategies.

Planning Policy Statements

- 4.21 The Planning Policy Statement supplement on climate change (PPS1),⁷⁴ published in 2007, sets out what the Government expects from good planning, and underlines that tackling climate change sits at the centre of all planning considerations. PPS1 develops the policy on renewable energy set out in Planning Policy Statement 22 on renewable energy (PPS22).⁷⁵ Planning authorities should have regard to both these documents when preparing local strategies and when taking planning decisions.
- 4.22 Both of these PPSs are already helping to create an attractive environment for innovation in which to bring forward investment in renewable and low carbon energy in environmentally acceptable locations. At the same time, they make clear that local communities should be given real opportunities to influence and take action on climate change.
- 4.23 PPS1 expects regional and local planners to use a robust evidence base to actively plan for, and support, renewable and low-carbon energy generation, including by allocating and safeguarding sites. **In particular we expect regions to set targets for renewable energy capacity in line with national targets, or better where possible.** These targets are expected to be reviewed in the light of delivery and revised upwards where appropriate. Given the compelling case for

74 <http://www.communities.gov.uk/publications/planningandbuilding/ppscclimatechange>

75 <http://www.communities.gov.uk/documents/planningandbuilding/pdf/147444.pdf>

renewable energy, and to avoid unreasonable or unrealistic demands of industry, the Government has said that applicants for renewable energy should no longer be questioned about the energy need for their project, either in general or in particular locations.⁷⁶

- 4.24 These expectations are supported in the Planning Act 2008 by statutory duties on both regional and local plan-makers to take action on climate change. In this chapter we set out a number of measures that are designed to help local and regional bodies deliver these challenging expectations.
- 4.25 This Strategy forms part of an evolving set of national policy and guidance affecting renewable energy projects. We know how important it is to be consistent across this Strategy, the PPSs and the NPSs. We also recognise feedback from stakeholders that we now need to update PPS1 and PPS22 so as to ensure they set a clear and challenging framework for delivering energy infrastructure and cutting carbon emissions consistent with national ambitions. An updated PPS will also need to reflect the importance of planning for the climate change we already expect and be properly integrated with the new suite of energy NPSs. **We will therefore review these PPSs and consult on a new combined climate change PPS by the end of 2009.** Until this review is complete, the existing PPSs will continue to be used for local planning decisions, alongside other relevant national policy including the NPSs once designated.
- 4.26 We also want to improve the delivery of our planning policy for managing flood risk (PPS25) to avoid onshore wind developments being ruled out in areas of flood risk. We are considering consulting on improvements in how flood risk is managed when deploying wind turbines in areas at risk of flooding.

Improvements in the development application process at the local level

- 4.27 At local level the process for dealing with development applications will play a vital role in how we deliver the step change in renewable and low carbon energy we need, located in appropriate places. The 2008 Killian Pretty Review⁷⁷ highlighted a number of other ways to make the local planning process a more effective, transparent and responsive system. Specific reforms to this process now being taken forward by the Department for Communities and Local Government (CLG) are outlined below.

76 See PPS1.

77 http://www.planningportal.gov.uk/uploads/kpr/kpr_final-report.pdf

- **Reducing the number of small-scale developments that require full planning permission.** This applies in particular to the extension of permitted development rights (PDR) to business and public services. Some forms of distributed generation up to a certain size are already subject to PDR and we are currently assessing whether small-scale wind, air source heat pumps, and other renewable technologies could be included. **The Government expects to consult later this year, with a view to introducing new regulations in April 2010.**
- **Encouraging the wider use of Planning Performance Agreements (PPAs).** PPAs enable Local Authorities to agree with the developer a timescale and plan for reviewing the application based on full engagement between developer, Local Authority and statutory consultees in pre-application discussions. The PPA process improves the quality of the decision-making process and provides certainty over the timescale for determining the outcome of development applications.
- **Establishing a Renewables and Low-Carbon Planning Performance Agreements demonstration project.** This will build on the work done on PPAs for other types of major applications. Where applicants put forward proposals for schemes involving renewable energy, we will encourage Local Authorities to use PPAs and draw down funding from this scheme to provide additional resource to administer the process. **CLG will publish further information about the scheme in the summer.**
- **Recovering planning appeals for decision by Secretary of State.** In June 2008 a specific recovery criteria was introduced which stated that the Secretary of State for Communities and Local Government would consider making decisions himself on planning appeals of major significance for the delivery of the Government's climate change programme and energy policies. The Secretary of State has already recovered several appeals and will not hesitate to continue to use these powers where this is justified.
- **Giving priority to appeals on renewable energy proposals.** In 2008-09 the Planning Inspectorate received 48 appeals relating to renewable energy developments. 65% of these were allowed. The Planning Inspectorate will give high priority to the handling of all appeals relating to renewable energy proposals.

- **Revising the Cost Award procedure.** This year the Government amended the appeal procedures. If a developer has submitted an appeal because the local planning authority did not determine an application in time, the authority will be expected to explain the reasons for not reaching a decision within the relevant time limit. Where an appeal against non-determination is allowed, the local planning authority risks having costs awarded against it if it is concluded that there were no substantive reasons to justify the delay and that greater communication with the applicant could have prevented the appeal being made.
- **Using Local Development Orders (LDO).** The first two pilot LDOs are now in preparation. These will allow local planning authorities the freedom to allow new development and changes of use without the need for individual planning applications. One of these is a partnership led by the London Development Agency that will use a grant provided by the Planning Advisory Service (PAS) to fit a new district heating system in East London. This is a good example of the kind of local action that we wish to encourage through the use of LDOs.
- **Increasing flexibility for planning permissions.** The Government is currently consulting on the introduction of a package of measures that will provide a proportionate and graded approach to making changes to existing planning permissions in cases where an entirely new application is not justified. The changes give developers scope to make minor alterations without going back to the start of the application process, therefore saving time and money for the developers and for the planning authority. This is particularly useful for renewable and low carbon developments where the technology may be new or evolving.

Strategic Approach to Planning

4.28 The reforms we are making to the development application process will be critical to achieving the large scale deployment of renewable and low-carbon energy we need to see in the UK, while balancing the need to safeguard our landscape and local interests. However, the ultimate objective is for all those with an interest in the way we use the landscape and our natural resources to work together to find the optimal solutions for the particular circumstances of their area. Effective and proactive strategic planning by local and regional authorities is therefore also vital if we are to capitalise on the renewable opportunities available to us. Key to this will be a transparent, robust and evidence-based process in which individuals, communities, developers and planners can engage. This section sets out the measures we are proposing to encourage this new strategic approach, onshore and in the marine environment.

Devolved Administrations (DAs)

- 4.29 **We have agreed with the DAs that each part of the UK will complete an evidence-gathering exercise to assess renewable electricity and heat potential and barriers, and propose a level of ambition for renewables deployment based on that assessment for renewable energy delivery by 2020.** The UK Government and Devolved Administrations will agree a common set of criteria for the assessment exercises in each part of the UK.
- 4.30 In England, the RDAs and Local Authorities will follow a similar approach to identify renewable energy potential and set their own targets as part of their Regional Strategies, as set out below.

Regional Strategies

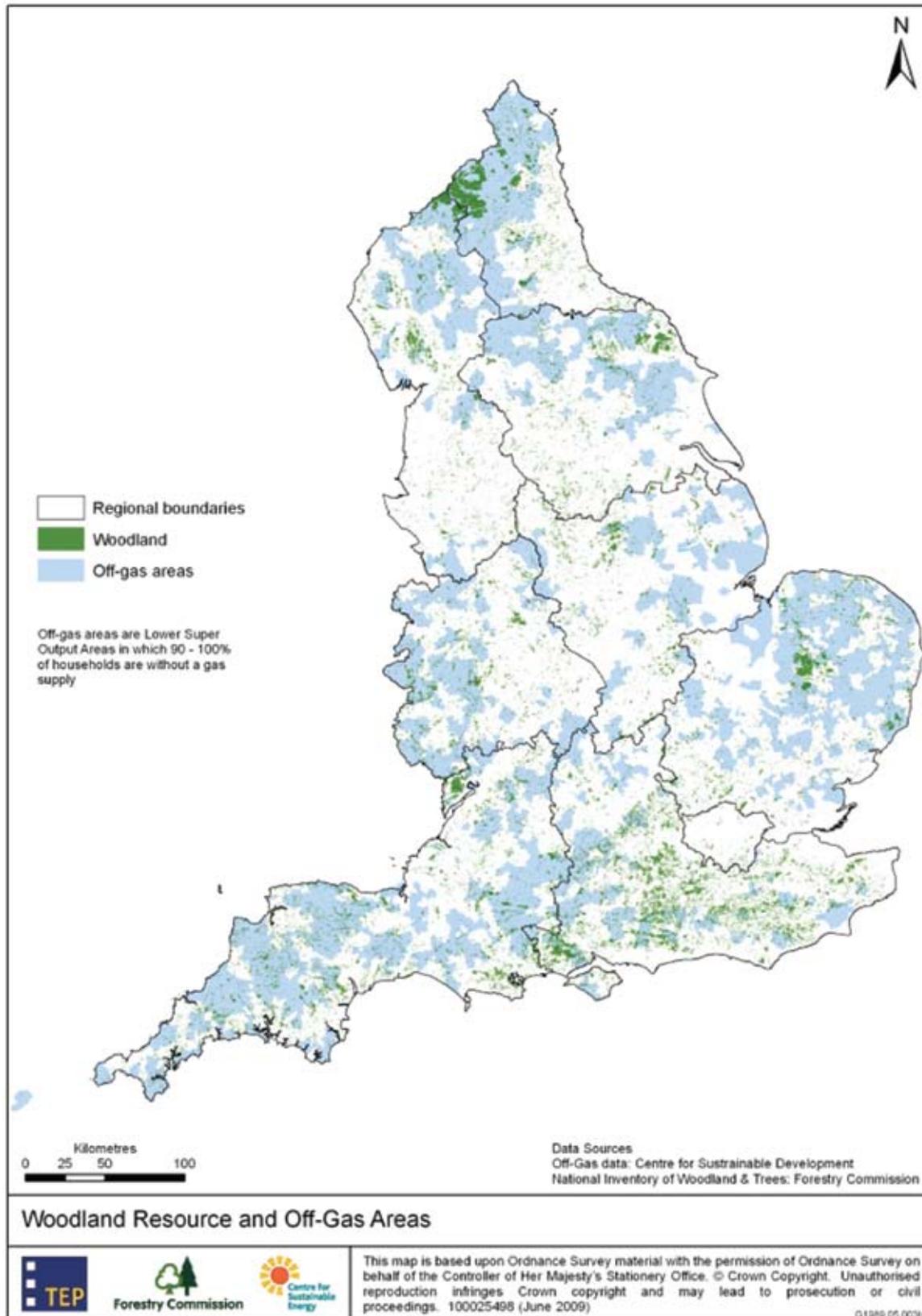
- 4.31 The Local Democracy, Economic Development and Construction Bill will, subject to Royal Assent, put in place the necessary legislation to **introduce regional strategies (RS) for all English regions outside London**, covering both economic and spatial planning. Prepared by responsible regional authorities, comprising Local Authority Leaders' Boards and the RDAs, they will replace existing regional economic strategies (RES) and regional spatial strategies (RSS) and integrate the substance of other regional strategies covering culture and sport, housing and biodiversity and transport. These strategies will be required to contain policies designed to contribute to the mitigation of, and adaptation to, climate change and will need to contain ambitious regional targets for renewables, as well as some forms of low-carbon energy, and will be key to the delivery of our national targets.
- 4.32 This approach builds on the existing requirements in PPS1 and PPS22. Regional strategies will be subject to public consultation, as will the local development plans we expect to flow from them, allowing scrutiny and input from all stakeholders, including the local community. Although the RS arrangements for London are different, legislation requires the Mayor's spatial development and other strategies to be in accordance with Government policy.
- 4.33 Research commissioned by CLG and published at the same time as this document⁷⁸ shows that there are inconsistencies in the way renewable energy capacity has been assessed and fed through to the targets included in the existing regional spatial strategies (RSS). In order to ensure that regional targets are sufficient to deliver a step change in renewable energy deployment and reflect the best possible options for their area, **we will support regions to review their targets for renewable energy and take a proactive, evidence-based approach to identify appropriate opportunities for renewables as well as any genuine constraints to deployment.**

78 <http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps22/>

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- 4.34 The vision is that all regions will work with stakeholders to develop a robust and detailed evidence base against which to develop the renewable and low-carbon energy aspects of their regional strategies. As well as securing ambitious and evidence-based targets, this approach will encourage more proactive planning for renewables at both regional and local levels and a more systematic approach to identifying the local benefits that could ensue. The evidence-based approach will provide important information to developers when working up project proposals but also ensure a more strategic approach to identifying the most appropriate, or equally, inappropriate areas for renewable energy projects.
- 4.35 It is vital that all regions are using a consistent approach to formulating this evidence base. The **ORED will bring together industry, NGOs, DAs, regional and local planners, statutory advisors on the environment and other planning stakeholders to develop a robust methodological approach and criteria for identifying the opportunities and constraints for renewable deployment in any given area at a strategic level.** In England this work will be overseen by a new Renewables Deployment Taskforce (see below).
- 4.36 We recognise that for some regions and Local Authorities taking a more evidence-based approach to energy planning will require additional support from central Government for skills development and funding for assessments. **ORED will provide up to £1.2 million of support to help all regions put in place a robust evidence-based assessment of their capacity for energy projects.**
- 4.37 Through this process we will ensure regional targets are set at a level that reflects both the potential and constraints in the region as well as national level commitments to 15% renewable energy by 2020 and our ambitious 2050 carbon-reduction goals. **We will consult on more explicit guidance later this year on how we expect the regions to deliver these targets and our specific expectations of regional strategies (RS).** The Government has already stated that we expect the RSs to set out how opportunities for renewable energy will be maximised, and demonstrate that the region is playing its full part in delivering the UK's EU target for 2020.
- 4.38 In particular we will expect regional strategies to reflect renewable and low-carbon energy, not just renewable electricity, and ensure that regions are actively factoring heat and community-scale technologies into their plans.
- 4.39 Several renewable energy stakeholders, including the Forestry Commission (see Figure 4.2), have begun adopting this evidence-based approach, which the Government welcomes. This is something we wish to encourage, but it is in the interest of all parties to ensure that there is not an overload of 'mapping' in the system which if uncoordinated and inconsistent could be misinterpreted and as a result, lead to greater delays in the planning process.

Figure 4.2

England's Woodland Resource and Off-gas Areas



- 4.40 **We will work with statutory advisors on the environment and other stakeholders to bring together all the relevant view points and consider a coordinated approach to 'mapping' renewable constraints and opportunities.** As part of this we will ensure that all parties are clear that this kind of 'mapping' should be interpreted as an indication of opportunities. Many constraints are dynamic and not absolute, we expect that some areas may be identified as preferred and some areas will remain unsuitable, however mapping in itself will not create 'no go' areas for development. All applications for planning permission should be considered on their merits against agreed criteria set out in the regional and local plans and consistent with national policy.
- 4.41 In England, regional strategies and renewable energy targets will provide important information to developers of nationally significant infrastructure when working up their project proposals. Developers should explain in their application to the IPC how their proposals fit with the regional strategy and support their targets or, alternatively, explain why they depart from them. Whether or not it conforms to the regional strategy and regional energy target will not, in itself, be a reason for approving or rejecting the application.

A strategic approach to planning in the marine environment

- 4.42 We will continue to take a strategic and proactive approach to planning offshore for renewable energy. DECC has recently completed a Strategic Environmental Assessment (SEA) on UK offshore energy, enabling amongst other things further rounds of offshore wind farm leasing to proceed in the UK Renewable Energy Zone and the territorial waters of England and Wales, in water depths of up to 60m (see Figure 4.3).⁷⁹ The conclusion of this process was that this scale of development of some 25 GW of offshore wind capacity would be permissible, without causing unacceptable impacts at a strategic level. The Government announced this decision on 24 June 2009 through a written Parliamentary statement and the publication of a Policy Document, *A Prevailing Wind: Enabling the Growth of Offshore Wind in the UK*.⁸⁰
- 4.43 This is a significant step forward and paves the way for the deployment of offshore wind capacity to meet our renewable energy target in 2020 and beyond. The Policy Document sets out how the Government will act to enable the plan/ programme to be delivered, including details of action on a range of issues related to the marine environment and spatial conflicts.

79 See <http://www.offshore-sea.org.uk>.

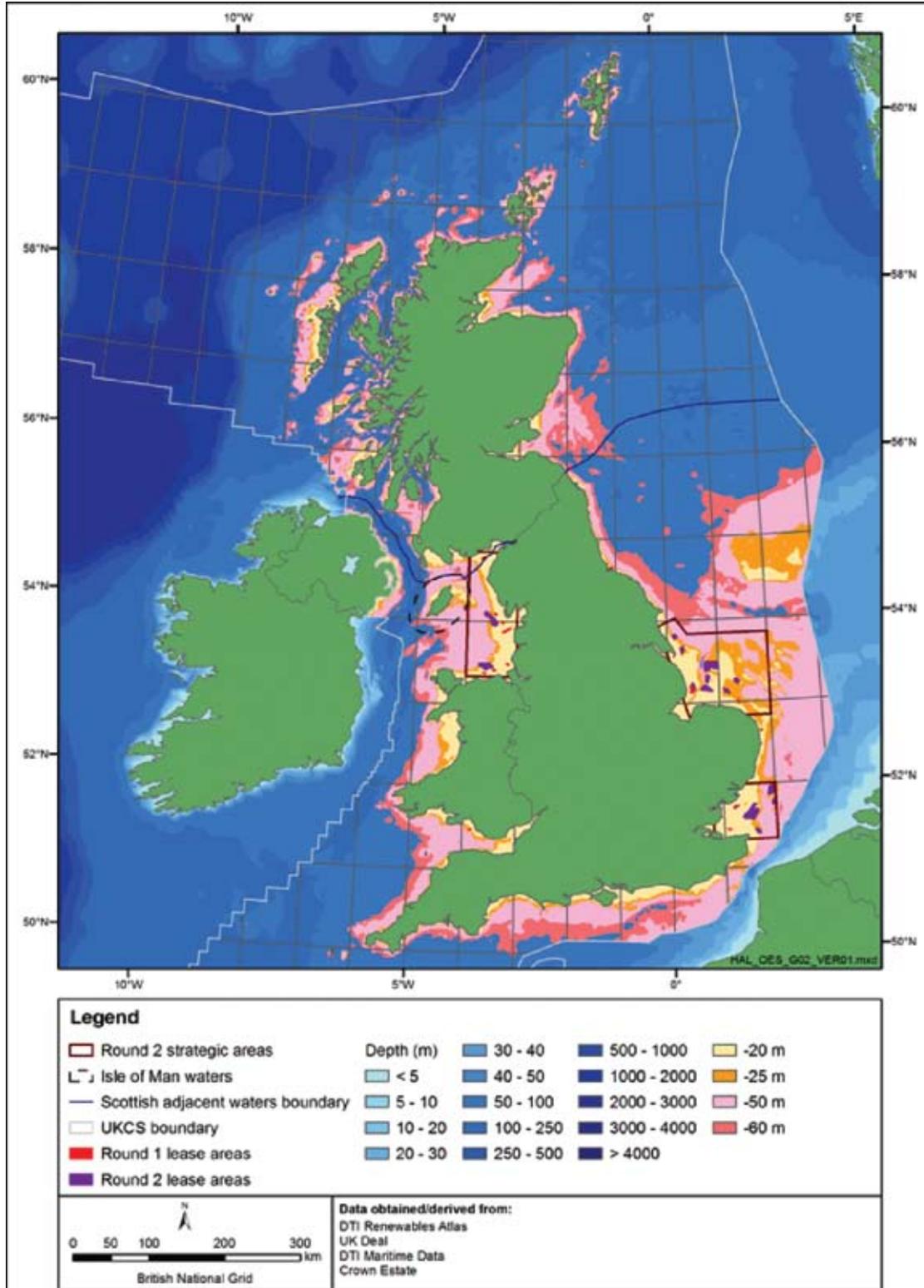
80 DECC (2009): 'A Prevailing Wind: Enabling the Growth of Offshore Wind in the UK'

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- 4.44 The responsibility for awarding leases for offshore wind farms rests with The Crown Estate, which owns virtually the entire seabed out to the 12 nautical mile territorial limit, and has the right to issue leases for development beyond the territorial limit within the Renewable Energy Zones (REZ) out to 200m. Following the announcement of the Government's decision, **The Crown Estate is now proceeding with its Round 3 process to award Zone Development Agreements (ZDAs) to developers by the end of the year.**
- 4.45 Northern Ireland and the Scottish Executive are assessing the potential for additional offshore wind generation in their territorial waters, which are subject to separate SEA processes.
- 4.46 Looking ahead, DECC will continue its rolling SEA programme for offshore energy, including its research programme and data collection to facilitate future assessments if and when they are required.

The Marine Management Organisation

- 4.47 The Marine and Coastal Access Bill provides for the creation of a Marine Management Organisation (MMO). An executive Non-Departmental Public Body, the MMO would be the UK's centre of marine expertise. It would also be the strategic delivery body for marine-related functions in the waters around England and in the UK offshore area for matters that are not devolved. The MMO would licence offshore energy installations with a generating capacity of 100 MW or less and declare safety zones around them where necessary. The MMO will also be a statutory party to the IPC's examination of projects over 100 MW generating capacity in waters in or adjacent to England and Wales.
- 4.48 The Bill would introduce a new marine planning system, with long-term objectives for the marine area around the UK and the creation of the Marine Policy statement and other, more detailed marine plans. MMO decisions must be made in accordance with these policy documents. Through streamlining the law on licensing marine development so that, as far as possible, only one licence is needed for each development, it should be faster, cheaper and simpler to license marine developments.

Figure 4.3:
Offshore wind SEA



Supporting Swifter Delivery

Planning skills and advice

- 4.49 This proactive evidence-based approach will place greater expectations on local and regional bodies and require a more sophisticated approach to understanding and utilising renewable energy opportunities as well as the various constraints. The Government recognises that there will be a need to provide extra advice and support to ensure the necessary skills and knowledge are in place.
- 4.50 **ORED and CLG will provide up to a further £10 million over two years of support to ensure the right skills and knowledge are available within the planning community at local and regional level.** This will include setting up, funding and managing a variety of support including an 'Expert Support Network' for planners on renewable energy as well as through existing bodies such as the Planning Advisory Service (PAS). Planners who are handling development proposals or drawing up local or regional plans will be able to use the network to seek advice and hands on assistance from experts on a range of technical and policy issues related to renewable energy. We will shortly publish further details of the support available.
- 4.51 ORED and CLG will facilitate specific additional hands-on **support to Local Authorities dealing with larger planning applications for renewables or low-carbon energy projects**, in particular where Local Authorities and developers wish to use the Planning Performance Agreement process.
- 4.52 In addition we will continue to deliver generic training to planners, planning inspectors and councillors on renewable energy policy and technical issues. This will increase planners' awareness of national policy on renewable energy; improve their understanding of different renewable energy technologies and their impacts; and give them practical advice on how to develop local and regional plans that assess the true potential for renewable energy in their area.
- 4.53 We will continue to develop and improve our websites⁸¹ providing access to policy guidance on renewable energy as well as best practice and technical information to developers and planners

Renewable energy performance indicators

- 4.54 The National Indicator Set measures the delivery of the Government's priorities by Local Authorities either alone, or in partnership. They also provide the basis for the Local Area Agreements, where up to 35 indicators are selected as priorities and specific targets are agreed against them. Indicators are a key tool to drive the

81 www.planningrenewables.org.uk,
<http://www.planningportal.gov.uk/>,
<http://www.communities.gov.uk/planningandbuilding/planning/planning/>

delivery of policy at local level, as performance against all indicators is assessed as part of the new Comprehensive Area Assessments, and those findings are made public. As part of the current review of national indicators, **we will be looking at the development of a new renewable energy indicator** for the next spending cycle. We will work with local government to consider how a renewable energy indicator might fit with the existing climate change indicators.

Scrutiny and challenge

- 4.55 While the measures above will support the planning community, there also needs to be thorough scrutiny and challenge of this new approach. Through ORED and the Government Offices we will test, scrutinise and, as necessary, challenge the energy components of regional and local strategies as they develop. There will also be more effective oversight of renewables content through the annual monitoring reports already required from regional and local planners.
- 4.56 Independent inspectors from the Planning Inspectorate will formally scrutinise local renewable energy policies and test the robustness of their evidence base, requiring action if plans are not considered sufficient.
- 4.57 Before signing off regional strategies for publication by responsible regional authorities, the Government will need to be satisfied that regional strategies have an ambitious and deliverable strategy on renewable and low energy, including heat and community-scale projects.

Renewables Deployment Taskforce

- 4.58 To support this planning work in England we will establish a new Renewables Deployment Taskforce which will have a Ministerial chair shared between CLG and DECC, and supported by ORED. The Taskforce will bring coordination and leadership to the various tiers of Government involved in delivering our energy targets. It will bring specific expertise, in particular from the Government Offices (GOs), Regional Development Agencies (RDAs) and Local Authorities, to the provision of high-level oversight of regional evidence bases and the subsequent local and regional energy strategies. The Taskforce will input to monitoring progress against regional targets, providing advice and constructive challenge to the local leaders boards, RDAs and GOs. With ORED, the Taskforce will examine specific blockages in the system and propose actions where it is identified that there is a generic or national-level problem. The Taskforce will have regular discussion with a wide range of stakeholders including NGOs and industry to ensure that all views are represented in the debate. The Devolved Administrations will interact with the Taskforce to share experiences and ensure a UK-wide approach.

Low-carbon economic areas

4.59 The UK Low Carbon Industrial Strategy⁸² sets out ambitions for low-carbon economic areas – geographical areas with a strategic focus on a particular low-carbon industry. The planning system can play a key role in facilitating this development, particularly as the zones will be driven by consortia of regional and sub-regional bodies led by Regional Development Authorities and Local Authorities. These partners will develop a shared commitment to the development of specific low-carbon sectors.

Addressing the Impacts of Renewables Deployment

4.60 The strategic approach to planning described above will provide a clearer, more evidence-based and more collaborative approach to identifying the opportunities and constraints for renewable and low-carbon energy projects. In the Renewable Energy Strategy consultation, we set out a number of specific areas where the Government would work with stakeholders to do more to resolve spatial conflicts and develop generic solutions to mitigate the impacts of renewables technologies.

Environmental impacts

4.61 Tackling climate change is vital for protecting our natural environment. If unchecked the impacts will be severe. Actions to address climate change can bring other environmental benefits. For example, exploiting wave, wind and solar energy can reduce local levels of pollution. Generating renewable energy from biomass waste could also significantly reduce the amount of waste that is landfilled in the UK. However, some measures can bring impacts on the environment by disturbing local habitats or causing local air pollution. Complying with the existing safeguards to protect the environment must remain a vital element of any development, but seen within the wider and long-term context of reducing carbon emissions and improving the security of energy supply.

4.62 The process of complying with environmental regulations as part of the consenting process is important to ensure that new development is located and constructed appropriately. This Strategy does not change existing environmental protections, such as the more stringent planning tests applicable to sites with nationally recognised designations, including National Parks and areas of outstanding natural beauty (AONBs). We are also taking steps to ensure sustainability of bioenergy and to make sure that the deployment of biomass heating does not cause an unacceptable deterioration in air quality. These are set out later in this chapter.

82 BIS and DECC (2009): 'The UK Low Carbon Industrial Strategy' – published with this document

- 4.63 However, sometimes the consenting process does not run as smoothly as it could and can hold up or even prevent deployment in cases where the environmental impacts could be reasonably addressed. In order to deliver the step change in renewable energy deployment needed to meet our commitments while continuing to meet statutory obligations on the environment, it will be imperative to have good quality planning applications from developers and a strategic approach from the relevant Government Agencies.
- 4.64 In recognition of this, **we have established a new UK-wide high-level board, the Renewable Energy Deployment Environmental Issues Project Board, to bring together representatives from the main consenting bodies and statutory consultees.** Its remit is to deliver strategic solutions to environmental issues encountered during the consenting process for renewable energy projects. The Board has published alongside this document a joint statement, which:
- expresses support for the objectives of the Renewable Energy Directive as a key contribution to tackling climate change;
 - highlights the need for clear and proportionate procedures for consenting of renewable energy, and the need for consenting bodies, statutory consultees and developers to work together to enable this; and
 - sets out the collective commitment of all Board members to work together to help ensure more consistent, evidence-based and timely consenting of renewable energy projects.
- 4.65 A number of work areas are now being taken forward by Board members and, where appropriate, in collaboration with developers. These include work on measures to improve the consistency and clarity of the requirements on developers; delivering better management and sharing of environmental data; and establishing best practice on pre-application engagement between environmental statutory bodies and developers to identify and tackle issues at an early stage and speed up the consenting process.
- 4.66 The Board will report regularly on progress to Ministers and its outputs will contribute to the UK's reports to the European Commission on progress towards the renewable energy target.

Aviation radar impacts

- 4.67 Wind turbines can have significant effects on aviation radar, which, unresolved, could potentially jeopardise national security or aviation safety, efficiency or compacity, and can in turn impact on the deployment of on and offshore wind. DECC and other Government Departments have been working with other aviation stakeholders to resolve this significant and challenging issue.
- 4.68 Following the Prime Minister's commitment to a resolution in November 2007, a Memorandum of Understanding was signed between the Department for

Business, Enterprise & Regulatory Reform (BERR), the Department for Transport (DfT), Ministry of Defence (MoD), the Civil Aviation Authority (CAA), NATS En Route Ltd (NERL), and the British Wind Energy Association (BWEA) on behalf of the wind industry in June 2008.⁸³ This committed all parties to delivering a joint work programme to resolve these issues and led to an Aviation Plan, subsequently published in September 2008,⁸⁴ which all parties have supported.

- 4.69 A governance structure has been created to deliver the Aviation Plan. This consists of: an Aviation Management Board bringing together DECC, DfT, MoD, CAA, NERL, BWEA, Renewables Advisory Board and the wind industry; a Fund Management Company set up by the wind industry to help fund the development of aviation solutions; and a technical Aviation Advisory Panel, reporting to both bodies on the feasibility of potential solutions.
- 4.70 Funding requirements over the next five years have been established following the agreement of the Aviation Plan. Industry has already committed £3 million over the next two years towards identifying technical solutions. DECC has previously committed considerable funding and **will be making a further contribution towards the costs of the work identified in the Plan.**
- 4.71 A series of trials and development of aviation radar solutions have taken place over the last year since the MoU was signed. In addition, resources in MoD and NERL have also been increased to speed up wind farm application processing, and interim solutions designed to assist developers in making better informed choices on site selection.
- 4.72 In the medium term, key work streams on aviation radar (En-Route, Air Traffic Control and Air Defence) will be pushed forward by the parties to the Memorandum of Understanding.

Navigational impacts

- 4.73 Following analysis of additional navigation data and consideration of the responses from the Offshore Energy SEA and the Renewable Energy Strategy consultations, the Government considers a balance can be reached to enable further deployment of offshore wind in UK waters while ensuring the minimisation of disruption, economic loss and safety risks to other users of the sea and the UK as a whole.
- 4.74 DECC, DfT and the Maritime and Coastguard Agency (MCA) will continue to work with all parties as the programme for offshore wind is delivered to remove or reduce any impacts on navigation to acceptable levels. The Government recommends that developers ensure that their potential site locations are suitable and do not impinge on major shipping routes. They should also ensure that

83 BERR (2008): 'Memorandum of Understanding: Aviation, radar and wind turbines (mitigation issues)'

84 BERR (2008): 'Aviation Plan: In respect to the interaction between wind turbines and aviation interests'

appropriate mitigation measures are considered, such as ensuring careful consideration of the layout of the turbines, whether any vessel traffic management is required and that any appropriate lighting and marking are employed on turbines.

- 4.75 We need to provide clear and consistent guidance for developers about their responsibilities for data gathering under the licensing and legislative regimes. We also need to agree with the statutory agencies what levels of data are required and set suitable standards and methodologies. To this end, DECC has agreed to facilitate a review and updating of the 2005 *Methodology for Assessing the Marine Navigational Safety Risks of Offshore wind farm* guidance to ensure that it contains the latest information and expertise. **This updated guidance document is expected to be ready by the end of 2009.**
- 4.76 To determine whether the adverse impacts are acceptable, in line with the relevant National Policy Statements, the appropriate decision maker will need to take account of any mitigation measures agreed between the applicant and affected parties on a case-by-case basis. The Government is continuing to work on developing some best practice guidance on this issue.
- 4.77 The Government considers that a balance between fishing and offshore wind interests can be achieved. Offshore wind farms should not normally occupy recognised important fishing grounds, where this would significantly impede sustainable fisheries. However we also recognise the potential for offshore wind farms to result in a net benefit to commercial fisheries in the medium and long-term, and any mitigation requirements imposed on developers through the planning process must be proportionate. DECC will continue to facilitate consultation between offshore wind developers and fisheries stakeholders.

Stronger Renewable Industry

- 4.78 We need to ensure that the UK maximises the economic and employment opportunities presented by the unparalleled level of renewable energy deployment over the next decade. The UK must make the most of its strengths as one of the world's largest manufacturing economies, as a world class centre of expertise and as a leading location for inward investment.

Challenges and Opportunities

- 4.79 With the whole of Europe seeking to meet stretching renewable energy targets, and with sharply increased investment in renewable energy in the rest of the world, the existing manufacturing and installation sector will be stretched to its limits. To deliver the level of renewable energy we need, UK and European supply chains will need to develop far more quickly than has happened to date. This includes a wide range of technologies. For instance, in the case of offshore wind

it will involve not only the design and manufacture of turbines but also foundations to site them on, cables to connect them to the mainland and vessels to install and maintain them.

- 4.80 The level of renewable deployment over the next decade presents a huge opportunity for UK industry. We are already the number one market in offshore wind, and are leading the way in deploying emerging technologies such as tidal stream energy. The UK's distributed energy and renewable heat sectors are also likely to see rapid growth in the next decade. UK strengths include a flexible and highly skilled workforce, an efficient and high-quality manufacturing and engineering ability, strong research base and decades of experience in the offshore sector. We are well situated to make the most of this significant commercial opportunity, and secure maximum benefit for UK industry.
- 4.81 There will be significant job opportunities associated with the Renewable Energy Strategy, which may create up to half a million jobs, as detailed in Chapter 7. Within this there will also be large opportunities in individual renewable sectors, for example in wind generation. Research by the Carbon Trust suggested that an offshore wind industry of the size of 29 GW could be associated with 40,000 jobs in the UK, or even 70,000 with a proactive manufacturing strategy.⁸⁵ New research by Innovas suggests that the size of the UK renewable energy sector, in terms of sales and employment, had been hitherto significantly underestimated. Innovas growth projections for onshore and offshore wind, which are of course increasingly uncertain as far out as 2020, suggest that by 2020/21 there could be an additional 130,000 jobs in the wind sector compared to 2007/08, of which around 60,000 would be in manufacturing.⁸⁶
- 4.82 The Government aims to ensure that the UK benefits economically and industrially from the move to low carbon, and that the jobs and growth it will bring support our long-term industrial future. We are committed to securing the maximum UK benefit for investment and employment, and making the UK the best place in the world to locate and grow a low-carbon business. Working closely with Devolved Administrations, Regional Development Agencies and delivery bodies including the Carbon Trust, the National Non-Food Crops Centre and the Biomass Energy Centre, we will significantly ramp up activity in the key sectors, such as wind and biomass, that are likely to see the bulk of early deployment of renewable energy.

85 Carbon Trust (2009): 'Offshore wind power: big challenge, big opportunity'. These jobs would be in operations and maintenance, services, turbine and component manufacturing, RD&D, engineering and design. 29 GW is on the high side of projections for 2020; if the level is lower in 2020, some of these 40-70,000 jobs may be created post 2020 as the offshore wind industry continues to grow.

86 Innovas (2009): 'Low Carbon and Environmental Goods and Services: an Industry analysis'. Note that Innovas employment estimates include the supply chain and may be subject to double counting, although their methodology tries to mitigate this risk. Note this estimate of 130,000 additional wind jobs excludes the small wind turbines sector.

Enabling the Supply Chain to Deliver

4.83 We have already had significant success in attracting inward investment in the renewable supply chain. An example is the Clipper Windpower Centre of Excellence for Offshore Wind in Northumberland, which is developing the world's largest offshore wind turbine (see Box 4.1). We have been supporting trade promotion activity for UK companies for more than a decade, helping UK firms win orders and build up their businesses. We also have a track record of developing our manufacturing sector to make the most of new opportunities, with the highly successful Manufacturing Advisory Service helping thousands of firms to become more competitive.

Box 4.1: Attracting inward investment: A case study

Clipper Windpower plc, a leader in advanced wind turbine technology, with substantial US manufacturing and market share, has established a Centre of Excellence for Offshore Wind in the North East of England to develop its 10 MW offshore-specific wind turbine (the 'Britannia' Project) and extension of its advanced and proven 2.5 MW technology. In developing this project over a three-year period, there has been close collaboration between Clipper, One NorthEast, DECC and UK Trade and Investment.

One NorthEast's Blyth-based New and Renewable Energy Centre (NaREC) will provide the Britannia Project with a support package for engineering and test facilities including its world-class wind turbine blade testing facilities. Funding provided by One NorthEast will also support the development of Clipper's turbine supply chain and related manufacturing facilities. Clipper view the North East as its global location of choice for this project which will lead to future manufacturing and job creation in the region.

In announcing this inward investment, James Dehlsen, Chairman and CEO of Clipper said 'We established the Project based on the offshore wind application of our technology and in concert with the UK Government's policy leadership targeted to provide upwards of 20% of the nation's electricity from renewable sources which will rely in great part on offshore wind development. This forward thinking policy should provide strong and affirmative action on both climate change and the enhancement of domestic energy security.'

4.84 A key priority is to support investment in large-scale manufacturing in areas such as offshore wind technology in the UK. **We have earmarked up to £120 million to support a step change in investment in the development of the offshore wind industry in the UK.**⁸⁷ ORED will proactively work to secure investment in large-scale production facilities in the UK, both by existing wind turbine

⁸⁷ This is up to £120 million earmarked to offshore wind from the £405 million of funding allocated to low-carbon investment in Budget 2009.

manufacturers and new entrants to the offshore wind market. The UK has a number of ways to support major investment projects in key growth areas. We will ensure that central Government, in partnership with Devolved Administrations, UKTI, RDAs, and other delivery bodies, offer the best possible package to support the development of our offshore wind sector, and have allocated some of the new capital announced in Budget 2009 to support investment in new offshore wind energy manufacturing facilities in the UK. We will also make a step change in the way we promote the UK as a place to do business in the renewables sector around the world, building on the existing work of ORED's 'UK Renewables' service.

- 4.85 In parallel **we will invest in the development of next-generation and near-market offshore wind technologies – by substantially increasing our funding for large-scale demonstrations.** This will build on the recent announcement of a £10 million scheme for the development of innovative and lower-cost offshore wind technology, with an initial increase of up to £10 million of support over the next two years. We will issue competitive calls to support the accelerated commercialisation of innovative and lower-cost offshore wind designs, as well as wider aspects of offshore wind technology (potentially including areas such as the development of next-generation foundations).
- 4.86 **We are examining how to improve the UK's capability in integrated offshore wind testing, including through dedicated testing facilities within the funding we have earmarked.** This has the potential to transform offshore wind, by supporting the development of a wide range of next-generation turbines, and will be a key part of our strategy to attract UK investment by new and existing wind turbine manufacturers. It will build on the success of existing renewable testing facilities such as the New and Renewable Energy Centre in Northumberland, and the UK's wave and tidal energy test centres. We will also support further development of the UK's world-leading wave and tidal energy testing facilities (including £9.5 million for Wave Hub).
- 4.87 ORED will support the development of a UK renewables infrastructure – for example building understanding and readiness for investment in suitable UK manufacturing sites and port facilities. As offshore wind turbines grow in size, manufacturing facilities have to be located in coastal areas, and require high quality facilities. **We will work with port owners, developers and the financial community to identify key areas with potential for renewable energy development,** building on the recent UK Ports Prospectus.⁸⁸ Regional Development Agencies, Devolved Administrations, ORED and BIS will provide coordinated support for infrastructure development in critical areas.
- 4.88 The UK has a substantial industrial and manufacturing sector which could play a role in the renewables supply chain. However, until recently a lack of confidence

88 UK Ports Prospectus (2009): <http://www.berr.gov.uk/files/file49871.pdf>

in the future prospects of renewables, and in some cases a lack of knowledge about opportunities in the renewable sector, have limited the appetite of industry to move into the sector. Chapter 3 sets out how we provide confidence to the market by extending and expanding our long-term financial incentive framework for renewables across the range of scales and technologies. ORED will build up the ability of the UK's wider supply chain – proactively identifying UK companies in other sectors that have potential to be a part of renewable supply chains, and providing direct access to renewables expertise and advice to support possible involvement in the renewables sector.

Box 4.2: Case study: JDR Cables

DECC in partnership with Renewables East supported JDR Cables during their diversification from oil and gas umbilical cables, into offshore wind. During 2006-07 support was provided to JDR Cable Systems to help them assess the market opportunity by providing sector/market and technology data, contacts, and offshore wind farm project information, including procurement timescales.

Having then made their decision to target specific offshore wind projects, JDR were further supported in year two 2007-08, but this time the intervention had a clear focus on driving down production costs through lean manufacturing and productivity initiatives. This strategic positioning of their cost and pricing structure relative to the market has helped yield the recent confirmation of contract award for the inter-turbine array cable order for the Greater Gabbard offshore wind farm – a Round 2 project which, once built, will be the largest offshore wind farm in the world at 500 MW from 140 turbines.

JDR Cable Systems have now invested in a further manufacturing facility in Hartlepool, which was officially opened this month creating 100 new green jobs.

- 4.89 Supporting investor decisions to invest in the supply chain and the UK renewables sector will be critically important. By extending the Government's current City communications activity, **ORED will promote active engagement and dialogue with the finance and investment community** in order to increase investor confidence in the UK, raise awareness of UK government policy on renewable energy, and take advantage of UK investment opportunities. **We also intend to publish a summary of renewable energy investment opportunities in the UK**, setting out why the UK is an excellent place to invest in the renewables sector, and highlighting key opportunities for such investment.

A Skilled Workforce

- 4.90 The switch to renewable energy will create a great many new skilled jobs. Meeting our target will provide up to half a million new jobs in the UK renewable energy sector.

- 4.91 Developing the skilled workers to fill these jobs is a major challenge. The average lead time, through apprenticeship or degree course, is several years. The key issues are:
- Attracting the right workers – and developing the right courses while building training capacity to train them (including capturing the knowledge and experience of older workers).
 - Ensuring that training is of good quality, that it is linked to occupational standards and qualifications, and that it builds up the necessary skills to handle new technologies.
 - Improving our understanding of supply and demand – to foresee and mitigate future imbalances.
- 4.92 The UK renewables industry does not yet have a coherent approach to training. The skills the UK's renewables sector will need are covered by at least nine different Sector Skills Councils (SSCs), and training to date has mostly involved a variety of courses and accreditation schemes operated by manufacturers and trade associations (although some progress towards a national structure has been made, for example the development of National Occupational Standards for Microgeneration by Summit Skills).
- 4.93 Energy & Utility Skills (EU Skills, the Sector Skills Council for the gas, power, waste management and water industries) has already begun to work with other SSCs to develop a skills strategy for renewable energy. However, the complex overlap across the SSCs has hindered effective leadership in skills development to date. Challenges include – in some sectors – fragmented and hard-to-reach workforces. Where significant progress has been made, it has generally been specific to a technology, business sector or particular region.
- 4.94 Recognising that the new renewables sector requires a step change in the way skills are developed, **ORED will support a comprehensive review of the renewables sector skills across the UK, to be led by EU Skills with input from the Devolved Administrations, the key SSCs and wider stakeholders.** The initial focus will be a detailed understanding of the current state of skills provision for the renewables sector, together with models of supply and demand, by April 2010, which will enable the SSCs and employers to develop a strategic approach to skills and training across the renewable energy footprint.
- 4.95 **ORED is working with EU Skills to assist the electricity sector to develop the National Skills Academy for Power.** If this is approved, the Academy should be launched by the first quarter of 2010. It will develop the skills needed for the enhanced, smart, networks needed to integrate renewable generation, including microgeneration, and aims to ensure that the energy sector has a healthy inflow of skilled workers for the future. ORED will also work with the Academy to ensure that the UK has the skilled workers both to deliver our

renewable energy systems and profit from the wider business opportunities of the global low-carbon market.

- 4.96 **The wind industry, led by the British Wind Energy Association and with assistance from ORED, is developing a skills and training strategy for wind energy and marine renewables** that will aim to ensure the industry is well positioned to recruit new workers and has an up to date training and qualifications framework. The BWEA plans to launch the first part of this strategy, an apprenticeship framework. **The Biomass Energy Centre is working with its sector to provide updated and detailed information and guidance on biomass installation, as well as a biomass training course.**

Quicker, Smarter Grid Connection

- 4.97 Constraints on access to the electricity grid represent a major challenge for both existing and future renewable generation projects. About 17 GW of renewable electricity developments – of which nearly 6 GW have received planning consent – are currently awaiting connection to the grid, and developers in some parts of the country have been offered an earliest connection date of 2020. In addition substantial new renewable electricity generation will require connection to the grid. The Government has therefore taken urgent action to improve existing connection arrangements.
- 4.98 Moreover, most of the new renewable electricity capacity in the medium term is expected to come from onshore and offshore wind, with longer-term contributions from marine power. Since these are generally sourced far from areas of demand, we will need to ensure significant new investment in transmission infrastructure.

Making the Most of Current Infrastructure

- 4.99 Respondents to the Renewable Energy Strategy consultation generally agreed that transmission access is one of the main barriers to renewables deployment. The Transmission Access Review (TAR), published alongside the consultation, set out a number of measures that the Government and Ofgem believe will remove or significantly reduce the current barriers to timely connection.
- 4.100 A wide range of respondents welcomed the measures set out in the TAR to improve use of existing assets and to deliver the necessary infrastructure improvements. Ideally, they wanted these measures to be implemented more quickly. To address these concerns Ofgem has implemented an interim access regime to ensure that projects can connect before longer term grid access reforms are implemented. This is based on a 'connect and manage' approach, and applies to connection at the level of both the transmission and the

distribution networks. In total, around 1 GW of renewables projects have been given earlier connection offers as a result (see Box 4.3).

Box 4.3: Interim connect and manage regime

Ahead of the enduring access reforms, we have taken urgent steps – with Ofgem, National Grid Electricity Transmission (NGET) and industry – to make sure that projects that are ready to go can connect as soon as possible. In May 2009, Ofgem approved a new interim regime that allows NGET to offer earlier grid access to a significant number of generators. Based on this regime, around 1 GW of renewable projects in Scotland have now been offered the opportunity for earlier connection. The regime means that projects are able to advance connection to the grid by a number of years.

- 4.101 Timely and effective reforms of the current access regime are essential. The new grid access regime must be consistent with our policy goals for meeting the renewable energy target in 2020, as well as our broader energy policy objectives on security of supply, meeting our carbon budgets and fair energy prices. The Government therefore took powers in the Energy Act 2008 to implement new grid access rules if the industry access reform process did not deliver as quickly as needed.
- 4.102 Industry developed proposals for enduring reforms of the grid access regime. These proposals were submitted to Ofgem for consideration. Ofgem subsequently recommended that the Secretary of State uses the powers taken in the Energy Act 2008 to implement enduring reform of the transmission access arrangements. Ofgem has indicated that if the Secretary of State decides to use his powers, it would delay consideration of the access-related industry proposals until a more suitable time.⁸⁹
- 4.103 We have considered the outcomes of the industry process and the advice of Ofgem on the best way forward to ensure a timely and effective solution for enduring grid access rights that is consistent with our policy goals. Our key considerations have been the extent to which the proposals add certainty for developers, speed up connections and ensure the efficient operation of existing plant. The risks to current and future consumers of grid access reform have been considered in terms of the impact on both the generation investment needed to meet our renewable energy target and other policy goals, and the costs of the possible options.
- 4.104 Given these considerations, **the Government has decided to use the powers taken in the Energy Act 2008 to introduce reforms to grid access arrangements.** The scope of the changes we propose will be focused primarily

89 For more information see:
<http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/tar/Documents1/Miliband%20-%2020250609.PDF>

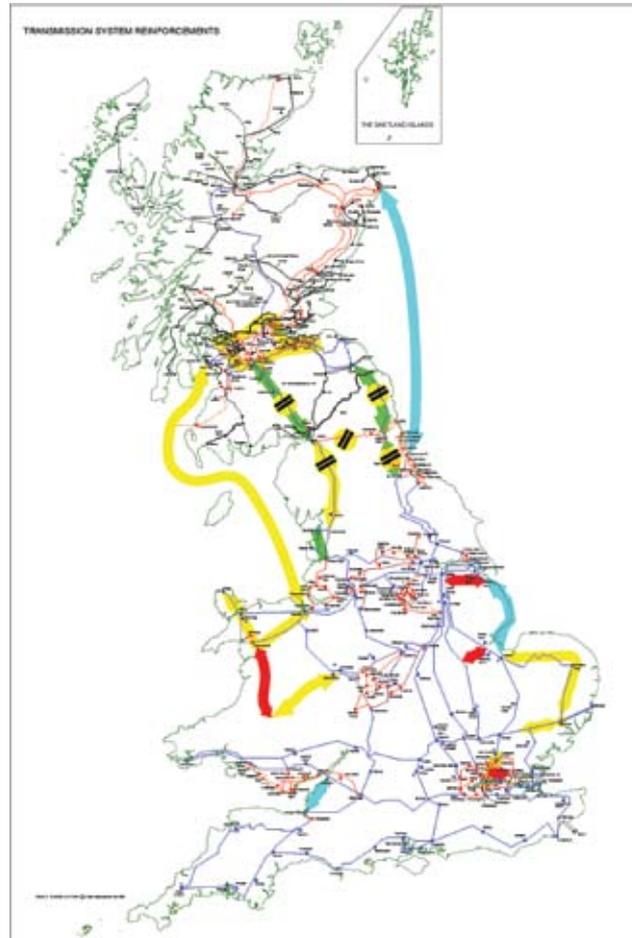
on access rights for new entrants. **The Government intends to build on the useful work of industry and Ofgem over the last year and consult on the principles of a model for grid access this summer. The intention is to make changes to codes and licences that reflect this model by June of next year.** These changes need to be consistent with the legal basis of the Energy Act 2008.

Delivering New Transmission Infrastructure

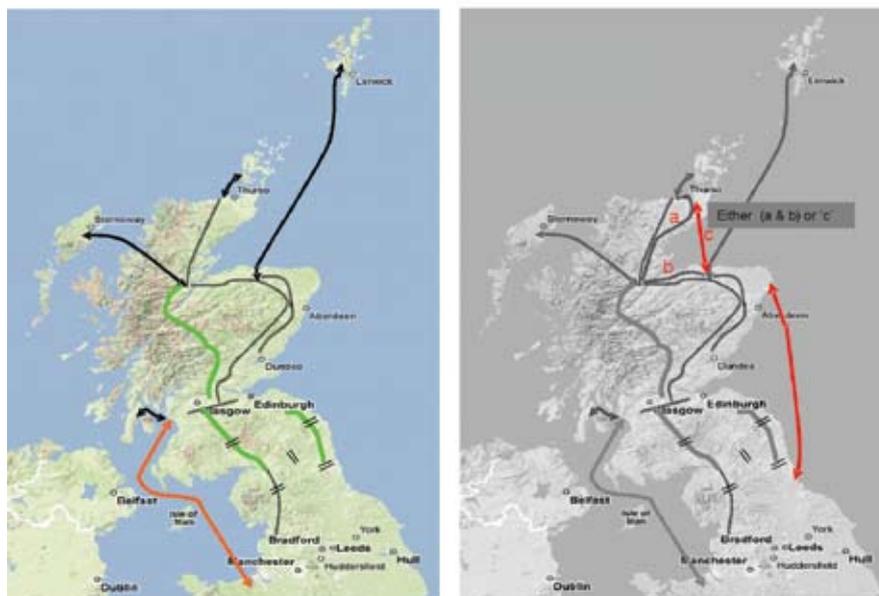
- 4.105 The Government is working with Ofgem and industry to ensure that the right grid infrastructure is in place to connect all the forms of new generation that the UK will need to achieve our climate and energy goals.
- 4.106 Since the RES consultation was published there have been significant developments in ensuring that the right investment is made in the transmission infrastructure, onshore and offshore.
- 4.107 The Electricity Networks Strategy Group (ENSG), chaired by DECC and Ofgem, published a report in March 2009 setting out an ambitious programme for network development that will support the connection of up to 35 GW of renewable generation. Delivering these reinforcements will require up to an estimated £4.7 billion⁹⁰ of new investment, in addition to current refurbishment and expansion plans of some £4-5 billion which have already been approved by Ofgem. These re-enforcements need to be built by 2015. The immediate priority is to provide certainty that essential (relatively low cost) design and pre-consenting work can be urgently progressed by National Grid Electricity Transmission (NGET) and the Scottish network companies. Ofgem has approved up to £43 million needed to begin pre-construction work on several projects in the ENSG report.

90 ENSG (2009): 'Our Electricity Transmission Network: A Vision for 2020: A Report by the Electricity Networks Strategy Group'

Figure 4.4:
Proposed transmission reinforcement for 2020⁹¹



Stage 1 and 2 transmission reinforcements for Scotland



91 See ENSG (2009): 'Our Electricity Transmission Network: A Vision for 2020: A Report by the Electricity Networks Strategy Group'

- 4.108 In addition, Ofgem is working with the transmission companies to develop proposals which create a more flexible regulatory regime that will encourage transmission companies to anticipate the investment needed. The initial consultation on these new proposals was issued in December 2008 and **Ofgem expects to finalise a new enhanced investment incentives regime for implementation before the summer of 2010**, to provide the appropriate funding mechanism to encourage successful anticipatory investment.
- 4.109 The Government also needs to consider now how to plan for network investment beyond 2020. As set out in the UK Low Carbon Transition Plan,⁹² the Government is considering what further role it might take in shaping the route map to meeting our energy and carbon policy objectives. A key element of the future energy system is the network infrastructure required to support and facilitate the shape of demand and supply on that system. The Government is therefore considering how it should work with the regulator and in consultation with the industry to develop a long-term vision for the network, including the investments that would help contribute to the Government's policy objectives. Part of the Government's considerations will include how best to underpin this vision and how all parties can report progress on their contribution to the delivery on the vision. This work will address questions about the scale of the investment required; the prioritisation of investment; and the investment needed to produce a smarter grid capability, consistent with the interests of consumers today and in the future.
- 4.110 The Government will continue to work closely with Ofgem and industry to facilitate delivery of the electricity network we need for 2020 and beyond. In particular we will work on enhanced incentives to Transmission Owners to make new grid investments, skills, supply chain, planning and innovation. **We will be publishing in the autumn a new National Policy Statement (NPS) on Networks Infrastructure for consultation**, alongside the Overarching Energy NPS and Renewable Energy NPS, to set out how the Infrastructure Planning Commission should consider applications to build new grid lines.
- 4.111 Over the longer term, the regulatory framework may need to adjust to allow the electricity system to contribute to our target of an 80% reduction in greenhouse gas emissions by 2050. The Government will contribute to Ofgem's RPI-x@20 project which will conclude next summer. This project will inform future price controls of the regulated network companies in Great Britain. In particular, to prevent a lock-out of options that may be crucial for meeting the trajectory towards the 2050 goal, this regulatory framework review will need to tackle issues such as incentives for innovation in network companies and broader ways to ensure the right strategic investments in the network.

92 DECC (2009): 'The UK Low Carbon Transition Plan'

4.112 On 24 June 2009, the Government announced a new offshore transmission regulatory regime to connect the potential 39 GW⁹³ of offshore wind in UK waters in the most cost-effective and efficient manner. This regime will provide opportunities for new entrants to the market to bid for Offshore Transition Owner (OFTO) licenses for design, finance, build and maintain offshore transition assets with an estimated value of up to £15 billion. Competitive tenders for the first projects, run by Ofgem, will start at the end of July. This will allow time for OFTOs to be appointed by June 2010, when we expect the regime to 'Go Live'. From that date, the transmission of electricity offshore at voltages of 132kV and above will require an OFTO licence. We will continue to work closely with Ofgem, NGET and The Crown Estate (which is the leasing authority offshore) to ensure that the new regime delivers an efficient and co-ordinated offshore network including offshore wind deployment, and any future marine generation capability. NGET's function as system operator onshore has also been extended offshore. **It will develop a coordinated and efficient offshore transmission system and work with The Crown Estate to develop a 20-year planning statement on offshore grid by December 2009.**

4.113 In the longer term, as the offshore grid is built in UK waters, it may make economic sense and be technically feasible to connect those wind farms with projects in the waters of other European countries. The UK is one of only two Member States who attend the Commission's 'Working group for offshore/ onshore grid development', and we are actively discussing these issues. We are also discussing with EU Member States and other stakeholders the policy implications of network development for specific offshore projects that could transcend boundaries of UK waters.

Smart Grid

4.114 In addition to increased investment and better access to the grid we are also looking at the need for the grid to be smarter. It will need to react to changes in generation and demand patterns as the energy system experiences a step change in intermittent generation at large-scale and an increased number of small-scale distributed generation plants, more price responsive consumers enabled by roll out of smart meters, and changes in demand from the use of electric vehicles. Network operators will benefit from having more real time information on energy use and supply, and will be able to facilitate two-way flows of energy efficiently on the system through use of more automated response technologies.

4.115 Many of the technologies to enable such capability are already available, but have not yet been integrated together in large-scale demonstrations. However our

93 This 39 GW represents the 33 GW from Rounds 1, 2 and potentially 3, plus up to 6 GW in Scottish territorial waters.

intention to roll out smart meters is already bringing forward a key element of smart grid capability. The current consultation on smart meter policy considers how roll out of smart meters should allow for smarter network operation, alongside better information for end-consumers.

- 4.116 Financial resources for regulated network companies are already available through funding from Ofgem’s Innovation Funding Incentive (IFI). The IFI encourages Distribution Network Operators (DNO) and Transmission Owners (TOs) to invest in appropriate research & development activities that focus on the technical aspects of network design, operation and maintenance. For the next five-year DNO price control, Ofgem has proposed a significant increase in funding to help prepare the networks for the low-carbon economy. These new proposals will allow a significant increase in investment for trialling innovative ways of managing the distribution network with increasing amounts of renewable generation. The Energy Technologies Institute also has a network group for funding onshore and offshore network technologies. In addition, the Government is providing direct funding, through the Research Councils, of over £30 million for collaborative research in networks involving academia and industry; and complementary funding of up to £6 million for smart grids, which will be used to support early-stage development of trials of key technologies consistent with a vision for smart grid in the UK to be published later this year.
- 4.117 The Government is now working with industry and other stakeholders to further develop our thinking about the contribution a ‘smart grid’ could make to decarbonising and securing energy supply in the UK, while meeting our wider objectives. The costs and benefits of a smart grid will ultimately depend on the combinations of technologies that are brought together – some are well understood, some at an early stage of development, others don’t yet exist. Going forward the Government will need to be clear about its objectives, make the right choices and be sure that the networks are ready in time to both facilitate and support changes while avoiding solutions that are inefficient in the longer term.
- 4.118 The Government and Ofgem, under the ENSG ‘smart grid working group’, are taking forward a study on smart grids in a UK context. The study will consider the costs, benefits and issues to be addressed in developing a smart grid for the GB electricity system, including technology readiness, how such a system might develop, and the drivers and barriers at each stage.
- 4.119 **Following completion of this work the Government will publish:**
- **A high-level ‘vision’, setting out what a UK smart grid might look like, why we would want to develop it, later this year.**
 - **In the light of work on the 2050 energy road map next year,⁹⁴ a ‘route map’ for delivery of this vision.**

94 See DECC (2009): ‘The UK Low Carbon Transition Plan’

Using more Sustainable Bioenergy

Introduction

4.120 Biomass is a versatile source of renewable energy. As a fuel rather than a technology, it can be used in a number of different ways to create bioenergy. Depending on the type of biomass, it can be combusted either to generate heat or to produce electricity. It can also be digested to generate biogas, processed to produce bioliquids for heat or power generation, or used as a transport fuel, a 'biofuel' (see Box 4.4).

Box 4.4: Different types of biomass

Biomass is defined as material of recent biological origin, derived from plant or animal matter. To create bioenergy, it can be combusted to generate heat and power, or converted into biofuels or a renewable gas.

Biomass for heat and power

The biomass used for heat and power usually falls in one of three categories:

- Biomass sourced from conventional forestry management. This includes thinning, felling and coppicing of sustainably managed forests, parklands and trees from other green spaces. It also includes sawmill residues (often processed to produce wood pellets), other wood processing residues and parts of trees unsuitable for the timber industry.
- Biomass from agricultural crops and residues. This includes crops grown primarily for use in energy generation ('energy crops'). Biomass for heat and power can use 'woody' energy crops such as short rotation coppice (SRC) or miscanthus grass which can be grown on land unsuitable for food crops. Biomass can also be sourced from agricultural residues such as straw, husks and kernels.
- Biomass from biodegradable waste and other similar materials; this includes sewage sludge, animal manure, waste wood from construction, and food waste that would otherwise be disposed of in landfill.

Figure 4.5:**Willow grown as short rotation coppice (SRC) ready for harvesting⁹⁵****Biofuels for transport**

Currently, two primary biofuels are in commercial production. Bioethanol made from fermenting agricultural crops such as sugar cane, sugar beet or wheat; and biodiesel produced from oily crops such as soy and oilseed rape or by processing oily wastes such as used cooking oil and animal fats. In the future, second generation or advanced biofuels may be manufactured from a wider range of biomass such as wood, energy crops and waste, using processes that also produce heat and power.

Renewable gas: biogas and syngas

Biogas can be produced from the decomposition of biomass in the absence of oxygen, a process known as anaerobic digestion (AD). AD can be used on farms to process animal slurries and other agricultural residues; by the water industry to process sewage sludge; and to process food waste that would otherwise go to landfill. In all cases it produces a valuable methane-rich gas which can be used like natural gas to generate energy for electricity, heat and transport.

The process of gasification or pyrolysis (high temperature treatment in the presence of little or no oxygen) produces a range of products including a gas that can be converted and used in a similar way to biogas. It is often referred to as 'syngas' and, where the feedstock is biomass, this gas is renewable.

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- 4.121 Our analysis suggests that using biomass to generate heat and electricity is a cost-effective way to meet the 2020 renewable energy target. Furthermore, when sourced sustainably, biomass, whether used to produce heat, electricity or biofuels, can make a significant contribution to our greenhouse gas targets and support wider sustainable development objectives at home and abroad. Our analysis indicates that around 30% of the UK renewable energy target could come from bioenergy for heat and power, rising to around 50% if biofuels for transport are included. In addition, it can provide the feedstock for a wide range of sustainable low carbon renewable materials and products.⁹⁶
- 4.122 The policies set out here aim to build on existing efforts to increase the production of sustainable biomass in the UK and support the expansion of the biomass supply chain, in ways consistent with our energy and climate change objectives. This effort relies on our long-term financial support frameworks – the Renewables Obligation, the new Renewable Heat Incentive and Feed-In Tariffs, and the Renewable Transport Fuel Obligation (see Chapter 3). But it also requires us to address the key issues influencing the increased exploitation of bioenergy, in particular:
- Increasing supply;
 - Ensuring sustainability;
 - Enabling the use of bioenergy;
 - Identifying new applications and sectors for bioenergy.

⁹⁶ The Government is promoting this through the UK Biomass Strategy (including the revised Non-Food Crops Strategy Action plan) Defra/DTI/DfT (2007): 'UK Biomass Strategy'

Box 4.5: Biomass supply for heat and power

Responses to the Renewable Energy Strategy consultation highlighted concerns about the reliability of supply of imported biomass and how the market might develop. In response, we have done further work to improve our understanding of the global biomass market to 2020. This analysis looked at the impact on the UK biomass market under different scenarios – including one where the overall EU renewable energy target is implemented, and a scenario where sustainability and greenhouse gas savings are prioritised.⁹⁷

Delivering the European renewable energy target is expected to increase the demand for biomass feedstocks in the heat and power sectors. Our analysis suggests that there could be sufficient biomass resource potential in the UK to meet this demand for heat and power in 2020, if the supply potential is fully developed.⁹⁸ This assessment assumes that we could rapidly increase the production of energy crops in the UK, increase wood fuel supply from sustainable forestry, make better use of agricultural residues and fully exploit waste biomass currently going to landfill. The study considered that biomass, specifically woody biomass, will increasingly become a globally traded commodity. Imported biomass products are likely to continue to play a role in the UK use of bioenergy.

Increasing Supply

Biomass

4.123 Wood: The UK woodfuel market is in its infancy and the supply chain is dominated by small and medium-sized enterprises. Encouraging more woodland owners to manage their land sustainably (by thinning, pruning and cyclic replanting) will bring more woody biomass to market and encourage greater biodiversity by providing habitats for a wider variety of woodland plant and animal species. The Forestry Commission's *Woodfuel Strategy for England*,⁹⁹ aims to bring an additional 2 million tonnes of woodfuel to market annually by 2020 – equivalent to 4 TWh¹⁰⁰ (around 2% of the renewable energy needed to meet our 2020 target) – by improving woodland management. The organisation has recently improved grants and support to woodland owners (particularly small woodlands) for resource planning and woodland management¹⁰¹ and provides

97 E4Tech (2009): 'Biomass Supply curve for the UK'

98 Separate work by RELU also indicates that there is sufficient land in the UK to support this: Haughton J. et al (2009): 'A novel, integrated approach to assessing social, economic and environmental implications of changing rural land-use: a case study of perennial biomass crops'. *Journal of Applied Ecology* 2009,46, 315–322.

99 Forestry Commission (2007): 'The Woodfuel Strategy for England'

100 Based on the fuel being used in a Combined Heat and Power system.

101 For the smallest woodlands (up to 30ha) grants will increase from £300 to £1000 (per woodland plan).

support for woodland-based businesses in partnership with the Regional Development Agencies.

- 4.124 Building on this, **the Forestry Commission will publish an implementation plan for its Woodfuel Strategy later in 2009, setting out measures to address forestry and woodland skills, infrastructure requirements and supplier confidence across the supply chain.** The Forestry Commission is also working with its Forest Research Agency and DECC to explore options for expanding and co-ordinating information and advice on bioenergy via the National Non-Food Crops Centre and the Biomass Energy Centre.
- 4.125 The Forestry Commission Scotland (FCS) is implementing a number of recommendations from its Wood Fuel Task Force to increase the supply of wood for renewable energy production. FCS also delivers the Scottish Government's £7 million Scottish Biomass Support Scheme, and is now running the £3.3 million Scottish Biomass Heat Scheme, targeted at biomass heating for SMEs.
- 4.126 Forestry Commission Wales (FCW) is leading the delivery of support to the wood energy market in Wales in line with *Woodlands for Wales*, the Welsh Assembly Government's Strategy for Woodlands and Trees revised in March 2009.¹⁰² FCW is also managing the delivery of the Rural Development Plan funded grant scheme for woodland owners called *Better Woodlands for Wales* that seeks to increase the amount of wood-fuel coming onto the market and is itself marketing 80,000 tonnes of low-quality biomass material annually, from the public forest estate, for the energy market.
- 4.127 **Energy crops:** The Government currently provides support worth £47 million for energy crops in England through the Rural Development Programme for England's Energy Crops Scheme, for the establishment of short rotation coppice (willow, poplar, ash, alder, hazel, silver birch, sycamore, sweet chestnut, lime) and miscanthus (a tall, woody, fast-growing energy grass). Payments are currently available at 40% of actual establishment costs, and are subject to an environmental appraisal to help safeguard against energy crops being grown on land with high biodiversity, landscape or archaeological value.
- 4.128 Currently, uptake of grants is low, in part due to the higher and more immediate return available from food crops such as wheat even when grown on lower quality land. **The Government has therefore decided to increase planting grants under the Energy Crops Scheme to 50% of establishment costs** in England from 2010, subject to approval from the European Commission.
- 4.129 **We are also funding a £1.5 million three-year research project to examine the feasibility of Short Rotation Forestry** as a viable renewable energy source within England. The project will examine whether these crops, including eucalyptus, have the potential to deliver greater volumes of biomass from the

102 WAG (2009): 'Woodland for Wales: The Welsh Assembly Government's Strategy for Woodland and Trees'

same land area as current energy crops. It will also provide scientific data on hydrology, carbon balance, economic viability and possible environmental risks, such as the impact on landscape and biodiversity.

Figure 4.6:
A field of miscanthus



4.130 **Waste:** Waste biomass is an under-used resource which could provide a significant contribution to our renewable energy targets and reduce the total amount of waste that is landfilled in the UK. We estimate that 6 million tonnes of waste wood and 9 million tonnes of waste food are currently landfilled each year. Strenuous efforts are being made to minimise this waste – for example by improving the way date labelling on food communicates information about food safety to consumers – but it is clear that a supply of waste food and wood will exist for the foreseeable future.

4.131 Currently 6 TWh of heat and power is generated from biomass municipal solid waste collected by Local Authorities, and about 18 TWh from landfill gas.¹⁰³ If all the food and wood waste sent to landfill were used for energy it would generate 42 TWh, or approximately 18% of our renewable energy target.¹⁰⁴ Responses to

¹⁰³ We expect the amount of energy generated from landfill gas to fall over time as the available landfill sites are used. The figures for current energy use are from BERR (2008): 'Digest of United Kingdom Energy Statistics 2008', Table 7.6.

¹⁰⁴ Analysis for the Government's Waste Strategy for England set out that the most effective use of most biomass waste is to generate energy (via anaerobic digestion for wet food waste, and combustion (even over recycling) for contaminated waste wood). The biomass element of solid recovered fuel (SRF) also counts towards our renewable energy targets. Defra (2007): 'Waste Strategy for England 2007'.

the Renewable Energy Strategy consultation¹⁰⁵ showed strong support for the Government to take further measures to discourage the landfill of biomass waste – although there was no overall consensus about what measures should be used.

- 4.132 The landfill tax provides a powerful driver to divert waste from landfill to other uses, and this has been strengthened with the further increases in the escalator announced in the 2009 Budget.¹⁰⁶ We intend to take further steps to ensure that Local Authorities have the right information to understand the benefits and enable them to make decisions to divert waste from landfill.
- 4.133 In order to put even less waste into landfills we plan to produce more bioenergy from wood waste, particularly through combustion; and to process more food waste, agricultural waste, and sewage using ‘anaerobic digestion’ to produce biogas, which is covered in the section below. **The UK will be consulting later this year on the scope for banning certain materials or kinds of waste from landfill**, working alongside appropriate instruments such as landfill tax. In addition we aim to capture more of the methane which our existing landfills produce. The Government has asked the Environment Agency to consider ways in which control over landfill gas emissions could be tightened further including, if necessary, tighter regulation.

Renewable gas

- 4.134 **Biogas:** We are undertaking considerable work to increase the deployment and use of anaerobic digestion to create biogas. Our analysis indicates that the technical potential of biogas generation for heat and power is about 10-20 TWh or more.¹⁰⁷ Biogas is already supported under the Renewables Obligation and we will consult later this year on how best to support its use to generate heat under the forthcoming Renewable Heat Incentive. In partnership with key stakeholders, Defra published *Anaerobic Digestion – Shared Goals* in February 2009,¹⁰⁸ which sets out the collective ambitions of the Government and stakeholders for the use of anaerobic digestion in the UK. To date over 50 organisations and businesses have formally endorsed these shared goals. The Government appointed the Anaerobic Digestion Task Group to consider how we can achieve these collective ambitions. The Task Group published an Implementation Plan in July 2009 setting out its recommendations for practical actions.

105 BERR (2008): ‘UK Renewable Energy Strategy: Consultation’

106 HM Treasury (2009): ‘Budget 2009: Building Britain’s Future’, TSO

107 The estimate was generated for DEFRA/DTI/DfT (2007): ‘UK Biomass Strategy’; Later reports indicated that the technical potential might be as much as 27 TWh – Enviro Consulting (2008): ‘Barriers to Renewable Heat part 1: Supply Side’

108 Defra (2009): ‘Anaerobic Digestion – Shared Goals’

4.135 We are already doing the following to encourage greater use of anaerobic digestion:

- Providing up to £10 million for the Anaerobic Digestion Demonstration Programme. These projects, to be built by end March 2011, will demonstrate 'state of the art' use of anaerobic digestion to create renewable energy, reduce greenhouse gas emissions and avoid waste being sent to landfill. **We also announced in the Budget 2009 an additional £10 million for anaerobic digestion, and in-vessel composting.**
- **We have commissioned the National Non-Food Crops Centre to develop a web-based portal to act as a first point of contact for advice on anaerobic digestion, to be delivered by end-2009.**
- The Environment Agency and the Waste and Resources Action Programme have been working with industry to develop a standard for digestate and a Quality Protocol to set out conditions for its production and use. These clarify when this material has been fully recovered and waste management controls are no longer required. They also provide users with confidence that the digestate they purchase conforms to an approved standard. The Environment Agency and WRAP will publish the protocol in the autumn once the technical and regulatory requirements have been finalised.

4.136 **Syngas:** Several gasification demonstration plants operate in Europe using a range of biomass feedstocks, from animal slurry to wood. However, the use of gasification for more advanced processes, such as producing synthetic, renewable natural gas, is not expected to become commercially available at scale until the latter half of the next decade.

4.137 The process produces high levels of industrial-strength heat and our analysis indicates that, given current estimates of construction and operation costs, we are likely to see only a few smaller-scale sites in the UK by 2020. There are also competing uses for syngas for the production of biofuels and as a feedstock for the renewable chemicals industry. In the longer term, as the technology becomes more advanced, the use of syngas may make a significant contribution to our renewable energy and low-carbon ambitions and it has therefore been afforded the same financial support as biogas produced from anaerobic digestion under the RO. **We will look at whether to provide similar support under the Renewable Heat Incentive as part of the further consultation on the RHI.**

Biofuels

- 4.138 At present biofuels are the most readily deployable renewable technology used in the transport sector. In 2008-09 around 2.6% of all UK road fuels used were biofuels, producing 10 TWh renewable energy and reducing UK carbon emissions by around 3 MtCO₂ from the displacement of fossil fuels.¹⁰⁹ The supply of biofuels in the UK is driven by the Renewable Transport Fuel Obligation (RTFO see Chapter 3). There is a global market for the sourcing and supply of biofuels and the majority of feedstocks used in the UK are sourced from abroad. To encourage sustainability of supply, the RTFO requires fuel suppliers to submit monthly reports on the lifecycle greenhouse gas saving and the sustainability of the biofuels which are published.
- 4.139 By setting out a clear strategy for meeting our energy and climate targets we will increase investment confidence and innovation, encouraging the UK industry to grow and develop, providing that our domestic and imported biofuels are produced in an environmentally, socially and economically sustainable way. UK producers, who have already invested considerable resource into improving their supply chains and processing facilities under the RTFO, will have the opportunity to compete in a global market if they can meet the European mandatory standards that have been agreed under the Renewable Energy Directive.

Ensuring Sustainability

- 4.140 The Government's bioenergy policies aim to reduce greenhouse gas emissions without harming the environment and while maximising benefits to biodiversity, farming and employment. Ensuring our biomass supplies are sourced sustainably is key to achieving this. In line with the views of the overwhelming majority of respondents to the Renewable Energy Strategy consultation, we are taking constructive steps to ensure that the biomass used in heat, electricity and transport are sustainably produced.

Biomass

- 4.141 In the UK, Government uses cultivation and environmental controls on crop production, together with sustainability standards¹¹⁰ on forest management, to minimise their environmental impacts. The new reporting requirement for the Renewables Obligation provides a means to monitor and promote the use of sustainable biomass. However, we do not yet have an overarching scheme that implements sustainability standards for solid biomass used for both heat and power across all the intended incentives.

¹⁰⁹ This estimate does not include emissions from biofuel production or possible indirect land use change

¹¹⁰ The UK Forestry Standard, published in 1998, sets out the Government's approach to sustainable forest management, including forest biomass

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- 4.142 We believe that mandatory sustainability criteria for large-scale users/suppliers of biomass for heat and electricity are essential. Since the global market for biomass is likely to expand, we must act internationally: if the UK introduces tighter criteria than the rest of Europe or other countries, biomass will simply be sold elsewhere. Therefore, **the UK is pressing the European Union to consider options for an efficient and effective sustainability scheme for suppliers of solid biomass under the terms of the Renewable Energy Directive,**¹¹¹ including building on existing pan-European tools which demonstrate the sustainability of European forests. Our position is set out in Box 4.6. The European Commission is due to report on this issue by the end of 2009.
- 4.143 **We are establishing a Biomass Sustainability Working Group, co-chaired by DECC and Defra, with representation from DfT, The Environment Agency, industry and NGOs.** This will be a forum to share good practice and help develop the UK's position on biomass for heat and electricity. **The UK is also pushing to agree international sustainability criteria and indicators for bioenergy through the Global Bioenergy Partnership. We expect these to be finalised by mid-2010.**

¹¹¹ The Renewable Energy Directive (2009/28/EC) includes mandatory sustainability criteria for biofuels and bioliquids (which can be used for heat and power). It also requires the Commission to report on the sustainable use of biomass by end 2009, bringing forward proposals if necessary.

Box 4.6 Sustainability criteria for biomass

We consider that efficient and effective international sustainability criteria for solid biomass should include the following features:

- Both home-grown and imported biomass sources used for heat and power should be included;
- Sustainability criteria for biomass for heat and power should differ from those for biofuels in order to reflect the different sustainability concerns resulting from the different sources, production and use of the feedstocks – and a supply chain which largely relies on SMEs, such as small woodland owners;
- The primary responsibility should be placed on biomass suppliers to source only sustainable feedstocks;
- The system must be practical and light-touch, avoiding unnecessary burdens for small users and suppliers and should build on existing schemes wherever possible;
- It should not lead to the degradation of natural or semi-natural ecosystems/habitats, to indirect land use change or to net biodiversity loss;
- It should recognise that, in most cases, biomass used for heat and electricity can – based on a whole lifecycle assessment – easily achieve more than the minimum 35% greenhouse gas savings stipulated for biofuels in the Renewable Energy Directive;¹¹²
- EU Member States should have the discretion to offer additional benefits/incentives to reward greater efficiency in conversion technologies and specific plants if wished; and
- Sustainability criteria should be subject to review so as to ensure there are no perverse outcomes, such as on food prices or land use, to promote continued development in best practice and continued greenhouse gas savings.

4.144 We introduced a sustainability reporting requirement for biomass within the Renewables Obligation in April 2009.¹¹³ This allows us to monitor the sustainability of biomass that is used to generate electricity. The requirement is administered by Ofgem, who will be making the results available on an annual basis from 2010. **We will consult, as part of the forthcoming incentives consultations, on similar requirements for the Renewable Heat Incentive and Feed-In Tariffs** in Great Britain.

4.145 Using ongoing research and the evidence generated from this reporting requirement, we will keep under review the impacts of our renewable incentives on the sustainability of biomass, sourced both domestically and internationally.

¹¹² Environment Agency (2009): 'Minimising greenhouse gas emissions from biomass energy generation'

¹¹³ Renewables Obligation Order 2009 SI No. 785, <http://www.opsi.gov.uk>

If negative impacts appear likely and current safeguards are insufficient to address them, the Government will take measures to deal with them within EU and international law.

- 4.146 There is concern that energy crops compete for land used for food production. We are therefore encouraging and contributing to research on the social, economic, environmental and land use effects of biomass for heat and electricity to minimise its impacts on the environment and food production. For example, results will shortly be available on Government-funded research identifying idle and marginal land for energy crop production. The research will also identify the type of energy crops most suited to conditions in England and Wales and develop solutions for growing these crops so that their potential benefits to soil carbon and biodiversity are realised.¹¹⁴
- 4.147 **Waste:** Biomass waste and residues do not give rise to such strong sustainability concerns since, in many cases, the alternative is simply to landfill the waste. Some waste food has an alternate use such as compost, while clean waste wood can be recycled into chipboard. However, large volumes of food waste are potentially available, and much waste wood is contaminated and so unsuitable for recycling. The Government thus believes that no case has been made to 'reserve' waste or by-products for alternative uses and proposes to exclude biomass waste/by-products from the sustainability provisions set out in Box 4.6 above unless different evidence emerges in the future – for example from the study mentioned below. This should help encourage the development of the market for biomass waste for energy.
- 4.148 The Government is conducting a study to determine a methodology to measure the indirect impacts of using by-products and wastes for bioenergy as opposed to alternative uses – such as by the chemicals sector. This work will help inform future sustainability reporting requirements. **We will consult on our approach to by-products and wastes as part of the forthcoming consultations on the financial incentives for heat and power.**

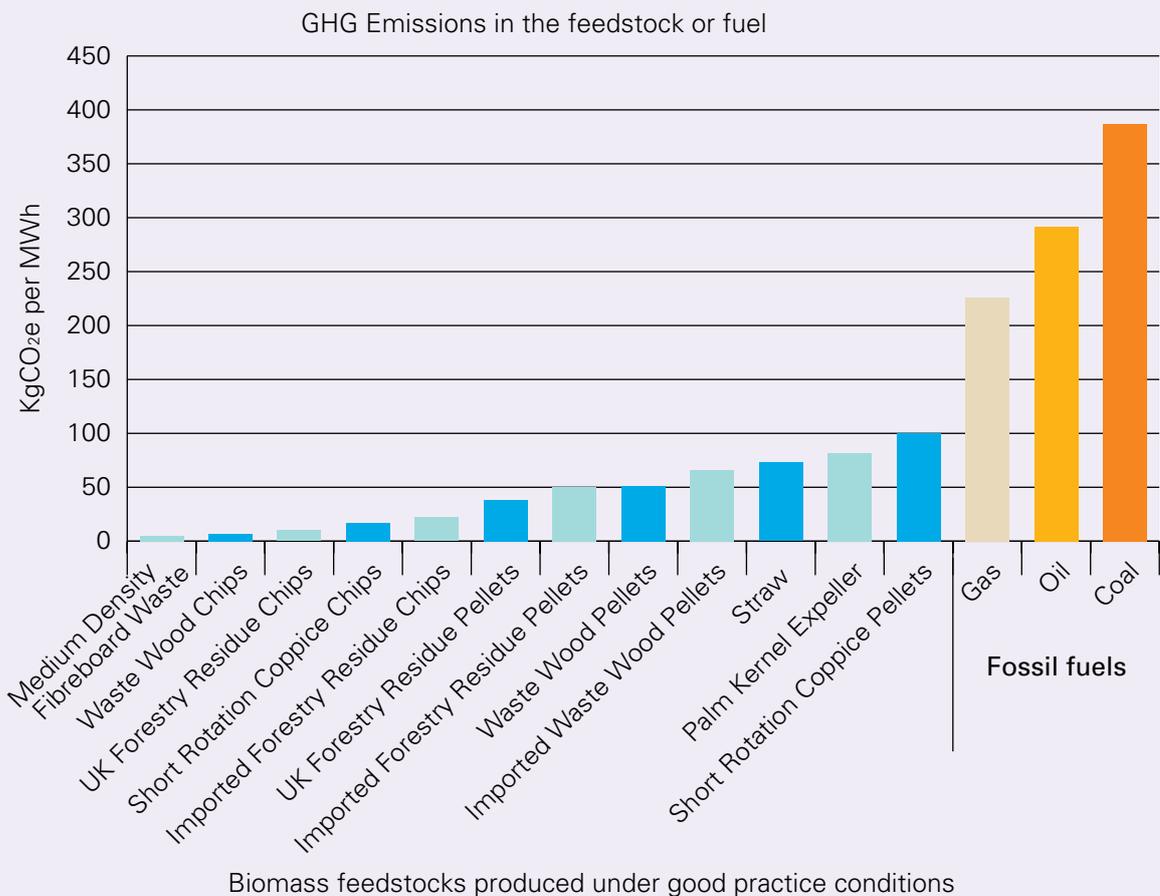
¹¹⁴ There are important conceptual issues relating to idle and marginal land and these are very elastic concepts. The study aims to identify areas of idle land or land of currently marginal economic production value in England and Wales that could potentially be used to grow energy crops. Use of this land will reduce the risk of competition with existing food crop production, and help ensure that any associated land use change does not have a significant impact on the anticipated greenhouse gas savings or pose any other significant detrimental environmental impact. The study is due to be completed later this year.

Box 4.7: Greenhouse gas savings from biomass

The Environment Agency uses its BEAT tool to consider the greenhouse gas emissions from biomass plants that are applying for planning permission. The tool provides an estimate of the life-cycle emissions associated with production, processing and delivery of a wide variety of biomass feedstocks. A recent report, using this tool, demonstrated that under 'good practice' conditions, greenhouse gas savings can range from 65% to 95%, compared to natural gas, depending on feedstock type.¹¹⁵ Some of these estimates are set out in Chart 4.1 below.

Greenhouse gas savings are also influenced by the thermal efficiency of the energy conversion process; the electrical efficiency of biomass power plants is typically 20-25%, while for Combined Heat and Power efficiencies can range from 65%-75% – which is why electricity generated from dedicated biomass with combined heat and power receives two Renewables Obligation Certificates per MWh.

Chart 4.1:
Greenhouse gas emissions from biomass



Source: Environment Agency (2009): 'Minimising greenhouse gas emissions from biomass energy generation'

Biofuels

- 4.149 We have made a good start at promoting the use of sustainable biofuels. Under the RTFO, suppliers claiming certificates report to the Renewable Fuels Agency on the carbon emissions and sustainability of their biofuels. This data is used to assess the greenhouse gas savings delivered, and to benchmark the performance of suppliers against the RTFO Meta-Standard for social and environmental sustainability. Published statistics from the Renewable Fuels Agency show that 99% of the biofuels coming from UK feedstocks comply with the environmental sustainability standards that the Renewable Fuels Agency uses for its reporting requirements.¹¹⁶
- 4.150 In addition, the Government commissioned Prof Ed Gallagher to undertake a review of the indirect effects of biofuels production.¹¹⁷ The review, which reported in July 2008, found that, although biofuels have the potential to deliver approximately 338 to 371 million tonnes of annual carbon dioxide savings globally, there is also a risk that their use may indirectly result in a net increase in greenhouse gas emissions, due to factors such as displacement of existing agricultural production (indirect land use change). Using food crops for fuel could also raise commodity prices and affect food security, particularly for poorer people in developing countries.
- 4.151 Fundamentally, the Gallagher Review recognised that there are good biofuels as well as bad and the effects of biofuel production will depend on a wide range of factors such as the feedstock used and the type of process to make the biofuel.
- 4.152 In response to the Review, we have slowed the annual rate at which the RTFO obligation level increases. This will allow us to work towards securing the longer-term sustainability of biofuels to inform decisions on the future level of use of biofuels in the UK.
- 4.153 At the European level, the UK was instrumental in ensuring that both the Renewable Energy Directive and Fuel Quality Directive contains mandatory EU-wide sustainability criteria for biofuels including a requirement that they deliver a greenhouse gas saving of at least 35% over the equivalent fossil fuel, rising to 50% and (for new installations) 60% and that they must not be sourced from areas of high biodiversity, or from high carbon soils such as rainforests or wetlands. As described in Chapter 3, the RTFO will be amended or replaced to include these mandatory sustainability requirements.

116 Renewable Fuels Agency (2009): 'Monthly Report 11: 15 April 2008 – 14 March 2009', Copyright Renewable Fuels Agency

117 Renewable Fuels Agency (2008): 'The Gallagher Review of the indirect effects of biofuels production', Copyright Renewable Fuels Agency

4.154 The European Commission will be producing a report on the indirect land use change impact of biofuels in 2010, which could lead to a further strengthening of the sustainability criteria for biofuels. This would help to increase confidence in our ability to ramp up to the 2020 target in a sustainable manner.

Research into biofuels

4.155 We will continue to be at the forefront of the debate and leading the promotion of sustainable biofuels. **We are developing a comprehensive cross-Government research and development strategy due for publication this summer** to help encourage the production of more sustainable biofuels that produce fewer impacts on the environment and food prices and to help inform national policy on biofuels.

4.156 We have already commissioned a research scoping study so that we can understand the existing research gaps and areas where we could be supporting greater scientific progress. The range of topics covered in the scoping study include:

- indirect effects including indirect land use change;
- other environment issues including land use, biodiversity, greenhouse gas, natural resources;
- social and economic impacts of biofuels including food;
- markets including trade, investment decisions, supply chains and skills;
- upstream and downstream infrastructure and vehicle capability including extension of biofuels to use in other modes of transport;
- advanced biofuels.

4.157 The scoping study will form the basis of the biofuels research and development strategy. This will embrace existing work on accounting for the indirect impacts of biofuels production, which we hope will influence the development of an EU-wide methodology.

4.158 **We will conclude research into the indirect effects of biofuels in 2010.** It is hoped that this work will help influence the European Commission's report into indirect land use change and, if appropriate, a proposed methodology for incorporating indirect land use change effects into the Renewable Energy Directive.¹¹⁸

¹¹⁸ Our research will also help inform the Commission's report on the feasibility of meeting the Renewable Energy transport target whilst ensuring the sustainability of biofuels

Enabling the use of Bioenergy

Fuel quality standards for biomass

- 4.159 As biomass boilers operate at optimal efficiency with fuel of the correct quality, using fuel which does not meet the specifications of the biomass unit can reduce its efficiency, increase maintenance costs and could increase particulate emissions. While large-scale users of biomass are able to specify fuel quality standards within their supply contracts, smaller-scale users (in particular domestic customers) rely on their suppliers to provide fuel of the correct type, size and moisture content. Currently woodfuel supply to small-scale customers tends to be local and informal but as the industry expands, the supply chain needs to be able to guarantee a reliable supply of material which meets specified standards.
- 4.160 A system to certify or guarantee the fuel specification of biomass will help ensure that fuels supplied are appropriate to the equipment and have a consistent quality and moisture content. Currently there are no standards in operation to give consumers the confidence that they are purchasing the right quality fuel. The Heating Equipment Testing and Approval Scheme (HETAS) has proposed developing such a scheme which will initially operate on a voluntary basis with the intention to have a scheme ready by 2011. The **Government is supporting the initial development of a pilot to trial fuel quality criteria with the wood-fuel supply industry.** We will continue to review progress in the development of the scheme.
- 4.161 CEN, the European Committee for Standardisation, has published draft technical specifications for the sampling and testing of solid biomass fuels and solid recovered fuels.¹¹⁹ These standards will allow a unified approach across Europe for the most common parameters used to determine the quality of biomass fuels, such as moisture content, density, ash content and calorific value as well as providing a common terminology and sampling methodology. We expect that full European Standards (ENs) for biomass will be available in the first half of 2010.

¹¹⁹ UK residents can download these standards free of charge via the BEC website http://www.biomassenergycentre.org.uk/portal/page?_pageid=77,19836&_dad=portal&_schema=PORTAL

Protecting air quality from increased biomass combustion

- 4.162 Increasing the use of biomass for renewable energy could affect air quality and public health if it leads to a large number of small-scale incineration plant being deployed in areas with existing air quality issues. This is more likely to involve biomass heating as, by its nature, it tends to be situated close to housing and be smaller scale (unless it is district heating). Such problems are less likely to arise from biomass electricity or energy generated from waste, which tends to be large scale, fitted with sophisticated abatement technology and situated away from areas with existing air quality issues. The Government wants to help ensure that the deployment of biomass heating does not cause an unacceptable deterioration in air quality.
- 4.163 Clearly, biomass heating should not be used where, without appropriate abatement technology, it could cause local air quality to be significantly degraded, for the UK's international obligations on air quality to be breached, or for public health to be significantly affected. Our assessment shows that controls on the type of boiler used and understanding about where best to site biomass heating will do much to mitigate this risk.
- 4.164 Currently the planning system and the provisions of the Clean Air Act 1993 in smoke control areas provide some mitigation of the impacts of biomass on air quality, particularly for larger-scale plant. Individual plant above 20 MW_{th} are covered by the Environmental Permitting Regulations (England and Wales) 2007. Where the biomass fuel is derived from waste, emissions are also controlled by the Waste Incineration Directive and the Environmental Permitting Regulations (England and Wales) 2007. These include strict emission controls, preventing potentially toxic emissions from reaching the local environment and ensuring that air quality standards are met.
- 4.165 Smaller-scale biomass plants, such as those fitted on individual households or schools, are not covered by the Environmental Permitting Regulations, although they can be subject to planning requirements and the Clean Air Act. This is why we need to introduce product standards to control emissions as biomass heating becomes more commonplace.
- 4.166 Most responses to the Renewable Energy Strategy consultation agreed that more could be done with regard to the air quality impacts of biomass by both Government and non-Government bodies, in order to encourage renewable heat deployment. Our discussions with key stakeholders also confirm that many Local Authorities are unclear as to where biomass can be used safely.

4.167 Concern about the perceived impact of biomass heat on air quality is a major constraint to its deployment in the heating sector. The policies set out below aim to provide additional protection and minimise air quality issues by ensuring that all biomass installations, not just plant above 20 MW_{th}, are subject to emissions controls. In addition, we also believe it is important to give clear advice about what types of biomass installations can be safely installed, and where they will have the least impacts on air quality, reflecting a new evidence base set out below.

Analysis on the impacts of biomass heat on air quality

4.168 The results of our analysis, set out in Box 4.8 below, indicates that if small scale biomass heat installations were used to meet 38 TWh (as modelled) in the Renewable Energy Strategy consultation document), they should have a small and manageable impact on air quality (and actually improve local air quality when replacing oil/coal heating), provided the following conditions were met:

- all new small-scale biomass plant are of high quality – corresponding to the best performing units currently available on the market;
- the majority of biomass heat uptake replaces existing coal and oil-fired heating, and is located off the gas grid or away from densely populated urban areas;¹²⁰ and
- in Air Quality Management Areas (classified under section 83 of the Environment Act 1995) deployment is substantially lower than other areas (this would be the case if biomass is used primarily off the gas grid).

¹²⁰ We expect this to be the case following the introduction of the RHI. At present the main drivers for biomass heat deployment are from new developments complying with planning guidance, predominantly in urban areas (due to higher build rates in urban areas). The RHI will encourage replacement of existing heating units and in particular those using solid fuels, where on-site fuel storage is required or where relative fuel costs are closer.

Box 4.8: Results of analysis on air quality modelling

The table below summarises the outputs from our analysis. In four of the six scenarios a bias was included to assume a higher rate of uptake off the gas grid and a preferential replacement of coal and oil heating. Two of these scenarios assumed uptake was limited to units with a high emission performance. The analysis showed that the results were most sensitive to emission performance and the fuel and location bias. There was less sensitivity to the final uptake rate, although lower uptake levels resulted in lower impacts.

Summary of air quality impact assessment modelling

Unit emission levels	Final uptake level in 2020 (output basis)	Fuel and location bias? ¹²¹	Additional km of roads exceeding PM ₁₀ limit value in 2020	Annual social (health) cost in 2020 (£m)
Medium – equates to average performance of current plant	52 TWh	No	577	2,803
	50 TWh	Yes	20	732
	38 TWh	Yes	9	557
High – equates to top end performance of current plant	52 TWh	No	138	731
	50 TWh	Yes	3	189
	38 TWh	Yes	2.5	142

Updated analysis for this Strategy indicates that biomass heat incineration might account for approximately 42 TWh on an input basis. This is slightly lower than the 38 TWh output measured uptake level modelled above.¹²²

Product standards to control particulate and NO_x emissions

4.169 We will work with industry and other key stakeholders to introduce emission performance standards for biomass boilers sold on the market under 20 MW_{th} size which are not currently covered by other legislation.

We are minded to set these at the levels we used in our assessment, in which ‘high quality’ plant were assumed to meet the criteria of 20g/GJ for PM₁₀ and 50g/GJ for NO_x. We will work with industry to ensure that selecting these values is not incompatible with the boilers currently available on the market, with or without abatement technologies.

121 Fuel and location bias indicates that the modelling assumed a preference for replacing coal and oil heating and avoidance of urban areas.

122 The air quality analysis was based on analysis for the Renewable Energy Strategy consultation that indicated a potential 38 TWh biomass heating contribution measured on an output basis. Due to requirements of the Renewable Energy Directive, biomass is now measured on an input – calorific value – basis for on-site use. Converting the above analysis to the same measurement parameters means that 38 TWh as an output amount of heat would equate to 43.9 TWh input, assuming efficiency of 87.5%.

- 4.170 As part of the Renewable Heat Incentive consultation later this year, **we will be consulting on whether to limit the RHI to operators of biomass boilers which meet these standards.** We want to avoid creating overlapping or duplicating regulations, and so **we are also considering providing a class exemption under the Clean Air Act 1993 for such boilers in Great Britain, in conjunction with the introduction of the Renewable Heat Incentive.**
- 4.171 To ensure emission performance and plant efficiency is maintained over the lifetime of the equipment, it is important that operators follow the manufacturers' recommended service and maintenance regimes using suitably qualified personnel. **We are considering the case for associating adherence to such regimes with emissions standards. We would welcome the views of industry and other stakeholders on this and will be consulting on any proposals.**

Advice for Local Authorities on air quality impacts of biomass

- 4.172 At this stage, the Government is not considering further powers for Local Authorities to allow them to require higher standards of products and emissions, given that we may impose high standards under the RHI which will already be at the top end of performance. However, Local Authorities are able to develop local planning guidance to ensure that the uptake of biomass is appropriate for their area.
- 4.173 The Government has written to the Local Government Association, copied to all Local Authority Chief Executives, setting out the outcomes of our analysis and giving recommendations on the development of local policies. Scottish Ministers have also written to the Chief Executive of the Convention of Scottish Local Authorities (COSLA), copying in all Scottish Local Authorities, in similar terms. Local Authorities will need to be mindful of the circumstances in their area and the fact that community or district heating may provide an alternative to individual small biomass boilers.

Biomass in the Building Regulations

- 4.174 The Government response to the Report from the Biomass Task Force committed to revisiting how the Part J (covering combustion appliances and fuel storage) of the Building Regulations controls the installation of biomass boilers. The Taskforce concluded that the existing regulations and accompanying guidance did not take sufficient account of the specific requirements of biomass such as flue size and location specifics and did not reflect all biomass technologies.
- 4.175 A review of Part J of the Building Regulations is currently underway to help overcome the potential barriers to the deployment of biomass boilers. It is

intended that **revised guidance will be produced in 2010 and will include updated information on biomass technology.**

- 4.176 The Task Force also identified the need to increase and improve the information on biomass fuels and applications included in the guidance relating to Part L of the Regulations (covering the conservation of fuel and power). In response, the latest revision of the 2008 Heating Compliance Guidelines for domestic buildings for Part L includes updated information on using a wide range of biomass fuels, together with better information on biomass application in Combined Heat and Power and district heating.
- 4.177 Further details of these activities are set out in the final progress report on the implementation of the Government Response to the Biomass Task Force published in June 2009.¹²³
- 4.178 **The Government will consult on the updates to part L and changes to part J of the building regulations this summer, with changes coming into force in 2010.**

Encouraging more energy infrastructure able to use biomass waste

- 4.179 The lack of combustion plants compliant with the Waste Incineration Directive (WID) and anaerobic digestion infrastructure acts as a barrier to fully exploiting biomass waste for energy. All combustion plant must be compliant with the WID before it can use waste as a fuel.
- 4.180 The 2009 Budget announced a **£10 million funding package which will go towards new composting and anaerobic digestion facilities**, which will eventually be able to process over 300,000 tonnes of additional food waste every year. This is in addition to the £10 million already earmarked in 2008 to build demonstration plants.
- 4.181 We are also aware that the public do not fully perceive the benefits of energy from waste plants. This was reinforced by responses to the Renewable Energy Strategy consultation. **We are therefore producing a toolkit for Local Authorities to help them communicate more effectively on issues of concern to the general public.**
- 4.182 To help Local Authorities meet European targets on landfill, the Government extended the Private Finance Initiative (PFI) programme to support Local Authorities investment in alternative waste treatment and disposal infrastructure, including WID-compliant power plant. To date, the waste PFI programme has over 40 projects at various stages of conception, construction and operation involving a range of technologies.

123 DECC (2009): 'Progress Report on Implementation of the Government Response to the Biomass Task Force Report'

4.183 At the end of 2008, following the Renewable Energy Strategy consultation, we asked Local Authorities to take waste wood into consideration when applying for waste PFI credits. The result was that many of have now included plans for a WID compliant Combined Heat and Power plant. Waste wood from these Local Authorities will therefore be used for energy generation.

4.184 We also intend to:

- Enable online determination of the energy content from the biomass fraction of a mixed waste stream (e.g. solid recovered fuel) by encouraging the development of the science behind this process. This will enable energy from waste plants with Combined Heat and Power (CHP) to obtain the appropriate level of ROCs (and in the future, the RHI) more easily. **By April 2010, Defra will report on progress on designing equipment and methodologies to enable the biomass content of solid recovered fuel to be determined cost-effectively.**
- Develop a grant scheme to encourage the use of solid recovered fuel in industrial scale CHP facilities. We are in the process of seeking State Aids approval for this grant to provide time-limited support to help increase renewable heat capacity prior to the start of the RHI in April 2011. **If State Aids approval is granted, Defra will implement a Solid Recovered Fuel grant scheme by 1 April 2010.**

Box 4.9: Case study: Greater Manchester Waste Disposal Authority

In April 2009, Greater Manchester Waste Disposal Authority (GMWDA) signed a 25-year Private Finance Initiative waste and recycling contract with the Viridor Laing consortium to construct waste recycling, treatment and disposal facilities and provide a fully integrated solution for the 1.3 million tonnes of municipal waste which the Authority handles each year. The contract is worth £3.8 billion and is the UK's first such project on this scale.

The contract will incorporate 43 facilities and use a range of technologies new to the UK including Mechanical Biological Treatment with Anaerobic Digestion; a Materials Recovery Facility; and Combined Heat and Power, while also increasing and upgrading Greater Manchester's network of 25 Household Waste Recycling Centres.

Instead of being landfilled, residual waste that cannot be recycled will be processed into a Solid Recovered Fuel ('SRF') for use by INEOS Chlor, a major chemicals producer, to provide energy and steam for its plant at Runcorn, Cheshire. The fuel will feed a new Combined Heat and Power plant which will produce enough energy to provide around 12% of the Company's total energy needs which are currently generated from fossil fuels. It is anticipated that further supplies of SRF will be secured from other waste disposal authorities, which will increase this figure to around 25%, helping to secure the future of the one of the North West's largest chemical companies. INEOS is currently one of the UK's biggest single gas customers and use around 0.6% of the UK total gas demand – equivalent to the amount of energy used by a city the size of Liverpool.

Subject to meeting good quality efficiency criteria, the Combined Heat and Power plant should benefit from the banded Renewables Obligation, which came into effect on 1 April 2009; and from enhanced capital allowances for eligible equipment used for the combustion of SRF.

Through this contract, GMWDA's nine constituent District Councils will divert more than 75% of waste away from landfill and raise the Councils' municipal waste recycling from 30% today to over 50% by 2015.

Using biofuels in transport

4.185 The use of biofuels in vehicles is subject to technical constraints associated with both the vehicles and infrastructure. Vehicle manufacturers will currently only warranty vehicles sold in Europe to run on a blend of 5% biofuel by volume due to concerns that higher levels would affect vehicle reliability and performance. Although the blending limit is due to be increased to 10% by volume for bioethanol in petrol and 7% for the biofuel content of diesel, the lower energy content of biofuels means that around a maximum of 6.5% biofuel by energy will be able to be used in standard vehicles. This will make it difficult to meet the 10% transport energy target.

4.186 There are vehicles that can run on higher blends of renewable fuel but the majority of these have been specially adapted, and are not available in Europe on a large commercial scale. Some biofuels coming to market can be used in standard vehicles at higher blends, but production of these is currently still at relatively low volumes compared to conventional biofuels. The European Commission is conducting a review, for 2012, of automotive technology and the feasibility of increasing current blending limits. We will feed the conclusions of our work into this review.

Identifying New Applications and Sectors for Bioenergy

Using renewable gas in the National Grid

- 4.187 There is keen interest from businesses which would like to inject biomethane (upgraded and cleaned biogas or syngas) into the gas grid. We intend to support this process through the Renewable Heat Incentive (see Chapter 3).
- 4.188 However, financial support is not the only issue for companies intending to inject biomethane into the gas grid. In Great Britain, gas is delivered via a network of pipes owned and operated by National Grid and the Gas Distribution Network Owners. These companies and the flow of gas itself are strictly regulated – to allow the operation of the competitive gas market, and to ensure health and safety. The gas regulatory regime can appear complex to those who do not operate within it. That is why **the Government, in partnership with Ofgem, the gas grid companies (National Grid and the Gas Distribution Network Owners), and trade associations (from the gas and renewables sectors), is publishing guidance to the GB gas regulatory regime** aimed at potential biomethane producers. This will be published shortly on the DECC website.
- 4.189 **The Government will consult in 2010 on providing biomethane producers with an exemption from the requirement to hold a Gas Transporter's Licence by the time the RHI is in place in 2011.**
- 4.190 In parallel, **the Health and Safety Executive, in partnership with DECC, will be ready to consider whether certain statutory requirements for the quality of gas in the grid might be adjusted**, in order to help biomethane injection, without compromising safety.

Biofuels in rail, aviation and shipping

- 4.191 Biofuels also have the potential to be used in other transport sectors. A cross-industry group is overseeing a rail research programme to quantify the effects on performance, range and reliability of train engines using diesel/bio-diesel blends. A number of test bench and service trials have been completed with a range of commonly-used engines using a 20% biofuel to 80% diesel mix of fuel sourced from UK suppliers. The results from the trials so far have been positive.

4.192 Rail currently uses a high sulphur form of diesel fuel (gas oil). The Fuel Quality Directive will require rail to switch to diesel with minimal sulphur content by the end of 2011. In practice rail is likely to switch to automotive specification diesel with whatever level of biofuel this contains.

Box 4.10: Electrifying the UK's railways

About 40% of the rail network is electrified accounting for about 60% of passenger travel. The case for electric trains goes wider than renewable energy: they offer better environmental performance, can increase capacity and reliability, as well as offering a more comfortable passenger experience. Importantly, electric trains are significantly cheaper to buy, maintain and operate than diesels which can help to reduce the overall cost of running the railway. The Government will shortly confirm plans for a major new electrification programme.

- 4.193 Looking towards 2020, sustainable biofuels may offer real potential for emissions reductions from aviation. There have been recent research and flight trials, but the challenging conditions at which aircraft cruise means that there is still much to be done to ensure the use of biofuels in aviation is safe. The Government is developing strategies to resolve these issues and actively encouraging industry to show leadership in planning for greater use of biofuels. Research work is being carried out on behalf of the Committee on Climate Change to assess the potential for biofuels in UK aviation. This will look at the technical potential; the economic case; the sustainable amount of biofuel that may be available for aviation; and plausible scenarios of uptake in UK aviation. We would want to see the same sustainability requirements for aviation as for road biofuels.
- 4.194 In January 2009, the Government announced a new target to reduce aviation's CO₂ emissions by 2050 to below 2005 levels. Although growth will occur in air traffic, efficiency improvements will be delivered by improvements in air traffic management; improvements in engine and airframe technology leading to improved aircraft fuel efficiency and from the use of biofuels in aviation. **The Committee on Climate Change will report to the Secretaries of State for Transport and for Energy and Climate Change by December 2009 to advise on the 2050 target, including the scope for the use of biofuels in aviation.**
- 4.195 The UK and other EU Member States are also pressing for international aviation and shipping to be covered at the United Nations Framework Convention on Climate Change conference in Copenhagen this December.

4.196 **Shipping** only makes up a very small portion of all transport energy consumption (see Chapter 2). However, Government has been encouraging consideration of alternative technologies for shipping and has been working through the International Organization for Standardization to develop a standard for marine biofuel. Some universities and other organisations have been researching other technologies such as fuel cells and Flettner rotors. Both the shipping industry and the marine bunker fuel market are global in nature and the UK will continue to work with other countries, including in the International Maritime Organization, to encourage the greater use of renewable energy in shipping.

Box 4.11: Green ships

Post 2020, the green ship concept could help shipping contribute towards the renewable energy target. This involves ships that are designed, constructed and operated in an integrated manner to eliminate harmful discharges and emissions throughout their working life and facilitate the recycling of the materials contained in the ship once its working life is at an end. The design of such a ship will be expected to incorporate innovative concepts. The use of alternative means of propulsion such as fuel cells, solar, wave and/or wind, could be an integral part of this.

Source: DECC



Chapter 5:

New Resources and Technologies



Summary

New sources of renewable energy supply can bring down the cost of meeting our targets and broaden and strengthen the UK supply base.

This chapter sets out the actions that we will take to analyse possible innovative renewable sources, and swiftly exploit those that could deliver energy affordably, securely and sustainably. To ensure that the Renewable Energy Strategy provides a stronger push on new resources and technologies we will:

- **Decide whether to go ahead with a Severn tidal power scheme;**
- **Ensure a strategic approach to understanding and encouraging the technologies to deliver our 2020 and 2050 goals;**
- **Support investment in key emerging technologies with total funding from DECC of around £450 million over two years and with substantial further funding from other parts of Government.**

Introduction

5.1 New and innovative sources of renewable energy can bring down the cost of meeting our targets and broaden and strengthen the UK supply base. We must bring through new renewable technologies to build our renewable energy capacity for 2020 and set us on track to 2050. The development of a range of technologies that are competitive enough, along with a carbon price, for firms to adopt is an urgent priority.¹²⁴ We must also look at the potential to exploit untapped resources, including tidal power schemes in UK estuaries, which could make a significant contribution to our energy mix as we approach and look beyond 2020.

Exploring the Feasibility of Severn Tidal Power

5.2 The majority of the UK's tidal range resource is concentrated in the Severn Estuary. Feasibility studies are already underway into tidal power schemes here, which could generate up to 8.6 GW of renewable electricity. Studies are also underway in the Mersey and the Solway Firth. In addition, the Wyre and Dee Estuaries and Morecambe Bay are being considered as potential sites for tidal power schemes.

¹²⁴ Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press

- 5.3 The tides of the Severn Estuary (up to 14 metres) are among the highest in the world. The potential of Severn tidal power is being investigated through the cross-Government Severn Tidal Power Feasibility Study. The study is considering a number of possible scheme options to generate electricity from the tides of the Estuary, ranging from a £21 billion barrage between Cardiff and Weston-super-Mare that could produce 5% of UK electricity, to a £2.3 billion 625 MW option supplying around 1% of electricity.

Figure 5.1:

Tidal power – upstream view of tidal power plant at La Rance Barrage, France – the largest operating tidal barrage in the world



- 5.4 Severn tidal power has huge potential and could be an important element of the UK renewable electricity portfolio. However, as well as major benefits it also has major drawbacks, which is why a scheme has not yet come forward, though it has been looked at several times over the last century. These drawbacks include the cost of detailed feasibility work and the risk that a scheme might not be consented, impacts on the natural environment and on industries such as ports and fisheries that currently use the estuary, and the multi-billion pound construction cost with a long payback period.

5.5 The feasibility study is investigating these and other issues. **After consultation, likely during 2010, we will decide whether the Government could support a scheme and if so, which scheme or combination of schemes.**¹²⁵ Within the feasibility study, we are considering both the merit and lost opportunity of building a smaller scheme with a shorter construction period and smaller capital costs, against schemes that generate more energy but have longer construction periods and higher capital costs. If the decision is to proceed with a chosen scheme, there would be further detailed work to be done over some three to five years in order to see if a project could be financed and consented. A full planning process would follow. The Government launched a consultation in January 2009 on the scope of its work and a proposed shortlist of schemes for further investigation. The response to the consultation is published alongside this document¹²⁶ and confirms the schemes under consideration to generate energy from the Severn Estuary – see Box 5.1 for details.

Box 5.1: Severn tidal power consultation response summary

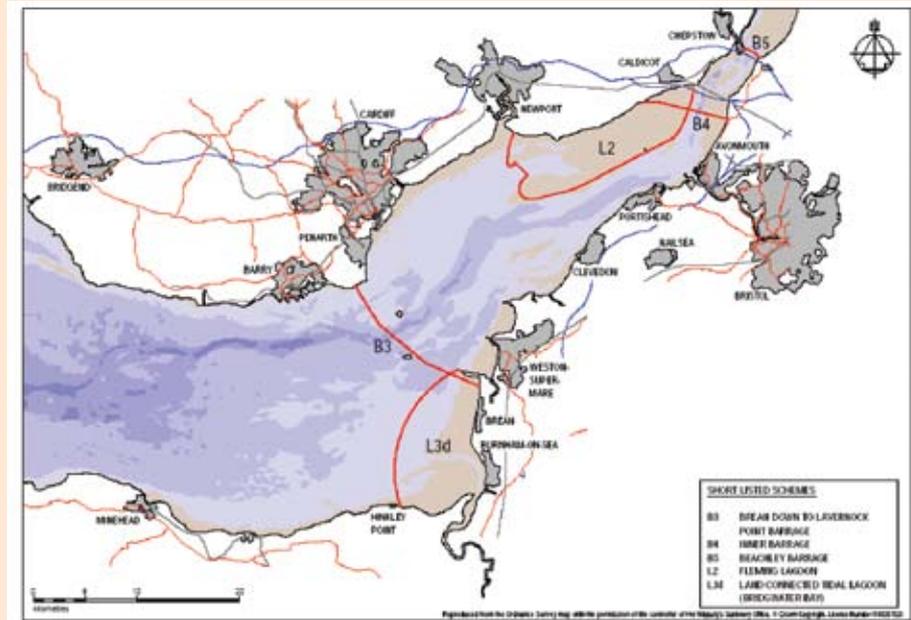
The public consultation, which closed in April 2009, focused on the scope of work to be done by the study. Following consideration of over 700 responses received, we confirm that the study will undertake:

- A strategic-level assessment of the impacts, costs and risks of the following options:
 - Beachley Barrage
 - Bridgwater Bay lagoon
 - Cardiff-Weston Barrage
 - Fleming lagoon at Welsh Grounds
 - Shoots Barrage
- The further development of new innovative technology options such as a tidal fence. £500,000 of public funding has been committed over the next year towards further work on these options. They may be more environmentally benign than conventional technologies and, although still too undefined for impact assessment, will therefore be considered alongside the options listed above at the end of the feasibility study.
- Consideration of constructing more than one scheme, together with the option of not developing Severn tidal power now at all (although not ruling it out for the future).

¹²⁵ The Welsh Assembly Government is contributing to the main feasibility study into the costs and benefits of capturing the massive tidal energy of the Severn Estuary and consideration of new innovative technologies which might present some opportunities, not only in the Severn but also elsewhere in Wales.

¹²⁶ DECC (2009): 'Severn Tidal Power Feasibility Study: Government Response to Phase One Consultation', Crown copyright

Figure 5.2:
List of shortlisted Severn tidal power schemes



Most consultation responses agreed with the scope of the Strategic Environmental Assessment as proposed. We confirm that the final assessment will cover, amongst other things:

- The impact any scheme would have on the local infrastructure and on local communities, including on roads and services, navigation, the Severn Bore, and construction effects;
- Consideration of compliance with environmental and other legislation;
- Sourcing of raw materials and skills needed to build a scheme;
- The overall CO₂ balance of the schemes.

We will review the scheme options eliminated now to confirm that shortlisting decisions are still valid. We will continue to engage closely with stakeholders, in addition to public forums and regular updates on the DECC website. A second public consultation will be held at the end of the feasibility study.

- 5.6 Severn tidal power is treated as an option in this document. Severn tidal power may well have a place in the UK's Renewable Energy Strategy and the national action plan to be developed, but this will not be known until the feasibility study concludes.

Strengthening Support for Innovation

- 5.7 We need innovation to improve existing renewable technologies, reduce their costs and develop new ones. Innovative renewable technologies face many barriers to their development and successful commercialisation, and the Government has a fundamental role in setting frameworks in which markets can operate fairly and effectively to help the private sector bring technologies through to large-scale deployment.
- 5.8 Creating the conditions for innovation means making sure that demand-side measures, such as enhanced financial support for technologies through carbon pricing and the banded Renewables Obligation, are aligned with direct public funding (grants) for research, development and demonstration.

Box 5.2: Main UK sources for energy technology development

Research Councils: Executive Non-Departmental Public Bodies (NDPBs) established to fund basic, strategic and applied research and related postgraduate training, mainly in the academic base, across the UK. The Research Councils co-ordinate their work on energy through the 'Research Councils' Energy Programme', which is made up of a broad spectrum of energy-related research and postgraduate training. Total Energy Programme spend 2008-09 – 2010-11 will exceed £300 million.

Technology Strategy Board: Set up in 2007 as a business-led NDPB to play a cross-Government leadership role in delivering a national technology strategy and advising on policies which relate to technology innovation and knowledge transfer. It operates across sectors of the UK economy, including energy, to stimulate innovation in those areas which offer the greatest scope for boosting UK growth and productivity. Total value of low-carbon energy projects is around £127 million, including contributions from other funders.

Energy Technologies Institute: Set up in 2007 as a public-private partnership with leading international engineering and energy companies to invest in the development of low-carbon energy technologies and solutions. It works by bringing more focus, ambition and collaboration to the UK's work in energy science. Its current budget is up to £600 million over 10 years, with potential to increase to over £1 billion.

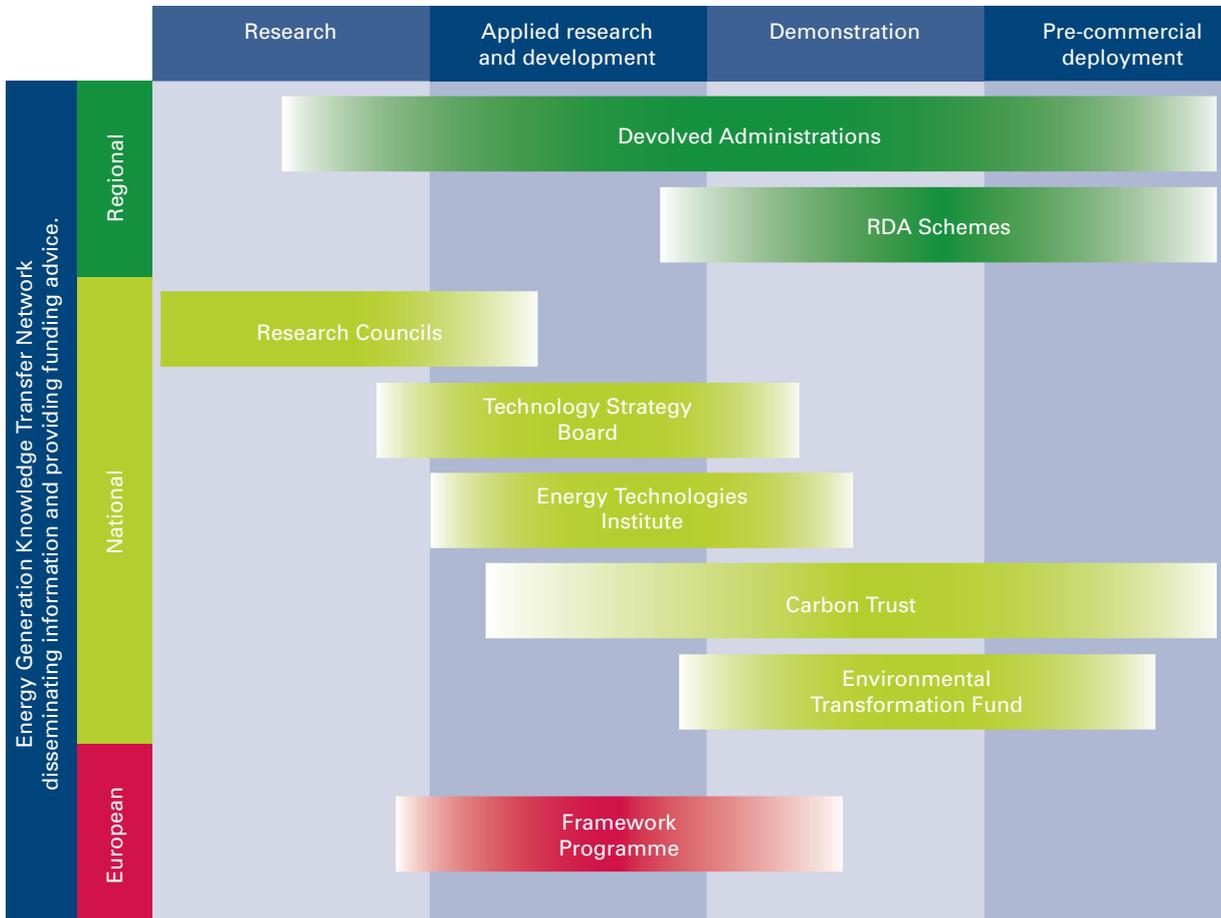
Carbon Trust: As well as providing business and the public sector with support and expert advice, it works to cut future carbon emissions by developing new low-carbon technologies through project funding and management, investment and collaboration and by identifying market barriers and practical ways to overcome them. It has invested £50 million over the last three years on low-carbon innovation, enterprise and investment projects.

Environmental Transformation Fund and other DECC funding: Promotes business and public sector energy efficiency and supports the development of low-carbon energy technologies. This works through developing partnerships, funding, expert advice and large-scale demonstrations. Current budget for the two years from 1 April 2009 is approximately £450 million.

Devolved Administrations and Regional Development Agencies: Promote national and regional economic development and growth, by investing in the capabilities of business and the knowledge base. Activities include supporting innovation through research and demonstration for new and emerging technologies and exploiting market and supply chain opportunities.

- 5.9 Over the last five years, the overall level of UK public funding for low-carbon technology innovation has increased significantly, particularly for renewables. New targeted funding schemes have been created and new approaches trialled, including novel partnerships, such as the Energy Technologies Institute. See Box 5.2 and Figure 5.3 for the main UK sources for energy technology development. However, to enable us to meet our challenging climate and energy goals, we need to ensure the funding landscape delivers renewable technologies in a long-term cost-effective way by addressing market failures but not crowding out private investment.
- 5.10 Budget 2009 announced £405 million to support low-carbon industries and advanced green manufacturing, such as wind energy, to be managed by the Department of Energy and Climate Change (DECC) and the Department for Business, Innovation and Skills (BIS). *Investing in a Low Carbon Britain*,¹²⁷ which was published alongside the Budget, explains that the new fund will target interventions in priority low-carbon industries that will enable UK business to compete globally, particularly where we have an advantage due to our natural resources, strong tradition or skills base. Renewable energy technologies such as offshore wind and marine energy are singled out as sectors with high growth potential, which need targeted support.
- 5.11 Funding will be delivered through existing programmes, such as the Environmental Transformation Fund, and as part of BIS's Strategic Investment Fund, also set out in Budget 2009, through Grants for Business Investment and other mechanisms.

127 DECC & BIS: (2009) 'Investing in a Low Carbon Britain', Crown copyright

Figure 5.3:**The UK funding landscape supporting low-carbon energy generation development**

- 5.12 Responses to the Renewable Energy Strategy consultation showed clear agreement that there are barriers to the development of renewable and associated technologies such as marine energy that are not addressed by current or proposed mechanisms to support innovation. Many called for investment in, and broadening of, R&D support schemes to address this.
- 5.13 Many respondents favoured adapting the Renewables Obligation rather than leaving it as it is or using alternative approaches. The nature of those adaptations centred on banding measures and support for marine technology. A sizeable majority believed that there was evidence that specific emerging renewable and associated technologies were not receiving appropriate support, with many in favour of increased financial incentives or providing greater support for marine technology.
- 5.14 To address these issues and to help meet our long-term climate and energy goals, we need to strengthen the innovation system for low-carbon technologies.

A strategic approach

- 5.15 To progress towards our low-carbon society, **we will show leadership by working with our partners, including the research community, business and investors to develop a shared vision of the potential technology and infrastructure requirements to support a 2050 low-carbon society.** We will identify the decision points, the key risks and the potential areas where further innovation could significantly improve outcomes and reduce costs. This shared vision would help the sector prioritise support for low-carbon energy technology innovation and leverage investment for key technologies. The first phase of this work will complete by late 2009.
- 5.16 The Carbon Trust has published a report, *Focus for Success: A new approach to commercialising low carbon technologies*,¹²⁸ which examines UK support for technology innovation. The review, carried out in consultation with DECC, sets out the rationale and a methodology for technology prioritisation as well as the need to tailor support for the technologies which are prioritised. DECC broadly endorses the Carbon Trust's conclusions and will consider adopting the methodology to complement existing prioritisation processes. We recognise the need to **focus on a range of 'technology families' and prioritise our resources while not picking individual devices.** This is about intervening where the Government can be most effective, in line with the new industrial activism,¹²⁹ accelerating development where technologies show potential for carbon abatement and UK economic benefit. Where market failures and barriers differ across sectors, we will strengthen future emerging renewable technology policy by tailoring support for prioritised technologies. However, given the uncertainty associated with the development of individual technologies, the Government will support a portfolio of key emerging technologies.
- 5.17 **We will run an initial trial to develop action plans between Government and industry for technologies** which we believe may have long-term potential for meeting our energy needs. **We will firstly run a pilot for marine and hydrogen and fuel cell technology action plans.**¹³⁰ The action plans will focus on addressing funding gaps and barrier removal to identify whether the technologies have a future role to play in the UK. They will feed into the longer-term development of our 2050 vision and complete by spring 2010 or before.
- 5.18 **We will consider the role of targeted financial incentives for bringing forward innovative technologies in the design of new incentives** (the new Feed-In Tariffs and Renewable Heat Incentive, and a revised or replaced Renewable Transport Fuel Obligation).

128 Carbon Trust (2009): 'Focus for success: A new approach to commercialising low carbon technologies'

129 BERR (2009): 'New Industry, New Jobs', Crown copyright

130 Action Plans are an outcome-focused approach to identifying the steps required to ensure full scale commercialisation of a technology.

Collaboration

- 5.19 **We are supporting the Technology Strategy Board with the establishment of an Energy Knowledge Transfer Network this autumn,**¹³¹ which will promote collaboration and knowledge sharing between developers nationally and internationally and in so doing, enable industry to identify suitable funding opportunities. UK and EU grant and support schemes for energy generation technology developers are provided by a number of bodies and can be seen as confusing and hard for developers seeking funding to navigate. The Knowledge Transfer Network will act as a ‘front door’ helping developers navigate the UK and EU funding landscape so they receive the best support available to progress their technology development.
- 5.20 **We will form a more collaborative working arrangement between low-carbon funding bodies to help accelerate technology development.** We will build on a strategy developed by the Low-Carbon Innovation Group to better integrate the programmes of support. This Group consists of the Technology Strategy Board, Carbon Trust and Energy Technologies Institute and will be expanded to include the Environmental Transformation Fund, Research Councils and when relevant, Regional Development Agencies and Devolved Administrations.
- 5.21 The Government will continue to work closely with our international partners, particularly in Europe, to help us deliver the technology advances we require to meet our goals. An important element of this will be the Strategic Energy Technology (SET) Plan,¹³² in which **the UK will work within the EU to focus, strengthen and give coherence to the European effort to accelerate innovation in renewable technologies.**

Technology-Specific Support

- 5.22 As previously stated, we need to focus on a range of renewable ‘technology families’ and prioritise our resources while not picking individual devices. This section provides details of some of the innovative renewable energy technology families we are supporting, which we believe may have long-term potential for meeting our energy needs. Although support for their development and early deployment may have a relatively small impact on 2020 targets, it will be crucial for our longer-term climate goals. The way we support these technologies now is key to our ability to meet post-2020 security of supply and emission reduction aspirations. Existing mainstream technologies such as onshore wind or large-

¹³¹ Knowledge Transfer Networks work by bringing together organisations and providing activities that promote the exchange of knowledge and support innovation.

¹³² The SET Plan is the EU’s high-level vision for energy technology development. It articulates, from a European perspective, what needs to be undertaken in terms of technology development and deployment, to achieve the EU’s 2020 energy targets and its vision for 2050. This will require a major expansion of renewables and other climate change mitigation technologies.

scale biomass will not be sufficient. Several of these emerging technologies also have significant potential to create UK industrial opportunities – see Chapter 7.

Supporting marine energy

5.23 Marine energy – wave and tidal stream energy sources – has the potential to make a significant contribution to our longer-term (2020-2050) energy and climate change goals by providing up to 20% of our electricity needs, with negligible emissions.¹³³ A photograph of a tidal energy device can be seen at Figure 5.4.

Figure 5.4:

Marine Current Turbines's 1.2 MW SeaGen device in Strangford Narrows, Northern Ireland¹³⁴



5.24 The UK has a huge level of marine energy resource available in its waters; the Carbon Trust has estimated a practically exploitable wave resource of around 50 TWh/y of electricity a year and a practically exploitable tidal stream resource of around 18 TWh/y.¹³⁵ The UK is currently seen as a global centre for wave and tidal energy with many leading devices being developed by UK companies and many overseas device developers active in the UK. The UK also has the world's leading testing and demonstration facilities in the New and Renewable Energy Centre

133 Carbon Trust Marine Energy Challenge 2006 suggested that 15% to 20% of the UK's current electricity demand could be supplied from wave and tidal stream energy sources. The potential refers mainly to the longer-term, 2020-2050 period.

134 Image: Marine Current Turbines Ltd

135 Carbon Trust (2006): 'Future Marine Energy Results of the Marine Energy Challenge: Cost competitiveness and growth of wave and tidal stream energy'. This equates to approximately 50% of Europe's tidal energy resource and 35% of Europe's wave energy resource.

(NaREC), the European Marine Energy Centre (EMEC) in Orkney and the proposed Wave Hub off Cornwall.

- 5.25 The Government regards marine energy as a key renewable technology for the UK, a view supported by the Carbon Trust's recent *Focus for Success* report.¹³⁶ The Government has already put in place a wide range of support mechanisms for wave and tidal technologies from the earliest stages of research to deployment of devices. This includes:
- Providing funding for research and development;¹³⁷
 - Providing funding for infrastructure, standards development and demonstration activities, through the Marine Renewables Deployment Fund (MRDF).¹³⁸
 - Amending the Renewables Obligation in April 2009 to allow an enhanced level of support – 2 ROCs per MWh of electricity generated. Separate enhanced banding levels operate under the Scottish Renewables Obligation where tidal energy technologies will receive 3 ROCs and wave energy technologies are banded at 5 ROCs per MWh; and
 - Developing a Strategic Environmental Assessment for wave and tidal energy in English and Welsh waters.
- 5.26 Responses to the Renewable Energy Strategy consultation, Government research, and ongoing work with the sector suggest there are still gaps in the support for marine energy technologies which need addressing to allow the sector to move from device development and testing through to commercial deployment. Particular concerns include:
- A gap for technology development between support for applied research and support for demonstration;
 - A sharp drop in support after the demonstration stage which will act as a brake on development and deployment of commercial scale marine energy projects, particularly in England and Wales; and
 - A need within the marine energy sector for strong leadership.
- 5.27 In addition to providing leadership to the marine sector, we will address these concerns through a suite of actions.

¹³⁶ Carbon Trust (2009): 'Focus for success: A new approach to commercialising low carbon technologies'

¹³⁷ Through the Technology Strategy Board, the Carbon Trust Marine Accelerator, the Engineering and Physical Sciences Research Council Supergen Marine programme and the Energy Technologies Institute.

¹³⁸ To date because of the early stage of development of the sector the demonstration scheme MRDF has not issued any grants. However, the design of the scheme has been endorsed by the Renewables Advisory Board and we anticipate that a number of developers are likely to apply in the near future.

- 5.28 **The Government is working with the sector to develop a Marine Action Plan by the end of this year.** This will consider the prospects and environmental implications of wave and tidal technology, including any planning and other barriers to development, along with the nature of support needed to facilitate effective deployment. The Action Plan will provide a basis for considering the framework of support for the deployment of wave and tidal stream technologies going forward.
- 5.29 **We will invest up to £60 million in UK marine energy infrastructure and technology, including wave and tidal energy testing centres (details set out below).**
- 5.30 In Budget 2009, the Chancellor announced measures to provide additional incentives for the renewable energy sector. This includes a **doubling in support for the proposed Wave Hub project** – a groundbreaking project in the South West of England that aims to create the UK's first offshore facility for the demonstration of wave energy generation devices. The Government is contributing £9.5 million to the project which is due to be built in 2010 with first devices deployed in spring 2011.
- 5.31 We are investing **up to £10 million at NaREC** in the North East to build on and utilise existing infrastructure to provide an open access facility for marine developers to test and prove designs/components onshore. We will provide **up to £10 million to support the South West's significant potential for wave and tidal energy deployment, research, demonstration and engineering.** Together with up to an additional £8 million from the UK Environment Transformation Fund to expand the in-sea stage testing facilities at EMEC in Orkney, these investments will provide the UK with unparalleled testing and demonstration facilities.
- 5.32 In addition, the Government will launch a **Marine Renewables Proving Fund which will provide up to £22 million** of grant funding for the testing and demonstration of pre-commercial wave and tidal stream devices. This will accelerate wave and tidal technologies' move towards commercial demonstration and assist the development of successful projects under the Marine Renewables Deployment Fund (MRDF), which supports the technologies at a subsequent stage. **We intend to retain the MRDF or a similar instrument and extend its operation to cover new devices reaching demonstration stage in the period 2011–2014.**¹³⁹

139 Subject to agreement of budgets in the 2011 Comprehensive Spending Review.

Box 5.3: Tidal Generation Limited (TGL)

In summer 2009, Tidal Generation Limited (TGL) will be deploying an advanced 500 kW turbine device, funded by the Technology Strategy Board, at the European Marine Energy Centre (EMEC) tidal testing site in Orkney. The device was developed in close partnership with Rolls Royce – using their engineering and design expertise. This collaboration led to Rolls Royce taking a controlling interest in TGL.

TGL were also the recipient of the first award of funding for marine energy from the Energy Technologies Institute. Their “ReDAPT” project will build on the learning gained from the 500 kW device and construct, deploy and test a commercial-scale 1 MW tidal turbine at EMEC in 2010-11.

Supporting offshore wind

5.33 Supporting innovation in offshore wind will be important to reduce the costs and risks and increase the efficiency of turbines. To enable this we have earmarked up to £120 million to support a step change in the development of offshore wind in the UK (see Chapter 4).¹⁴⁰ This will include substantial support for innovation, through further grant funding for R&D and demonstration. To help bring together all this activity, a co-ordination group from DECC, the Carbon Trust, The Crown Estate and the Energy Technologies Institute meets regularly to ensure effective liaison across the following offshore wind programmes:

- DECC is running a £10 million competitive call for proposals for Offshore Wind demonstration projects under the Environmental Transformation Fund.¹⁴¹ It will provide capital, typically to cover 25% of project cost, and aims to support three to five projects to stimulate and encourage the development and demonstration of offshore wind technologies/components for larger multi-MW turbines to enable their faster deployment within the 2020 timescales. We will build on this with up to £10 million of additional support over the next two years – see Chapter 4.
- The Carbon Trust’s Offshore Wind Accelerator is a unique partnership with some of the world’s leading offshore wind developers, who are working with a range of innovators to support the development of technologies which can reduce the cost of offshore wind power. It is focused on four key areas of technical challenge:¹⁴² innovative turbine foundations; improved understanding of wake effects in large turbine arrays; improved understanding of access, logistics and transportation requirements; and innovative electrical systems.

¹⁴⁰ This is up to £120 million earmarked for offshore wind from the £405 million of funding allocated to low-carbon investment in Budget 2009.

¹⁴¹ <http://www.berr.gov.uk/energy/environment/etf/lowcarbonenergydemonstration/page49669.html>

¹⁴² <http://www.carbontrust.co.uk/technology/technologyaccelerator/offshore-wind-accelerator.htm>

- The Crown Estate, which owns or manages the UK seabed, has already leased many areas for wind development, and is currently proceeding with leasing Round 3, which aims to create 25 GW of offshore wind power by 2020. In response to significant industry interest, the Crown Estate invited companies interested in offshore wind demonstration centres in UK waters to register initial expressions of interest, and 35 such expressions have been received. **The next stages of the application process will be announced in mid-July with the expectation of signing the first agreements to lease for demonstration centres by the end of 2009.**
- The Energy Technologies Institute's wind programme is aimed at developing technology that will result in a step change to the reliability of, and the cost of, electricity (circa 50% reduction by 2050) from offshore wind farms. The programme is focusing on developing next-generation turbines targeting deployment for late Round 3 and beyond to include more challenging sites such as very deep water (>60m). **The next stage of the programme is to test and demonstrate an improved capability for offshore wind turbines which will include innovative technologies.**

5.34 As detailed in Chapter 4, we are also examining how to improve the UK's capability in integrated offshore wind testing, including through funding that we have earmarked.

Supporting deep geothermal power

5.35 Deep Geothermal Power is an innovative energy technology that is seeing a surge in interest worldwide. It uses the natural heat from deep underground to drive turbines at the surface, providing a renewable and non-intermittent source of electricity and heat. **The Government will commit up to £6 million to explore the potential for deep geothermal power in the UK** helping companies carry out exploratory work needed to identify viable sites. As it matures this technology could become a significant player in the UK's energy landscape.

Supporting electric vehicles

5.36 Electric vehicles could contribute towards the 10% renewable transport target, with their contribution based on the average renewable energy content of the electricity grid. Early demonstrations of electric and plug-in hybrid vehicles will involve some of the UK's leading power companies so that we can learn how best to manage increased demand as well as maximise the benefits these vehicles can bring in the creation of a greener electricity grid. The Government also realises the potential of hydrogen and fuel cell vehicles. They offer zero emissions at the point of use and provided that the hydrogen fuel is produced from renewable or other low-carbon sources, low or zero emissions overall.

Hydrogen and fuel cell vehicles demonstrations are therefore also supported by the Government.

- 5.37 Responses to the Renewable Energy Strategy consultation showed many people saw the potential of electric/hybrid vehicles, although some respondents did not think such vehicles could realistically contribute to the renewable energy and carbon reduction targets in 2020. Improvement of the recharging infrastructure was the most frequently cited proposal for accelerating the introduction of such vehicles.
- 5.38 In April 2009, the Government published a vision document, *Ultra-Low Carbon Vehicles in the UK*,¹⁴³ which set out our aim for the UK to be a world leader in this area. It included a road map depicting developments that consumers and industry will see over the next five years. In particular the consumer will see:
- By 2009-10: Demonstrations of cutting-edge cars on the road, to prove the concept and show the potential of these cars in a real-world setting;
 - 2010-12: A small number of urban centres emerging as the UK's electric car cities with help from Government to buy ultra-low carbon cars;
 - From 2012 onwards: electric and plug-in hybrid cars becoming increasingly common, with refuelling and paying to refuel them becoming an increasingly straightforward part of drivers' lives.
- 5.39 The main barrier to ultra low-carbon vehicles is that they are substantially more expensive than their conventional counterparts. For electric and plug-in hybrid vehicles, this is primarily due to the high cost of the batteries. *Ultra-Low Carbon Vehicles in the UK* gave further details of the £250 million announced by the Secretary of State for Transport in January 2009, the majority of which will be used to create a **scheme to provide pioneering motorists with help worth in the region of £2,000 to £5,000 to buy electric and plug-in hybrid cars** – when they hit the showrooms, which we expect from 2011 onwards.
- 5.40 The remainder of the funding – up to **£20 million – will be used to develop a charging infrastructure framework** to help consortia of cities, regions, private businesses and utility companies create a UK network of electric car cities. This is being further supplemented with up to £10 million for accelerated deployment from 2010 onwards. **We are engaging with industry and other stakeholders to consider how these schemes will work. We will announce further details shortly.**
- 5.41 Under the Low Carbon Vehicles Innovation Platform (led by the Technology Strategy Board), the Government is providing over £140 million of coordinated support for research, development and demonstration with a view to accelerate industry investment in low-carbon vehicle commercialisation and build new

143 DfT, BERR & DIUS (2009): 'Ultra-Low Carbon Vehicles in the UK', Crown copyright

partnerships to address technical challenges, including in the area of electric vehicles. As part of this programme, up to £25 million has been allocated to develop and deploy a credible fleet of electric and plug-in hybrid cars (see Box 5.4).

Box 5.4: Case study: Ultra-Low Carbon Vehicles demonstration project



In 2008, the Technology Strategy Board launched its Low Carbon Vehicle Demonstrator Programme aiming to fund the demonstration of pure electric and low-carbon plug-in hybrid passenger cars across the UK. The programme is supported by the Department for Transport and several Regional Development Agencies. The result has been a £25 million funded programme which will see more than 340 vehicles trialled in several UK regions. The vehicles range from two-seater city cars right through to seven-seater multi-purpose vehicles and hydrogen fuel cell powered vehicles.

Members of the public, government agencies and consortia member employees will trial these vehicles and research will be carried out to look at the way the vehicles are used and charged on a daily basis as well as investigating the perceptions of the users and the general public. This is a critical first step in helping position the UK as a major force in the development and understanding of the potential market for electric and plug-in hybrid vehicles.

Supporting advanced biofuels

5.42 As discussed in Chapter 4, biofuels are liquid transport fuels created from the chemical transformation of plants and other forms of biomass. Given current concerns around the potential for certain biofuels to displace existing food crops, the need for more advanced biofuel (fuels derived from waste or non-food crops like algae) is vitally important. For example, biomass gasification is one of the emerging alternative technologies. Gasification is a thermal process which can be applied to a wide range of biomass types including co and by-products, wastes and residues, and can be used to produce a wide range of fuel and/or chemical products combined with heat and power (see Chapter 4 for further details). This Biomass-to-Liquids process has the potential to yield higher volumes of fuels per hectare and to provide superior greenhouse gas savings when compared to many existing biofuels.

5.43 There are still a significant number of technical and investment challenges to overcome to fully realise the potential of advanced biofuel production. The Government is therefore investing and facilitating their development.

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- 5.44 The £27 million Sustainable Bioenergy Centre, which we launched in February 2009, will considerably increase UK research capacity. The Government is investing £18 million in the centre through the Biotechnology and Biological Sciences Research Council. It is a key contribution which will target research on the development of advanced bioenergy and biofuels.
- 5.45 There is a lot of interest in developing algae as a biofuel, as it could eliminate any indirect land use change effects. Algae have the potential to be grown on seawater or wastewater, as well as on unproductive, non-arable land. The Government has committed **funding of up to £6 million in the Carbon Trust's Advanced Bioenergy Directed Research Accelerator**, which is investigating the potential of algae for biofuels as well as pyrolysis techniques. See Box 5.5 for the Algae Biofuels Challenge.
- 5.46 A more coherent collaborative approach to new technologies is now being practised by Knowledge Networks, research bodies, Non-Governmental Organisations and industry who, for example, are researching longer-term options beyond the nearer-term lignocellulosic technologies which are likely to be commercialised within the next decade. These options include micro and macro algae and developments in the use of hydrogen.
- 5.47 **The Government intends to provide financial support for the creation, by industry, of a biofuels demonstration plant in England**, which would use organic waste material to produce bioethanol and renewable power. Further details are expected to be announced later this year.

Box 5.5: Algae Biofuels Challenge



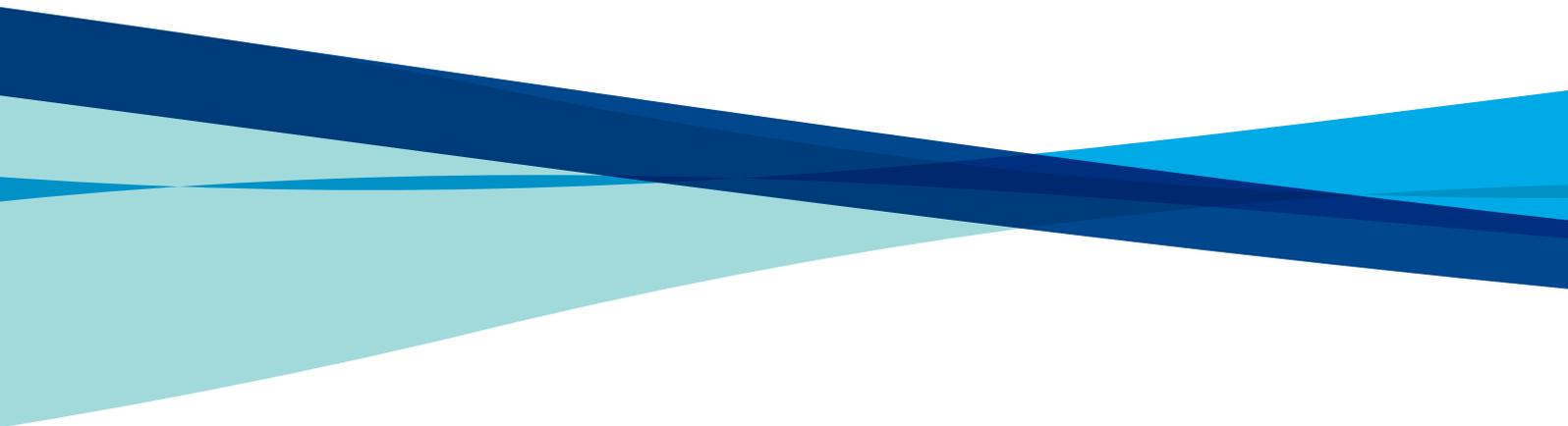
In 2008, as part of the Carbon Trust's Advanced Bioenergy Accelerator, the Carbon Trust launched the Algae Biofuels Challenge: a multi-million pound investment aimed at commercialising the use of microalgae biofuels by 2020. Algae can be grown in salt, brackish or waste water. Under favourable conditions some species double in size every day and therefore algae could provide an oil yield per hectare 5-10 times that from any conventional energy crop. The cultivation of algae has fewer negative impacts than other biofuels and in particular does not need to divert arable land or freshwater from the production of food crops.

It is estimated that by 2030, biofuels manufactured from algae could replace at least 6% of worldwide road transport biodiesel or at least 12% of aviation jet fuel. There is particular interest from the aviation sector, where the alternative options for low-carbon power are more limited.



Chapter 6:

A Role for Everyone



Summary

We all have a part to play to deliver our renewable energy target – from building developers, to communities and householders. Local and regional government as well as the Devolved Administrations have a leadership role, but we also want to encourage all groups to get involved, to identify the benefits and reap the rewards from renewable energy. To do this, we will:

- **Help communities share the benefits, through a revised toolkit for developers;**
- **Encourage adoption, through new financial incentives and new funding for information and support;**
- **Lead by example, by developing public sector on-site generation and using public sector land.**

- 6.1 A transformation in our energy supply will require clear and early actions from Government, but it cannot be done without individuals, business and communities also playing a role. There is already a lot of enthusiasm for renewable energy, and groups around the country are showing they are ready for the challenge. Individuals, communities, businesses and other organisations can take a lead through adopting their own renewable energy technologies, supporting local renewables projects, and inspiring others through innovative new ideas.
- 6.2 However, we can do more to enable renewable technologies to be installed in homes, communities and businesses, and to encourage support for large deployments. Government at central, regional and local level can play a key part, including by showing leadership in the use of its own estate.

Sharing the Benefits

- 6.3 If we are to meet our renewable energy target and longer-term carbon reduction ambitions, many communities will need to 'host' renewable energy projects such as wind farms, biomass plants or solar rooftop arrays. Individuals and communities can therefore play a key role by supporting large-scale renewable energy projects in their localities, both through their involvement in the formal planning process and through broader support for, and involvement in, developing renewable energy.
- 6.4 Social attitudes to renewable energy are very encouraging. Our latest Renewable Energy Awareness and Attitudes Research shows that 60% of respondents strongly supported renewable energy, compared with 55% in 2008. 82% of respondents said they were in favour of wind power, and 62% said they would be happy to live within 5 km of a wind power development. In addition, most respondents to the Renewable Energy Strategy consultation felt more could be

done by the Government to ensure community support for renewable generation, and several saw scope for other parties to provide support.

- 6.5 The first step in establishing support for renewables deployment is to ensure that local concerns are fully respected. Communities need to have confidence that legitimate concerns about specific proposals and their location will be listened to. That is why the Government is fully committed to a planning system which integrates economic, environmental and social objectives and ensures potential conflicts between the interests of individuals, or local communities, and the needs of the nation as a whole are properly reconciled. Chapter 4 provides more detail on how this is being done.
- 6.6 We are taking an approach to planning for renewables which will operate in a more strategic, evidence-based way. This will create a clearer, more transparent process for communities and help them understand the potential benefits of renewable development. We will support the regions and Devolved Administrations in understanding the potential for, and constraints to, delivering renewables in their area and on that basis develop ambitious targets. Through this process communities and localities will develop a better picture of how they can respond to the climate change challenge.
- 6.7 Under this planning model, the various levels of government will take a leadership role in delivering the target:
- **Devolved Administrations:** Each of the three Devolved Administrations (DAs) has agreed to undertake an evidence-gathering exercise to assess renewable electricity and heat potential, and thereby to propose an evidence-based level of ambition for renewable energy delivery by 2020. As set out in Chapter 4, the UK Government and DAs will agree a common set of criteria for the assessment exercises in each part of the UK.
 - **Regional Development Agencies:** The English Regional Development Agencies, together with Local Authority Leaders' Boards, will prepare regional strategies containing policies designed to contribute to the mitigation of, and adaptation to, climate change. The strategies will need to contain appropriate regional renewable/low-carbon electricity and heat plans based on an evidence-based assessment of capacity to deliver, constraints to deployment and regional objectives and opportunities.
 - **Local Authorities:** Local Authorities in England and Wales will also have a key role to play in assessing renewables potential and developing targets. As set out in Chapter 4, in England, as part of the current review of national indicators, we will be looking at the development of a new renewable energy indicator for the next spending cycle. In Wales, the Welsh Assembly Government is commissioning a toolkit for Local Authorities, which will allow them to assess the potential for renewable and low-carbon energy.

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- 6.8 The Government established the Homes and Communities Agency (HCA) in December 2008. HCA programmes such as the Carbon Challenge and the new investment in local low and zero carbon energy infrastructure announced in Budget 2009 will help promote the use of renewable energy technologies.
- 6.9 Renewable energy developers also have a central role to play in building local support for their projects, by ensuring effective engagement with local communities and sharing some of the benefits from renewable deployment with those who host them. To help them do so, **we are publishing alongside this strategy a revised toolkit for developers, Local Authorities and community groups written for the Renewables Advisory Board**, which advises the Secretary of State on renewable energy. This toolkit provides information and case studies for delivering community benefits (see Box 6.1 for an example). It will help developers consider a range of ways in which to provide benefits to the local community and learn from case studies showing how other projects have approached this issue. The Office for Renewable Energy Deployment (ORED), as part of its role to engage across a wide range of energy stakeholders, will highlight the existence of the toolkit, encourage its use and emphasise that any community benefits offered must be consistent with national, regional and local planning policies.
- 6.10 Our expectation is that, by supporting greater engagement and the development of an evidence-based approach to spatial planning, we will encourage a regime in which all communities in the UK understand how they can contribute effectively to the achievement of our energy and climate change goals. It is also our expectation that, based on the support we will provide, developers will follow best practice in sharing benefits of projects and that this becomes the norm.

Box 6.1: Case study: Altahullion Wind Farm



Altahullion, which consists of 20 turbines, with an installed capacity of 26 MW, is situated near Dungiven, County Londonderry, Northern Ireland. The site, now owned by RES-Gen Ltd. and designed and developed by RES-Gen with B9 Energy, was commissioned in 2003.

Electricity from the wind farm is sold to Belfast-based Energia which supplies

hospitals, schools and Northern Ireland businesses.

During the pre-application stage of the Altahullion wind farm, a local community group requested that tourist work be included in the development. Although not material to the planning decision, the developers of the wind farm implemented a number of measures in response to this request.

The turbine closest to the main road was identified as a tourist turbine. A car park was created on site and visitors are able to follow a footpath leading right up to the turbine. Information boards provided by the wind farm owner, the RSPB and the local council provide information about the wind farm and associated environmental issues. The Road Service Department installed a road sign identifying the wind farm as a place of interest and a Sustrans cycle route also passes by the site.

The local council, Limavady Borough Council, now markets the site as a tourist attraction on its website and it features in the Council's 2008 visitor guide.¹⁴⁴

Annual school visits to this wind farm are run by RES-Gen and are proving increasingly popular. In the last five years, RES-Gen report that 440 local people have visited the site through their organised tours, with the majority of these being school children.

A teacher taking part in one of these site visits commented:

'My Primary 5 class thoroughly enjoyed the guided tour of their local wind farm site located at Altahullion in County Derry. The visit helped to develop their understanding of Renewable Energy Systems through the information presented and the variety of well organised practical activities planned by the RES leader.'

¹⁴⁴ Website: (<http://www.limavady.gov.uk/visiting/attractions/14/>); visitor guide: (http://www.limavady.gov.uk/filestore/documents/publications/Final_Visitor_Guide_2008.pdf)

Encouraging Adoption

- 6.11 Households, communities, businesses and organisations can also play a part in tackling climate change and ensuring a secure energy supply by taking up micro-scale and community-scale renewables, from a local wind farm to a biomass-powered district heating network, solar panels or a heat pump in the house, or small-scale-wind to power a supermarket or school.
- 6.12 Last year the Government launched a project called the Big Energy Shift, with the aim of developing a clearer understanding of attitudes and actions of households, communities and small businesses regarding low-carbon policy. Households in England, Wales and Northern Ireland were asked for their opinions on the challenges in tackling climate change and decarbonising energy. Responses were encouraging, with the majority of people across the forums overwhelmingly positive about improving the energy efficiency of their homes and about microgeneration technologies. They looked to the Government to take the lead and are ready for some bold steps. The report concluded that the Government should focus on some key areas, including ensuring systems are in place to help people meet the cost of investing in new energy technologies, and providing information and advice to the public.

Greater financial support

- 6.13 The feedback set out above made clear that financial cost is a major barrier to renewable energy deployment at small and community scale. We are taking a range of actions to address this.
- 6.14 We already provide support for microgeneration through the Renewables Obligation (see Chapter 3). And we provide capital grant support for a range of small-scale technologies through the Low Carbon Buildings Programme.
- 6.15 We now want to do much more. New Feed-In Tariffs will, from April 2010, provide guaranteed, long-term support payments to renewable electricity projects up to 5 MW in the form of a simple, hassle-free scheme. We expect that this will be particularly attractive for those outside the professional energy business, i.e. communities, SMEs, public organisations and households. Furthermore, from April 2011 a new Renewable Heat Incentive will provide similar incentives for individuals, community groups and businesses to install renewable heat technologies at all scales. On the back of these schemes, energy suppliers and other providers will play a key role in providing user-friendly products and services, marketing them to customers, and encouraging take-up of the financial incentives.
- 6.16 To cover the period before the start of the new financial incentives are introduced, Budget 2009 announced £45 million of new funding through the Low Carbon Buildings Programme (LCBP). By the time we introduce the Feed-In Tariffs and

Renewable Heat Incentive, we will have provided over £100 million of direct public spending into small-scale generation through the LCBP. This equates to about 30,000 projects. In addition, we will have provided over £30 million through bioenergy grants schemes.¹⁴⁵

Improved information

- 6.17 Alongside the cost of deploying renewable energy technologies, one of the constraints to wider deployment is a perceived lack of information and advice. For instance, respondents to our Renewable Energy Strategy consultation said more should be done to raise awareness of renewable heat by improving the availability of advice, particularly to individuals and local organisations; investing in training; and awareness raising among the general public. It is clear that more is needed to help people through the process of becoming energy generators; clear and simple advice and information targeted at the non-expert audience.
- 6.18 The Energy Saving Trust (EST) is an independent organisation that provides free information to householders on energy efficiency, water, transport and waste. This helps householders save money and fight climate change by reducing carbon dioxide emissions from their home. To reflect its increased ambition on renewable energy, the EST has launched a new online diagnostic tool, the Home Energy Generation Selector, to allow people to find out which low-carbon energy solutions could be suitable for their home.¹⁴⁶ **We are providing an extra £1 million a year funding to the Energy Saving Trust to increase the support its help line and advice centre staff can give people on how to generate their own energy.** This is already the most visited section of the EST's website.
- 6.19 The Carbon Trust is an independent company set up in 2001 by the Government to accelerate the move to a low-carbon economy by providing organisations with expert advice, finance and accreditation to help them reduce carbon emissions and develop commercial low-carbon technologies. Since 2001, the Carbon Trust has helped UK business save over 17 million tonnes of CO₂, and more than £1 billion – by 2011 these figures should have doubled. Box 6.2 gives an example of successful renewable energy use in business.

145 Bio-energy Infrastructure Scheme (BEIS) and Bio-energy Capital Grants Scheme (BCGS).

146 See www.energysavingtrust.org.uk/renewableselector/start

Box 6.2: Renewables in business¹⁴⁷

Bell Brothers Nurseries Ltd grows bedding plants and supplies to DIY stores, supermarkets and wholesalers. The enterprise has over 50,000 m² of modern, automated glasshouses which require year-round heating, historically provided by heating oil.

In October 2007, the company installed a 2 MW biomass boiler to deliver approximately 60-70% of annual heating requirement to 33,000 m² of glasshouses. The boiler can burn a wide variety of biomass fuels, some of which have very low cost. The project received a capital grant of 17.5% of capital expense and is expected to achieve payback in four years.

The expected carbon savings from the project are 2,500 tCO₂ per year.

- 6.20 **For communities, we are providing new funding to develop an online ‘How to’ guide for community energy.** This will be a web-based resource for Local Authorities, community groups, developers, energy suppliers and service providers, businesses, and anyone looking to increase their ambition and install renewable and low-carbon energy generating technologies at community scale. It will seek to support people in a community joining together to buy a wind turbine, for example by highlighting how cooperative ownership might help them; point to sources of suitable fuel supply for a business seeking to generate their own heat from a biomass boiler; or provide details of energy suppliers to Local Authorities looking to generate and supply energy across their own estate and the wider community.
- 6.21 The availability of information on these issues is improving, but there is a need to bring all the threads together in one place, providing a road map of the end-to-end processes, information on relevant technologies, what people need to know about regulation, what financing options are available, and from whom people can get further advice and support. We are taking forward work to scope out what is required, mapping the existing advice landscape, identifying key gaps and options for signposting, seeking out partners and potential for coordinated provision and joint activity. We will come forward with more detailed proposals alongside the Heat and Energy Saving Strategy later this year.
- 6.22 A range of other organisations are also responding to the new financial support measures by offering more information and advice targeted at household, business and community users of renewable energy. A list of helpful links is set out in Box 6.3 below.

¹⁴⁷ Source: Carbon Trust

Box 6.3: Sources of advice¹⁴⁸

Information for communities

Advice on community-owned renewable energy:
www.energy4all.co.uk/

Energy4All's steps to generating community wind projects:
www.energysteps.coop

Advice from the Department for Environment, Food and Rural Affairs (Defra) on community action against climate change:
<http://www.defra.gov.uk/sustainable/government/advice/community/index.htm>

Defra's Greener Living fund
<http://www.defra.gov.uk/corporate/how-do-we-work/third-sector/strategy/greener-living-fund.htm>

Information for households

Impartial advice on energy saving and renewable energy in the home:
www.energysavingtrust.org.uk

Act On CO₂ campaign and carbon calculator:
<http://actonco2.direct.gov.uk>

Advice on greener living:
<http://www.direct.gov.uk/en/Environmentandgreenerliving/>

Defra's advice on climate change action in the UK:
<http://www.defra.gov.uk/environment/climatechange/uk/individual/index.htm>

Independent advice on renewable energy in the home:
<http://www.yougen.co.uk>

Information for businesses and organisations

Advice for organisations on reducing carbon:
www.carbontrust.co.uk

Advice on opportunities on renewable fuels and materials:
www.nnfcc.co.uk

¹⁴⁸ These links are provided for general information only. We are not responsible for the reliability or the content of any pages of external websites. We cannot guarantee that these links will work all of the time and we have no control over the availability of external websites.

Information on planning

Information for Local Authority planners and councillors:
www.planningrenewables.org.uk

Information on grants for renewables

Low Carbon Buildings Programme – provides grants for the installation of microgeneration technologies in a range of buildings including households, community organisations, public, private and the non-profit sectors:
<http://www.lowcarbonbuildings.org.uk>

Technology-specific information

A guide to UK mini-hydro developments:
www.british-hydro.co.uk

Information service on all aspects of bioenergy:
www.biomassenergycentre.org.uk

Ground Source Heat Pump Association:
<http://www.gshp.org.uk/>

Solar Trade Association, which promotes solar thermal in the UK:
<http://www.solar-trade.org.uk/>

Heating and Hot Water Industry Council:
<http://www.centralheating.co.uk/>

Northern Ireland

Organisation for the promotion and development of renewables in Northern Ireland:
<http://www.actionrenewables.org/>

Ensuring confidence

6.23 The Microgeneration Certification Scheme (MCS) is a set of robust standards for products and installers, administered by a Panel of industry, Government and other stakeholders. Its purpose is to certify small-scale on-site low-carbon and renewable products and installers. To ensure consistency, MCS certification bodies are UKAS accredited to deliver the scheme. MCS should help to build a sustainable industry and to create increasing consumer confidence in the reliability and quality of these energy technologies. MCS supports the Low Carbon Buildings Programme and Carbon Emissions Reduction Target (CERT), but it is hoped that it will be able to stand alone from grant programmes, as a recognised certification 'mark'.

6.24 The registration and accreditation process for the Renewables Obligation is quite complex for new and smaller users. We want the new Feed-In Tariffs to be more accessible to the smaller schemes and as such are proposing the MCS or an equivalent scheme should be used to accredit installations up to 50 kW in size. For larger installations between 50 kW and 5 MW, we propose that, at least at the start of the scheme, the Renewables Obligation accreditation process should be used.

Building standards

6.25 In setting the standards for the design and construction of buildings, (including energy conservation standards), Building Regulations will be crucial to enable the installation of small-scale renewable technologies and energy efficiency measures in new and existing buildings.

6.26 In July 2007, The Department for Communities and Local Government (CLG) issued a policy statement, *Building A Greener Future*,¹⁴⁹ announcing that all new homes in England will be zero carbon from 2016. The following year, the Government announced a further ambition that all new non-domestic buildings should be zero carbon from 2019 and, in the case of new public sector buildings, from 2018. CLG consulted on the detailed definition of zero carbon homes in December 2008.¹⁵⁰

6.27 **We intend to allow certain on-site renewables, including where they will be receiving financial support under the Feed-In Tariffs or Renewable Heat Incentive (see Chapter 3), to count towards the zero carbon standard.** This will allow zero carbon homes to contribute towards our 2020 renewables target, and renewables to contribute towards achieving the zero carbon standard in new homes. Our analysis indicates that the zero carbon home 'carbon compliance' requirements alone could result in renewable energy generation of between 100 and 850 GWh per year by 2020.

6.28 **CLG will publish a summary of consultation responses in summer 2009 and a further policy statement (which will include details on counting renewables as part of the zero carbon homes standard) as soon as possible thereafter.** The Government will also consult this year on proposals to take forward the ambition for new non-domestic buildings to be zero carbon. In order to prepare for zero carbon and to encourage the uptake of energy efficiency and renewable measures, **we will introduce a progressive reduction in maximum carbon emissions from all new buildings through the Building Regulations,** with the first changes scheduled to come into force in 2010.

149 CLG (2007): 'Building a Greener Future: policy statement'

150 CLG (2008): 'Definition of Zero Carbon Homes and Non-domestic Buildings: Consultation'

- 6.29 In April 2007 the Code for Sustainable Homes came into operation as the national standard for sustainable new build homes. Giving a rating from 1 to 6 for new homes designed and assessed against the Code is helping developers to build more sustainable homes which include, where appropriate, small-scale renewable energy systems. Typically homes built to Code level 3 and above, the current standard for publicly-funded housing, have high levels of energy efficiency to reduce the energy requirement combined with solar thermal or photo voltaic panels, air or ground source heat pumps as well as biomass boilers.
- 6.30 The Government uses the Standard Assessment Procedure (SAP) to assess the energy performance of dwellings and determine compliance against the minimum standards set out in Building Regulations. SAP therefore plays an important role in determining how technologies are used in new-build housing. **The Building Research Establishment (BRE) is consulting, on behalf of DECC, on changes to the SAP methodology.** Results from the consultation will be published later this year. Any resulting changes to SAP will be made in 2010 alongside those to the Building Regulations.
- 6.31 Through the Building Regulations, the Government could mandate the installation, where technically and economically feasible, of renewable energy and efficiency measures in existing buildings undergoing significant refurbishment or renovation (known as the retrofit market). However, only a very small minority of responses to the Renewable Energy Strategy consultation¹⁵¹ thought the best way to incentivise retrofit was through further regulation. Most thought financial incentives and better information would provide enough incentive. The Government agrees that the new financial incentives and increasing awareness of the benefits of renewables may encourage installations at the necessary rate without the need for further regulation. The Heat and Energy Saving Strategy consultation proposed that the Government would explore the potential of further regulation of existing buildings as part of a review in 2012, noting that other mechanisms needed to be given time to make progress.¹⁵² Analysis of responses is underway.

Encouraging community approaches

- 6.32 Individuals, groups and organisations can play a key role in encouraging others to take up renewable solutions through exemplar deployments, community pressure (e.g. parents on schools) and more concerted action such as the Transition Towns and Greening Campaign movements (see Box 6.4).

151 BERR (2008): 'UK Renewable Energy Strategy: Consultation'

152 DECC (2009): 'Heat and Energy Saving Strategy Consultation'

Box 6.4: Grassroots movements

The **Greening Campaign**¹⁵³ was set up in response to the threat of global warming. It aims to help motivate people to reduce their energy consumption and therefore lower their personal and community carbon footprint. The campaign is the brain child of Terena Plowright, who is a resident of Petersfield and who wanted to make a difference. The campaign was so successful it was taken up by several other local communities. It is now operating across the South East region, with enquires coming from across the country.

Transitions towns¹⁵⁴ is a grassroots movement which aims to equip communities for the dual challenges of climate change and peak oil. The movement currently has member communities in a number of countries worldwide.

6.33 In recent years, there has been a rise in the number of cooperatively-owned renewable energy projects. Communities are coming together to take shares in large-scale developments in their areas, and to develop their own schemes (see Box 6.5 and 6.6). The web resource for community energy described above will support projects such as these.

Box 6.5: Case study: Westmill Wind Farm Coop¹⁵⁵



Westmill Wind Farm Coop was the first onshore wind farm to be built in the south east of England, and is 100% community owned. The Coop's share offer, which raised £4.6 million, has more than 2,300 members. It produces enough electricity to power more than 2,500 homes.

Westmill was established to provide an opportunity for all who are concerned with the effects of climate change to become involved in the ownership and operation

of a wind farm. It was especially aimed at groups and individuals local to the wind farm.

In 2009, Westmill established the Westmill Sustainable Energy Trust, to encourage the deployment of sustainable energy, in particular within 25 miles of the wind farm.

Westmill is part of the Energy4All family of cooperatives, and has been supported by a capital grant from the South East England Development Agency.

153 www.greening-campaign.co.uk

154 www.transitiontowns.org

155 Image: Westmill Wind Farm, picture taken by Martin Phelps

Box 6.6: Case study: Torrs Hydro Project¹⁵⁶



The Torrs Hydro scheme in Derbyshire is the first community-owned hydropower scheme in the UK. Torrs Hydro New Mills Limited was incorporated in 2007 as an Industrial and Provident Society, a form of cooperative operating for the benefit of the community. Its members, the 231 shareholders, own the scheme.

A community share issue raised over £125,000, with additional grant funding coming from the East Midlands Development Agency, The Cooperative Fund and the Sustainable Development Fund of the Peak District National Park. The shareholders are mostly local people and businesses plus people from further afield who wish to support renewable energy schemes.

Future profits will fund a community grants programme.

6.34 It is not the role of Government to replicate such grassroots movements. However it can encourage these and similar initiatives. For example:

- **The Government is providing new support to NESTA's Big Green Challenge.** This is a £1 million challenge prize designed to encourage and reward people working together to innovate. Competitors were asked to develop and implement new approaches that would lead towards a 60% reduction of CO₂ emissions in their communities. Ten finalists were named in September 2008 (see Box 6.7). The new support will enable additional projects to go ahead and more lessons to be drawn and spread.

¹⁵⁶ Image: Torrs Hydro & Torr Weir (Image copyright © Peak Digital Limited 2009).

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- **The Department for Environment, Food and Rural Affairs (Defra) is running a £6.1 million fund to promote greener living.** This is aimed at supporting programmes and projects that help individuals and communities in England live more sustainably.¹⁵⁷ The scheme provides two-year funding to selected third sector delivery partners for projects which will influence environmental behaviour in the wider population, based on Defra's framework for environmental behaviours. Applicants submitted 112 concepts in December 2008 and 17 were shortlisted. The eight successful projects were announced in June 2009 and will start in summer 2009.
- 6.35 Building on these examples, **we are providing £10 million for 'Green villages, towns and cities'** – a challenge for communities to be at the forefront of pioneering green initiatives. 15 communities will be selected to participate as 'test hubs', with local residents, businesses and the public sector playing a leading role. Participants will work together to develop community-wide plans on priorities such as energy savings and clean energy generation, waste and water management, transport, green jobs, quality of place and community empowerment. If successful, the Government can use what we learn to help roll out a nationwide plan, potentially helping every city, town and village make the transition to a sustainable future.

157 See www.greenerlivingfund.org.uk

Box 6.7: Case study: Big Green Challenge finalist: Low Carbon West Oxford

Spurred on to do something to tackle climate change by the devastating floods that have now become a regular occurrence in the region, with a summer flood for the first time in 2007, an Oxford community group has set up its own green 'renewables building society' to help local people and businesses save energy and money, and reduce their carbon emissions.

Low Carbon West Oxford (LCWO) plans to generate lots of renewable electricity from a number of different local projects. One idea is to get the large businesses around West Oxford who have massive amounts of roof space to lease their roofs to the community for solar panels. Other ideas include working with the Environment Agency on a micro-hydro water project at Osney Weir and with local landowners on small-scale wind turbines.

The electricity generated will be sold to the building owners (with any excess sold to the grid) and the earnings will be put back into LCWO to be used for other activities such as helping local residents to refurbish their homes, making them more environmentally-friendly.

The aim is to generate long-term, consistent funds to support work with local people, both residents and businesses, to help them decide how they want to make the change to a low-carbon economy. Everybody will have different approaches and will need different sorts of help – the project aims to provide that help.

More local, co-ordinated delivery to increase take-up

6.36 Earlier this year we consulted on a new Heat and Energy Saving Strategy, including proposals for a 'Great British Refurb', through which we will offer 'whole house' upgrades for energy efficiency and microgeneration technologies to homes around Britain.¹⁵⁸ We used this consultation to consider whether a new delivery model is needed for household low-carbon energy and energy saving solutions. Potential delivery models on which we consulted include:

- A supplier-led model like the one we have at present, perhaps with more ambitious targets and revised scoring mechanisms to encourage higher-cost energy saving measures;
- A supplier-led model opened up to new players;
- A supplier-led model with an outcome target (for example a cap on emissions from households, which energy suppliers would need to meet);

¹⁵⁸ DECC (2009): 'Heat and Energy Saving Strategy Consultation'

- A more coordinated approach through a separate central delivery body, which could encourage engagement with Local Authorities and potentially implement policies on a street-by-street basis. This sort of body could offer households a 'whole-house' assessment of how to save energy and which technologies to install.

6.37 **We will publish our Heat and Energy Saving Strategy later this year, including our initial view of the most appropriate long-term delivery model** for energy saving, low-carbon heat and renewables solutions for households and communities. We will carry out a consultation before any revised scheme is introduced.

Leading by Example

6.38 The public sector spent more than £4 billion on electricity and gas in 2007-08; it uses nearly 8% of total UK gas consumption and 6.5% of UK electricity consumption; and is responsible for 8% of the UK's carbon dioxide emissions.¹⁵⁹ Thus, the public sector could make a significant contribution to the achievement of the 2020 target through its own operations.

6.39 The Government has already put in place a range of initiatives to reduce carbon emissions and encourage the adoption of renewables in the public sector, as set out in Box 6.8. Public sector emissions have already reduced by a third between 1990 and 2007, compared to an 18% reduction by the UK economy as a whole. The Government is determined to reduce them further, to deliver a total reduction of 16.9% in 2010-11, against a target of 12.5%. Beyond 2011, Government Departments have been set a target of a 30% reduction in their own estate and operations emissions by 2020 from 1990 levels. This target will be incorporated into Departmental carbon budgets and exceeds that set for the economy as a whole (34%, but against 1990 levels).

¹⁵⁹ Public sector includes: Central and local government, education, health, MoD, government agencies and Non-departmental public bodies.

Box 6.8: Renewable energy in the public sector – current initiatives

Major initiatives to increase the adoption of renewable energy include:

Sustainable Operations on Government Estate: These targets, announced in 2006, required central Government Departments to achieve 10% of their electricity consumption from renewable sources by 2008.

Partnership for Renewables programme: This was set up in 2006 by Carbon Trust Enterprises with the aim of building 500 MW of renewable energy capacity on public sector land. PfR manages all aspects of development, from screening sites to conducting feasibility studies to construction and operation. It has contracted with and screened the land banks of over 100 public sector bodies and now has over 200 sites (representing capacity of 1.5 GW) in the early stages of development.

Low Carbon Buildings Programme: The LCBP provides grants for the installation of microgeneration technologies in a range of buildings including households, community organisations, and buildings in the public, private and the non-profit sectors.

Carbon reduction in schools: The Department for Children, Schools and Families has allocated £110 million to install cutting-edge carbon reduction and renewable energy technology in more than 200 secondary schools that are undergoing major refurbishment over the next three years.

Homes funded through the Homes and Communities Agency: All homes built on land owned by the Homes and Communities Agency or with funding through the National Affordable Housing Programme need to be built to level 3 of the Code for Sustainable Homes. This is helping to drive the uptake of small-scale renewable energy and has already delivered low and zero carbon homes.

Carbon Challenge: This initiative run by the Homes and Communities Agency aims to accelerate the homebuilding industry's response to climate change by building homes that reach level 6 of the Code for Sustainable Homes. Four new communities are planned which will together provide around 1,000 zero carbon and highly sustainable homes. Work on the first site at Hanham Hall, near Bristol, is expected to start in late 2009.

Encouraging greater adoption of renewables in the public sector

- 6.40 The UK's legally-binding carbon budgets and our ambition for all new public sector buildings to be zero carbon by 2018 will likely encourage the public sector to adopt renewable technologies where these are cost effective (after taking financial support under the new Feed-In Tariffs and Renewable Heat Incentive into account).
- 6.41 The Technology Strategy Board and the Office of Government Commerce are working together to develop a high profile competition for suppliers to design and pilot new low-carbon technologies which could be installed in some key

Government buildings. The objective would be to use the Government estate to drive UK innovation in energy efficiency and explore the potential for supporting the 80% reduction in carbon emissions that will be required across the UK as a whole by 2050. We can demonstrate Government leadership in trialling new solutions which could be replicated across the wider public and private sectors.

Assessing the potential for renewables in the public sector

6.42 Partnerships for Renewables (see Box 6.9) has assessed the total potential generating capacity for wind on the public sector estate: half of the generating capacity is on land owned by the Forestry Commission, a quarter is on the estate of Central Government Agencies including the MoD, with the remaining quarter owned by Local Authorities. Further work though is required to take account of current land use and the acceptability of renewables development (particularly on the MOD estate) and will be included, as described in Chapter 4, in each of the English Regions evidence-based assessment of the potential for renewables in their area, as a basis for their setting targets for renewables deployment.

Box 6.9: Partnerships for Renewables working with the Environment Agency¹⁶⁰



The Environment Agency has been formally working with Partnerships for Renewables since November 2008 to allow PFR to develop renewable energy projects on its land. Its land portfolio has the potential to host approximately 80 wind turbines which would have a potential generation capacity of 200 MW generating an amount of green electricity equivalent to that used by about 90,000 households.

The Environment Agency could benefit from annual lease rental payments of £2.4 million.

6.43 **We will encourage all Government Departments to review their potential for on-site renewable generation**, as part of the development of their climate change strategies. Completion of such a review, together with a measure of each body's use of renewable energy, is planned as a specific indicator of progress under the reviewed Sustainable Operations on Government Estate framework. We will, in due course, be assessing ways in which to encourage bodies in the wider public sector to more systematically assess the potential for carbon savings, energy efficiency and renewables deployment.

160 Image: Environment Agency

- 6.44 Local Authorities are currently prevented from selling electricity which is produced other than in association with heat. Following a commitment in the recent Heat and Energy Savings Strategy consultation document **we will consult shortly on removing this legal restriction.**
- 6.45 The Carbon Trust already provides advice and guidance to around 2,500 public sector bodies on energy efficiency and carbon reduction through a network of over 350 accredited consultants. Within its carbon management services the Carbon Trust supports more than 440 public sector bodies in developing their strategic response to climate change. In particular, they focus on the risks of non-action and the business case for investment into a wide portfolio of carbon reduction measures, including renewables. **We will work with the Carbon Trust and share our expertise to further help bodies identify the opportunities for renewable energy solutions** within public sector buildings and facilities, and how best to overcome any perceived constraints to their adoption.

Box 6.10: Forestry Commission demonstration project



The Forestry Commission is the largest single land manager in Britain (private or public), with the public forest estate covering some 1 million hectares (2.5 million acres) in England, Scotland and Wales. The public forest estate has considerable potential to meet a range of Government climate change, low-carbon, and renewable energy targets – notably through the development of wind, hydro and biofuel opportunities.

DECC and the Forestry Commission have been working closely together since early 2009 to examine the potential for renewables on Forestry Commission land and develop policy solutions to remove barriers and capitalise on that potential.

It is our intention to use this as a demonstration project to provide practical solutions and best practice examples which can then be applied to the wider public estate.

The Forestry Commission Renewable Energy Business Unit (REBU) has undertaken a significant amount of evidence gathering to understand the opportunities and constraints for renewables on their estate. This has involved examining a wide range of issues including available wind, hydro and biomass resources and potential constraints such as aviation issues, environmental concerns and electricity grid access.

DECC is now working collaboratively with the Forestry Commission to take this work forward. The outcomes of the project are expected to be finalised this summer, including consideration of how the range of existing Government programmes to assist the public sector in greening its estate and using public land for renewables deployment could be deployed in this context.

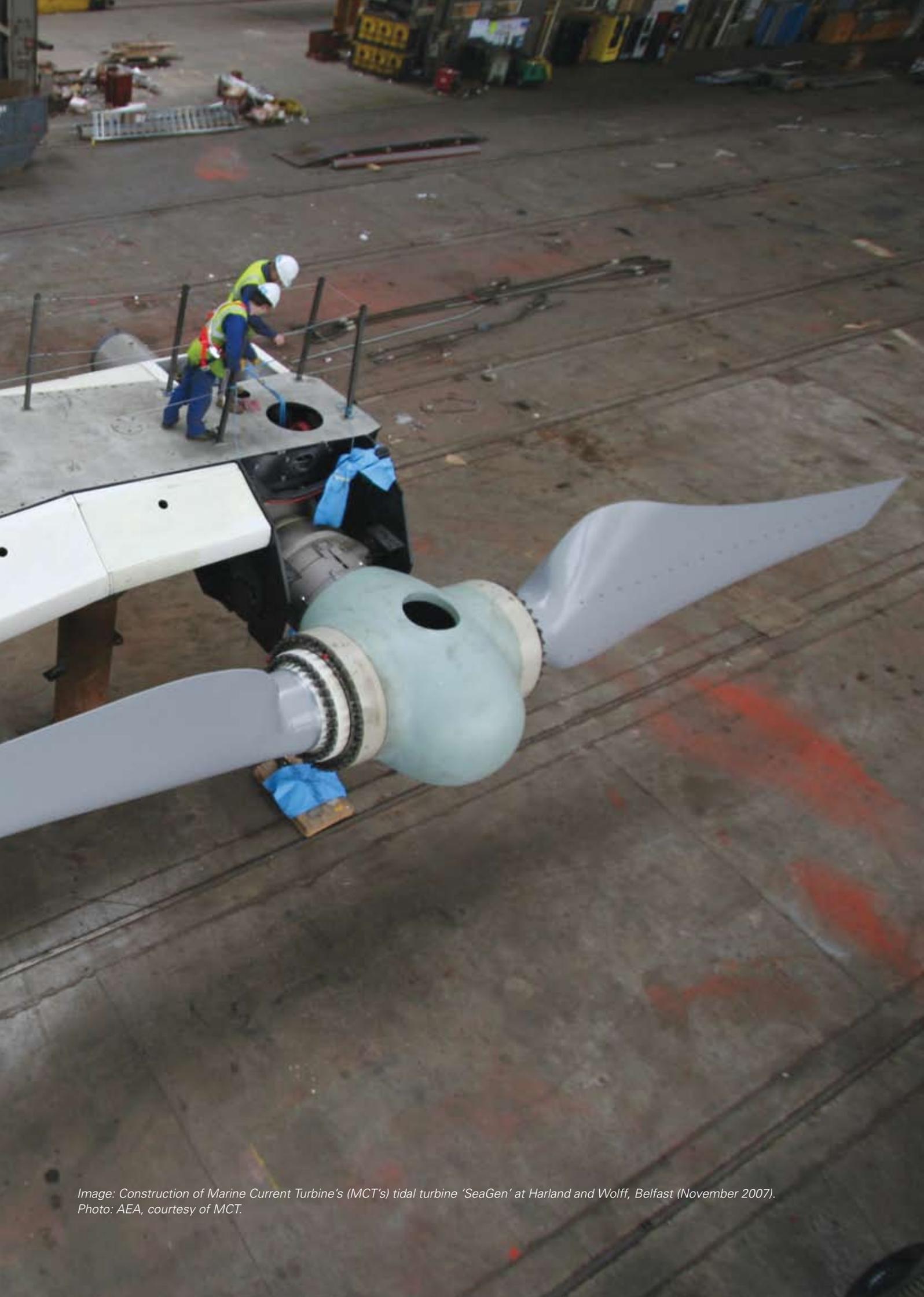
Supporting renewable deployment in the public sector

- 6.46 The public sector will be eligible to receive support for renewable deployment under the Feed-In Tariffs and Renewable Heat Incentive. Public sector bodies can also apply for funding to cover 50% of the eligible costs of renewable energy developments under the Low Carbon Buildings Programme (LCBP). Of the £45 million new LCBP funding committed in Budget 2009, £25 million will be available to public sector bodies. As announced in the UK Low Carbon Transmission Plan, DECC has challenged itself to meet a 10% reduction in its emissions in 2009, with more to come in 2010 and beyond. We will extend this challenge to all other Government Departments, and to help them meet the challenge DECC will make available funding for low-carbon measures, including renewables.
- 6.47 As part of the Pan-Government Energy Project,¹⁶¹ the Government is working across different Departments and public sector organisations to take advantage of the public sector's collective energy-buying power by offering long-term power purchase agreements (PPAs) to generators. This could help support renewable energy deployment. See Chapter 3.

Monitoring Awareness

- 6.48 **ORED will monitor public awareness of and attitudes to renewable energy throughout the implementation of the Renewable Energy Strategy**, through its annual Renewable Energy Awareness and Attitudes Research. We will take the findings into account when communicating about renewable energy, including addressing concerns identified in the research. We will also monitor uptake of renewable technology more generally, to ensure that we remain on track to meet our renewable targets.

¹⁶¹ Project sponsored by MoD (and established to implement collaborative energy procurement across the public sector).



*Image: Construction of Marine Current Turbine's (MCT's) tidal turbine 'SeaGen' at Harland and Wolff, Belfast (November 2007).
Photo: AEA, courtesy of MCT.*

Chapter 7:

Benefits and Impacts



Summary

Achieving 15% of renewable energy across our energy system will have benefits and impacts beyond simply tackling climate change and reducing the UK's carbon emissions. In addition to these issues, some of the key areas covered by this chapter include:

- **The climate change benefits and environmental impacts;**
- **The impact on security of supply from the intermittent nature of wind generation and fossil fuel imports;**
- **The business and employment opportunities in the UK;**
- **The cost of renewable energy and our estimates of the impact on prices, including our approach to fuel poverty.**

7.1 The Government intends to maximise the benefits and business opportunities that will arise from delivering our renewable energy ambitions. At the same time we need to manage the effects of intermittency and interactions with other issues such as the security of our electricity supply, energy prices and the local environment. As the Stern Review showed, the costs of inaction on climate change far outweigh the costs of action.¹⁶² This chapter updates the analysis of these issues that we set out in the Renewable Energy Strategy consultation document¹⁶³ and describes how we plan to respond to them.

Climate Change Benefits

7.2 The Climate Change Act 2008 set a legally-binding target of at least an 80% reduction in greenhouse gas emissions by 2050 and a carbon budgeting system which caps emissions over five-year periods.¹⁶⁴ The first three carbon budgets, covering 2008-2022, were announced in April 2009.¹⁶⁵ By ensuring we have a diverse range of viable low-carbon technologies, this Strategy will help us achieve the carbon budgets, and will also help decarbonise our electricity supply so that we can meet our 2050 emissions reduction target.

7.3 The EU Emissions Trading System (ETS) caps emissions from large industrial sectors, including electricity generators. The increase in renewable electricity generation will contribute to emissions reductions in the traded sector.

¹⁶² Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press.

¹⁶³ BERR (2008): 'UK Renewable Energy Strategy: Consultation'.

¹⁶⁴ Climate Change Act 2008.

¹⁶⁵ http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/carbon_budgets/carbon_budgets.aspx

Renewable electricity should contribute savings of around 33 MtCO₂ a year in 2020.¹⁶⁶

- 7.4 The EU ETS cap does not cover emissions from the transport sector and much of the heat sector. Thus, this Strategy will provide additional carbon savings in these sectors, which will contribute to meeting our carbon budgets. The 'lead scenario' (which includes 12% renewable heat and 10% renewable transport) would provide carbon savings of around 17 MtCO₂ in the non-traded sector in 2020. Cumulatively we estimate that our action on renewables will lead to savings of 755 MtCO₂ by 2030 – of which 535 MtCO₂ are accounted for under the Emissions Trading System caps, and 220 MtCO₂ are additional CO₂ reductions. Within these additional savings, the 73 MtCO₂ saved over the third carbon budget period (2018-2022) will deliver about a sixth of the abatement needed to meet the third budget.
- 7.5 As well as considering the impact of renewables on climate change, we also need to consider the impact of climate change on renewables. New infrastructure will need to remain operational in the future. The effects of unavoidable climate change such as higher temperatures, more intense storms, increased flood risk and reduced water availability need to be factored into design, location and operation at the start of a development. In June 2009, a consortium comprising the Department for Environment, Food and Rural Affairs (Defra), the Meteorological Office Hadley Centre, the UK Climate Impacts Programme (UK CIP) and the Marine Climate Change Impacts Partnership (MCCIP) published the latest set of UK projections of current and future climate change for the UK up to 2099. These will help those delivering renewable energy to assess their risks as they plan for the future.
- 7.6 Under the Climate Change Act 2008, the Secretary of State has the power to require reporting authorities (public bodies and statutory undertakers) to report on the risks posed to their organisation by climate change and their proposals for adapting to those risks. **DEFRA is currently consulting on how this power and associated statutory guidance should best be applied to reporting authorities, particularly utilities companies, including those in the energy sector.**

Environmental Effects

- 7.7 Tackling climate change is essential for maintaining a healthy, resilient natural environment. Biodiversity is likely to be particularly badly affected by climate change, with potential extinction of many species. There would also be an increase in the severity of both flooding and drought incidents in different areas of the country and a possible transformation of the traditional, rural landscape of Britain. Increasing use of renewable energy can help us avoid this.

¹⁶⁶ Estimated contribution of around 130 MtCO₂ savings in the traded sector for the ETS budget period 2013-2020.

- 7.8 As well as reducing the threat from climate change, renewable energy can bring other environmental benefits. For example, energy from wind, waves, tides and the sun produces negligible amounts of local pollutants. The sustainable management of forests and woodland for energy can provide valuable habitats and suitably located offshore wind farms can offer sanctuaries for marine species.
- 7.9 Renewable energy also has the potential for negative effects on the local environment. For example, an increase in the burning of biomass could affect local air quality, inappropriately located wind farms could affect landscapes, and new tidal infrastructure could affect marine species and important habitats. These impacts need to be addressed in line with the principles of sustainable development, taking full account of the costs and benefits. Chapter 4 sets out some of the measures we are taking to ensure this.

Benefits for the Security of Fuel Supply

- 7.10 This Strategy will provide important benefits for energy security. Based on the levels of renewables deployment in the lead scenario, we estimate that it will reduce our use of fossil fuels by around 10% in 2020, and reduce gas imports by around 20-30% against forecast use in 2020. This reduction, along with the more diverse sources of fuel that it implies, should increase the security of our supply.
- 7.11 Biofuels are likely to provide most of the renewable energy for transport. Increasing the proportion of biofuels in transport decreases the amount of petroleum or crude oil that we need to import.¹⁶⁷ In the lead scenario of 10% renewable energy for transport, which will be blended into the general fuel supply, our consumption of oil could be reduced by 2.5 million tonnes of oil equivalent (3% of our oil demand) in 2020. While there are also potential risks associated with importing biofuels (such as crop failures or disruption in countries that produce both biofuels and fossil fuels), overall biofuels could improve the UK's security of supply through:
- Reducing the need to import oil from regions associated with geopolitical risks, as biofuel imports are expected to come from countries with less geopolitical risk;
 - Reducing the impact of crude oil supply disruptions;
 - Alleviating the impact on petrol and diesel retail price of spikes in the price of crude oil or petroleum products.

¹⁶⁷ However, the amount of reduction of petroleum product imports will be less than the amount of biofuels used because of differences in energy contents.

Security of electricity supply

7.12 The decarbonisation of our electricity supply needed to meet our climate change goals will lead to significant changes in our electricity system. Most of the increase in renewable generation is likely to come from wind, which means that supply will be intermittent and not perfectly predictable.¹⁶⁸ This presents potential challenges.

Investment in flexible generation

7.13 Other forms of electricity generation will need to be flexible enough to operate when renewable generation is low, for example due to slow wind speeds. Higher peak prices are likely to be needed to remunerate those flexible generators that only run for a limited number of hours during the year. And these investors will need to be confident that prices will reach sufficiently high levels on a sufficient number of occasions to allow them to recover their costs. Our analysis (outlined below) suggests that if the market provides adequate price signals, market participants will invest in sufficient provision of flexible back-up generation to ensure secure supplies. Analysis led by Redpoint for our consultation¹⁶⁹ and for this Strategy,¹⁷⁰ and an intermittency study undertaken by Pöyry,¹⁷¹ suggest that there will be sufficient incentive for encouraging investment in flexible generation, although the Pöyry study suggests returns will tend to be at the lower end of economic viability. Both studies assume that plants can earn a return on their investment by operating flexibly, generating more at times of system tightness and capturing the prevailing prices.

7.14 The Pöyry study assumed a higher level of wind capacity than the Redpoint study projected (33 GW in 2020 rising to 43 GW in 2030 compared to 26.4 GW in 2020 in our lead scenario), and found that wholesale prices could peak around £1,300/MWh for a few hours in 2020. By 2030 (in Pöyry's high wind scenario), wholesale prices could go even higher during the tightest supply periods. By comparison, prices reached a high of around £500/MWh last year. Such variability in wholesale prices is important to ensure appropriate investment in back-up capacity and potential demand-side measures. However, where prices are very volatile and the peaks high, this can cause some uncertainty for investors, raise questions about whether back-up plant is sufficiently flexible and have an impact on those electricity consumers who buy directly from the wholesale market. However, this volatility will not be seen in retail prices.

168 'Intermittency' in this document can be read as covering both the unpredictability of wind output, which is an issue for the amount of short term reserve, and the variability of output, which is an issue for overall capacity.

169 Redpoint et al (2008): 'Implementation of EU 2020 Renewables Target in the UK Electricity Sector. Renewable Support Schemes'

170 Redpoint/Trilemma (2009): 'Implementation of EU 2020 Renewables Target in the UK Electricity Sector: RO Reform'

171 See Summary Report, Pöyry (2009): 'Impact of Intermittency: How wind variability could change the shape of the British and Irish electricity markets'

The electricity balancing system

- 7.15 Demand and supply of electricity have to be kept in balance on a second-by-second basis. Maintaining this balance in Great Britain is the responsibility of National Grid. System balancing can be achieved in a number of ways, including ensuring the supply is sufficiently flexible, managing demand-side response, interconnection and electricity storage.
- 7.16 Increased levels of renewables deployment could increase the challenges of physically balancing the system. Further work is now needed to identify where and when problems could arise and what needs to be done to address them. Most respondents to the Renewable Energy Strategy consultation suggested that whilst there were clearly implications for balancing (including the costs), there was adequate time to identify and address problems using current industry mechanisms. This was also the message from National Grid's recent consultation on operating the electricity system to 2020.¹⁷²
- 7.17 If the levels of wind generation were too high, when taken together with 'must run' generation (such as nuclear plants that cannot be quickly turned on and off), supply would exceed demand and generation would have to be curtailed. Both the analysis by Pöyry and earlier analysis by SKM suggest that curtailment is only likely to be a significant issue for levels of wind generation of around 40 GW, which is significantly higher than levels envisaged in this Strategy.

Nuclear

- 7.18 Analysis of the pathway to achieving our climate change goals by 2030 and 2050 (set out in the UK Low Carbon Transition Plan¹⁷³) indicates that we will need a mix of renewables, carbon capture and storage and nuclear generation. Some respondents to the Renewable Energy Strategy consultation raised concerns about whether supporting a high level of renewable generation could have implications for investment in nuclear. Independent analysis for DECC¹⁷⁴ based on our latest fossil fuel assumptions suggests nuclear investment is economically viable under different renewable electricity scenarios (i.e. 24%, 29% and 32%), although the results are very sensitive to assumptions on relative nuclear capital costs, fossil fuel prices and carbon prices. So the analysis indicates that there are a number of factors that affect nuclear investment, including the amount of renewable deployment, but the key determinants of how much new nuclear will be built are more likely to be nuclear capital costs and future expectation of fossil fuel and particularly carbon prices.

172 National Grid (2009): 'Operating the Electricity Transmission Networks in 2020: Initial Consultation'

173 DECC (2009): 'The UK Low Carbon Transition Plan'

174 Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewable Target in the UK Electricity Sector: RO Reform'

Next steps

7.19 Our most recent analysis indicates that intermittency should be manageable in the period up to 2020. However, it could potentially become a problem after 2020 due to closures of old gas and coal plants and should we further increase deployment of renewable electricity. To address this, we are doing further work to determine the scale and nature of the challenges of intermittent generation for post-2020 levels of deployment, and we are considering ways of reducing the impact, for example by encouraging demand-side response. **We will shortly publish a call for evidence on security of supply, which will seek views from stakeholders on our assessment on intermittency.** As levels of renewable generation increase, we will work closely with the National Grid, Ofgem, industry and academics to consider what further steps might be necessary to address any issues arising from intermittency.

Business Benefits

- 7.20 This Strategy will provide business opportunities and jobs, and potentially create whole new industrial sectors, although businesses will also face higher energy costs. Meeting our share of the renewable energy target will provide around £100 billion¹⁷⁵ worth of investment opportunities and up to half a million jobs in the UK renewables sector by 2020.
- 7.21 The Government aims to maximise the benefit to the UK from these opportunities. We intend to make the most of our strengths as one of the world's largest manufacturing economies, as a world class centre of energy expertise and as a leading location for inward investment. The range of policies set out in this Strategy, including the new financial incentives, will provide a new generation of highly-skilled jobs in renewable energy; enable diversification of businesses into the renewable sector; and foster a research base that supports ground-breaking research and the capacity to turn it into world-beating technologies.
- 7.22 The UK needs to compete effectively for investment in renewables as well as other energy capacity in the next decade, both with other EU Member States, and with the emerging market for renewable investment in the US, China and India. This Strategy, with its clear commitment to achieving our ambitious renewable energy targets and detailed proposals for overcoming relevant financial and non-financial barriers, is a key first step in supporting the necessary investor confidence in the UK as a renewables market. However, the Government also needs to play a leadership role in developing the UK's renewable energy supply chain and skills. We are therefore launching together with this Strategy the Office for Renewable Energy Deployment (ORED). ORED will develop UK manufacturing skills and jobs to meet identified bottlenecks across all deployable renewable

¹⁷⁵ Estimated capital investment (undiscounted) required to 2020 under the lead scenario in the renewable heat and electricity sectors.

electricity technologies. This work will include building up the capacity of the supply chain and will proactively support investment in manufacturing in the sector, in collaboration with key partners, including the Department for Business, Innovation and Skills (BIS), Regional Development Agencies, Devolved Administrations and UK Trade and Investment (UKTI).

7.23 BIS and DECC are currently working on the Government's plans to further support companies' efforts to decarbonise their operations and increase their resource efficiency, to make the most of the growing markets for new low-carbon goods and services, and to help companies adapt to the effects of climate change. The Government recognises the need for a new strategic industrial activism to maximise opportunities and minimise risks – to intervene where markets fail to properly value long-term low-carbon investment, and to support the market where they succeed. The UK Low Carbon Industrial Strategy has also been published alongside this document (see Box 7.1)

Box 7.1: The UK Low Carbon Industrial Strategy

The UK Low Carbon Industrial Strategy,¹⁷⁶ published alongside this Strategy, sets out in more detail how the Government will deliver the targeted strategic support that will make sure that the UK benefits economically and industrially from the move to low carbon – ensuring that the jobs and growth that it will bring support our recovery from the downturn and our long-term industrial future.

In *Building Britain's Future: New Industry, New Jobs*,¹⁷⁷ the Government set out a framework for a new activism which will shape our approach to supporting the low-carbon economy, by complementing the market and positioning the UK to take full advantage of our competitive strengths. Following this approach, Budget 2009 and *Investing in a Low Carbon Britain*¹⁷⁸ committed to a programme of targeted investment in the low-carbon economy, to provide real help now for businesses and households, creating and sustaining the jobs that will contribute to the UK's prosperity in the future.

The LCIS will build on this, identifying economic opportunities for the UK and examining how we can shape the business environment to enable firms in the UK seize these opportunities. The Strategy uses economic and other analysis to identify Britain's areas of potential strengths in the global low-carbon market and sets out further detail of how the £250 million low-carbon element of the Strategic Investment Fund announced at the Budget will be spent.

176 BIS and DECC (2009): 'The UK Low Carbon Industrial Strategy'

177 BIS and DECC (2009): 'Building Britain's Future: New Industry, New Jobs'

178 DECC and BIS (2009): 'Investing in a Low Carbon Britain', Crown Copyright

Impact on Jobs

- 7.24 Although there will be some displacement as we restructure our economy, this Strategy will create significant job opportunities. The Renewable Energy Strategy consultation estimated that renewable energy could generate 160,000 jobs by 2020, both in the UK and abroad. Since the consultation, a report produced by Innovas for the Department for Business, Innovation and Skills (BIS)¹⁷⁹ suggests that the size of the renewable energy sector, and of the broader low-carbon and environmental goods and services economy, has been substantially underestimated.¹⁸⁰ Based on Innovas projections and Labour Force Survey data, we estimate that this Strategy, combined with a growing market for renewable energy across Europe and globally, would increase UK employment in the renewable energy sector by up to 500,000 people by 2020. These projections use a broad definition of the sector¹⁸¹ and are subject to considerable uncertainty.
- 7.25 More recently still, the *Employ RES* report for the European Commission¹⁸² has estimated the 2020 total EU-27 employment in renewable energy sectors will be around 2.8 million. The estimates from different studies vary as a result of different definitions, but also because of the degree of uncertainty in future projections.

Impact on the Economy

- 7.26 This Strategy will help bring down the costs of the technologies we will need to meet our longer-term emissions reductions goals. However, higher levels of renewable deployment will also lead to costs on the economy.
- 7.27 We have revised the estimate of the static additional costs to the UK economy of delivering this Strategy to be around £4 billion a year in 2020 (at today's prices), based on fossil fuel prices equivalent to \$80 bbl oil.¹⁸³ This estimate has fallen by about a fifth since we published the Renewable Energy Strategy consultation. The costs would be further reduced if fossil fuel prices were higher, if demand is lower than expected (for instance due to further energy saving measures), or potentially if the flexibilities in the Renewable Energy Directive are used (see Chapter 8).

179 Innovas (2009), 'Low Carbon and Environmental Goods and Services: an industry analysis'

180 Their bottom-up methodology reveals more low-carbon and environmental activity than SIC coding, and other previous estimates. However, it risks double counting companies who produce goods or services for more than one environmental market. Innovas compare their numbers to validated and verified data sources to mitigate this risk.

181 Including employment in the Innovas definition of the renewable energy sector, plus employment in biofuels industries (also from Innovas data) and in renewable power generation (DECC estimate based on the Labour Force Survey).

182 Franhofer Institute et al, for the European Commission (2009): 'Employ RES – The impact of renewable energy policy on economic growth and employment in the European Union'

183 £4 billion represents the resource cost of the renewable technologies, net of cost of conventional alternative energy sources, and the cost of carbon in the ETS sectors.

7.28 Macroeconomic modelling by HMRC suggests that the positive effects on the economy by boosting investment in renewable energy and bringing large multiplier effects into play, roughly balance the negative effects such as increased energy prices, leading to increased business costs and lower consumption. We estimate that overall this Strategy will be roughly neutral to slightly negative in terms of GDP.

Table 7.1

HMRC Macroeconomic modelling results, relative to baseline

	2020	2030 ¹⁸⁴
ETS only	-0.5%	-0.1%
ETS & RES	-0.5-0.6%	-0.1-0.2%

7.29 Macroeconomic modelling for the European Commission¹⁸⁵ suggests that meeting the European Renewable Energy target of 20% will boost EU-27 GDP by 0.23-0.25% in 2020. This modelling found that the effect on the UK could be positive or negative, depending on which model is used.

7.30 These small projected changes in GDP need to be seen in context of the much larger potential costs of inaction on climate change. A high-carbon future would mean more extreme weather such as droughts and floods, and exposure to global factors that can cause spikes in energy prices. Action now will avoid higher costs and impacts later. The Stern Review suggested that global action to tackle climate change will avoid global costs equivalent to 5-20% of global GDP per year, dwarfing the costs of coordinated international action.¹⁸⁶ Government modelling suggests that costs of action will vary between 1-3% of global GDP in 2050. There is no low-cost, high-carbon option for the future.

Impact on Energy Prices and Bills

Lower impacts than previously estimated

7.31 Our package of measures presented in the UK Low Carbon Transition Plan, which include not just the Renewable Energy Strategy but also energy efficiency policies, will add, on average, an additional 6% to today's household energy bills and 15% to today's industrial bills by 2020. The impacts on energy bills as a result of the Renewable Energy Strategy will be lower than initial analysis suggested,

184 The GDP impacts relative to the baseline are much lower for all scenarios in 2030, because of an adjustment effect with the new investment kicking in as the carbon market is assumed to become global. Therefore it is better to look at the relative ordering in each year rather than comparing the size of the effects between years.

185 Fraunhofer Institute et al, for the European Commission (2009): 'Employ RES – The impact of renewable energy policy on economic growth and employment in the European Union'

186 Stern, N (2007): 'The Stern Review: Economics of Climate Change', Cambridge University Press

and higher fossil fuel prices would reduce them further. The overall projected costs of the Strategy in 2020 have fallen by around a fifth compared with estimates at the time of the consultation. The lower estimates presented in Tables 7.2, 7.3, 7.4 and 7.5 reflect in part reduced estimated levels of renewable heat and revised modelling on projected technology costs and structure of the forthcoming renewable heat incentive.

- 7.32 Under the fossil fuel price scenario consistent with \$80/bbl oil (referred to here as the central scenario), we estimate that, if taken in isolation, the measures included in this Strategy would increase average domestic electricity bills by 15% and domestic gas bills by 23% by 2020. For industry, we estimate the equivalent figures would be an average of 15% for electricity and 30% for gas by 2020. Our modelling suggests that an increase in biofuel blending to 10% by energy in the transport sector may cause an increase in driving costs of 6% for petrol and 2% for diesel vehicles by 2020. The assumed price of oil also has a significant impact on the projected price impacts. If fossil fuel prices were sustained at \$150/bbl oil (consistent with our higher fossil fuel assumptions), and approximately the level to which oil prices rose last year – the price impacts from this Strategy would fall to an estimated increase of 2% on domestic electricity bills in 2020 and 16% on domestic gas bills. For industry, we estimate bills will rise by an average of 2% for electricity and 18% for gas in 2020. In the transport sector, the price impacts from biofuel blending would fall to 4% for petrol and 1% for diesel vehicles by 2020.
- 7.33 Since most sources of renewable energy use relatively new technology, they are currently more expensive than conventional sources. Therefore, the measures we are taking to increase renewable energy will add to energy prices. Impacts of gas prices could be lower if ongoing analysis on renewable Combined Heat and Power reveals more cost effective opportunities than currently estimated. Tables 7.2, 7.3, 7.4 and 7.5 show our latest estimates of the price impacts of this Strategy. (These new estimates are based on our lead scenario of about 30% renewable electricity, 12% renewable heat, and 10% renewable transport.)

Table 7.2:
Effects on annual domestic electricity (large and small-scale) bills resulting from measures to achieve about 30% renewable electricity

	Central Fossil Fuel prices		Upper bound fossil fuel prices	
	Average bill impact	% Impact	Average bill impact	% Impact
2015	£12	2%	£7	1%
2020	£77	15%	£17	2%

Table 7.3:

Impact on annual domestic gas bills resulting from measures to achieve about 12% renewable heat

	Central Fossil Fuel prices		Upper bound fossil fuel prices	
	Average bill effects	% Impact	Average bill effects	% Impact
2015	£34	5%	£32	3%
2020 ¹⁸⁷	£172	23%	£165	16%

Table 7.4:

Effects on annual non-domestic electricity (large and small-scale) bills resulting from measures to achieve about 30% renewable electricity

	Central Fossil Fuel prices		Upper bound fossil fuel prices	
	% impact		% Impact	
2015	2%		1%	
2020	15%		2%	

Table 7.5:

Impact on annual non-domestic gas bills resulting from measures to achieve about 12% renewable heat¹⁸⁸

	Central Fossil Fuel prices		Upper bound fossil fuel prices	
	% Impact		% Impact	
2015	6%		4%	
2020	30%		18%	

7.34 While we will continue to work to minimise the price effect of our policies, the benefits of early action and making the transition to a low-carbon economy significantly outweigh the costs.

187 The reason for the different price impacts in 2015 and 2020 is due to expected higher uptake of renewable heat technologies later in the period to 2020, as the industry responds to the financial incentives.

188 There is a wide range of energy use by firms in this sector and the average bill impacts will depend on individual firms' energy use

Reducing the impacts further

- 7.35 The costs of making the transition to a low-carbon future could be significantly reduced through energy saving measures. We already have a variety of mechanisms for encouraging energy saving, but we intend to introduce new measures to further reduce the costs of heating and powering homes. **We will publish the Heat and Energy Saving Strategy later this year, setting out a range of measures to promote greater energy efficiency which can in turn help reduce consumers' energy bills.** Energy saving will also help meet our renewable energy targets, as the lower the overall level of energy consumption in the UK, the lower the level – and hence cost – of renewable deployment we need to meet our targets.
- 7.36 The Government will continue to ensure that the market delivers fair and competitive energy markets. Ofgem plays a key role in delivering this agenda. Following its probe into the energy supply markets, Ofgem has taken steps to protect consumers from unfair pricing, to improve information on consumers' bills so they can make more informed choices, and to deliver greater financial transparency across the markets so that consumers have confidence that the markets are competitive and fair. Ofgem now publishes a quarterly report on movements in wholesale and retail prices, which will increase transparency.
- 7.37 It should also be noted that the projections of impacts on energy bills are based on the costs of our renewable energy financial support schemes as currently structured. We have already taken several measures to ensure these financial incentives deliver value for money for consumers who are bearing the costs in their energy bills. Recent changes to the Renewables Obligation (RO - banding and headroom from April 2009) are improving the efficiency of the RO, and we are incorporating the same best practice principles on effectiveness and efficiency into the design of the forthcoming Renewable Heat Incentive and Feed-In Tariffs. At the same time, we are working to improve further the efficiency of the RO by consulting this summer on an RO revenue stabilisation scheme. This would aim to ensure that generators under the RO are receiving an adequate return on their investments, but that they do not receive excess profits, in particular when fossil fuel prices are high (see Chapter 3).

Managing the remaining impacts

- 7.38 Our new Feed-In Tariffs and Renewable Heat Incentive will provide further opportunities for individuals and businesses to gain more control over their overall fuel bills by generating some or all of their own energy needs through their own small-scale renewables, such as solar panels, heat pumps, micro-wind and biomass boilers. This can give them a higher degree of energy independence and shield them against energy price rises. The new incentives will make it easier and more affordable to take up these sorts of technologies.

-
- 7.39 A key priority for the Government is protecting the vulnerable from increasing prices. We already have a range of policies to reduce the numbers of people in fuel poverty, including Warm Front, which has helped nearly 2 million homes since 2000 with energy efficiency and central heating improvements, and income support measures such as Winter Fuel Payment and Cold Weather Payment. **We will consider how existing measures on fuel poverty might be further improved and whether new policies might be introduced to help us make further progress towards our goals.**

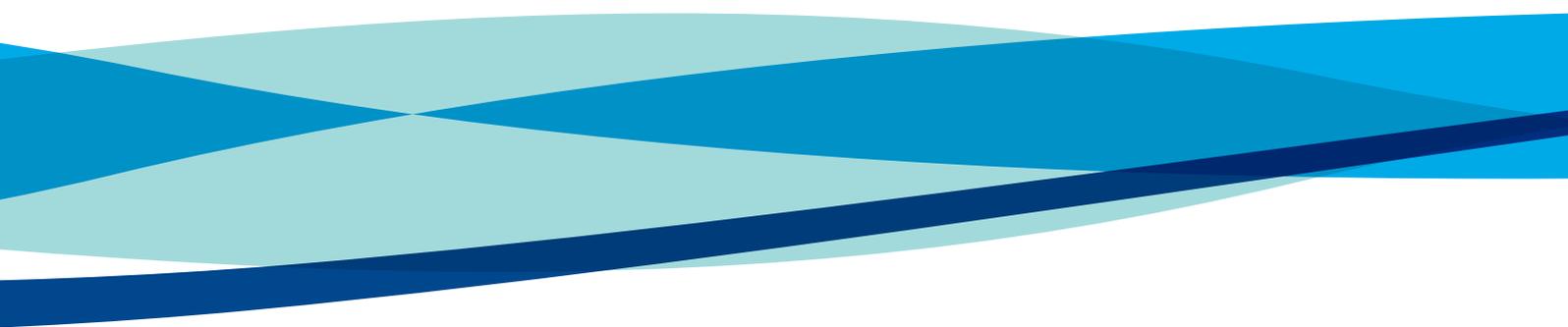
Impact on Energy Markets

- 7.40 The policies in this strategy have been designed to be consistent with delivery through a dynamic market framework. Of course, competitive markets must benefit consumers both now and in the future. Working with Ofgem, we will continue to monitor and develop our delivery framework to ensure that it meets these objectives.
- 7.41 Meeting our renewable ambitions will be very challenging, and involve significant costs. There are also risks to be managed. But the rewards will more than compensate for the risks. As the Stern Review shows, the costs and risks of inaction are significant. This Renewable Energy Strategy is an integral part of the Government's overall UK Low Carbon Transition Plan for delivering the clean, secure and affordable energy of the future. We believe that the actions set out in these strategies – and associated policies for nuclear, carbon capture and storage, heat and energy saving – will deliver the decarbonised energy system we need to tackle climate change; maximise our economic opportunities; spread the costs fairly; and keep our energy supplies secure.



Chapter 8:

Implementation



Summary

This chapter sets out an action plan with key milestones to meet the 2020 target and implement the Renewable Energy Directive – including our approach to joint projects with other Member States. We will publish our national action plan by July 2010, a formal report to the European Commission on how we will meet both our interim and 2020 targets.

To ensure we meet the target and implement the Strategy, we will:

- **Create the Office for Renewable Energy Deployment (ORED) to ramp up delivery of the range of measures set out in this strategy;**
- **Create a formal governance structure to review progress and impacts and to monitor delivery of the targets across the UK;**
- **Work closely with the Devolved Administrations, regional and local government to develop our national action plan and ensure we meet our 2020 goals.**

8.1 Many different bodies will need to take action to deliver our renewables target. This chapter summarises who will do what by when.

The Renewable Energy Directive

8.2 The Renewable Energy Directive was published on 5 June 2009.¹⁸⁸ The Directive obliges Member States to:

- Meet the 2020 national renewable energy targets (15% for the UK);
- Introduce measures to meet the indicative interim targets;
- Introduce mandatory requirements for biofuels and set a target for achieving 10% renewable energy in transport by 2020;
- Adopt a national action plan setting out adequate measures to achieve the 2020 targets;
- Submit to the Commission every two years a progress report towards meeting the targets;
- If an interim target is missed, submit an amended national action plan setting out adequate and proportionate measures to rejoin the indicative trajectory set by the interim targets within a reasonable timetable.

¹⁸⁸ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources.

- 8.3 By 31 December 2014, the Commission will review the following aspects of the 10% transport target: the cost-effectiveness of measures taken; the feasibility of meeting it based on sustainable biofuels; the impact on food supply; the commercial availability of electric vehicles; the evaluation of market conditions; and the greenhouse gas emission standards that apply to biofuels; as well as the implementation of the Renewable Energy Directive, particularly the role of joint projects (trading). On the basis of this review, the Commission may present new proposals. It will also produce a report on requirements for a sustainability scheme for biomass by the end of 2009.
- 8.4 In 2018, the Commission will produce a road-map for renewable energy post-2020, and in 2021 it will review the application of the Directive.
- 8.5 The Directive contains requirements in addition to the 2020 renewables targets, for instance relating to:
- Administrative procedures, regulations and codes;
 - Information and training;
 - Guarantees of origin of electricity, heating and cooling produced from renewable energy;
 - Access to and operation of the grids.
- 8.6 In most cases, these requirements are to be implemented by December 2010 and will need to be covered in the national action plans, which must be adopted before July 2010.

Using joint projects

- 8.7 Because targets for Member States were based on their deployment to date and ability to pay, rather than on their potential for renewable energy, the Renewable Energy Directive includes so-called 'flexibilities' (joint projects), which aim to ensure that the overall EU target of 20% renewables by 2020 is delivered in the most efficient way.
- 8.8 The Directive allows four different flexibility mechanisms:
- Statistical transfer between Member States, under which one Member State could buy a certain amount of renewable energy deployed in another Member State. This amount would be deducted from the seller's share of renewable energy and added to that of the purchaser.

- Joint projects, under which all or part of a new renewable energy project in a Member State would count towards another Member State's target (usually in return for funding). The renewable energy could be used in the country of generation, imported to the second Member State through an interconnector (a link between the electricity systems of the two Member States) or used elsewhere.
- Joint projects with third countries, under which a Member State could fund a renewable electricity project in a non-EU country. This must be a new project and only the electricity that is consumed in the EU, through a physical interconnector, can count towards the target.
- Joint support schemes through which Member States may choose to join or coordinate their financial support schemes for heat and/or electricity.

- 8.9 Under the terms of the Directive, by the end of 2009, Member States must provide the Commission with an estimate of their potential for joint projects, and of any excess in renewable energy or demand for renewable energy from other Member States using any of the mechanisms outlined above. The national action plans, which Member States must submit to the Commission before July 2010, must estimate how much they may rely on joint projects. However, both of these are however only estimates and not binding.
- 8.10 We consulted as part of the Renewable Energy Strategy consultation¹⁸⁹ on the extent to which we should be open to using joint projects to meet the UK target. Responses were mixed. Energy suppliers/network companies were strongly in favour of using joint projects, but the majority of other categories of respondents opposed it.
- 8.11 Our analysis suggests that, if there was a fully liberalised and perfectly efficient cross-EU trading system, using joint projects to meet the last percentage point of our target could potentially save up to 9-15% of total costs, or £400-600 million in 2020.¹⁹⁰ There would be a corresponding reduced impact on consumer bills. However in reality it is very unlikely that there will be such an open and efficient trading system, so in practice savings are likely to be considerably less.
- 8.12 Having taken account of responses to the consultation and the updated analysis of the costs of meeting our target, our policy towards the flexibilities will be:
- **We will set out to meet our 15% target domestically, and our lead scenario (see Chapter 2) reflects this by not assuming a contribution from trading towards meeting the target.**¹⁹¹

189 BERR (2008): 'UK Renewable Energy Strategy: Consultation'

190 Calculations based on Pöyry (2008): 'Compliance costs for meeting the 20% renewable energy target in 2020'

191 With the limited exception of joint projects where the electricity is consumed in the UK (see below).

- **However, all plans are uncertain, so we will be open to using joint projects, if needed to make up any shortfall in the final target, under the conditions set out below.**
- We will also be open from the outset to joint projects in the specific case of electricity projects where the energy is physically imported into and consumed in the UK, and **we are consulting this summer on changes to the Renewables Obligation to allow such cases to benefit from RO support.**¹⁹²
- **Following the publication of this Strategy, we will give consideration to what further legislative or other measures are needed to allow wider forms of trading in the future if needed.** This will include our strategy for reaching agreements with other countries to count generation there towards our target. Trading through support schemes where the electricity was not consumed in the UK would be likely to require primary legislation.

8.13 We would, in future, be open to projects under the flexibility mechanisms under the following principles:

- Only a limited proportion of the UK target should be traded.
- Any trading would be based on voluntary bilateral arrangements between the UK and another country.
- Using the flexibility mechanisms would need to offer genuine cost savings to the UK.
- We would ensure that openness to flexibilities does not undermine the UK financial support mechanisms.
- The flexibility options in the Directive should not result in the responsibility for renewable energy policy being moved from national Governments to EU institutions. Member States should retain control.
- We would ensure that any investments outside the UK support sustainable renewable energy.

Monitoring and reporting

8.14 The Renewable Energy Strategy will be dynamic, as renewables deployment ramps up towards 2020, with regular reviews of progress based on the requirements in the Directive as explained above. We will also update our economic forecasts periodically.

8.15 Member States will need to report to the Commission every two years with the first report due by December 2011. In the UK, we will indicate progress towards the Directive target in a table published in the annual *Digest of UK Energy*

¹⁹² DECC (2009): 'Consultation on Renewable Electricity Financial Incentives'

Statistics publication. This will show renewables used for electricity generation, heat and biofuels for transport, and will also show how the capped gross final energy consumption denominator is derived, together with the headline percentage figure. This data will be published in July each year, seven months after the end of the period which it relates to. Data for electricity, as measured for the Renewables Obligation, will continue to be published in the June edition of *Energy Trends*.

Role of Devolved Administrations

- 8.16 This strategy is published by the UK Government. Our policies to meet the 2020 targets will be taken forward on an England, England and Wales, Great Britain or UK-wide basis as appropriate and in accordance with each devolution arrangement. The Devolved Administrations set their policies within their areas of responsibility; some of these policies are also described in this Strategy.
- 8.17 We have engaged closely with the Devolved Administrations in developing this Strategy, and will continue to work closely with them in implementing the policies set out here – including in developing the UK national action plan, and in meeting the 2020 target.
- 8.18 In addition, each of the Devolved Administrations is setting out its own plan to increase renewable energy use. The UK Government and the Devolved Administrations are working together to ensure that our plans are aligned.

Scotland

- 8.19 Scotland contains some of the most concentrated renewable energy resources in the whole of Europe, and Scottish Ministers are committed to realising the huge potential for renewable energy generation in Scotland. Ensuring that potential is realised is at the heart of their economic and environmental plans. They aim to establish Scotland as a global leader in the field.
- 8.20 Scottish Ministers are committed to working in partnership to deliver this ambition. At a European level, Scotland is a key partner in the European working group on a North Sea grid and has recently established the Scottish European Green Energy Centre in Aberdeen to develop networks and partnerships across Europe, and promote the development and deployment of green energy technologies.
- 8.21 Scottish Ministers are also continuing to engage very closely with the UK Government on the shape and scope of renewable energy legislation and the financial incentives which they create. With Renewables Obligation banding now in place, Scottish Ministers are working with UK colleagues on the further changes to the RO required to align it with the demands of the EU 2020 renewable energy target, as well as on the emerging details of the Feed-In Tariffs

for small-scale electricity and a Renewable Heat Incentive. **Scottish Ministers will be consulting on these matters during the coming months.**

8.22 Within Scotland, the First Minister now chairs an Energy Advisory Board to provide strategic level collaboration and communication on key issues facing the sector. The Forum for Renewable Energy Development Scotland (FREDS) reports to this Board and, through a membership of key individuals from industry, academia, regulatory and enterprise agencies, specifically develops and tests policy in the renewable energy field.

8.23 Key achievements and future goals amongst some of the key Renewables sectors in Scotland include:

- Scottish Ministers have dramatically improved Scotland's record on determinations, many of them in onshore wind, consenting 22 major renewables projects in the last two years – a substantial increase in pace. They are committed to determining new applications within nine months (where there is no public inquiry) and improving procedures even further.
- In Wave and Tidal Energy, Scottish Ministers launched the Saltire Prize in December 2008, a £10 million worldwide innovation prize designed to accelerate the commercial deployment of wave and tidal energy. So far it has attracted over 100 registrations of interest from over 23 countries. Scotland will also shortly increase support for wave and tidal energy through its Renewables Obligation legislation; 5 Renewables Obligation Certificates (ROCs) per unit of output for wave, 3 ROCs for tidal generation.
- In offshore wind, Scottish Ministers are conducting a Strategic Environmental Assessment (SEA) for Scottish territorial waters which will highlight the most suitable areas for development, and which will be completed by early 2010. Scotland is also working with the Crown Estate and UK Government to support the SEA process for UK territorial waters.
- In renewable heat, Scottish Ministers are aiming for a tenfold increase in heat energy from renewables, such as biomass and ground source heat pumps – increasing from 1% to 11% by 2020. A Renewable Heat Action Plan will be a mandatory provision within the Scottish Climate Change Bill and Scottish Ministers recently allocated £1.6 million to 26 projects as part of the first round of the Scottish Biomass Heat scheme; the second round was launched on 20 May 2009.
- The Scottish Renewables Action Plan was launched in the summer of 2009. Its overall aim will be to support and accelerate the implementation of renewable energy in line with EU targets, and is proposed as a constantly-evolving framework of action, undertaken collectively by the Scottish Government, private sector and other public bodies.

Northern Ireland

8.24 Northern Ireland also benefits from good natural resources for renewable energy. It has the potential to make significant progress in increasing the amount of energy from renewable sources in order to contribute to policy goals on security of supply, reduction of greenhouse gases, as well as contributing to business competitiveness, increasing competition in power generation and presenting opportunities for enterprise activity.

8.25 **Northern Ireland plans to issue for consultation an over-arching Strategic Energy Framework, which will set out the scale of its ambition in new targets on renewable electricity and for renewable heat and give further details of the concrete plans to support these new targets.** Specific action plans on marine energy, bioenergy, smart metering and heat will follow as part of a Northern Ireland Sustainable Energy Action Plan.

8.26 Among the key actions being taken forward to help Northern Ireland secure its energy supply, realise economic and business opportunities from renewable energy and reduce carbon emissions are:

- a Strategic Action Plan for offshore wind and marine-based renewables (tidal stream and wave). This Action Plan is the subject of a current Strategic Environmental Assessment which will be completed by early 2010. The Action Plan will issue for consultation in autumn 2009 alongside the SEA's Environmental Report;
- a cross-Departmental Bioenergy action plan which will provide an appropriate framework for boosting the amount of bioenergy produced and consumed in the region;
- co-operation with regulatory and industry partners to deliver new electricity grid infrastructure to absorb renewable electricity generation from onshore and offshore wind and tidal stream generation to meet Northern Ireland's renewable electricity targets to 2020 and beyond;
- developing a renewable heat strategy for Northern Ireland through action to maximise the amount of renewable heat generated and used, including plans to provide a form of support system for renewable heat;
- leading joined-up government, communications and engagement on sustainable energy issues, including publication of a Northern Ireland Energy Efficiency Action Plan;
- ongoing co-operation with regional partners through the British Irish Council in particular on areas of research potential such as the Biomara and Isles projects;

- ongoing co-operation with the Republic of Ireland in particular on renewable energy targets, metering and grid development.
- The region's RDA, Invest NI, will continue to work closely with DECC and ORED and will develop a strategy to maximise job and wealth creation opportunities for the region through renewable energy.

Wales

- 8.27 In Wales, the Assembly Government's approach to renewable energy is set within the context of its duty (under the Government of Wales Act 2006) to make a scheme setting out how Welsh Ministers propose to promote sustainable development. The Assembly Government's new scheme for sustainable development, *One Wales: One Planet*,¹⁹³ sets out its vision of a sustainable Wales. To achieve this, the Scheme recognises that Wales will need to reduce its use of carbon-based energy by 80-90%, resulting in a similar reduction in greenhouse gas emissions. The Assembly Government has set an ambitious target to reduce greenhouse gas emissions by 3% per year in areas of devolved competence and has published a draft Climate Change Strategy setting out the actions being taken to achieve this and to contribute to wider UK, EU and international targets on emissions reduction.
- 8.28 The Assembly Government has just completed a consultation on the National Energy Efficiency and Saving Plan, which sets out proposals to encourage microgeneration and community-scale energy generation, alongside energy efficiency measures particularly in harder-to-treat domestic properties and in non-domestic buildings.
- 8.29 Following on from the publication in 2007 of the *Micro-generation Action Plan for Wales*,¹⁹⁴ in 2008 the *Renewable Energy Route Map for Wales*¹⁹⁵ gave the Welsh Assembly Government's then best estimate of the practicable renewable heat and electricity generation outputs which could be achieved by 2025. In particular the Assembly Government believes that with Wales' coastline, geography and climate, it is quite feasible within 20 years for Wales to produce more electricity from renewables than it consumes as a nation.
- 8.30 The Assembly Government considered in 2008 that Wales should be able to produce at least 33 TWh per year of electricity from renewable technologies by 2025 – with about a half of this from marine, a third from wind and the rest mainly from sustainable biomass (including waste), hydropower and microgeneration. Developments since the publication of the *Route Map*, especially in respect of

193 <http://wales.gov.uk/topics/sustainabledevelopment/publications/onewalesoneplanet>

194 <http://wales.gov.uk/about/departments/dein/publications/microgenplan>

195 <http://wales.gov.uk/consultations/closedconsultations/environment/renewenergymap>

offshore wind, mean that Wales can aspire to a figure of greater than 33 TWh per year.

8.31 In pursuit of these aspirations, the past two years has seen:

- The launch and delivery of the 2007-2013 European Structural Funds programmes in Wales, which have a total investment value of £3.9 billion to promote jobs and sustainable growth in Wales by supporting business, people, communities and the environment.
- Projects have already been approved under these programmes to support the development of a sustainable wood fuel industry throughout the region and a number of projects are being developed in the areas of community-scale renewable energy, marine and energy efficiency.
- The European Parliament has adopted an amendment to the Structural Fund Regulations, allowing expenditure on energy efficiency improvements and the use of renewable energy in existing housing.
- The start of the joint DECC/Defra/WAG/SW England Severn tidal power feasibility and innovation studies initiatives (see Chapter 5 of this document).
- The Assembly Government launched the all-Wales Low Carbon Research Institute to enhance and brigade the considerable Wales R&D academic expertise in partnership with industry.¹⁹⁶
- Progress has been made with Wales' major biomass and offshore wind projects and the leasing of land managed by Forestry Commission Wales (FCW) on behalf of the Welsh Assembly Government, selected through the innovative Assembly Government Planning guidance¹⁹⁷ for major onshore wind farm developments in strategic search areas. Under the auspices of the UK Electricity Networks Strategy Group,¹⁹⁸ detailed plans are being identified for major grid enhancements in Wales to enable low carbon energy developments.
- The publication of the *Wales Future Directions* waste management strategy.¹⁹⁹
- The launch of the *Wales Bio-energy Action Plan*.²⁰⁰
- As precursor to a full strategic environmental assessment²⁰¹ the completion of the first phase of the marine energy environmental data capture exercise in Welsh waters.

196 <http://www.cardiff.ac.uk/archi/lcri.php>

197 <http://wales.gov.uk/topics/planning/policy/tans/tan8>

198 <http://www.ensg.gov.uk>

199 <http://wales.gov.uk/consultations/environmentandcountryside/wastestrategy>

200 <http://wales.gov.uk/consultations/closedconsultations/environment/bioenergyactionplan>

201 <http://www.decc.gov.uk/en/content/cms/news/pn052/pn052.aspx>

- In addition, the Assembly Government will publish on 16 July 2009 a strategic Ministerial Statement on marine energy, outlining the enormous resources for marine energy in Wales and the initial actions required to accelerate their exploitation in an environmentally acceptable way.

8.32 A comprehensive energy strategy for Wales will be produced later in 2009, within strong sustainable development and climate change policy strategic frameworks.

Role of Regions

8.33 The nine English Regional Development Agencies (RDAs) have an important role to play in taking forward the implementation of Regional Strategies in their regions. The RDAs are well placed to contribute to renewable energy priorities by:

- Providing regional leadership in preparing and delivering single integrated regional strategies (see Chapter 4);
- Maximising business opportunities through support for the energy and environment technologies sector, skills and supply chain development, inward investment and critical energy infrastructure (see Chapter 4 and Chapter 7);
- Supporting low-carbon innovation through research and demonstration for new and emerging technologies (see Chapter 5);
- Supporting businesses through Business Link and related services; and
- Developing the market for renewable technologies through sustainable investment and procurement activities.

Role of Local Authorities

8.34 Local Authorities have a key role to play in ensuring the UK meets its targets for renewable energy. Local government plays various roles – as consumers of energy, planners, economic regenerators, housing providers, community leaders and convenors of local partnerships. Each role provides a platform for promoting renewable energy supply:

- Local Authorities can have a substantial and positive influence on delivering renewable energy and securing greater energy efficiency, including through their responsibilities for planning, transport and waste management. For example, through their forward planning and management of proposals for new development they are key to getting the infrastructure in place to supply and deliver renewable energy; in planning the right development for the right location they can encourage less travel; and through their transport planning they can help secure more sustainable transport options.

- Through the ownership and management of public land and property, local councils can act as beacons of excellence through their use of renewable energy;
- Local Authority Leaders' Boards will work in partnership with regional development agencies to prepare revisions to Regional Strategies (see Chapter 4);
- As major energy consumers, local councils and their local public sector partners can influence the supply chain, for instance by entering into long-term supply contracts;
- As the providers of grants and through their investment in local economic regeneration, local councils can facilitate access to finance for renewable energy companies;
- As community leaders, local councils can work with communities to build understanding and acceptance of renewable energy and help galvanise communities to use energy more efficiently.

Governance

8.35 **We will oversee delivery of the target and progress towards 2020 through a high-level delivery board**, which will include representatives of Devolved Administrations and major stakeholder groups. This delivery board will be chaired by senior officials from the Department of Energy and Climate Change (DECC) and supported by an official-level project board, which will report directly to DECC Ministers. Below this over-arching delivery board, there will be a range of governance arrangements for specific aspects of the strategy.

Renewables deployment

8.36 The Office for Renewable Energy Deployment (ORED), which will be part of DECC, will have the objective of significantly ramping up the deployment of established renewable energy technologies to meet the UK target by addressing delivery issues such as planning and the supply chain (see Chapter 4). The Office will report to Ministers on progress towards meeting the UK's target. ORED will be advised on deployment issues by the Renewables Advisory Board (RAB) which provides impartial and authoritative advice to the Secretary of State for DECC (see Box 8.1).

8.37 To ensure that key stakeholders are involved there will also be specific governance arrangements supported or overseen by ORED including:

- A Renewables Deployment Task Force, which will be responsible for overseeing the regional and local planning aspects of the Strategy;

- An Environmental Issues Project Board, including the Statutory Advisors, which will enable more effective management of the environmental issues related to the deployment of renewable energy;
- Ofwid, the Offshore Wind Delivery Board, co-chaired with The Crown Estate, which will oversee work to enable the step change required in offshore wind deployment;
- The Aviation Management Board through which key aviation interests will work to mitigate the impacts of wind on aviation.

Financial incentives

8.38 The Renewables Financial Incentives Programme Board will oversee work on financial incentives.

Electricity grid

8.39 The Electricity Networks Strategy Group (ENSG) is a high-level forum, chaired jointly by DECC and Ofgem, with the broad aim of identifying and co-ordinating work to address strategic issues that affect the transition of electricity networks to a low-carbon future. Separately, a DECC/Ofgem Project Board oversees the establishment and implementation of the offshore transmission regime.

Severn tidal power

8.40 A study of the feasibility of exploiting tidal power in the Severn estuary is being carried out by a cross-Government team led by DECC and including representatives of the Welsh Assembly Government and the South West Regional Development Agency. This board feeds into an ad hoc Ministerial Group chaired by the Secretary of State for DECC. A Technical and Engineering Expert Panel has been appointed to peer review the technical outputs of the feasibility study and provide independent engineering advice; a Strategic Environmental Assessment Steering Group guides and comments on the process of the SEA.

Renewable transport

8.41 The Department for Transport is setting up a project board for implementing the renewable transport target in the Renewable Energy Directive and the provisions of the Fuel Quality Directive.

Waste policy

8.42 The Waste Programme Board will oversee implementation of the Strategy's provisions for generating energy from waste. It aims to drive delivery of the Waste Strategy for England 2007 by providing support, advice and direction to government and delivery organisations on the sustainable management of waste.

Box 8.1: Renewables Advisory Board

The Renewables Advisory Board (RAB) was set up in 2002 to provide advice to the Government on a wide range of renewable energy issues. The board is an independent, non-departmental public body sponsored by DECC, which brings together Government Departments, the renewables industry, academia and the unions. The board is chaired by the Secretary of State, DECC, and is composed of 12 official-level members and 18 appointed members, selected from all sectors of the renewables industry.

RAB provides the Secretary of State with independent, impartial and authoritative advice and specific recommendations on policies, programmes and measures, to improve Government understanding of the obstacles and opportunities for renewable technologies in the UK.

Each year, the Board reviews future policy issues and devises the tasks that it will undertake over the next 12 months. For 2009, RAB is concentrating on providing the Secretary of State with advice on delivery of the UK's 2020 target.

Better Regulation

8.43 We will take forward the proposals and further work set out in the Renewable Energy Strategy in accordance with the principles of better regulation. In keeping with the Government's agenda for improving regulation, we will use the economic principles for selecting and designing renewables policies to reduce the emissions of carbon dioxide and other greenhouse gases that are set out in our publication, *Making the right choices for our future: An economic framework for designing policies to reduce carbon emissions*.²⁰²

Action Plan for Delivery

8.44 Annex 2 summarises our action plan for delivering the Renewable Energy Strategy.

8.45 Many of the policies set out in this strategy are subject to Parliament and to State Aid rules.

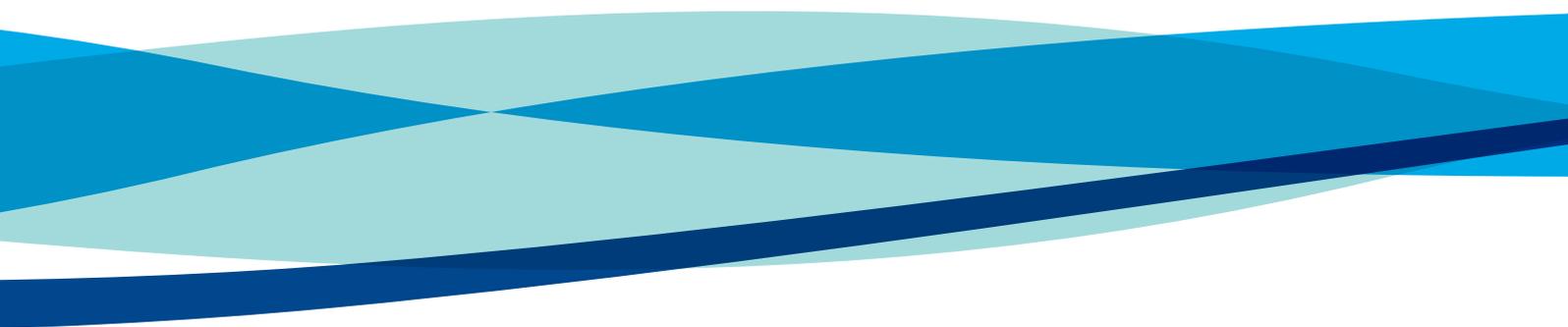
²⁰² DECC and Defra (2009): 'Making the right choices for our future: An economic framework for designing policies to reduce carbon emissions'

Timeline

2009	
End-2009	Member States publish a forecast document, setting out estimates of their level of potential for joint projects, and any excess in renewable energy or demand for renewable energy from other Member States
31 December 2009	Commission report on sustainability of biomass used for heat and electricity, with proposals for legislation if required
2010	
1 April 2010	New Feed-In Tariffs scheme and reformed Renewables Obligation in place
30 June 2010	Member States publish their national action plans, setting out how they will meet their targets
June 2010	New offshore transmission regime goes live
2010	New long-term transmission access rules introduced
2010	Infrastructure Planning Commission set up and National Policy Statements finalised
5 December 2010	Deadline for transposition of the Directive
31 December 2010	Commission report reviewing the impact of indirect land use change on greenhouse gas emissions from biofuels
2011	
1 April 2011	New Renewable Heat Incentive scheme in place
31 December 2011	Member States submit their first report on progress under the Directive
2012	
2012	Commission produces first reports on progress under the Directive and on the calculation of greenhouse gas impact and on measures taken to respect the sustainability criteria
End-2012	End of first period of the indicative trajectory (4% in 2011-12)

2013	
31 December 2013	Member States submit second report on progress
2014	
2014	Commission produces second reports on progress under the Directive and on the calculation of greenhouse gas impact and on measures taken to respect the sustainability criteria
End-2014	End of second period of the indicative trajectory (5.4% in 2013-14)
31 December 2014	Deadline for Commission to review the 10% transport target and the wider operation of the Directive
2015	
31 December 2015	Member States submit third report on progress
2016	
2016	Commission produces third reports on progress under the Directive and on the calculation of greenhouse gas impact and on measures taken to respect the sustainability criteria
End-2016	End of third period of the indicative trajectory (7.5% in 2015-16)
2017	
31 December 2017	Member States submit fourth report on progress
2018	
2018	Commission produces fourth reports on progress under the Directive and on the calculation of greenhouse gas impact and on measures taken to respect the sustainability criteria
2018	Commission presents a renewable energy roadmap for the post-2020 period
End-2018	End of fourth period of the indicative trajectory (10.2% in 2017-18)
2019	
31 December 2019	Member States submit fifth report on progress

2020	
2020	15% of UK energy to come from renewable sources
2020	Commission produces fifth reports on progress under the Directive and on the calculation of greenhouse gas impact and on measures taken to respect the sustainability criteria
2021	
2021	Commission produces report reviewing the application of the Directive
31 December 2021	Member States submit final report on progress



Annexes

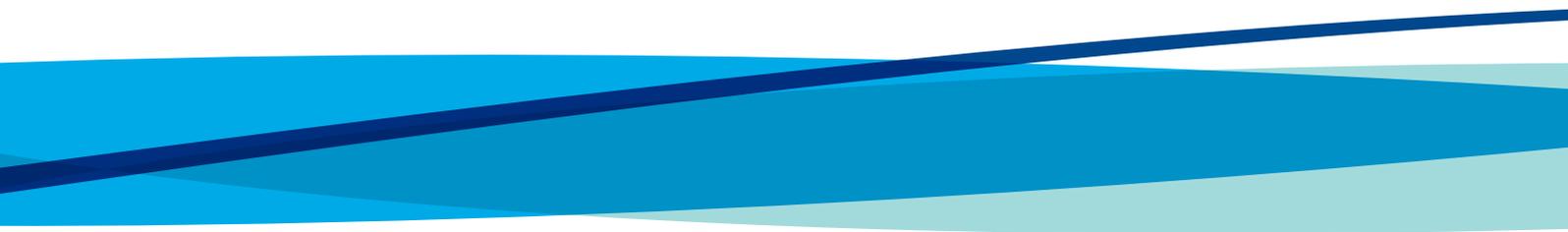
Annex A: Analysis of Responses to Consultation

Annex B: Summary Action Plan for Delivery

Annex C: Glossary of Terms

Annex D: Related Documents and Links

Annex E: Choosing the 'Lead Scenario' for Delivering the Renewable Energy Target



Annex A: Analysis of Responses to the UK Renewable Energy Strategy Consultation²⁰³

Executive Summary

The majority of respondents agree with the assessments and proposals set out in the consultation on most issues, in particular regarding carbon dioxide emissions and security of supply, but also on environmental and energy market issues. When asked at an overall level, there were more than four times as many expressing agreement with the general approach as disagreement, albeit that for most that support was conditional. The most frequently mentioned proviso was to stress the urgency with which change is required.

A consistent point of consensus was that the Government could be doing more on all of the issues raised (investment in training and research and development and offering financial incentives were recurring themes to many of the issues). Engendering community support and tackling air quality were the only two issues where many respondents thought non-governmental parties had much of a role to play alongside the Government. Some areas of action for Government prompted by the consultation are:

- Offering greater business certainty when designing policies to meet the 2020 renewable energy target (as a priority over the need for flexibility);
- Tackling the energy efficiency of buildings (through new building regulation and through incentivising retrofit, especially insulation, through financial incentives and feed-in tariff schemes), appliance efficiency and raising public awareness and buy-in;
- Protecting the security of the UK's electricity supply by focussing on smart metering and improved storage capacity and avoiding too heavy a reliance on wind energy;
- Reducing the constraints on renewable development arising from grid issues, predominantly addressing improving access to the grid and expansion of the network;

²⁰³ Full report available at http://decc.gov.uk/en/content/cms/consultations/cons_res/cons_res.aspx

- Addressing supply chain issues by pre-empting any future skills gap with investment in training;
- Providing further support for small-scale renewable electricity, a large proportion advocating feed-in tariffs as the most appropriate mechanism; overall agreement with the Government's current position that it should not introduce statutory targets for microgeneration at this stage in its development;
- Doing more to meet the potential of renewable heat. Whilst there is no consensus on what that action should be, some spoke of the role that Local Authorities could play in this regard and some of regulation to ensure that Combined Heat and Power is adequately incorporated into new builds;
- Addressing biomass sustainability concerns with proper land evaluation and by ensuring bioenergy crop production does not encroach on land for food crops; whilst overall projections for the biomass market tend to be positive, they are less so when regarding the future for biomass imports;
- Taking further regulatory measures on waste sorting to discourage the landfill of biomass waste;
- Simplifying and clarifying the planning system and making it operate more swiftly in order to facilitate renewable deployment;
- Improving the recharging infrastructure for electric/hybrid vehicles.

There is very strong support for retaining the Renewables Obligation as the prime support mechanism for centralised renewable electricity, although one in seven suggest changes be made to the RO in light of the EU targets, such as extending the end date to 2038 or longer, introducing a standard length of time under which projects get RO support for 20 years or more, and supporting headroom and grandfathering.

Asked about incentivising renewable and low-carbon transport in a sustainable and cost-effective way, respondents' focus revolved around biofuels, electric/hybrid vehicles and, to a lesser extent, public transport. Whilst most can see the potential for impact from encouraging uptake of electric/hybrid transport, most do not predict an impact prior to 2020.

Relatively few issues were met with majority disagreement:

- Most respondents do not support the deployment of any of the UK's renewable energy targets in other countries;
- A slim majority of respondents disagree with the Government's assessments of the *potential* of different renewable electricity technologies, there being a body of opinion that marine energy, solar energy and hydrogen storage have been underemphasised at the expense of wind energy;
- A very small majority do not see a Renewable Heat Obligation as workable (whereas a Renewable Heat Incentive is seen as viable);

-
- Whilst more respondents acknowledge the potential of the off gas grid market than reject this idea, a very slim majority do not wish to see off grid prioritisation, mostly because they see this as too narrow a focus and wish to see renewable heat encouraged both on and off grid;
 - The analysis of energy prices was disputed, with some querying the cost assumptions in the proposal; the analysis of fuel poverty and the economy divided the response between those agreeing and those disagreeing;
 - Very few addressed the issue of putting in safeguards to limit the potential cost of feed-in tariffs for small-scale electricity generation. Of those who did, the majority did not support safeguards, and there was opposition to limitations on either the overall number of new installations in a given period or on newly installed capacity in a given period. Respondents did support prioritisation being given to those in fuel poverty.

Annex B:

Summary Action Plan for Delivery

Greater Financial Support

WHO	WHAT	WHEN	SEE PAGE
DECC	Announce further details on £4 billion of lending from European Investment Bank	July 2009	53
DECC	Consult on changes to the Renewables Obligation (RO) and the design of the Feed-In Tariffs (FITs)	Summer 2009	55–59; 63–64
DECC	Consult on the design of the Renewable Heat Incentive (RHI)	Late 2009	63
OGC	Pursue setting up Power Purchase Agreements directly between public bodies and generators for a percentage of the electricity volumes consumed by the public sector	Late 2009	58–59
DfT	Consult on draft legislation to amend or replace the existing Renewable Transport Fuel Obligation, with legislation expected to take effect in December 2010	Early 2010	60–61
DECC	FITs up and running	April 2010	65
DECC	Changes to RO in force (except any revenue stabilisation mechanism)	April 2010	54–57
DECC	RHI up and running	April 2011	65
DECC	First planned review of RO bands completed	April 2013	55
DECC	Earliest effective date for any mandatory RO revenue stabilisation scheme	April 2013	58

Better Planning for Delivery

WHO	WHAT	WHEN	SEE PAGE
DECC/MOD and industry	Deliver the Aviation Action Plan	Ongoing	89
CLG	Consult on extending the use of permitted development rights for small-scale renewables to business and public services	2009	77
DECC	Set up an Expert Support Network for planners on renewable energy	Summer 2009	85
DECC and CLG	Introduce hands-on support to Local Authorities on renewables planning issues	2009	85
DECC	Consult on the new National Policy Statements for energy planning	Autumn 2009	75
CLG	Establish a demonstration project to encourage the wider use of Planning Performance Agreements to improve the planning process for renewables	2009	77
CLG	Review Planning Policy Statements (PPSs) on Climate Change and Renewable Energy and consult on a combined climate change PPS	Late 2009	76
DECC	Provide support and guidance, including a consultation, to English Regions and Local Authorities on how to assess renewable energy potential	Late 2009	79
DECC and Devolved Administrations	Agree approach to assess renewable energy potential in the Devolved Administrations	Late 2009	79
DECC	Set up a new Ministerial Renewables Deployment Taskforce to bring coordination and leadership to regional and local delivery of the targets in England	Late 2009	86
The Crown Estate	Award Zone Development Agreements to developers under Round 3	Late 2009	83
DECC	Publish new National Policy Statements	2010	75
Defra	Introduce the Marine Management Organisation	April 2010	83
CLG	Introduce Infrastructure Planning Commission	2010	73

WHO	WHAT	WHEN	SEE PAGE
CLG	Introduce new regulations on extending the use of permitted development rights for small-scale renewables to business and public services	April 2010	76

Stronger Renewable Energy Industry

WHO	WHAT	WHEN	SEE PAGE
DECC	Set up the Office for Renewable Energy Deployment (ORED) with a clear remit to address barriers to deployment and stimulate investment	July 2009	70
DECC and EU Skills	Develop the National Skills Academy for Power	Early 2010	95
DECC and the Wind Industry	Develop a skills and training strategy for wind energy and marine renewables	Early 2010	96
DECC and EU Skills	Undertake comprehensive review of skills for renewables and develop a Renewable Skills Strategy	April 2010	95
DECC and BIS	Provide £120 million to support a step change in the development of offshore wind in the UK	By 2011	92

Quicker, Smarter Grid Connection

WHO	WHAT	WHEN	SEE PAGE
Ofgem	Launch a new enhanced investment incentives regime for network operators	2009–2010	100
DECC	Consult on a National Policy Statement on networks infrastructure	Late 2009	100
DECC	Publish Smart Grid Vision	Late 2009	102
DECC and Ofgem	Fully implement a new offshore transmission regulatory regime to connect offshore wind in the most cost effective and efficient manner	June 2010	101
DECC	Implement reforms to the transmission access regime for onshore	June 2010	97–98
DECC & BIS	Provide a further £6 million to supplement the work already underway on the development of a smart grid	2010	102
DECC	Publish new Smart Grid Policy Route Map	2010	102

Using More Sustainable Bioenergy

WHO	WHAT	WHEN	SEE PAGE
Defra	Publish a toolkit for Local Authorities to help them make public announcements on waste policy and communicate more effectively	July 2009	123
DfT	Develop and publish a comprehensive cross-Government biofuels research and development strategy	Summer 2009	117
DECC in partnership with Ofgem, National Grid and Gas Distribution Network Owners	Publish guidance to the GB gas regulatory regime for potential investors in biomethane injection	Summer 2009	126
Committee on Climate Change	Report on the scope to use biofuels in aviation	Late 2009	127

WHO	WHAT	WHEN	SEE PAGE
DECC with input from Defra	Consult on whether to limit the Renewable Heat Incentive only to operators of biomass boilers under 20 MW size which meet emissions standards	2009	121–122
DECC	Consult on a sustainability reporting requirement for the Renewable Heat Incentive and Feed-in-tariffs in Great Britain. These consultations and the consultation on changes to the RO will include our approach to reporting on by-products and wastes	2009	113
Forestry Commission and Forestry Research	Publish an implementation plan for the Woodfuel Strategy	2009	107
The Environment Agency, the Waste and Resources Action Programme (WRAP) and Industry	Develop a standard for digestate from anaerobic digestion and a Quality Protocol	Autumn 2009	110
European Commission	Publish a report on the sustainability of biomass for heat and power, with proposals if appropriate	Late 2009	112
DECC, Defra and the National Non-food Crops Centre	Develop a web-based portal to act as a first point of contact for advice on anaerobic digestion	Late 2009	110
Defra (UK Government)	Consult on the scope for banning certain materials or kinds of waste from landfill	December 2009	109
DfT, DECC and partners	Consult on options for meeting the transport target	Early 2010	48
Defra	Provide up to £10 million additional funding for new composting and anaerobic digestion facilities	March 2010	123

WHO	WHAT	WHEN	SEE PAGE
Defra and Industry	Report on progress on designing equipment and methodologies to enable the biomass content of solid recovered fuel to be determined cost-effectively	April 2010	124
Defra	Implement a solid recovered fuel grant scheme (subject to state aids clearance)	April 2010	124
HETAS, Woodfuel industry and DECC	Run a pilot for fuel quality criteria with the wood-fuel supply industry	2010	118
CLG	Publish revised guidance to part J of the building regulations covering biomass	2010	122–123
DECC	Increase planting grants under the Energy Crops Scheme, to 50% of establishment costs	2010	107
DECC	Consult on exempting biomethane producers from the need to hold a Gas Transporters' Licence	2010	126
European Commission	Report on and, if appropriate, develop a methodology for accounting for Indirect Land Use Change	December 2010	117
DfT and partners	Conclude research into the indirect effects of biofuels and use this work to influence the European Commission's report into Indirect Land Use Change	2010	117
The Health and Safety Executive in partnership with DECC	Consider whether certain statutory requirements for the quality of gas in the grid might be adjusted, in order to help biomethane injection, without compromising safety	2010	126
DECC	Provide funding for a £1.5 million three-year research project to examine the feasibility of Short Rotation Forestry as a viable renewable energy source within England	2011	107
DECC and Defra, alongside industry and other key stakeholders	Work with industry and other key stakeholders to introduce emission standards for biomass heating boilers under 20MW size which are not currently covered by other legislation	2011	121

WHO	WHAT	WHEN	SEE PAGE
DECC, Defra and WRAP	Provide around £10 million for the Anaerobic Digestion Demonstration Programme	2011	110

New Resources and Technologies

WHO	WHAT	WHEN	SEE PAGE
TSB	Provide £140 million of coordinated support for research, development and demonstration in low carbon vehicles	Ongoing	140
Carbon Trust	Fund up to £6 million in the Carbon Trust's Advanced Bioenergy Directed Research Accelerator	Ongoing	148
DECC, SWRDA, WAG	Announce and begin development of proposals for new innovative Severn tidal technologies	July 2009	134
DECC, SWRDA, WAG	Announce shortlist of potential Severn tidal power projects	July 2009	134
Carbon Trust	Provide support from the Offshore Wind Accelerator to reduce costs and address foundations, wake effects, electricals and access/egress by boat	Summer 2009	144
DECC	Form a more collaborative working arrangement between low carbon funding bodies to help accelerate technology development	Summer 2009	140
DECC	Extend the Marine Renewables Deployment Fund into the next spending period	Summer 2009	143
DECC and BIS	Double support for the proposed Wave Hub project in Cornwall, providing £9.5 million	Autumn 2009	143
DECC and TSB	Launch the Energy Knowledge Transfer Network to promote collaboration and knowledge sharing between developers	Autumn 2009	140
DECC and BIS	Provide up to £10 million to support the South West's potential for wave and tidal innovation	Autumn 2009	143
DECC and partners	Provide an additional £8 million to expand the in-sea stage resting facilities at EMEC in Orkney	Autumn 2009	143

WHO	WHAT	WHEN	SEE PAGE
NaREC and partners	Invest up to £10 million in NaREC in the North East to build on and utilise existing infrastructure for marine developers	Autumn 2009	143
DECC	Launch a £22 million Marine Proving Fund to provide testing and demonstration of devices	Autumn 2009	143
DECC and partners	Develop a shared vision of the potential technology and infrastructure requirements to support a 2050 low-carbon society	Late 2009	139
DECC	Develop an Action Plan for considering the framework of support for the deployment of wave and tidal stream technologies	Late 2009	143
DECC, SWRDA, WAG	Consult on conclusions on Severn Tidal Power Feasibility Study. Decide whether to support a Severn tidal power scheme	2010	134
DECC	Provide up to £6 million to explore the potential for deep geothermal power in the UK	2010	145
DfT	Provide £250 million to create a scheme so motorists will receive help worth between £2,000 to £5,000 to buy electric and plug-in hybrid cars. £20 million of this is to develop a charging infrastructure framework	2011	146

Engagement

WHO	WHAT	WHEN	SEE PAGE
DECC and Carbon Trust	Help public sector bodies identify the most cost-effective renewable energy solutions	Ongoing	170
DECC	Monitor public awareness of, and attitudes to, renewable energy through the ongoing Renewable Energy Awareness and Attitudes Research	Ongoing	171
DECC	Publish a toolkit to help renewable energy developers provide benefits to the local community	July 2009	154
DECC	Provide £1 million a year increased funding to Energy Saving Trust to improve microgeneration advice and information	July 2009	157

WHO	WHAT	WHEN	SEE PAGE
DECC	Fund new projects for community carbon savings under the Big Green Challenge	July 2009	164
CLG	Publish a summary of consultation responses on the definition of zero carbon homes in the summer, to be followed by a policy statement	2009	161
Defra	Provide £6.1 million to eight projects to support Greener Living	2009	165
CLG	Publish a further consultation on zero carbon non-domestic buildings	2009	161
CLG	Consult on amendments to the Building Regulations to reduce carbon emissions from new homes (changes will come into force in 2010)	2009	161
DECC	Provide new funding to develop an online 'How to' guide for community energy	Late 2009	158
DECC and CLG	Publish a Heat and Energy Saving Strategy, including views on the appropriate delivery model for low-carbon energy in households	Late 2009	167
DECC	Encourage all public sector bodies to review their potential for on-site renewable generation	Late 2010	169
DECC	Provide up to £10 million for 'Green villages, towns and cities' to develop community-wide plans in pilot locations	2010	165

Benefits & Impacts

WHO	WHAT	WHEN	SEE PAGE
DECC	Issue Call for Evidence on measures to increase electricity security of supply, including demand-side response	Late 2009	179

Implementation

WHO	WHAT	WHEN	SEE PAGE
DECC	Consult on changes to the Renewables Obligation to enable joint projects (trading), for electricity projects where the energy is consumed in the UK	Summer 2009	193
DECC	Establish a project board to ensure delivery of the target, which will report directly to DECC Ministers	Summer 2009	200
DECC	Publish a forecast document, setting out our estimated level of potential for joint renewable energy projects	Late 2009	192
DECC	Publish the UK national action plan, setting out for the European Commission how we will meet our 2020 target	July 2010	190
All Government Departments, led by DECC	Ensure transposition of the Renewable Energy Directive	December 2010	203
DECC	Publish the first national report to Commission on progress	Late 2011	203

Annex C:

Glossary of Terms

AD	Anaerobic Digestion
AONB	Area of Outstanding Natural Beauty
bbI	Barrels of oil
BEAT	Biomass Environmental Assessment Tool
BERR	Department for Business Enterprise and Regulatory Reform
BIS	Department for Business, Innovation and Skills
BRE	Building Research Establishment
BWEA	British Wind Energy Association
CAA	Civil Aviation Authority
CCC	Committee for Climate Change
CCS	Carbon Capture and Storage
CEN	European Committee for Standardisation
CERT	Carbon Emissions Reductions Target – obligation on energy suppliers to deliver energy saving measures
CHP	Combined Heat and Power
CLG	Department for Communities and Local Government
CO₂	Carbon dioxide
COSLA	Convention of Scottish Local Authorities
CRC	Carbon Reduction Commitment
DAs	Devolved Administrations
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DNO	Distribution Network Operator
EIB	European Investment Bank
EMEC	European Marine Energy Centre
ENs	European Standards
ENSG	Electricity Networks Strategy Group – group chaired by DECC and Ofgem looking at electricity network investment
EST	Energy Saving Trust

ETI	Energy Technologies Institute
EU-27	The 27 EU Member States
EU ETS	EU Emissions Trading System
FC	Forestry Commission
FCS	Forestry Commission Scotland
FCW	Forestry Commission Wales
FEC	Final Energy Consumption
FITs	Feed-In Tariffs – forthcoming GB financial incentive for renewable electricity up to 5 MW
FREDS	Forum for Renewable Energy Development Scotland
G8	Group of eight major industrialised nations
GB Queue	The Great Britain Queue (for access to the electricity network)
GDP	Gross Domestic Product
g/GJ	Grammes per gigajoules
GHG	Greenhouse gas
GMWDA	Greater Manchester Waste Disposal Authority
GOs	Government Offices for the English regions
GW	Gigawatts
GWh	Gigawatt hours
HES	Heat and Energy Saving Strategy (to be published later this year)
HETAS	Heating Equipment, Testing and Approval Scheme - a Body recognised by Government to approve solid fuel heating appliances, fuels and services
HMRC	HM Revenue & Customs
IFI	Innovation Funding Incentive – Ofgem incentive mechanism to encourage Distribution Network Operators to apply technical innovation
Invest NI	Northern Ireland’s economic development agency
IPC	Infrastructure Planning Commission (to be introduced in 2010 following the Planning Act 2008)
Km	Kilometres
kW	Kilowatts
LCBP	Low Carbon Buildings Programme – provides grants for installing microgeneration
LDO	Local Development Order – will allow local planning authorities to allow new development without the need for individual planning applications
LCIS	Low Carbon Industrial Strategy, published alongside this document

MCA	Maritime & Coastguard Agency
MCCIP	Marine Climate Change Impacts Partnership
MCS	Microgeneration Certification Scheme – independent scheme that certifies microgeneration products and installers
MMO	Marine Management organisation
MoD	Ministry of Defence
MoU	Memorandum of Understanding
MRDF	Marine Renewables Deployment Fund – provides funding for marine energy demonstration and research
MtCO₂	Million tonnes of carbon dioxide
MW	Megawatts
MWh	Megawatt hours
MWth	Megawatt thermal (unit to measure heat)
NaREC	New and Renewable Energy Centre, based in the North East of England
NDPB	Non-Departmental Public Body
NERL	National Air Traffic Services En Route Ltd
NESTA	National Endowment for Science, Technology and the Arts
NGET	National Grid Electricity Transmission, the GB system operator for the electricity network
NGOs	Non-governmental organisations
NNFCC	National Non-Food Crops Centre
NO_x	Nitrogen oxide
NPS	National Policy Statement – a suite of documents required under the Planning Act 2008, which will help ensure decisions on energy infrastructure are consistent
Ofgem	Office of Gas and Electricity Markets (UK energy regulator)
Ofwid	Offshore Wind Delivery Board
ORED	Office for Renewable Energy Deployment – set up by DECC alongside the publication of this Strategy
PAS	Planning Advisory Service – service funded by CLG to help planning deliver local priorities and outcomes
PDR	Permitted Development Right
PFI	Private Finance Initiative
PfR	Partnerships for Renewables – set up by Carbon Trust Enterprises to work with public sector bodies to develop and manage renewable energy projects

p/kWh	Per kilowatt hour
PM	Particulate Matter (emissions measurement)
PPA	Power Purchase Agreement – contract between an electricity generator and a site owner
PPA	Planning Performance Agreement – enables Local Authorities to agree with the developer a timescale and plan for reviewing the application
PPS	Planning Policy Statement – prepared by Government to explain statutory provisions and provide guidance on planning policy
RAB	Renewables Advisory Board – advises the Secretary of State, DECC, on renewable energy issues
R&D	Research & Development
RDAs	Regional Development Agencies
RES	Renewable Energy Strategy
RES	Regional Economic Strategy
REZ	Renewable Energy Zone – area of sea which may be exploited for energy production
RFA	Renewable Fuels Agency – administers the RTFO for the Government
RHI	Renewable Heat Incentive – forthcoming GB financial incentive for renewable heat
RO	Renewables Obligation – UK financial incentive for large-scale renewable electricity
ROCs	Renewables Obligation Certificates – certificates issued to renewable electricity generators under the RO
RPI-x@20	Ofgem project to review the workings of the current approach to regulating Great Britain’s energy networks
RS	Regional Strategies – strategies for the English regions covering both economic and spatial planning, to be introduced under the the Local Democracy, Economic Development and Construction Bill, subject to Royal Assent
RSPB	Royal Society for the Protection of Birds
RSS	Regional Spatial Strategy
RTFO	Renewable Transport Fuel Obligation – a requirement for fossil fuel suppliers to use renewable fuels e.g. biofuels in the UK
SAP	Standard Assessment Procedure – for the energy assessment of dwellings
SEA	Strategic Environmental Assessment, under Directive 2001/42/EC ‘on the assessment of the effects of certain plans and programmes on the environment’

SET	Strategic Energy Technology plan – the EU’s high-level vision for energy technology development
SMEs	Small and Medium Sized Enterprises
SRC	Short Rotation Coppice – a form of woody biomass
SRF	Short Rotation Forestry – a form of woody biomass
SRF	Solid Recovered Fuel – waste recycled for energy
SSCs	Sector Skills Councils – 25 UK employer-driven organisations designed to build a skills system that is driven by employer demand
TAR	Transmission Access Review – joint BERR-Ofgem review of the framework for connecting renewable generation to the grid, published June 2008
TCPA	Town and Country Planning Act 1990
TGL	Tidal Generation Ltd – supplier of tidal turbines
TO	Transmission Owners – National Grid, Scottish Power Transmission Ltd (SPT) and Scottish Hydro Electric Transmission Ltd (SHETL)
TWh	Terawatt hours
TWh/y	Terawatt hours per year
UKAS	United Kingdom Accreditation Service
UK CIP	UK Climate Impacts Programme
UKERC	UK Energy Research Centre
UKTI	UK Trade & Investment
UN	United Nations
WAG	Welsh Assembly Government
WFD	Waste Framework Directive
WID	Waste Incineration Directive
WRAP	Waste Resources Action Programme
ZDA	Zone Development Agreement – awarded by The Crown Estate to developers under Round 3

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Annex E:

Choosing the 'Lead Scenario' for Delivering the Renewable Energy Target

Our lead scenario to meet the 2020 renewable energy target of 15% of our energy to come from renewable sources is described in Chapter 2. In assessing the relative strengths and weaknesses of various scenarios to meet the target, we needed to balance several important factors, shown in Box 1, as well as consider the analysis of what is achievable in each sector.

The large-scale electricity sector is the most advanced in terms of its current deployment of renewable technologies, therefore the barriers to further deployment are relatively well known. But a higher contribution from intermittent wind generation might present greater risks to security of supply from their deployment, and can cause high and volatile peak prices. Moreover, carbon savings in this sector will not contribute to UK carbon budgets as they are capped in the ETS.

In the heat sector, our current analysis indicates that renewables could contribute between 8.5% and 12% of heat demand. A 12% effort level could however require stretching growth rates.²⁰⁴ Recognising on-going work on the potential contribution from renewable Combined Heat and Power, as well as the fact that heat is one of the most cost-effective sectors the higher bound of this range was chosen.

In our lead scenario, 10% of transport energy comes from renewable sources. This reflects the 10% 'sub-target' for transport as set out in the Renewable Energy Directive. Because of the existing uncertainty surrounding biofuel sustainability, we have not assumed a greater contribution from transport at this stage.²⁰⁵

We wanted to encourage the deployment of small-scale renewable electricity technologies so that communities and individuals could make an active contribution to the renewables target and to our longer-term carbon goals. The scenario recognises that these are relatively expensive options compared to other renewable technologies,

204 NERA/AEA (2009): 'The UK supply curve for Renewable Heat'

205 The feasibility of reaching the 10% transport sub-target whilst ensuring sustainability will be subject to review by the European Commission by the end of 2014

and that deployment is from a very low base so the scope for this sector to contribute is naturally limited.

The lead scenario does not assume a role for trading (meeting part of the target through supporting deployment abroad, as is permitted under the Renewable Energy Directive). Chapter 8 sets out our policy on trading in more detail.

Box 1: Factors that were considered in constructing this scenario

1. Cost and consumer prices: Our analysis estimated the overall resource and subsidy costs as well as the impact on consumer bills.²⁰⁶

2. Security of supply: We have considered the impact on the electricity grid of intermittent renewable technologies such as wind, the requirement for fossil fuel back-up, and the impact on investment signals. We have also considered the impact on other forms of electricity generation such as clean coal (CCS) and nuclear to ensure diversity of supply.

3. Carbon savings: Additional carbon savings arising from the Renewable Energy Strategy will come primarily from the heat and transport sectors, as the large-scale electricity sector already trades in the carbon market and is capped under the EU Emissions Trading Scheme.

4. Risks of deployment: We considered the risks to achieving different deployment rates across sectors, the barriers that need to be overcome, and supply chains that need to be built up. Some sectors are starting from a very low base and face relatively untested risk to future rollout.

5. Future proofing: We wanted to ensure that, as far as possible, the lead scenario is in line with the energy mix, and necessary level of community engagement needed to meet our longer-term low-carbon goals.

6. Sustainability impacts: We considered the environmental concerns surrounding certain biofuels which constrain the ability of transport to deliver their share of the target. Sustainability is also a consideration for the availability of solid biomass for heat and power.

7. Investor confidence: We aim to ensure that the signals that the scenarios give to investors are credible, transparent and enable them to plan for the longer term.

²⁰⁶ Redpoint/Trilemma (2009): 'Implementation of the EU 2020 Renewables Target in the UK Electricity Sector: RO Reform', NERA / AEA (2009): 'The UK supply curve for Renewable Heat' and Element/Pöyry (2009): 'Design of a Feed-In Tariff for sub-5 MW electricity in GB'



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