



## CHAPTER 8

# Meeting Our Goals

## Making progress towards our Energy White Paper goals

8.1 In this report we underline the scale of the challenges we face in making further progress towards our Energy White Paper goals. We will need to take action across all fronts if we are to address these problems. Government policy needs to deliver the right incentives for individuals, businesses and energy suppliers to respond to these challenges in their day-to-day activities.

### Impact on carbon emissions

8.2 The proposals in this report, together with other proposals announced since publication of the new Climate Change Programme in March this year, will save 19.5 – 25.3 million tonnes of carbon (MtC) by 2020.

8.3 The table below sets out the carbon impact of each measure; a range is quoted to reflect uncertainty over the timing and effectiveness of the new policies.

**TABLE 8.1: CARBON IMPACT OF GOVERNMENT MEASURES ANNOUNCED SINCE THE 2006 CLIMATE CHANGE PROGRAMME REVIEW (EXCEPT WHERE DENOTED†)**

	MtC abated in 2020
Better Billing	0 – 0.1
Changes to the Renewables Obligation <sup>1</sup>	0.7 – 1.5
EU Emissions Trading Scheme <sup>2</sup>	8
More energy efficient products <sup>3</sup>	2
Nuclear new build <sup>4</sup>	0 – 1.1
Renewable Transport Fuel Obligation	0.3 – 1.1
New measure for achieving carbon savings from large non-energy intensive organisations	1.2
Successor to EU voluntary agreements on new car fuel efficiency <sup>5</sup>	1.8 – 2.1
Continued commitment on energy suppliers to 2020 <sup>6</sup>	3.0 – 4.0
†Continuation of building regulations 2005 <sup>7</sup>	2.5 – 3.0
Carbon neutral government <sup>8</sup>	0 – 0.8
Carbon neutral developments <sup>9</sup>	0 – 0.4
<b>Total</b>	<b>19.5 – 25.3</b>

#### Notes

1 These carbon savings are additional to those from the existing Renewables Obligation and derive solely from the proposed changes to the Obligation

2 This value is based on the proposed reduction in carbon allocation in phase II of the EU ETS.

3 Products policy is delivered by a package of measures, including, labeling, minimum standards and voluntary agreements. This 2MtC saving is net of products delivered via EEC or the new measure for achieving carbon savings from large non-energy intensive organisations.

4 The scale of new nuclear capacity and the timing of its commissioning will depend on commercial investment decisions. For illustrative purposes this table assumes that between 0 and 1.6 gigawatts of new capacity are in operation by 2020.

5 These estimates assume that the level of the

Renewable Transport Fuel Obligation rises to 10% by 2015. This figure is used merely for illustrative purposes and does not prejudice later UK decisions on the appropriate future level of the obligation.

6 Government is committed to maintaining a household obligation on suppliers in some form until at least 2020. The level of ambition from 2011 should at least be equal to that under EEC3, delivering 3-4 MtC by 2020.

7 The figures here are for contributions from Building Regulations for 2010-2020 and have not been included in our base line assumptions. The figures reflect the additional savings from new buildings, refurbishments and boiler and window replacements between 2011-2020 due to Building Regulations.

8 Policy was announced by Defra in June 2006.

9 Policy was announced by DCLG in May 2006.

8.4 There are further measures which could save significant amounts of carbon. First, it is already a UK objective to include aviation in the EU ETS<sup>90</sup>. Second, the UK has asked the European Commission to seriously consider including surface transport in the EU Emissions Trading Scheme. This could save 4-7 MtC by 2020. Carbon capture and storage (CCS) could in principle bring further savings. If a 500MW demonstration project of coal plant with CCS went ahead, this could save 0.3 MtC in 2020. We are also working to remove regulatory and other barriers to CCS, and if CCS ultimately proved commercially viable, very significant carbon savings might become possible beyond 2020. Beyond 2020, if further nuclear power stations are built, we could save around 0.7 MtC for each GW of capacity installed<sup>91</sup>.

8.5 There are a number of other factors which will affect the progress we make in achieving carbon savings over the next two decades:

- fossil fuel and carbon prices as well as attitudes to climate change that could have a significant impact on emissions. High fossil fuel prices could result in reduced energy consumption; high carbon prices could incentivise a faster rate of low carbon technology development; and consumer demand could stimulate the market for environmentally friendly goods and services;
- the potential for life extensions for existing nuclear plants, early applications of carbon capture and storage or a higher penetration of distributed generation technologies; and
- clarifying our carbon framework and our position on renewables and nuclear to improve the investment environment, and helping to build investor confidence in taking long term decisions which are consistent with our goals.

8.6 In the 2003 Energy White Paper, projections showed UK carbon emissions reaching 135 MtC in 2020. We said that in order to demonstrate our leadership in tackling climate change and make real progress towards our 2050 carbon reduction goal we would need to make a reduction in emissions by 15 – 25 MtC to 110 – 120 MtC by 2020.

8.7 However, since 2003, emissions have risen on the back of strong economic growth and higher fossil fuel prices that have been favourable to coal-fired power generation. New projections<sup>92</sup> suggest that UK carbon emissions will reach 146 MtC by 2020 on the basis of current policies. So we would now need to make bigger cuts in emissions of around 25 – 35MtC in order to reduce emissions to 110 – 120 MtC by 2020.

8.8 Table 1 above shows the impact of the proposals in this report, including those announced since the 2006 Climate Change Programme Review, as a reduction of up to 25 MtC in 2020. Together with further potential reductions referred to in paragraph 8.4, these ambitious proposals are a significant step in the right direction, getting us on course to achieve real progress in emissions reductions by 2020 and on the right path to achieving our goal of cutting the UK's CO<sub>2</sub> emissions by some 60% by about 2050. In this report the Government provides a framework for long-term policy; it is not the last step. We will develop and implement further measures in the years ahead and strengthen the use of policy measures already in place. Tackling climate change requires action across

90 This would produce carbon savings within the context of the EU scheme. Exactly how much of this would be attributable to the UK would depend on how international aviation emissions are allocated to national inventories under any future international agreement.

91 Assumes 1GW of CCGT capacity is displaced.

92 See annex C.



all departments, achieving carbon reductions through different technologies and across all sectors of the economy towards our 2050 goal.

8.9 The Government is committed to keeping under review progress towards our climate change goals and reporting on this annually to Parliament.

8.10 To drive forward progress, we are proposing to establish an Office of Climate Change. This will be a shared resource, reporting to ministers across Government. The Office will have a vital contribution to make ensuring that the analysis and policy work going on across Government is coherent and supports our overall strategy.

8.11 In the 2006 Climate Change Programme Review we said that the idea of carbon budgets would be considered by the Stern review of the economics of climate change, and that this analysis would influence our work. The Stern Review has carried out an initial assessment of carbon budgeting. And we shall continue to study the merits of carbon budgeting as a means of helping to deliver our goals.

## Impact on security of supply

### Framework for electricity generation

8.12 There has been much focus in this report on removing barriers to investment in low carbon technologies. We are also reinforcing our commitment to a carbon price, taking steps to enable nuclear new build and boost renewables. These measures should increase the proportion of low carbon technologies in the electricity generation mix and tend to reduce the share of gas-fired generation.

8.13 If we assume that our proposals to incentivise low carbon electricity generation will lead to the displacement of gas fired power generation, they would reduce the share of gas in our generation mix by up to 10% and reduce gas consumption in 2020 by up to 5 billion cubic meters (bcm) per year. This would be part of the overall savings in gas consumption referred to below.

### Gas security of supply

8.14 We have identified increasing reliance on gas (at a time of falling UK Continental Shelf (UKCS) production) as one of the main energy policy challenges faced by the UK. It will be for producers and consumers to decide how much gas is consumed in the UK. However, assessing the impact of proposals in terms of reduced gas consumption is one way of measuring their impact on security of supply.

8.15 The proposals in this report could reduce gas consumption by around 12 to 20 bcm by 2020, which currently represents about 11–17% of our expected 2020 consumption.

8.16 Our proposals also improve the framework for investment in the UK Continental Shelf (UKCS), potentially delivering significantly higher oil and gas production – up to an extra 1 million barrels of oil equivalent (boe) a day in 2020 – and reducing our import requirement. About half of this extra production would be gas and half would be oil. The resulting cut in gas imports would be over and above the reduction explained in the previous paragraph.

8.17 Moreover, we are consulting on the effectiveness of our current framework for gas security of supply to assess whether it is sufficiently robust to cover the risks associated with the move to increased UK gas import dependence.

## Impact on competitive markets

8.18 In recognition of our increasing reliance on global energy markets, we are pursuing a strong international agenda to promote more open and competitive markets. And we will continue our drive for EU energy market liberalisation and integration, working with the European Commission to enforce and strengthen internal market legislation and to make full use of European competition rules to tackle anti-competitive practices. This will help improve the effectiveness and transparency of international energy markets and address anti-competitive behaviour in Europe, ensuring more reliable UK access to energy markets.

8.19 At home, our proposals demonstrate our continued commitment to competitive energy markets; in clarifying our position on nuclear new build, renewables and our carbon framework we are reducing uncertainty, improving the environment for investors. We are also improving the information available for investors, users of energy and government so that both investment and policy decisions are based on the most robust available information.

## Impact on fuel poverty

8.20 Rising fuel prices mean that fuel poverty remains a major long-term challenge. But our package of measures does not greatly add to this challenge. We can and will take steps to better target existing support: by getting details of the help that is available to those who need it most; ensuring energy is competitively priced; and enhancing energy efficiency.

## Impact on energy prices

8.21 Carbon abatement can be costly and can increase energy prices. Acting internationally is the best way to minimise these impacts. The existence of the EU ETS is having an impact on electricity prices in the UK – and elsewhere – because electricity generators will factor in the cost of carbon allowances. The size of this impact depends on the scale of effort to deliver carbon savings across the EU and the related abatement costs. At the current EU ETS carbon price of around €15, the impact on electricity prices could reach around 20% for industrial and 10% for household consumers. The overall effect will also depend upon the response of energy demand.

8.22 We have taken cost effectiveness into account in developing policies to reduce carbon and improve security of supply, and have examined how to reduce barriers to current policies to deliver greater carbon savings at little or no extra cost. We therefore expect the impact on energy bills to be small. We will undertake a full analysis of the impact of our proposals in the forthcoming White Paper.

8.23 Recent analysis has identified that in the medium term, the costs of mitigating climate change are likely to be of the order of 1% of global GDP,



with some studies pointing to ancillary benefits from improved efficiency and more innovation, so that the cost may eventually be much less than this<sup>93</sup>.

## Developing the right long-term framework for delivering our goals

8.24 Over the long term we must continue to make progress in reducing carbon emissions on a path consistent with our 2050 goal. We will also need to adjust to the global depletion of fossil fuels. The actions we need to take to address these long term challenges are closely linked.

8.25 There is a range of paths consistent with delivering secure affordable supplies, consistent with our carbon goal for the long term. Factors which shape these are:

- **The actions of others** – our 2050 carbon goal is couched in terms of a contribution to international action to deliver the carbon savings required to make a real impact on climate change. Commitment by others is vital for tackling the global problem of carbon dioxide emissions and climate change; if we act alone we risk undermining the competitiveness of our economy. The speed with which we move to a low carbon economy will also be determined by the actions of energy supplier countries to extract reserves in a timely and efficient manner affecting the availability and price of fossil fuels.
- **Market developments** (e.g. fossil fuel prices) – have encouraged coal use in electricity generation but could in the longer-term result in reduced energy consumption; high carbon prices could incentivise faster development of non-fossil fuel, low carbon technologies.
- **Technological developments** – given the potential for technological development over the longer term to help us deliver our goals at a lower cost than today, we have always been mindful that a straight-line path to our 2050 carbon goal may not be the most cost-effective path.

8.26 Many of the above are unknown. We need to take action now without locking ourselves into a position which risks proving inefficient in the light of future developments. Key to this is our commitment to keep under review progress towards our climate change goals so that our energy policy framework enables us to take full advantage of opportunities to make progress towards our goals e.g. through harnessing new technologies.

8.27 Government intervention may be necessary to help make markets take account of, and efficiently respond to, our energy policy goals. The use of economic instruments, such as taxes and trading schemes, to incentivise behaviour that protects or improves the environment, and to deter actions that are damaging to the environment, is one option to enable environmental goals to be achieved at the lowest cost and in the most efficient way. Over the past decade, Government has introduced a range of economic instruments in pursuit of environmental objectives, and we will continue to explore options for introducing new ones, taking account of all economic, social and environmental objectives.

<sup>93</sup> Work carried out for 'The Government's Review of the Economics of Climate Change – led by Sir Nick Stern and due to report Autumn 2006.

## Harnessing technology to deliver our goals

8.28 Advances in technology have the potential to make genuine step-changes to meeting our goals across the entire energy system: generation/production, transport/transmission, storage and use largely through increases in efficiency (demand reduction) or alternative (non carbon) energy sources.

8.29 The development of new energy technologies will be crucial in addressing these challenges at reasonable cost. Work carried out for the 2003 Energy White Paper estimated the costs of meeting the 60% carbon reduction goal to be two to three times higher where innovation failed to reduce the costs of new low carbon technologies below their expected levels in 2010. This analysis is in the process of being updated.

8.30 However, we do not know which technologies will be most effective in delivering our long-term energy goals as many are at an early stage of development and so their technical and commercial success is still uncertain. It is important, therefore, to ensure that a wide-range of new energy technologies is developed on a global scale.

8.31 Some of the areas where we hope to harness the potential of technology are:

- **improving the efficiency of the electricity system** – though reliable, the current electricity system is very inefficient both because the capacity of the system is rarely fully employed (only during periods of peak demand) and a large proportion of the heat generated by large power stations is wasted into the atmosphere;
- **low carbon transport systems** – based upon new and emerging technologies, principally hydrogen, advanced biofuels and hybrid technologies. These will require significant further development to realise their full potential for carbon savings. For example, fuel cell development will be necessary to maximise the use of hydrogen; and
- **nuclear fusion** – nuclear fusion offers the potential to provide a new major source of energy using basic fuels which are abundant and widely available (hydrogen/deuterium from water and lithium). A fusion power station would create no greenhouse gases during its operation and no long-lived radioactive waste. The goal of the international fusion research programme, starting with the construction of ITER – the experimental fusion reactor to be built in France – is the demonstration of full-scale power generation in a prototype power plant within 30-35 years.

8.32 The UK is already playing its part. Total government spend on R&D into renewable and low carbon energy will be over £500m between 2002 and 2008, delivered through the Research Councils and the Government's Technology Programme. The publicly funded, independent Carbon Trust also supports industry-led R&D. Also, for many technologies, the more expensive demonstration stage of innovation is a key barrier. DTI has a range of capital grant programmes totalling £300m which support promising technologies to move through this phase of development to commercial deployment.

8.33 Government also recognises the crucial role that market influence has on innovation and we are bringing forward proposals to restructure the Renewables Obligation to further encourage emerging energy technologies.



8.34 We recognise the international nature of these challenges and so we are emphasising greater international collaboration, through the European Union and the International Energy Agency as well as bilateral agreements, such as that with China on carbon capture and storage.

8.35 The private sector must also play a key role in the innovation process. Aspects of the Government's work targeted at strengthening the investment framework are important here if we are to move new energy technologies rapidly from the laboratory to the market.

8.36 In recognition of the importance of collaboration between the public and private sectors in technological advancement, we formed the Energy Research Partnership at the end of 2005. The Energy Research Partnership brings together high-level representatives from Government, industry and academia in the UK. It provides leadership for energy research and innovation, including improving understanding of what drives business investment in energy R&D.

8.37 In Budget 2006, we announced the intention to create a major new public-private funding initiative promoting energy R&D – the National Institute for Energy Technologies (NIET) (see box 8.1).

#### **BOX 8.1: THE NATIONAL INSTITUTE FOR ENERGY TECHNOLOGIES**

The National Institute for Energy Technologies will bring a new level of focus, ambition and industrial collaboration to the UK's work in the field of energy science and engineering, and will exploit the UK's potential to be a world-leader in energy technologies.

It will have a "design life" of a finite period, probably a decade. The Institute will work to objectives set in consultation with funders, including industry contributors, and it will have a strong public-private governance structure. We anticipate that the initial focus of the Institute will be on research and development, although it may develop a role in demonstration and deployment. The Institute is expected to operate with a "hub" with a high calibre Director and "spokes" through which the main research projects/activities are undertaken. Industry partners will be free to undertake joint projects on a voluntary basis using their own funds.

The Chancellor's announcement stated that the Institute might, in due course, have a budget of £100m p.a. The Energy Research Partnership, under the joint chairmanship of Paul Golby, Chief Executive of E.On UK and Sir David King, the Government's Chief Scientific Adviser, has committed itself to raising substantial sums of private investment. EDF Energy, Shell, BP and E.On have already announced their intention to be involved. We envisage that the Institute will hold funds in a single "core" pot from all funders. Funding will be allocated competitively, using existing facilities where possible.

We are working with the companies to develop the proposal and will shortly publish an outline prospectus for the Institute in order to seek broader views and to gauge wider interest.