



DEPARTMENT OF TRADE AND INDUSTRY
Renewable Energy

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EXECUTIVE SUMMARY



1 The generation of electricity from renewable sources of energy, such as wind, wave and solar power, produces significantly less environmental pollution than generation from fossil fuel sources. Increased use of renewable sources, as one part of the Government's wider Climate Change Programme, will assist in achieving its target of moving towards a 20 per cent cut in carbon dioxide emissions, from 1990 levels, by 2010, and its goal of putting the United Kingdom on a path towards a reduction of some 60 per cent from current levels by about 2050.

2 The Government has set a target that by 2010, 10 per cent of Great Britain's supply of electricity should be from renewable sources, subject to the costs being acceptable to the consumer. It aspires to double this level by 2020. The use of renewable energy on this scale would reduce carbon dioxide emissions by between 20 million and 27 million tonnes, and increase the diversity and hence the security of the United Kingdom's energy supplies.

3 Within Government, the Department of Trade and Industry (the Department) is responsible for promoting electricity from renewable sources. Most renewable technologies are not currently commercially viable, and therefore need Government support to secure their more widespread use and development. The Department has put in place a variety of mechanisms to assist technologies at different stages of their development, so that they can mature and be deployed on a scale that will reduce their unit costs.

4 The main mechanism for technologies closest to commercial viability, such as onshore wind, is the Renewables Obligation (the Obligation). This requires all electricity suppliers to source a growing percentage each year of their total sales from renewable sources. Under the Obligation, generators who produce electricity from eligible sources receive Renewables Obligation Certificates (Certificates) which they may sell to suppliers along with the electricity they produce, or trade separately. Suppliers must either surrender sufficient Certificates in any year to meet their Obligation, or pay a buy-out related to the size of their shortfall. Funds raised from buy-out payments are then re-distributed to suppliers according to the volume of Certificates they surrendered. The value of the buy-out underpins the market value of Certificates. Provided the demand for Certificates exceeds supply, the Certificates add considerably to the income of companies generating electricity from renewable sources. A more detailed description of the Renewables Obligation is given in [Figure 7 on page 14](#).

5 In addition to the support provided by the Renewables Obligation the Department makes grants to technologies further from the market to support initial operational and demonstration projects, and relevant research and development. There are also other Government policies to tackle climate change, which indirectly encourage the development of renewable energy. Total public support for the renewables industry is expected to average £700 million per annum between 2003 and 2006. Around two thirds of this support will come through the Renewables Obligation, the cost of which is met by consumers and will reach up to £1 billion per annum by 2010 (the equivalent of a 5.7 per cent increase in the price of electricity).

6 Against this backdrop of large-scale public investment in renewable technologies this report examines:

- the Department's achievements to date in supporting renewable energy and its progress against targets (Part 1);
- key factors which will determine the future growth of renewable energy (Part 2); and
- the cost to the consumer and taxpayer of supporting renewable energy (Part 3).

Our methodology is explained in Appendix 1. We employed economic consultants, Oxera, to conduct a critical review of the Department's policies for providing financial support, and to estimate future levels of renewable generation.

Increasing renewable generation

7 Support for renewable generation has a considerable history. During the 1990s, a Non-Fossil Fuel Obligation set targets for the level of electricity generated from renewable sources. Under this scheme renewable generating companies bid for competitively let, long-term contracts, to provide electricity at premium rates. The scheme had mixed success. It was partly responsible for reducing the cost of renewable generation, but a number of contractors experienced planning, technical and commercial problems in developing sites, and generating capacity remains 25 per cent short of the policy's target of 1,500 megawatts.

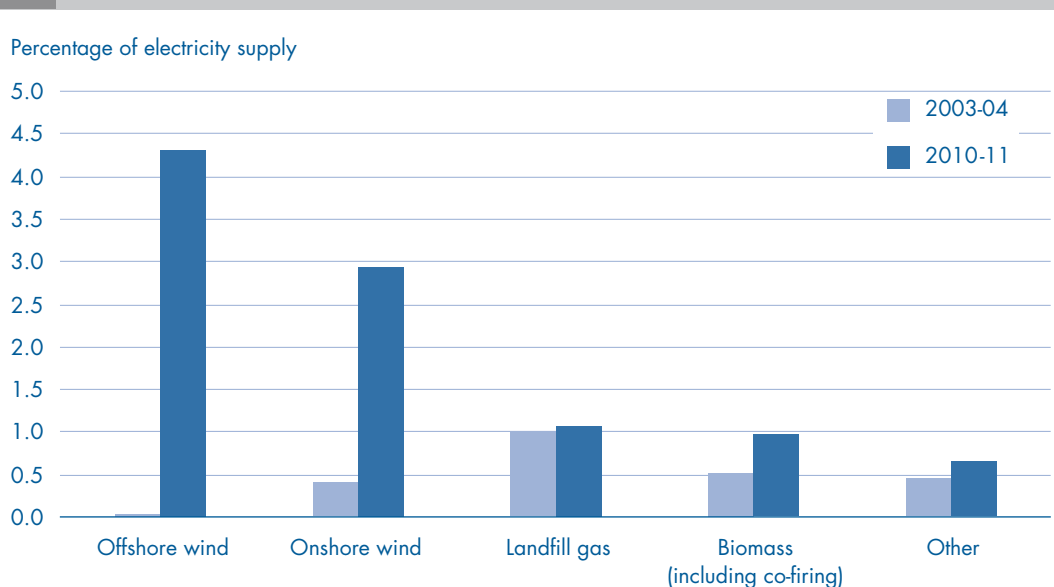
8 In 2003-04, the second year of the Renewables Obligation, eligible renewables accounted for 2.4 per cent of Great Britain's electricity generation, significantly lower than the Obligation level of 4.3 per cent. A recent House of Lords Science and Technology Select Committee¹ report concluded that the Department was likely to achieve not more than 7.5 per cent by 2010, in comparison with its target of 10 per cent. In January 2005, our consultants, using a similar model to that underlying some of the evidence submitted by the Department to that Committee, but with updated assumptions on the potential barriers to progress, have estimated 9.9 per cent for 2010, very close to the target. **Figure 1** gives the expected breakdown of generation levels by renewable technology. The difference between estimates is mainly due to recent increases in wholesale electricity prices. Our consultants' sensitivity analysis of this estimate shows that, by 2010, more favourable conditions for renewables produces barely any more generation than their central estimate, but their less favourable scenario, based on lower than expected wholesale electricity prices and higher technology unit costs, yields just 7.5 per cent for renewables generation - below target.

Key factors for future success

9 Achieving the 10 per cent target will require a step-change in the level of renewable generation and depends upon five key factors. The Department has been active in addressing these factors, but the situation is complicated, and an ineffective or delayed response to any given factor could jeopardise target achievement.

10 The planning system can pose difficulties for renewables developers: Variation in the planning system across the United Kingdom has meant significant differences in the duration and success rate of planning applications within England, and between England, Scotland and Wales. In 2001, the Scottish Executive issued revised guidance which has contributed to a large increase in onshore wind developments. The Office of the Deputy Prime Minister has now issued similar guidance for England, requiring local planning authorities to give due consideration to regional and national renewable energy targets when assessing planning applications. It is too early to assess the likely impact of the revised guidance in England, where the physical and social context is different from that of Scotland. The Welsh Assembly Government is also in the process of issuing revised planning guidance on renewables, which it hopes to finalise in summer 2005.²

1 Eligible generation under the Renewables Obligation in 2003-04 and estimated levels in 2010-11 for Great Britain



NOTE

Co-firing is where coal and biomass are mixed for combustion in existing coal-fired power stations. 'Other' category includes smallscale hydroelectricity, sewage gas and marine renewables.

Source: Oxera; Ofgem

¹ 'Renewable Energy: Practicalities' 4th Report of Session 2003-04.

² 'Technical Advice Note 8: Renewable Energy' was issued for consultation in July 2004 (Welsh Assembly Government).

11 Timely reinforcement of the grid network is required:

Electricity is transmitted long distances in Great Britain via the transmission network, and is supplied to users through local distribution networks. Future renewable energy projects will connect to these networks, often in new places, affecting the flow of electricity across the system. This will require parts of the networks to be upgraded. For the transmission network this could cost between £1.1 billion and £1.3 billion by 2010, although there is continuing uncertainty as to exactly how much network reinforcement will be necessary to meet the 10 per cent target. The costs of network enhancement are initially met by the owners of the transmission networks, who pass these on to generators and suppliers through use-of-system charges. The network owners have identified a number of specific enhancements to the transmission network likely to be required to accommodate significant additional wind capacity. These have been put forward to Ofgem, which has so far approved proposals for £560 million of funding for the first stage of this work. Similarly, for the distribution networks, the Department and Ofgem are seeking to put in place the incentives to ensure the necessary upgrades are made.

12 The wholesale electricity market is a determinant of investor confidence:

The market value of electricity is an important determinant of the economic viability of many renewable technologies. Changes to the arrangements for trading electricity in 2001 contributed to a fall in wholesale electricity prices which reduced the confidence of investors in the renewable sector at the time. However, wholesale electricity prices have risen recently and are likely to remain high by historical standards for the next few years, driven by factors including higher fuel costs for coal and gas, and the effective introduction of carbon dioxide pricing through the new European Union Emissions Trading Scheme. Although the Renewables Obligation does not provide the guaranteed long-term prices enjoyed under the Non-Fossil Fuel Obligation, higher wholesale electricity prices give some measure of comfort to developers.

13 The stability of Government renewable energy policy is important to encourage investment:

Rapid growth in renewable energy generation depends upon having a policy framework which provides a stable environment for investment, secures returns on investments, and has clear long-term goals. The Department has sought to achieve stability through the Renewables Obligation. Initially the Department set increasing annual Obligation levels up to 10.4 per cent by March 2011. In response to concerns from the renewables industry the Department proposed, in December 2003, extending Obligation levels up to 15.4 per cent by 2015-16. This proposal, which is due to come into force in April 2005, has provided investors

with more long-term confidence of future revenues and increased the likelihood that the 2010 target will be met.

14 The renewables industry, however, has continuing concerns about the operation of some aspects of the Renewables Obligation. One issue on which there are mixed views is the eligibility of co-firing for Certificates. This is where coal and biomass are mixed for combustion in existing coal-fired power stations. So as to encourage the development of energy crops, the eligibility of co-firing within the Renewables Obligation has been extended from 2011 to 2016. Analysis conducted by our consultants suggests that co-firing will not discourage the development of other non-bioenergy sources of renewable generation. However, there is a concern that some of the environmental benefits of co-firing may be lost because it increases the commercial life of coal-fired power stations, thus leading to greater burning of coal. Work conducted for the Department in 2003 suggested that this was not a material risk. However, our consultants estimate that an average of 21 per cent of the carbon dioxide savings from co-firing may be offset by higher coal burn.

15 The value of Renewables Obligation Certificates, and hence the income available from renewable generation, was reduced by the financial failure between 2002 and 2004 of three electricity supply companies who defaulted on their payments to the buy-out fund. Defaults totalled £23.6 million in 2002-03 and £9.2 million in 2003-04. Independent renewable generating companies are also concerned that larger electricity supply companies have limited interest in buying and selling Certificates because they are usually able to purchase them from the electricity generating arm of their business. The Department is addressing the first of these issues as part of its amendments to the Renewables Obligation, which will shortly be laid in Parliament with the aim of bringing them into force by 1 April 2005. It will consider the second as part of its current review of the Renewables Obligation.

16 Some technologies require additional support:

Some renewable technologies are not commercially viable under the Renewables Obligation alone. In response, the Department has provided capital grants to enable the bioenergy and offshore wind sectors to reduce their unit costs of generation. For bioenergy, the Department and the Lottery-supported New Opportunities Fund have allocated £55 million to 22 projects. To date, two projects are under construction and the programme is running a year behind schedule. Developers face various difficulties. For example, some have found it hard to sign long-term power purchase agreements with an electricity supplier for the electricity they propose to generate, at prices which would make the projects commercially viable.

17 The Department has seen greater success with its offshore wind scheme. It has allocated capital grants of £117 million to 12 projects, two of which are now fully operational. It expects the remaining projects to come online in the next three years, providing total capacity of over 1,000 megawatts, enough to supply more than 600,000 households. Much larger offshore wind farms in the future could provide up to seven times as much capacity. It is too early to say with confidence the extent to which experience from the first round of offshore wind farms will help reduce the costs of construction and operation. These, and other factors, will determine the case for support being provided to future offshore wind projects.

18 Success or otherwise in dealing with these five factors will help determine whether the Department meets the 10 per cent target for 2010. Meeting the Government's longer term aspirations for 2050 is likely to require further renewable technologies to become more commercially viable. The Department's New and Renewable Energy Programme (the Programme) has sought to encourage new technologies by funding research and development. £230 million has been spent since 1988. Throughout the 1990s, the Department's expenditure was lower than forecast, but a change in its long-term strategy in recent years has produced an increase in expenditure. Focus is now increasingly on supporting technologies, such as wave and tidal energy, which the Department considers have greater potential to succeed over a 10 to 20 year timescale.

19 The Department has clear procedures for monitoring the performance of individual projects supported by the Programme and recognises that a proper assessment of its long-term achievements needs to be conducted regularly and systematically. The most recent evaluation, which the Department commissioned in 2001, found that there were relatively few examples of the Programme's high risk projects - which focus on developing core technology or equipment - providing outputs which were subsequently used commercially by renewable generators. The Programme's non-technology work to address barriers to the uptake of renewable energy, such as planning and finance, had been more successful in assisting developers.

20 In 2004, the Department subsumed the Programme into its wider corporate Technology Programme, for which it has secured additional funding over the next three years. The Technology Programme aims to maximise value for money by focusing Departmental support on those areas where the case for it is strongest. Increasingly, the renewables sector will now have to compete with other technologies for this increased funding, and demonstrate success from the support it receives. For the period

2005-06 to 2007-08 the Department has recently agreed an indicative allocation of at least £20 million per annum of Technology Programme funding to support research and development into renewables and low carbon technologies, subject to high quality proposals coming forward and the ability of the sectors to demonstrate success from the support received.

21 Historically, the Department provided the large majority of Government funding for research into renewable energy. In recent years, however, a wider range of public bodies have started to support the renewables industry. This has increased the opportunities for companies to obtain funding, provided they develop an understanding of the range of support schemes operating at a regional, national and European level.

The cost of supporting renewable energy

22 One of the goals of the Government's energy policy is to put the United Kingdom on a path towards a reduction in carbon dioxide emissions of some 60 per cent from current levels by about 2050. Given the scale of the desired reduction, it has implemented a variety of policy tools of which the promotion of renewable energy through the Renewables Obligation is only one. By 2010, public support for the renewables sector will cost consumers and taxpayers over £1 billion a year – the bulk of this accounted for by the Renewables Obligation. As a means of reducing carbon dioxide emissions, the Obligation is several times more expensive than other measures currently being implemented by Government. However, the Government sees renewables as a necessary part of its Climate Change Programme. This is because there are limits to which some other approaches, such as energy efficiency, can contribute to the required long-term reduction in carbon dioxide emissions. The Department chose the Obligation to meet its target to supply 10 per cent of electricity from renewable sources by 2010. It is unlikely that a policy tool focused directly on reducing emissions across all sectors of the economy, such as a carbon dioxide tax, would have yielded the same level of renewable generation in this time. In addition, the Obligation has other aims, including assisting with the security of the United Kingdom's electricity supply and creating economic opportunities for domestic companies, although the Department views them as subsidiary to the Obligation's main objective of reducing carbon dioxide emissions. The Department also expects that the Obligation will result in innovation which will reduce the unit costs of renewable technologies in the future.

23 In designing the Renewables Obligation and the capital grants schemes the Department sought to strike a balance between the environmental benefits of increased renewable generation and controlling the costs to the taxpayer and consumer by, for example, excluding largescale hydroelectric power stations from the Obligation. Costs to the consumer are driven by the level of the buy-out price and the size of the annual Obligations placed on suppliers. In July 2000, the Department was planning to set a buy-out price of £20 per megawatt hour for the first year of the Obligation and provide capital grants totalling £200 million to the pre-commercial technologies offshore wind and bioenergy. The Department subsequently found that the amount of capital grants it could provide each new project had to be reduced due to European Union regulations and a lower than anticipated budget of around £80 million. Owing to the reductions in capital grant funding, offshore wind and bioenergy projects required increased revenue support to be viable.

24 During August 2000, the Department examined the impact on each of the major renewable technologies of changing the buy-out price and consequently it made a number of changes to the Renewables Obligation. It decided that, in addition to largescale hydroelectric power, another low-cost technology, energy from incinerating mixed waste, should be excluded from the Obligation. Some waste projects were considered to have the potential to be commercially viable without support from the Renewables Obligation, and the Government was concerned that supporting the incineration of mixed waste might inhibit efforts to encourage greater recycling.

25 Both the reduction in capital funding and the exclusion of energy from waste had, however, made the 2010 target more difficult to achieve as they discouraged the development of some higher cost projects. The Department therefore raised the buy-out price to £30 per megawatt hour to increase incentives for those technologies remaining in the Renewables Obligation. The higher buy-out price increases the amount electricity suppliers are willing to pay renewable generators, thus increasing the incentives to build new capacity and ultimately increasing the level of renewable generation. The higher buy-out price was seen as particularly important for encouraging the development of pre-commercial technologies, such as offshore wind and bioenergy, given the lower levels of capital grants available. In 2000, the Department estimated that the net effect of these changes to the Renewables Obligation would be to increase the cost to consumers by around £150 million per annum by 2010.

26 In 2001, the Department decided to include live Non-Fossil Fuel Obligation sites in the Renewables Obligation. This more than doubled the supply of Renewables Obligation Certificates in 2002-03 and thus significantly aided the introduction of the Renewables Obligation by helping to create a market for Certificates. Alternative approaches available to the Department would not have provided the same momentum to the introduction of the Obligation and could have jeopardised progress against the 2010 target. However, the inclusion of these sites has increased the cost to electricity consumers, but has benefited the Exchequer by equal measure. The size of this transfer is likely to be in the range of £550 million to £1 billion over the period to 2010. The additional payments made by consumers are held in a fund administered by Ofgem. Through the Sustainable Energy Act 2003 the Government has earmarked £60 million of this fund to promote the use of renewable energy. The remainder is likely to be paid into the Consolidated Fund.

27 The Department's planned review of the Renewables Obligation in 2005 is a good starting point for managing the on-going cost effectiveness of the scheme. The Department has announced the review will consider amongst other issues 'the transition to market of renewable technologies over time, either from the impact of carbon dioxide pricing, falls in technology costs or other factors'. Our consultants' analysis shows that most renewable technologies continue to need public support to be commercially viable, but the level of support provided by the Renewables Obligation is greater than necessary to ensure that most new onshore wind farms and large landfill gas projects are developed. Our consultants estimate that, if the Renewables Obligation and other policies remain unchanged until 2026-27, around a third of the total public support provided could be in excess of that needed by generators to meet the higher costs of renewable generation. Competition in the electricity supply industry, however, may lead to some of this excess being competed away and passed back to consumers.

28 The Department has assured industry that if the 2005 review were to result in less support being provided for some technologies, the entitlement to Renewables Obligation Certificates of currently operating projects, and those actively under development, would be protected. To maintain business confidence in the Renewables Obligation the Department has also excluded certain issues from the review which affect the cost of the scheme to consumers. In particular, it will not consider reducing the buy-out price or the level of annual Obligations placed on suppliers.³

³ The Department explained that changes might be made to the level of annual Obligations but only where necessary to compensate for any changes to the Renewables Obligation eligibility rules for energy from waste and combined heat and power.



CONCLUSIONS AND RECOMMENDATIONS

The Department of Trade and Industry (The Department) has put in place a number of measures clearly aimed at achieving the Government's target that 10 per cent of electricity supplied by 2010 should come from renewable sources. The Renewables Obligation is an innovative mechanism which provides support to companies generating renewable energy. The Department has worked hard to provide a package of measures designed to provide a level of financial support to renewable energy technologies at different stages of development and commercial viability. The United Kingdom is recognised as a country which provides strong support for renewables – a recent assessment by Ernst & Young rated the United Kingdom's renewable energy market as one of the two most attractive in the world.⁴ The following conclusions and recommendations are designed to help the Department to meet the 10 per cent target while minimising costs to the taxpayer and consumer.

1 The Department has responded quickly to emerging problems threatening the achievement of its 2010 target. It has recently developed a formal project plan, bringing together the various elements of its on-going programme of work. The ability to establish a 'critical path' for the project, and monitor key milestones, is crucial in an area where the lead times for action on matters involving the electricity grid network or planning changes are measured in years, rather than months.

2 The Department has commissioned major reviews on the progress of, and prospects for, its renewable energy programme. It has set out work plans to deal with barriers to progress which it monitors monthly; and it collects a range of data on, for example, the level of renewable

generation and the scale and success rate of planning applications for new generating plant. These elements provide a good basis for monitoring progress. They could be refined by defining a balanced scorecard of key indicators and critical milestones, clear expectations of the trajectories for these indicators, and a suitable strategic monitoring schedule, so that the significance of the information can more readily be assessed.

3 Indicators of value for money should form part of the scorecard. The Renewables Obligation represents an expensive means by which to reduce carbon dioxide emissions – at least over the short and medium terms. The Department therefore needs to keep a firm grip of the Obligation's cost relative to other instruments for reducing carbon dioxide by regularly monitoring indicators such as cost per tonne of carbon dioxide saved, as well as tracking indicators of the Obligation's contribution to longer term goals, which could include reductions in the unit generation costs of renewable technologies.

4 Under the Department's new corporate approach to funding research and development, renewables now have to compete with other new and emerging technologies for the increased funding the Department has secured. To ensure that the renewables sector is well placed to compete under these new arrangements, the Department needs better evidence of achievements from previous research and development grants, and improved processes for learning and disseminating the lessons from that experience.

⁴ Renewable Energy Country Attractiveness Indices (December 2004) Ernst & Young



5 Many public bodies now support renewables research, development and demonstration projects. This situation is potentially confusing for those seeking funding. The Department should ensure that it maintains an overview of renewables support, and that the remits and activities of public bodies are clear to those seeking support.

6 One of the aims of support is to develop technologies, and the industry as a whole, so that they make a growing, sustainable and competitive contribution to energy supply. To achieve this, the Department has put in place a range of support mechanisms, such as the Renewables Obligation and capital grants programmes, to help technologies at different stages of development. The Department should set out, for the renewables industry, the criteria that it uses to judge when to move technologies from research, through development and demonstration to assisted large-scale operation and, hopefully, commercial operation. This would provide companies with a clear view of the nature and, where possible, an indication of the level of public support they might expect over time.

7 The Department needs to pay special attention to the potential move from support under the Renewables Obligation to fully commercial operation. This is the area where estimates of excess support are highest. Any significant changes in support can affect market confidence, and hence financial backing for the development of renewables in the round. To balance the interests of taxpayers and consumers with those of the renewables industry, the Department should establish the criteria for reducing or withdrawing support. The 2005 Renewables Obligation review is an opportunity to do this. Factors it will need to consider include:

- the need for a lead time for changes which reflect the long life-cycles and payback periods in a capital intensive industry;
- the need to define 'fully commercial' – by technology, by reference to a standard, average or 'good practice' efficiency, and by age of project;
- the case for a period of tapered support, to ease the transition; and
- the impact of other initiatives, such as the European Union Emissions Trading Scheme and the Climate Change Levy, which affect the relative competitiveness of renewable generation against other electricity sources.

8 The Department decided not to consider the buy-out price and the level of annual Obligations placed on suppliers in the 2005 review. If it is to ensure that the Renewables Obligation will achieve its objectives in the long-run then the Department will need, in future reviews, to take account of all the factors that influence the cost of the scheme to consumers. In so doing, it will need to consider both the interests of consumers and the importance of maintaining investor confidence.

9 By 2010, the Government is likely to have had access to an accumulated surplus in the range of £550 million to £1 billion, resulting from the inclusion of Non-Fossil Fuel Obligation contracts in the Renewables Obligation. As this surplus will arise from charges levied on the electricity customer, the Department and HM Treasury should explain to Parliament the origin of these funds and how they will be treated.