

# Meeting Carbon Budgets – ensuring a low-carbon recovery

2nd Progress Report to Parliament  
Committee on Climate Change  
Executive Summary  
June 2010



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Committee on Climate Change  
Executive Summary  
June 2010

Presented to Parliament  
pursuant to section 36(1) of the  
Climate Change Act 2008

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# Foreword

This is our second annual report as required under the Climate Change Act. It follows only nine months after our first report to Parliament. From now on, however, our annual reports will be delivered at 12 monthly intervals in June each year.

In our first report, published last October, we showed that emissions fell only slightly in the five year period before the recession. We therefore argued that a step change in the pace of emissions reduction is required to achieve carbon budgets.

In this report, we consider latest trends in annual emissions relative to current budget limits, and we assess progress against our forward indicators which determine whether we are on track to meet future budgets.

The UK's greenhouse gas emissions fell 8.6% from 2008 to 2009 with reductions of 9.7% in CO<sub>2</sub> and 1.9% in non-CO<sub>2</sub> emissions. But the reduction was largely due to the recession and other exogenous factors, which we estimate could reduce emissions by up to 6% over the first budget period. Underlying progress, which we assess by looking at the impact of specific policy measures, was limited relative to that needed to put the UK on the path towards the 2050 target, implying that a step change in the pace of emissions reduction is still required.

We therefore reiterate our recommendation (set out in our first annual report) that outperformance in the first budget period should not be banked. We raise the issue of whether the second and third budgets should be tightened in the face of the easier short term challenge – for instance by moving to the Committee's "Intended budget" even in the absence of a new global agreement. And we recommend that new policies are introduced to strengthen incentives for energy efficiency improvement, investment in low-carbon power generation, development of an electric car market, and introduction of new practices in agriculture.

This report is the first of four this year. In July, we will publish our review of the approach to low-carbon R&D in the UK. In September we will publish our advice on the second phase cap for the Carbon Reduction Commitment Energy Efficiency Scheme. Our main report this year will be the advice on the fourth carbon budget. This will include assessment of recent developments in climate science, progress moving towards a new global agreement, and the UK path for emissions reductions in the period to 2030. We will publish our advice on the fourth carbon budget before the end of the year as required in the Climate Change Act.

The Committee and Secretariat have worked very hard in the last year to publish our first report to Parliament, our advice on the future of UK aviation, our advice to the Scottish government, and this report. On behalf of the Committee, I would like to thank the Secretariat for their dedication and professionalism.

# The Committee on Climate Change



## Lord Adair Turner, Chair

Lord Turner of Ecchinswell is the Chair of the Committee on Climate Change and Chair of the Financial Services Authority. He has previously been Chair at the Low Pay Commission, Chair at the Pension Commission, and Director-General of the Confederation of British Industry (CBI).



## David Kennedy, Chief Executive

David Kennedy is the Chief Executive of the Committee on Climate Change. Previously he worked on energy strategy at the World Bank, and the design of infrastructure investment projects at the European Bank for Reconstruction and Development. He has a PhD in economics from the London School of Economics.



## Dr Samuel Fankhauser

Dr Samuel Fankhauser is a Principal Research Fellow at the Grantham Research Institute on Climate Change at the London School of Economics. He is a former Deputy Chief Economist of the European Bank for Reconstruction and Development and former Managing Director (Strategic Advice) at IDEAcarbon.



## Professor Michael Grubb

Professor Michael Grubb is Chair of the international research network Climate Strategies. He is a senior research associate at Cambridge University and holds a visiting professorship at Imperial College. Previously he was Head of the Energy and Environmental Programme at Royal Institute of International Affairs, and Professor of Climate Change and Energy Policy at Imperial College.



## Sir Brian Hoskins

Professor Sir Brian Hoskins, CBE, FRS is the Director of the Grantham Institute for Climate Change at Imperial College and Professor of Meteorology at the University of Reading. He is a Royal Society Research Professor and is also a member of the National Science Academies of the USA and China.



## Professor Julia King

Professor Julia King CBE FREng is Vice-Chancellor of Aston University. She led the 'King Review' for HM Treasury in 2007/8 on decarbonising road transport. She was formerly Director of Advanced Engineering for the Rolls-Royce industrial businesses. Julia is one of the UK's Business Ambassadors, supporting UK companies and inward investment in low-carbon technologies.

**Lord John Krebs**

Professor Lord Krebs Kt FRS, is currently Principal of Jesus College Oxford. Previously, he held posts at the University of British Columbia, the University of Wales, and Oxford, where he was lecturer in Zoology, 1976-88, and Royal Society Research Professor, 1988-2005. From 1994-1999, he was Chief Executive of the Natural Environment Research Council and, from 2000-2005, Chairman of the Food Standards Agency. He is a member of the U.S. National Academy of Sciences. He is chairman of the House of Lords Science & Technology Select Committee.

**Lord Robert May**

Professor Lord May of Oxford, OM AC FRS holds a Professorship jointly at Oxford University and Imperial College. He is a Fellow of Merton College, Oxford. He was until recently President of The Royal Society, and before that Chief Scientific Adviser to the UK Government and Head of its Office of Science & Technology.

**Professor Jim Skea**

Professor Jim Skea is Research Director at UK Energy Research Centre (UKERC) having previously been Director of the Policy Studies Institute (PSI). He led the launch of the Low Carbon Vehicle Partnership and was Director of the Economic and Social Research Council's Global Environmental Change Programme.



# Acknowledgements

The Committee would like to thank:

**The team that prepared the analysis for the report.**

This was led by David Kennedy and Adrian Gault and included: Owen Bellamy, Russell Bishop, Ute Collier, Ben Combes, Kristofer Davies, Neil Golborne, Philip Hall, David Joffe, Alex Kazaglis, Swati Khare-Zodgekar, Anna Leatherdale, Eric Ling, Nina Meddings, Laura McNaught, Sarah Naghi, Akshay Paonaskar, Stephen Smith, Kavita Srinivasan, Jonathan Stern, Indra Thillainathan, Mike Thompson, Claire Thornhill, Emily Towers and Jo Wilson.

**A number of individuals who provided significant**

**support:** Luke Davison, Mario Deconti, Simon Green, Katherine Kinninmonth, Roger Lampert, Margaret Maier, Stella Matakidou, Stephen Oxley, Michele Pittini, David Wilson.

**A number of organisations** for their support, including Association of Electricity Producers, British Institute of Energy Economics, Carbon Trust, Commission for Integrated Transport, DECC, Defra, DfT, Energy Saving Trust, Environment Agency, Heating and Hotwater Industry Council, Market Transformation Programme, National Insulation Association, Northern Ireland Executive, Office for Nuclear Development, Office for Renewable Energy Deployment, Ofgem, RenewableUK, Rural Climate Change Forum, Scottish Government, Shell, Society of Motor Manufacturers and Traders, UK Business Council for Sustainable Energy, Welsh Assembly Government.

**A wide range of stakeholders** who engaged with us, attended our expert workshops, or met with the Committee bilaterally.

# Executive Summary

This is our second annual report to Parliament on progress reducing emissions and meeting carbon budgets as required under the Climate Change Act. It follows our first report to Parliament in October 2009, which under the Act was delayed slightly from our normal June reporting date. This allowed the Government to respond to our advice on the level of carbon budgets (December 2008), through legislating carbon budgets (May 2009) and publishing the Low Carbon Transition Plan (July 2009). In future, the Act requires that we report annually every June (i.e. our next progress report to Parliament will be in June 2011).

In our first report to Parliament we concluded:

- CO<sub>2</sub> emissions fell by only 0.6% annually in the period before the recession, relative to 2-3% annual cuts required in the period to 2020 to meet carbon budgets. Going forward, therefore, a step change in the pace of emissions reduction is needed – in line with emissions trajectories in DECC's Low Carbon Transition Plan.
- New approaches to energy efficiency improvement in buildings, decarbonisation of the power sector and reducing emissions from transport are necessary to deliver the step change.
- Emissions will fall as a result of the recession. However, this should not be regarded as evidence of the step change. Given the impacts of the recession, the aim should be to outperform budgets through implementation of measures, and not to bank outperformance through to the second budget.

We also set out indicators covering both measures and policy milestones to drive emissions reductions, and against which progress meeting carbon budgets could be assessed.

In this report, we do three things:

- We consider the latest emissions data and the extent to which emissions reductions have ensued as a result of the recession and other exogenous factors, or through implementation of measures.
- We consider progress against the indicators set out in our first report to Parliament.
- We present an updated analysis of emissions reduction opportunities in agriculture, and extend our indicator framework to cover this sector.

The main messages in the report reflect the fact that it is only nine months since our first report to Parliament, and we would therefore expect that there has been only limited progress towards the required step change:

- UK greenhouse gas emissions fell by 1.9% in 2008 and 8.6% in 2009, mainly due to the recession and other exogenous factors (e.g. fuel price rises).
- Implementation of measures together with the impacts of the recession should result in emissions lower than legislated for the first budget. Given the need for implementation of measures in preparation for the deeper emissions cuts required in future, the aim should be to outperform the first budget, and not to use this outperformance to reduce effort in the second budget.
- Our indicator framework envisaged limited progress on implementation of measures in 2009, based on modest ambitions in policies that were firm and funded in 2008. This is generally what has followed, for example with progress on loft and cavity wall insulation in line with our indicators. There has been outperformance against our indicator for new car efficiency, due largely to the impact of the recession and fossil fuel price increases in recent years, reinforced by policies (e.g. vehicle excise duty differentiation according to fuel efficiency).

- However, our indicator framework also builds in a step change in the pace of implementation across the range of measures (e.g. residential and non-residential energy efficiency improvement, renewable heat and electricity, and electric cars) moving towards the second budget period. There is no evidence of broad outperformance on implementation of measures in 2009, and therefore a step change is still required. In the absence of such a step change (i.e. based on the rate of implementation of measures in 2009) there would be a gap of around 35 Mt CO<sub>2</sub> relative to the (currently legislated) third Interim carbon budget, and 150 Mt CO<sub>2</sub> relative to the Intended third budget.

Progress has been made developing approaches to drive the step change, but new policies are required in order to reduce emissions in power, buildings, transport and agriculture sectors:

- **Strengthening incentives for investment in low-carbon power generation:** Three key areas where there is a need for strengthening incentives are reform of the electricity market arrangements, underpinning the carbon price, and demonstrating coal and gas carbon capture and storage (CCS) generation.
  - **Electricity market reform.** The Energy Market Assessment (EMA) concludes that current electricity market arrangements are unlikely to result in required electricity sector decarbonisation in the period to 2030. It is crucial now to proceed with energy market reform, to which the new Government is committed, considering in detail the range of options set out in the EMA, and to introduce a new system with appropriate incentives for investment in secure and low-carbon power generation.
  - **Carbon price floor.** The carbon price within the EU Emissions Trading Scheme (ETS), and future expected prices, remain low. For the interim period before new electricity market arrangements are introduced, and in the absence of EU-wide action, there is a strong case for introduction of a UK carbon price floor (i.e. minimum price, as proposed by the new Government). This should, together with the carbon price in the EU ETS, provide sufficient incentives for investment in low-carbon power generation.
- **CCS demonstration.** A new framework for CCS was announced in November 2009, but no demonstration plant has yet been chosen. Also since our October 2009 report, new analysis has suggested a significant potential role for gas CCS. It will be important to demonstrate CCS technology on both coal and gas generation. The Emissions Performance Standard proposed in the Coalition Agreement could, depending on detailed design, provide appropriate signals about the very limited role for conventional coal generation in the 2020s. A coherent approach to fossil fuel fired generation requires that the Government should also seriously consider an Emissions Performance Standard for conventional gas generation (e.g. to require that all new coal and gas plant beyond 2020 should have CCS fitted).
- **Developing new delivery mechanisms and incentives to improve energy efficiency of buildings:** The new Government's commitment to a National Energy Efficiency Programme, to be supported by early legislation and a 'Green Deal', requires detailed implementing arrangements. These include financing arrangements (the balance between 'Pay As You Save' and additional funding to support the implementation of more expensive measures and free energy efficiency measures for the fuel poor); how homeowners will be incentivised to participate (e.g. provision of energy audits, financial incentives, standards); the specific roles of local authorities, energy companies and other players; and standards for the private rented sector.
- **Encouraging a move to more carbon-efficient cars:** The recession has led to a change in car purchase behaviour towards more carbon-efficient models. Incentive mechanisms could be used to lock in this behaviour (e.g. further differentiation of VED on the basis of fuel-efficiency). In relation to electric cars, progress was made in 2009 through the Plugged in Places project. In order to develop this key technology for widespread roll-out in the 2020s, the Government should set ambitious targets for electric car penetration in the period to 2020, and commit to funding both the transitional cost premium of electric cars and the cost of a national battery charging network.

- **Introducing new policies for the agriculture sector.** Our new analysis of the agriculture sector suggests that there is significant scope for emissions reduction through a range of measures relating to soils and livestock, and through anaerobic digestion, with emissions reduction potential exceeding the target set out in the Low Carbon Transition Plan. We recommend a three pillar approach based on: improving the evidence base to better measure emissions and understand emissions reduction potential; serious consideration of the full range of policy options going beyond voluntary action; development of an indicator framework against which future progress reducing emissions can be assessed.

We also include in this report a high-level consideration of departmental carbon reduction delivery plans, as requested through our (Whitehall and Devolved Administrations) Sponsors Group. These plans are an important part of the framework for delivering carbon budgets. We recommend that they could be strengthened through the inclusion of trajectories for key measures against which progress can be assessed, and that they should include commitment to appropriate policies where these are currently absent.

We now provide a more detailed summary of these messages, with the complete underpinning analysis set out in the full report to Parliament<sup>1</sup>. We set out the summary in 6 sections:

1. Emission reductions during the recession
2. Step change still needed
3. Progress decarbonising the power sector
4. Progress reducing emissions from buildings and industry
5. Progress cutting surface transport emissions through low-carbon vehicles and alternatives to car travel
6. Opportunities for reducing emissions from agriculture

## 1. Emission reductions during the recession

### Key emissions drivers

The context for 2009 emissions includes falling GDP, rising fuel prices (other than in transport), and lower temperatures but less cold days:

- Overall GDP fell by 5%, and within this manufacturing output declined 10%.
- Residential and industrial fuel prices generally rose in 2009 – with residential gas prices up by 12% in real terms.
- Whilst average temperatures in December and January 2009 were lower than in the same months in 2008, overall 2009 had fewer days with temperatures below the heating threshold, with these two effects largely balancing in terms of energy demand.

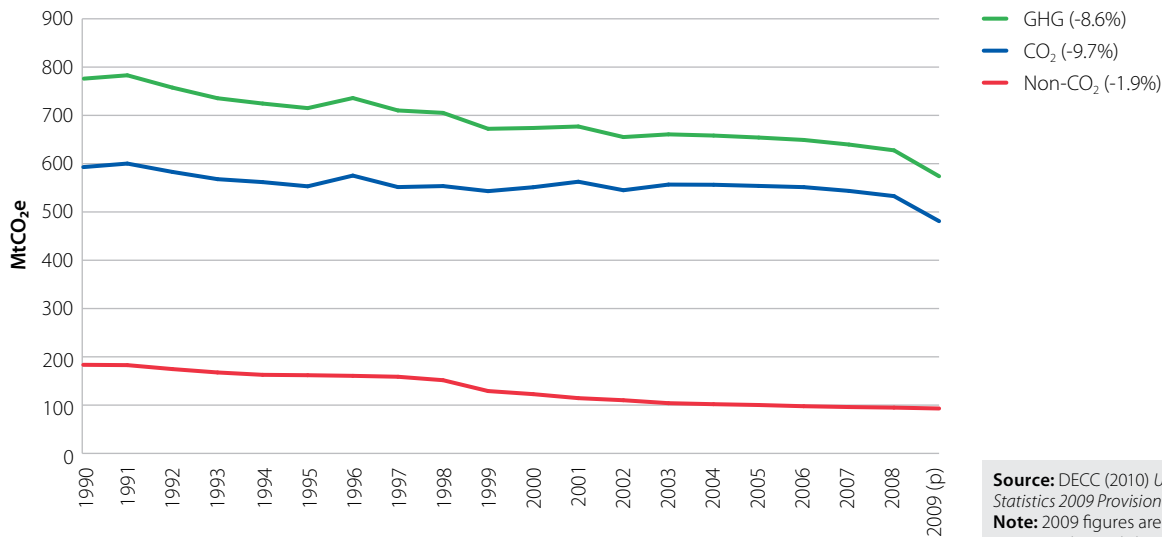
### Economy-wide emissions

Greenhouse gas emissions (GHGs) fell by 8.6% (provisional) in 2009, driven mainly by reductions in CO<sub>2</sub> emissions of 9.7%, with a smaller 1.9% reduction in non-CO<sub>2</sub> (Figure 1). Emissions fell in each of the main emitting sectors (Figure 2):

- Power sector CO<sub>2</sub> emissions fell by 13.1% in 2009.
- CO<sub>2</sub> emissions from buildings and industry fell by around 12% in 2009.
  - Direct emissions (i.e. from fuel burned) from the residential sector fell by 5%, while we estimate indirect emissions (i.e. from electricity used) fell 10%.
  - In the non-residential sector, we estimate that public sector direct emissions were flat and indirect emissions fell 7%. Commercial emissions fell an estimated 10% (direct) and 14% (indirect).
  - We estimate that direct industrial emissions fell by 18% while indirect emissions fell 19%.
- Transport emissions fell by 6.5% in 2009. Within this we estimate that CO<sub>2</sub> emissions from road transport fell by around 3.9% in 2009.
- Whilst sectoral GHG data for 2009 are not yet available, GHG emissions from agriculture fell by around 1% in 2008.

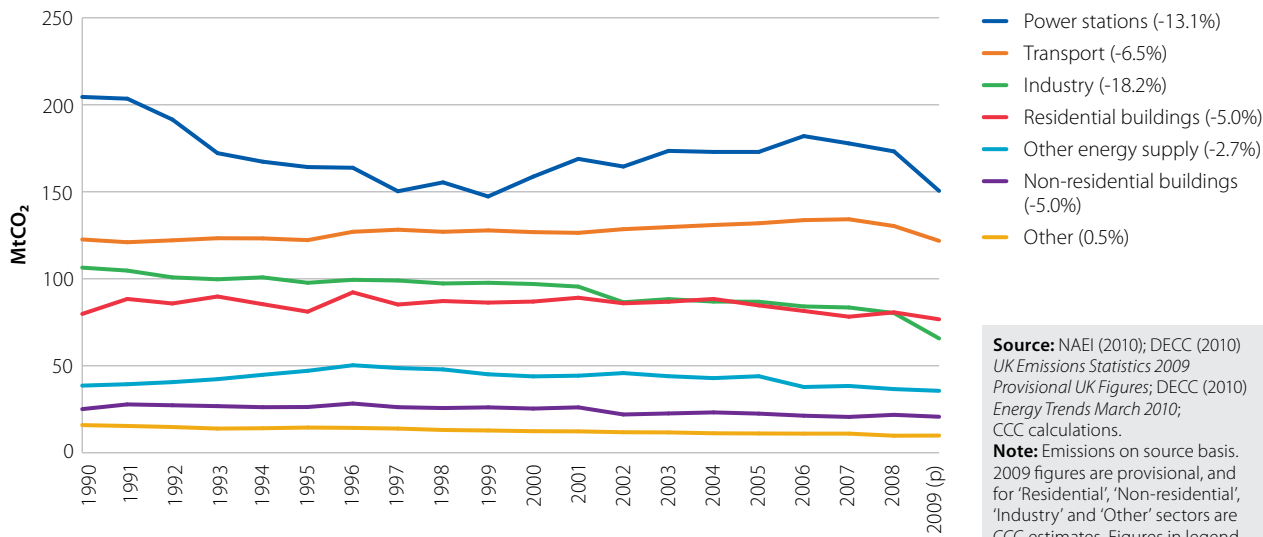
<sup>1</sup> Available at [www.theccc.org.uk](http://www.theccc.org.uk)

**Figure 1** UK greenhouse gas emissions (1990-2009)



**Source:** DECC (2010) *UK Emissions Statistics 2009 Provisional UK Figures*.  
**Note:** 2009 figures are provisional. Figures in legend show change in emissions in 2009.

**Figure 2** UK CO<sub>2</sub> emissions by sector (1990-2009)



**Source:** NAEI (2010); DECC (2010) *UK Emissions Statistics 2009 Provisional UK Figures*; DECC (2010) *Energy Trends March 2010*; CCC calculations.  
**Note:** Emissions on source basis. 2009 figures are provisional, and for 'Residential', 'Non-residential', 'Industry' and 'Other' sectors are CCC estimates. Figures in legend show change in emissions in 2009.

**Non-traded sector emissions**

In our 2009 progress report to Parliament, we projected that non-traded sector emissions (from heating, transport, agriculture, etc.) would fall significantly as a result of the recession. This would make the first carbon budget achievable with less emissions reduction effort than was envisaged at the time that it was set (i.e. the budget did not build in expected impacts of the recession).

However, we argued that it is important that measures to reduce emissions are implemented in the first budget period in order to prepare for meeting subsequent budgets. Therefore we argued that the aim should be to outperform the first budget (i.e. the combination of emissions reductions through the recession and implementation of measures would go beyond what is required to meet the budget), and not to bank (i.e. carry forward and credit, as allowed under the Climate Change Act) outperformance through to the second budget.

In our 2009 report, we projected emissions reductions due to the recession and other exogenous factors of around 3-6% across the first budget:

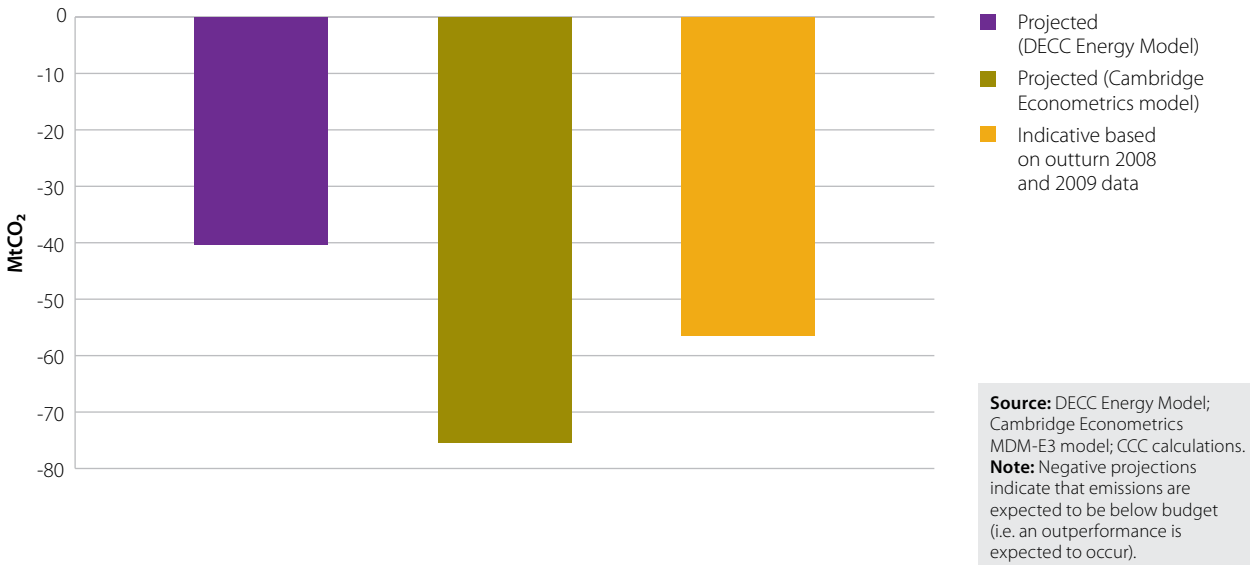
- Projections from the DECC Energy Model suggested impacts of around 3%.

- Projections from the Cambridge Econometrics model, which assumes more income responsive energy demand, suggested impacts of around 6%.

Actual emissions data for 2008 and 2009 now confirms a strong reduction, with our new analysis suggesting that emissions will be around 4% lower than we originally envisaged for the first budget period (i.e. within the range of the DECC and Cambridge Econometrics projections, Figure 3).

We have considered the possibility that reduced emissions in 2008 and 2009 are due to implementation of measures, rather than the recession and other exogenous factors. However, our analysis suggests that implementation of measures can only account for a small part of the total emissions reduction (Table 1). Therefore we continue to recommend that the aim, through the combination of recession impacts and implementation of measures required in the remainder of the first budget, should be to outperform the first budget (e.g. by up to 75 MtCO<sub>2</sub>, around 6%, projected by the Cambridge Econometrics modelling, and not to bank outperformance.

**Figure 3** Projected outperformance of first budget (2008-2012) in the non-traded sector due to the recession and other changes



**Table 1** Actual versus expected delivery of CO<sub>2</sub> emissions reduction measures in the non-traded sector in 2008 and 2009

	Uptake/improvement			Emissions reductions (MtCO <sub>2</sub> )		
	Expected	Outturn	Outperformance	Expected	Outturn	Outperformance
<b>Domestic sector</b>						
Loft insulation (professional)	1.0 m	1.6 m	0.6 m	0.2	0.3	0.1
Loft insulation (DIY)	0.0 m	0.9 m	0.9 m	0.0	0.2	0.2
Cavity wall insulation	1.1 m	1.1 m	0.0 m	0.6	0.6	0.0
Solid wall insulation	0.05 m	0.03 m	-0.02 m	0.1	<0.1	<-0.1
Efficient boilers	2.0 m	2.3 m	0.3 m	1.0	1.1	0.1
<b>Road transport</b>						
New car gCO <sub>2</sub> /km	2% improvement	9% improvement	7%	0.1	0.4	0.3
Biofuels (by volume)	+1.9 percentage points*	+1.9 percentage points*	0 percentage points	2.0	2.0	0.0
<b>Total</b>						
				4.0	4.8	0.8

**Source:** Uptake – Insulation: Ofgem, DECC; Boilers: Heating and Hotwater Industry Council, CLG, CCC; New car CO<sub>2</sub>: Society of Motor Manufacturers and Traders; Biofuels: HMRC. Emissions reductions – CCC calculations.

**Note:** \*i.e. increase in share from 1% to 2.9% by volume. Uptake figures for insulation and boilers are cumulative installations in 2008 and 2009.

Under previous HMT forecasts and more conservative forecasts by the Office of Budget Responsibility (OBR) for the June 2010 Budget, the impact of the recession will continue through the first three budget periods (e.g. HMT projected GDP to be 7% lower in 2014 and 6% lower in 2020 than anticipated when the carbon budgets were set; OBR project GDP in 2015 to be 10% lower). This raises a question about whether and when the UK should move from the Interim to Intended budgets, with costs of achieving the Intended budget now lower as a result of the recession. We will return to this consideration in the context of our advice on the fourth carbon budget (2023-27), to be provided by the end of the year.

### Traded sector emissions

Emissions from the electricity generation sector and energy-intensive industries are capped Europe-wide under the EU ETS. From 2008 to 2009 the UK cap remained flat at 246 MtCO<sub>2</sub>. However, actual emissions from UK firms covered by the EU ETS fell 12.5% to 232 MtCO<sub>2</sub> in 2009. As a result UK firms were able to sell

more allowances into the EU market, or to bank them towards meeting future caps.

In assessing the traded sector, we recognise that since emissions are capped the budget will always be achieved by definition (e.g. as emissions are increased, the EU ETS requires that this must be offset by the purchase of emissions reductions in European or global carbon markets, which is reflected in the UK Net Carbon Account as defined under the Climate Change Act).

However, our approach reflects the need to reduce emissions in the traded sector over the first three budget periods, particularly given the priority to prepare for decarbonisation of the power sector in the period to 2030. Therefore our focus in monitoring progress is on measures and policies to support low-carbon investment and technologies for cutting emissions in power generation and other energy-intensive industries.

At the European level (where the cap was also flat from 2008 to 2009), traded sector emissions fell by 11.6%, largely due to reduced output of energy intensive industries during the recession, as well as some fuel switching from coal to gas in power stations in response to relatively low gas prices. The implication of this is that the EU ETS cap can be met with less emissions reduction effort than was envisaged at the time that the cap was set and that the EU ETS price will be lower than widely predicted before the recession.

In 2009, we revised our 2020 carbon price projection down from around €55/tCO<sub>2</sub> to around €20/tCO<sub>2</sub>. The current market price is around €15/tCO<sub>2</sub>, with market estimates of a 2020 price in the range €25 – 40/tCO<sub>2</sub>. A price of €25/tCO<sub>2</sub> or lower in 2020 (e.g. if it turns out that there has been over-allocation of allowances, or if more offset credits are allowed into EU ETS) may not be sufficient to support required investments in low-carbon power generation. In the absence of EU-wide tightening of the cap, therefore, the case for underpinning the carbon price should be seriously considered, possibly as an interim measure before more fundamental electricity market reforms are introduced (Section 3); the new Government has recognised this, and announced in the recent budget its intention to consult on options for carbon price strengthening in the autumn.

The effectiveness of a carbon price floor will depend on detailed design. Specifically, this should deliver a target carbon price which together with the EU ETS is sufficient to support investment in low-carbon power generation. Factors to be considered in setting the precise level of the carbon price floor should include:

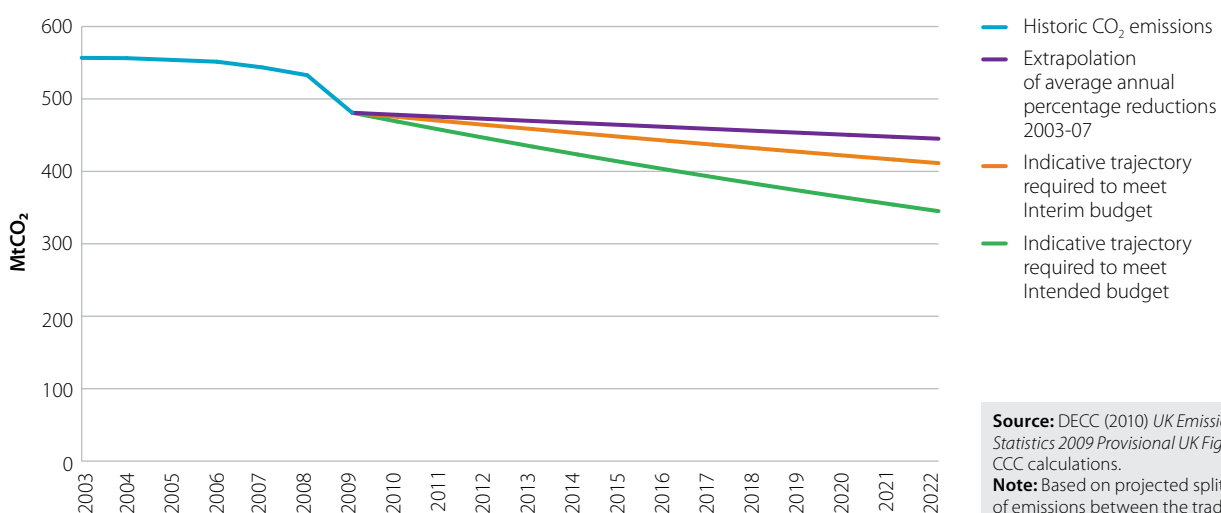
- The projected carbon price under an EU 30% GHG emissions reduction target for 2020.
- The level of support required for *new* low-carbon generation (as opposed to existing generation, which should not benefit from windfall profits) under various assumptions about fossil fuel prices.
- The present value of the marginal abatement cost associated with meeting the target in the Climate Change Act to reduce 2050 emissions by 80% relative to 1990 levels.

## 2. Step change still needed

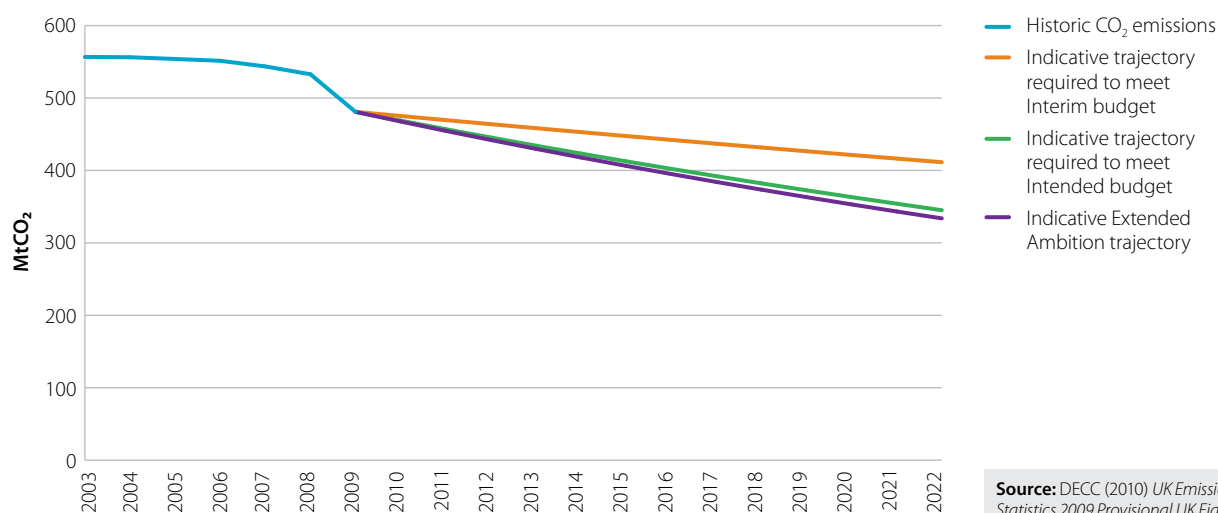
Our first report to Parliament considered emissions data for the five-year period prior to the recession and concluded that a step change in the pace of emissions reduction is required in order that carbon budgets are achieved.

The recession has led to a step down in the level of emissions but not to a step change in underlying progress. If GDP were to return to trend growth,

**Figure 4** Indicative non-traded sector CO<sub>2</sub> emissions based on rate of implementation of measures achieved in 2009 versus budget requirements (2003-2022)



**Figure 5** Indicative economy-wide CO<sub>2</sub> Extended Ambition trajectory incorporating additional recession impacts versus budget requirements (2003-2022)



Source: DECC (2010) UK Emissions Statistics 2009 Provisional UK Figures; CCC calculations.

and before allowing for any *further* bounce-back in emissions (e.g. due to re-stocking of inventories, disproportionate growth in output and emissions of energy-intensive industries), analysis in this report shows that with progress either at the rate for the period 2003-07, or based on implementation of measures in 2009, carbon budgets will not be achieved (Figure 4):

- The purple line in Figure 4 projects emissions on the basis of average annual reductions in the five years before the recession; this is similar to a projection based on underlying progress during the recession (not shown in Figure 4).
- Even with the impact of the recession (shown by the kink in the blue line), reverting to the pre-recession rate of reduction (the purple line) would not be sufficient to meet the Interim Budget (shown by the orange line) or the Intended budget (shown by the green line).

Therefore a step change is still needed. The requirement for progress can be considered in three categories of measures:

- Increasing the pace of emissions reduction in areas where there was some (limited) progress in 2009 (e.g. cavity wall insulation).

- Locking in to changed car purchase behaviour during the recession, and ensuring further progress on purchase of more efficient cars.
- Building up momentum in areas where there has been very limited progress implementing measures to date (e.g. low-carbon power generation, solid wall insulation, SME energy efficiency improvement, renewable heat, new van efficiency, Smarter Choices, agriculture).

If these measures were to be implemented, then this could be sufficient to meet the Intended budget (Figure 5):

- The purple line in Figure 5 shows emissions under an assumption that the impact of the recession persists and measures in the Committee's Extended Ambition scenario are implemented, including measures which are cost-effective and measures which are required to develop technologies for deployment in the 2020s.
- This is below both the orange line representing the Interim budget, and the green line representing the Intended budget.

As noted above, this raises a question about whether and when the UK should move to the Intended budget, which we will consider as part of our advice on the fourth carbon budget.

### 3. Progress decarbonising the power sector

#### Progress reducing power sector emissions

In 2009, power sector emissions fell by 13.1% due to both a demand reduction and a fall in carbon intensity (Figure 6, Figure 7, Figure 8):

- Electricity demand remained constant in 2008 and fell by 7% in 2009.
- Carbon intensity of power generation fell from 545 gCO<sub>2</sub>/kWh in 2008 to 496 gCO<sub>2</sub>/kWh in 2009. This reflects an increase in nuclear generation and a reduction in coal-fired generation, along with a small increase in renewable generation:
  - The share of nuclear generation increased from 13% in 2008 to 19% in 2009 as two plants which had outages throughout 2008 returned to operation.
  - Due to low gas prices in 2009 and despite a low carbon price, much of the additional nuclear generation displaced coal rather than gas. The share of coal-fired generation fell from 32% in 2008 to 28% in 2009, whilst the share of gas-fired generation stayed constant at around 45%.
  - Generation from renewables continued to follow a gradual upward trajectory, increasing its share of total generation from 6.1% to 7.3%.

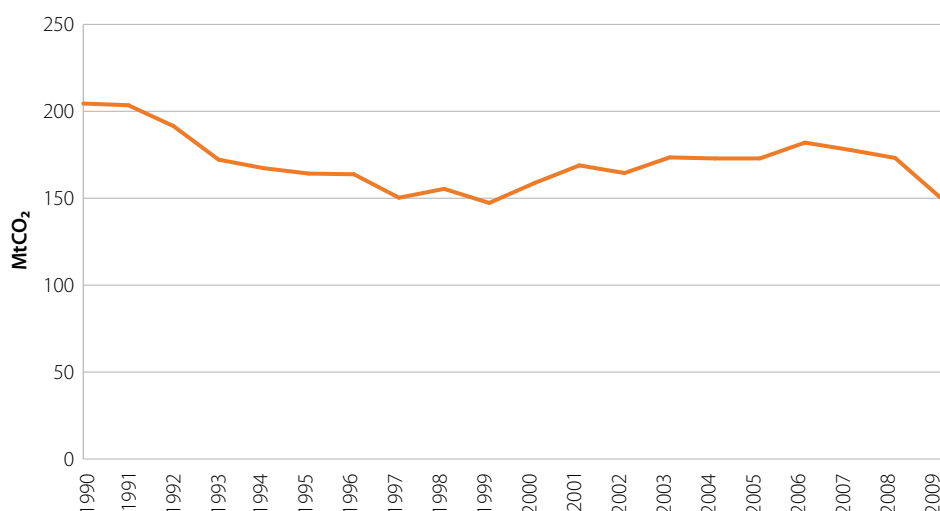
#### Progress increasing the level of renewable electricity generation

In 2009 and early 2010, around 0.7 GW of new wind capacity was added to the system, in line with our indicators. However, the required addition in the period to 2020 is over 3 GW annually in the third budget period.

In order to facilitate significantly increased levels of investment, improvements in the planning process will be required. Although there were planning applications for around 5 GW of new plant in 2009, the planning period remains too long (15 months in 2009, and over 40 months for larger projects), and the planning approval rate for smaller projects fell slightly. Therefore planning remains a major risk for development of renewable electricity, and proposed replacement of the Infrastructure Planning Commission should be managed in a way which avoids creating further uncertainty.

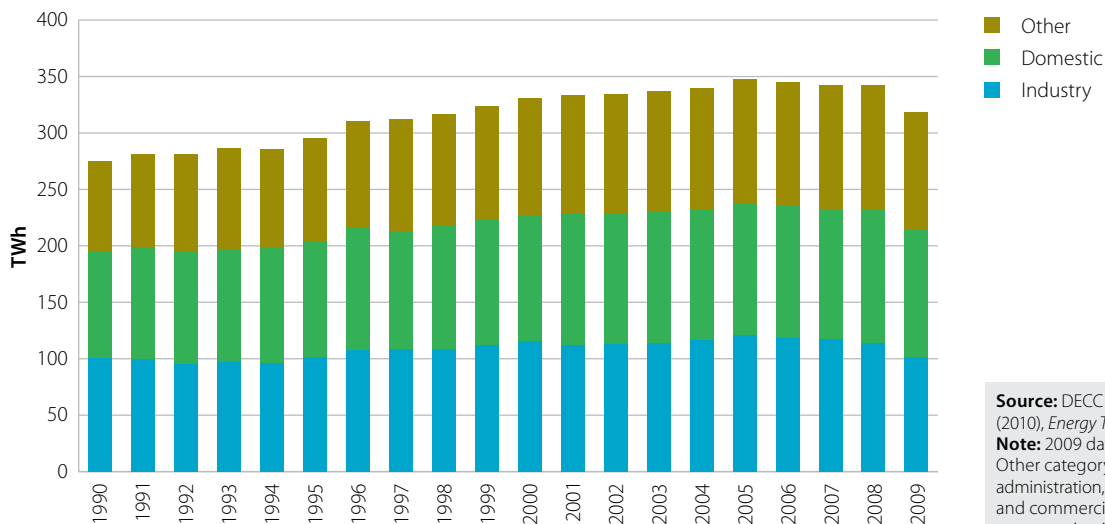
There was some progress in 2009 as regards investments in the transmission grid required to support increased levels of renewable generation (e.g. towards enduring regimes for onshore and offshore grid access). However, agreement of investments identified in the Electricity Network Strategy Report has slipped, and this should be remedied in order that investments proceed and become operational as required in 2015.

**Figure 6** CO<sub>2</sub> emissions from power stations (1990-2009)



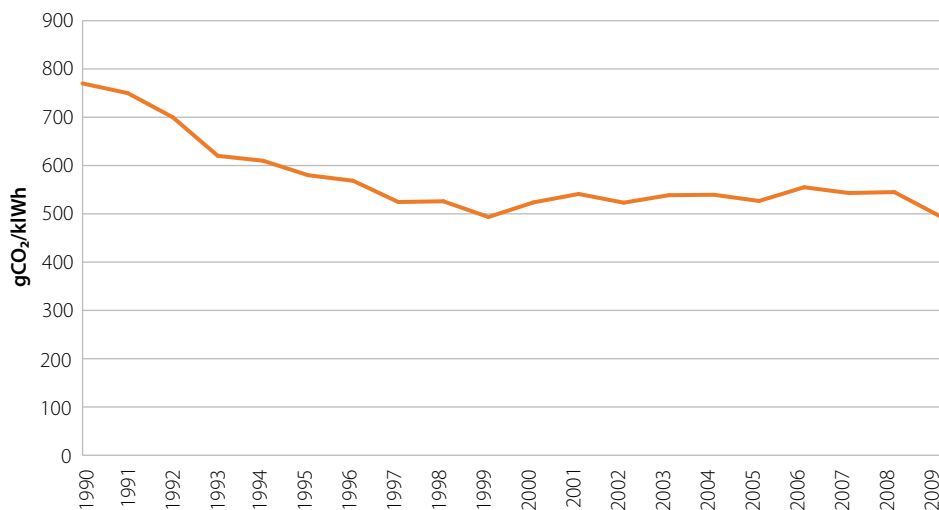
**Source:** DECC (2010) *Energy Trends March 2010*.  
**Note:** 2009 data are provisional.

**Figure 7** Electricity consumption (1990-2009)



**Source:** DECC (2009) *DUKES*; DECC (2010), *Energy Trends March 2010*.  
**Note:** 2009 data are provisional. Other category includes public administration, transport, agriculture and commercial sectors. Electricity consumption is net of energy industry electricity use, and transmission and distribution losses.

**Figure 8** Carbon intensity of electricity generation (1990-2009)



**Source:** CCC calculations based on: DEFRA (2009) *GHG Conversion Factors*; DECC (2010) *Energy Trends March 2010*.  
**Note:** 2009 data are provisional. Intensity is based on energy supplied from major power producers and all renewable generators and is net of transmission and distribution losses.

### **Progress towards nuclear new build**

Our analysis suggests that new nuclear is likely to be a cost-effective low-carbon technology, and could be added to the system from 2018, potentially playing an important role in sector decarbonisation through the 2020s.

Progress on new nuclear has been in line with our indicators (e.g. issuing of draft National Policy Statements). Key challenges for 2010 include getting Parliamentary agreement on the National Policy Statement and Regulatory Justification, together with progress approving new reactor designs and establishing funding arrangements for decommissioning and waste. Progress is required in all of these areas if new plant is to come on to the system from 2018.

### **Progress developing CCS technology**

The new Government's commitment to delivering four CCS demonstration projects is key to developing options for power sector decarbonisation in the 2020s. However, the first project is slightly behind schedule, and further slippage must be avoided if new capacity is to come on to the system by 2015.

The competition covering the next three demonstration projects should proceed this year given the need for demonstration and early decisions (e.g. by 2018) on deployment.

The Energy Act 2010 provides a high-level financial and regulatory framework for CCS and is a major step forward in developing this potentially crucial technology. However, uncertainty remains both over financing of CCS retrofit to demonstration plants and operation of plants. Further details in both areas (e.g. a commitment to support finance for retrofit, and a limit on conventional coal generation in the 2020s, for example through an Emissions Performance Standard as proposed in the Coalition Agreement) would improve the investment climate for CCS and should therefore be seriously considered.

There is likely to be an important role for gas CCS, given:

- New analysis suggesting the potential competitiveness of gas CCS.
- The need for flexible forms of low-carbon power generation in the future (e.g. for seasonal electric heating).
- The large capacity of capture-ready unabated gas plant that will be on the system by 2020.

The Committee therefore recommends that serious consideration should be given to including at least one natural gas CCS demonstration plant in the second competition, and possibly more depending on bids received; demonstration of gas CCS under the second competition would provide the option of deployment in the UK from the early to mid 2020s.

Extending an Emissions Performance Standard to cover gas generation (e.g. through requiring that CCS is fitted to any new plant beyond 2020) would provide a coherent approach to fossil fuel power generation. It would be consistent with the required path for power sector decarbonisation through the 2020s where the vast majority of investment at this time is in low-carbon generation. It should therefore seriously be considered.

We will provide a detailed assessment of gas CCS and supporting arrangements in our advice on the fourth carbon budget, to be provided by the end of the year.

### Reform of electricity market arrangements

An Energy Market Assessment (EMA) was published in 2010, concluding that required investments in low-carbon generation capacity are unlikely to result under current electricity market arrangements. The EMA ruled out carbon price strengthening alone as providing an appropriate solution, and suggested further consideration should be given to approaches (consistent with measures we proposed) to provide confidence about the price paid and to require investment in low-carbon generation.

The Committee strongly welcomes the EMA and the new Government's commitment to reform the electricity market, and urges that serious consideration is now given to the range of options for strengthening incentives for investment in low-carbon generation. The Committee will set out a high-level assessment of options in the context of advice on the fourth carbon budget, to be published before the end of 2010.

### 4. Progress reducing emissions from buildings and industry

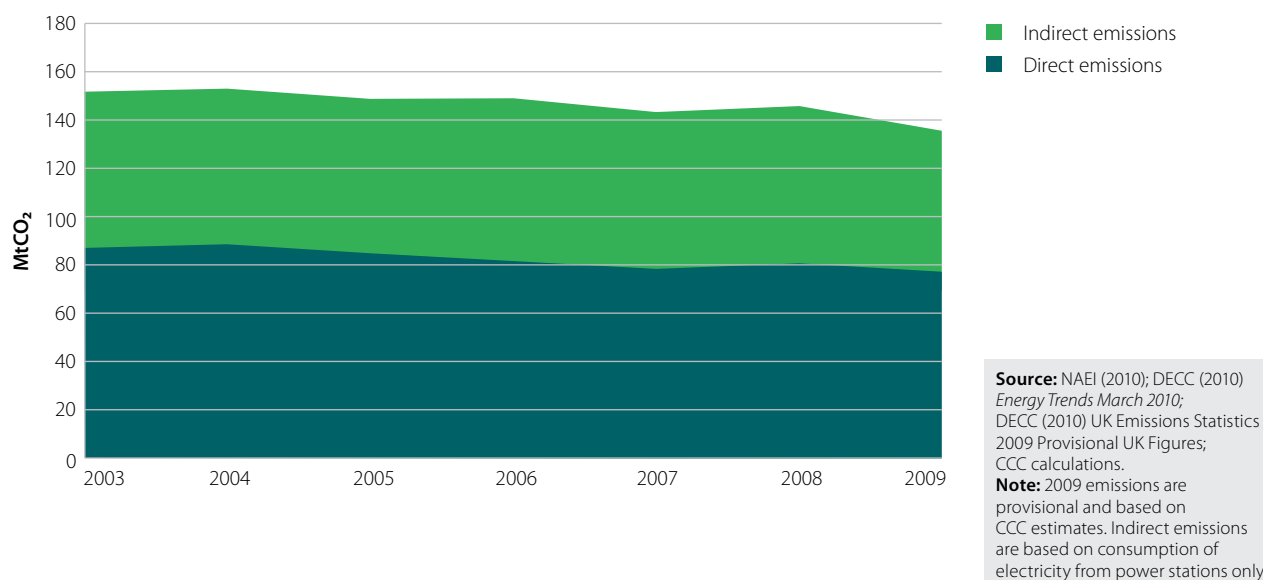
Buildings and industry emissions comprise around 350 MtCO<sub>2</sub> overall, of which 41% is from the residential sector, 38% from industry, 15% from the commercial sector, and 6% from the public sector. Total emissions comprise direct (i.e. due to the burning of fossil fuels for heat) and indirect (i.e. mainly electricity related) emissions in the following proportions: residential sector – 55%/45%; industry – 59%/41%; commercial sector – 21%/79%; public sector – 49%/51%.

#### Progress reducing residential emissions

Emissions from residential buildings grew by 2% in 2008 and fell by 7% in 2009, with reductions in both direct and indirect emissions (Figure 9), due mainly to rising fuel prices and the recession:

- Direct emissions rose by 3% in 2008 while indirect emissions stayed broadly flat.
- In 2009 direct emissions fell by 5%, while electricity emissions fell by 10%.

**Figure 9** Residential CO<sub>2</sub> emissions (2003–2009)



Some savings are attributable to the installation of energy efficiency measures:

- Good progress was made on boiler replacement, with 1.2 million “A” rated boilers sold in 2009. High sales continued in early 2010, incentivised by boiler scrappage schemes in England, Wales and Scotland.
- Progress insulating lofts was on track relative to our indicator framework. In 2009, around 0.8 million lofts and 0.6 million cavity walls were insulated professionally under the Carbon Emissions Reduction Target (CERT), which additionally subsidised a large amount of DIY loft insulation material.
- There was very limited progress on solid wall insulation (e.g. 15,000 solid walls were insulated under CERT in 2009) and the sale of efficient appliances (e.g. only 0.1% of cold appliances sold were A++).

However, these measures together can account for only a small proportion of the observed emissions reduction in 2009 (e.g. around 1 MtCO<sub>2</sub> from a total 4 MtCO<sub>2</sub> reduction in direct emissions). Therefore it is likely that the 2009 reductions are primarily a result of rising energy prices (residential gas and electricity prices rose 12% and 3% respectively in real terms) and the recession.

In the future, it will be necessary – under the successor policy to CERT – to double the pace of cavity wall insulation and at least maintain the pace of loft insulation if the ambition to insulate all houses by 2016 (as set out in DECC/CLG’s Household Energy Management Strategy (HEMS)) is to be achieved. This will become more challenging as loft and cavity wall insulation to date may be regarded as low hanging fruit (i.e. undertaken by people most willing to undertake these measures). A significant increase in the pace of emissions reduction through solid wall insulation, increased penetration of efficient appliances and a range of other low-carbon measures, will also be required to meet the second and third carbon budgets, and to prepare for delivering carbon budgets through the 2020s.

The new Government’s announcement of an Energy Bill to deliver a national energy efficiency programme and a ‘Green Deal’ is a positive step towards strengthening incentives for residential energy efficiency improvement. In designing an implementing framework, a number of key areas should be clarified: how to incentivise householders to take up comprehensive whole house packages through marketing, provision of energy audits and financial incentives/standards; how partnerships between local authorities, energy companies and other organisations will translate into a neighbourhood approach; the appropriate balance between ‘Pay As You Save’ and socialised funding (i.e. spreading costs across the consumer base to provide free measures for the fuel poor and to subsidise some of the less cost-effective measures); standards for the private rented sector.

#### **Progress reducing non-residential emissions**

Emissions from non-residential buildings – comprising around 72% emissions from commercial buildings, and 28% from public sector buildings – are likely to have fallen significantly in 2009 due to reductions in commercial sector output:

- Around 80% of commercial sector emissions are indirect. Prior to the recession, commercial emissions were broadly flat. In 2008, direct emissions increased by 6%, with indirect emissions remaining flat, and average emissions increasing by 1%. Initial estimates for 2009 suggest significant reductions, with a reduction of 10% in direct emissions and 14% in indirect emissions. Commercial sector energy consumption fell by around 6%, reflecting reduced GVA of 5%.
- Total public sector CO<sub>2</sub> emissions in 2008 were broadly constant. We estimate indirect emission reductions of around 7% in 2009, as a result of a reduction in the emissions intensity of power generation, but direct emissions in 2009 were broadly unchanged.

Two key areas where new policies are required to strengthen incentives for reduction of non-residential emissions are:

- **Buildings energy performance:** CLG has consulted on extending Display Energy Certificates (DECs) to cover commercial buildings, and will be publishing – later this year – an impact assessment on the costs and benefits of rolling out Energy Performance Certificates (EPCs) to all non-residential buildings and setting EPC minimum ratings. Given the importance of better information in encouraging energy efficiency improvement and providing a basis for new policy approaches, proceeding with the EPC consultation and making a decision on both forms of certification in 2010 would support early roll out to all commercial and public sector buildings. It would also complement the Government's proposed 'Pay As You Save' approach to the non-residential sector.
- **SME energy efficiency:** We have identified significant potential for SME emissions reductions. Work is ongoing in DECC to address this potential through consideration of options to strengthen incentives for SME energy efficiency improvement. Timely conclusion of this project would allow an early decision on new policy approaches to help SMEs improve energy efficiency.

### **Progress reducing industry emissions**

Industry CO<sub>2</sub> emissions fell 4% in 2008, with provisional data for 2009 suggesting further reductions, particularly in energy-intensive industries covered by the EU ETS, which account for two thirds of total UK industry emissions. For example, there was a 30% reduction in emissions from cement production and a 14% reduction from steel production in 2009.

Given limited evidence on detailed measures for reducing emissions we have not yet set out an indicator framework for industry. We have therefore not considered the precise extent to which industry emissions reductions are a result of implementation of measures or the recession. However, given that emissions reductions correspond to significant reductions in output it is likely that the recession played a key role in driving lower emissions in 2009.

Going forward, it will be important both to improve the evidence base on industry emissions, working towards defining progress indicators, and to ensure that appropriate policies are in place. We will provide more in depth analysis of industry in our advice on the fourth carbon budget, to be published before the end of the year.

### **Progress increasing renewable heat penetration**

This is a cross-cutting issue given scope for deployment of renewable heat in residential and non-residential buildings and industry. Currently there is very low penetration of renewable heat technologies in the UK. Increased penetration is required to meet the first three carbon budgets, to meet the UK's obligations in the context of the EU's renewable energy target, and to develop technologies for roll-out in the 2020s.

The Renewable Heat Incentive proposals published in February 2010 suggest an ambition for deployment for the various technology options that is broadly consistent with our analysis. Further consideration of precise levels of support and delivery mechanisms may be required. In developing the approach to renewable heat, this should be fully integrated with the approach to energy efficiency (i.e. these should be reinforcing), to ensure the appropriate balance between measures is chosen.

## 5. Progress cutting surface transport emissions through low-carbon vehicles and alternatives to car travel

This summary focuses on road transport, which comprises 98% of surface transport emissions; the remainder of emissions are from rail, which is considered briefly in Chapter 4. Emissions from aviation and shipping are discussed in Chapter 1.

### Progress reducing road transport emissions

Road transport emissions comprise around 62% from cars, 13% from vans, and 20% from HGVs, with the remainder (5%) primarily from buses and mopeds and motorcycles.

#### Car emissions

Emissions from cars fell by 3.1% in 2008 and around 2.7% in 2009<sup>2</sup>, reflecting improved fuel/carbon efficiency and reduced car miles (Figure 10):

- Average car fleet emissions fell from 177 g/km in 2007 to 173 g/km in 2008 (a 2.5% reduction). This was accounted for both by improved fuel efficiency of new cars (around three-quarters of the 2.5%) and increased penetration of biofuels (around one-quarter).
- We estimate that the carbon intensity of the fleet reduced a further 1.6% in 2009, with improvement in fuel efficiency accounting for around two thirds of this reduction and the remainder due to increased biofuels penetration.
- Car miles fell from 420.2 billion vehicle km in 2007 to 417.7 billion (a 0.6% reduction) in 2008 and 412.8 billion (a 1.2% reduction) in 2009, reducing emissions by the same proportion.

#### Van emissions

Van emissions fell by 2.9% in 2008, mainly due to improved fuel/carbon efficiency. Van emissions are likely to have increased slightly (by around 0.3%) in 2009:

- Average van emissions improved 2.5% from 231 g/km in 2007 to 226 g/km in 2008. We estimate that most of this improvement (around 2 percentage points) was due to use of biofuels, with the remainder (0.5 percentage points) due to improvement of the fuel efficiency of the van fleet.
- Van miles fell by 0.4% in 2008 but increased by 1% in 2009.

#### HGV emissions

HGV emissions fell by 3.4% in 2008 due mainly to reduced miles travelled, and are likely to have decreased further by around 9% in 2009:

- HGV miles fell from 30.3 billion vehicle km in 2007 to 29.6 billion in 2008 and 27.2 billion in 2009, resulting in emissions reductions of 2.3% in 2008 and 8.4% in 2009.
- There was also some improvement in HGV fuel efficiency, from 800 g/km in 2007 to 792 g/km in 2008, resulting in emissions reductions of 1.1%.

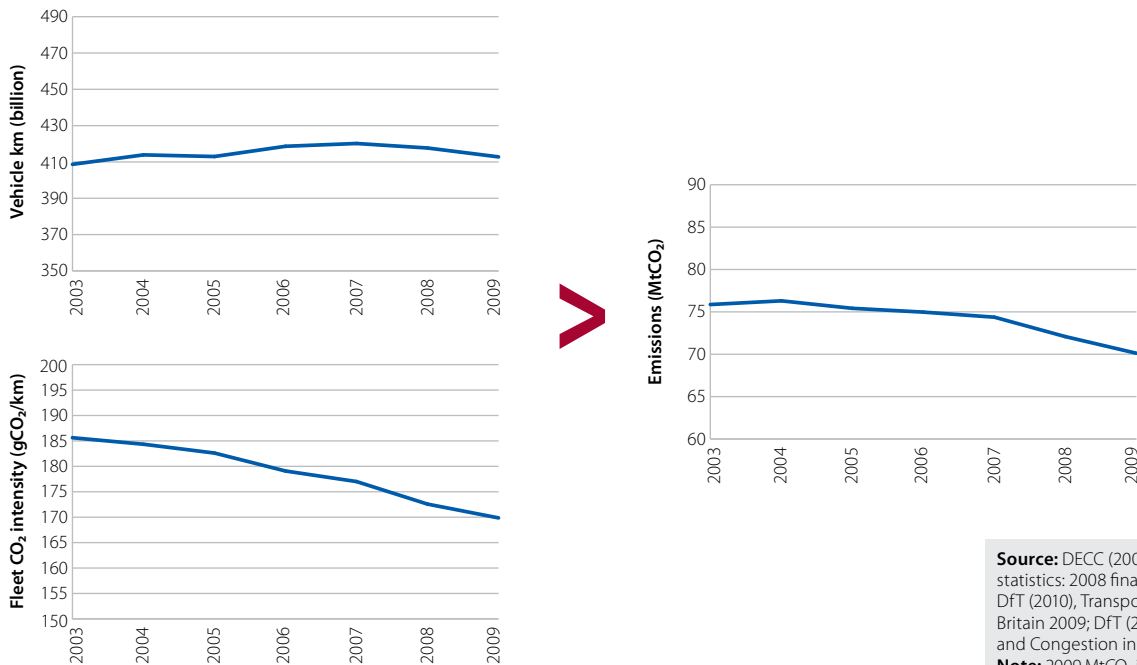
### Progress reducing carbon intensity of vehicles

#### More efficient new cars

Carbon intensity of new cars fell from 158 g/km in 2008 to around 149 g/km in 2009, therefore outperforming our indicator for 2009 of 157.8 gCO<sub>2</sub>/km. Our analysis suggests that changed car purchase behaviour reflects the recession and increased oil prices, the impacts of which have been reinforced by various policies (the car scrappage scheme, VED differentiation, fuel duty, company car tax). Further progress towards a 95 g/km target in 2020 would be incentivised by strengthened fiscal incentives (e.g. increasing VED differentiation according to fuel efficiency, and offsetting any oil price reductions through increased fuel duty).

<sup>2</sup> 2009 emissions data has not yet been published; we have therefore estimated emissions based on data on 2009 petrol and diesel fuel sales, mileage and our own estimate of the reduction in CO<sub>2</sub> intensity of the vehicle fleet.

**Figure 10** Car mileage, carbon intensity of the car fleet and CO<sub>2</sub> emissions (2003-2009)



**Source:** DECC (2009), UK emissions statistics: 2008 final UK figures; DfT (2010), Transport Statistics Great Britain 2009; DfT (2010) Road Traffic and Congestion in Great Britain.  
**Note:** 2009 MtCO<sub>2</sub> is a CCC estimate, and 2009 gCO<sub>2</sub>/km is based on a CCC assumption.

**Developing an electric car market**

Electric cars are a key technology for decarbonising transport in the 2020s and should be developed as an option in the period to 2020. We have suggested that it is feasible and desirable to have up to 1.7 million electric cars on the road in 2020 on the path to widespread deployment required to meet carbon budgets in the 2020s.

Progress has been made in setting up electric car pilot projects through the Plugged in Places programme, which has selected three cities for pilots and will select another 3-6 cities shortly.

In order to develop this option for roll-out in the 2020s, we recommend that the Government should adopt ambitious targets for deployment of electric cars in the period to 2020. It should commit to funding both towards the purchase of electric cars (to offset a transitional cost premium) and investment in a national battery charging network

**Reducing van emissions**

In October 2009 the EU proposed a draft framework for reducing new van emissions. Our analysis shows that this framework is achievable and desirable in the context of meeting carbon budgets, and should therefore be welcomed by the Government. Agreement on a final framework and introduction of measures for uptake of more efficient vans would provide the basis for emissions reductions in this sector, rather than a return to the trend of rising emissions before the recession.

### Alternatives to car travel

Reductions in car miles in 2009 are likely to be due to the recession rather than implementation of policies, given very limited policy effort in this area. However, we have identified two areas in our indicator framework where there is scope for significant emissions reduction under new policy approaches:

- Roll out of Smarter Choices.** New evidence from the Sustainable Travel Towns shows that Smarter Choices initiatives aimed at reducing car travel (e.g. through working from home, car pooling, and use of public transport) result in car emissions reductions of around 5-7% and wider economic benefits. However, policy on Smarter Choices has moved backwards following the withdrawal of the planned Sustainable Travel City project in March 2010. Emissions reductions from Smarter Choices would make a cost-effective contribution to achieving carbon budgets, and therefore an early commitment to roll out this policy across UK towns and cities would reverse recent negative policy developments.
- Integration of land use and transport planning.** In our first report to parliament we showed scope for constraining transport emissions growth through design of new developments (e.g. these might be close to workplaces, facilitating commuting by public transport rather than car). Recent evidence from the Commission for Integrated Transport reinforces our assessment. The proposed review of planning policy by the new Government provides an opportunity to consider scope for designing new developments in a way that limits additional transport emissions. This is in a context where there will be potentially large numbers of new houses and other developments in the next two decades, and where location decisions could have impacts for meeting carbon budgets.

### 6. Opportunities for reducing emissions from agriculture

Estimated agriculture emissions, which are primarily of non-CO<sub>2</sub> greenhouse gases, fell slightly (1%) in 2008, which is the most recent year for which data is available. In the longer term, emissions have fallen by around 20% since 1990, due to reduced use of fertiliser as well as reduced livestock numbers in response to reform of the EU's Common Agricultural Policy.

In response to our 2008 analysis on scope for reducing agriculture emissions, the Low Carbon Transition Plan included a 3 MtCO<sub>2</sub>e cut from this sector in England in 2020 (compared to UK non-CO<sub>2</sub> emissions of 44 MtCO<sub>2</sub>e in 2008). In this report we present new analysis which suggests that emissions reductions above 3 MtCO<sub>2</sub>e may be possible.

The current approach to unlocking emissions reduction is based around voluntary action by the industry in partnership with the Government. However, this is not the chosen approach in other sectors (e.g. energy efficiency improvement in commercial buildings), where policies with stronger incentives have been introduced or are being considered. It is highly likely that in future alternative policy measures will be required, making full allowance for the specific complexities of the agriculture sector (e.g. difficulties measuring farm-level emissions, the possibility of production leakage to other countries); therefore the full range of policy options should be considered.

Given the uncertainty over scope for emissions reductions, and the multiple emissions drivers, the focus in assessing progress reducing emissions should be implementation of measures. In agreeing an agriculture indicator framework, it will be important to further develop the evidence base, to underpin trajectories for productivity indicators (e.g. related to fertiliser use and livestock productivity and indicators for farming best practice).

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In summary, emissions fell significantly in 2009, mainly due to the recession and other exogenous factors. There was implementation of measures in line with our indicators. However, our indicators for 2009 only built in the modest ambition of policies that were firm and funded in 2008. The required step change in the pace of emissions reduction has not yet happened. In order to achieve the step change, new policies are required to strengthen incentives for action in the power sector, buildings, industry, transport and agriculture. Given new policies, we are confident that individuals and businesses will respond, taking advantage of affordable opportunities to reduce emissions, and contributing both to meeting carbon budgets and the wider economic benefits that this will bring.

**Summary of progress against indicators and future challenges**

**Economy-wide**

Significant fall in emissions in 2009 probably reflects recession. Implementation of measures in 2009 broadly on track but ambition was modest. Still need to see the step-change in delivery going forward. Progress made in developing policies but further detail required to provide confidence that these will deliver sufficient emissions reductions, and new policies required in some areas.

	Progress against indicators and milestones	Challenges
<p><b>Power</b></p> <p><b>Emissions</b></p>	<p><b>Market</b></p> <p>Initial findings of Energy Market Assessment published in March 2010, accepts need for intervention, and sets out options. New Government commitment to energy market reform.</p>	<p>Short window for reform to occur if key investments are to go ahead in time. Full range of options available should now be considered in detail.</p>
<p><b>Transmission</b></p>	<p>Enduring access regime in place, offshore enduring regime on track, some slippage on agreement of onshore grid investments.</p>	<p>Important that there is no further slippage in the agreement for onshore grid investments.</p>
<p><b>Planning</b></p>	<p>Decision times improving but still slower than indicator.</p>	<p>Important that replacement of IPC does not adversely affect planning efficiency.</p>
<p><b>Renewables</b></p>	<p>2009 expected wind capacity delivered with some delays; some supply chain development. Green Investment Bank announced.</p>	<p>Required rate of installation of new wind capacity will be much higher from now to 2020.</p>
<p><b>Nuclear</b></p>	<p>Draft National Policy Statement published in 2009 plus other enabling actions on track.</p>	<p>Progress on enabling actions now depends on decisions of Ministers and Parliament.</p>
<p><b>CCS</b></p>	<p>Demonstrations increased to four, commitment to rolling review from 2018. First project slightly behind schedule.</p>	<p>More clarity on financing for retrofit and operation of unabated plant into 2020s is needed. Demonstrations on gas should be considered.</p>
<p><b>Emissions intensity</b></p>		

Summary of progress against indicators and future challenges			
Buildings & industry		Progress against indicators and milestones	Challenges
<p><b>Direct emissions</b></p>	<p><b>Residential</b></p> <p>On track with modest expected uptake of loft and cavity wall insulation and efficient boilers in 2008-09; Home Energy Management Strategy published March 2010 and political commitment to National Energy Efficiency Programme and 'Green Deal'. Building regulations tightened in 2010, in line with achieving zero carbon new build houses by 2016.</p>	<p>Need to maintain/increase pace on lofts/cavity walls; "low hanging fruit" taken. Significant increase in uptake of solid wall insulation required to 2020. Further details needed around specific policy delivery elements of National Energy Efficiency Programme. Housing stock turnover is slow – refurbishment of existing stock is crucial, including large number of 'Hard-to-Treat' (e.g. solid wall) homes.</p>	
			<p><b>Indirect emissions</b></p>
<p><b>Industry</b></p>	<p>CCA renegotiation underway for next phase (to 2017), 2010 targets tightened by 4.4%.</p>	<p>Need to ensure CCA targets are continually binding. Need to improve evidence base on scope for longer term emissions reductions in industry.</p>	
	<p><b>Renewable heat</b></p>	<p>RHI proposals published February 2010.</p>	<p>Need to ensure RHI is integrated with energy efficiency policy and barriers to deployment are addressed.</p>

**Note:**  
1. Please refer to chapters for sources and notes to tables.

Summary of progress against indicators and future challenges																																																																	
Progress against indicators and milestones	Challenges																																																																
<p><b>Road transport</b></p> <p><b>Direct emissions</b></p> <table border="1"> <caption>Direct emissions (MtCO<sub>2</sub>)</caption> <thead> <tr> <th>Year</th> <th>Outturn (MtCO<sub>2</sub>)</th> <th>Indicator trajectory (MtCO<sub>2</sub>)</th> </tr> </thead> <tbody> <tr><td>2003</td><td>122</td><td>122</td></tr> <tr><td>2004</td><td>120</td><td>120</td></tr> <tr><td>2005</td><td>118</td><td>118</td></tr> <tr><td>2006</td><td>115</td><td>115</td></tr> <tr><td>2007</td><td>112</td><td>112</td></tr> <tr><td>2008</td><td>110</td><td>110</td></tr> <tr><td>2009</td><td>108</td><td>108</td></tr> <tr><td>2010</td><td>105</td><td>105</td></tr> <tr><td>2011</td><td>103</td><td>103</td></tr> <tr><td>2012</td><td>101</td><td>101</td></tr> <tr><td>2013</td><td>99</td><td>99</td></tr> <tr><td>2014</td><td>97</td><td>97</td></tr> <tr><td>2015</td><td>95</td><td>95</td></tr> <tr><td>2016</td><td>93</td><td>93</td></tr> <tr><td>2017</td><td>91</td><td>91</td></tr> <tr><td>2018</td><td>89</td><td>89</td></tr> <tr><td>2019</td><td>87</td><td>87</td></tr> <tr><td>2020</td><td>85</td><td>85</td></tr> <tr><td>2021</td><td>83</td><td>83</td></tr> <tr><td>2022</td><td>81</td><td>81</td></tr> </tbody> </table>			Year	Outturn (MtCO <sub>2</sub> )	Indicator trajectory (MtCO <sub>2</sub> )	2003	122	122	2004	120	120	2005	118	118	2006	115	115	2007	112	112	2008	110	110	2009	108	108	2010	105	105	2011	103	103	2012	101	101	2013	99	99	2014	97	97	2015	95	95	2016	93	93	2017	91	91	2018	89	89	2019	87	87	2020	85	85	2021	83	83	2022	81	81
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<p><b>New car fuel efficiency</b></p> <p>Significant reductions in new car gCO<sub>2</sub>/km.</p>	<p>Need to lock in improvement; EU targets should deliver continued improvement but UK unlikely to reach or exceed EU target without policy on consumer choice.</p>																																																																
<p><b>Reducing van emissions</b></p> <p>EU draft framework for new van emissions published October 2009.</p>	<p>Need to agree ambitious framework.</p>																																																																
<p><b>Increased use of biofuels</b></p> <p>Increasing as expected.</p>	<p>Need to understand likely availability of sustainable biofuels beyond 2020 and potential contribution to emissions reductions.</p>																																																																
<p><b>Development of electric car market</b></p> <p>Price support for new electric and plug in hybrid cars announced;</p> <p>Commitment from new Government to mandate national charging network;</p> <p>Plugged In Places pilot projects announced and first three pilots selected.</p>	<p>Need deployment targets for 2020. Greater price support may be required to support early market.</p>																																																																
<p><b>Smarter Choices</b></p> <p>Policy on Smarter Choices has moved backwards following the withdrawal of the planned Sustainable Travel City project in March 2010.</p>	<p>No policy for roll out across UK towns and cities.</p>																																																																
<p><b>Eco driving</b></p> <p>Limited car driver training delivered in 2009 but Government exploring options for wider delivery.</p>	<p>Need to consider potential delivery mechanisms for wider roll out.</p>																																																																
<p><b>Land use/transport planning</b></p> <p>Limited progress in developing integrated transport and land use strategy so far.</p>	<p>Proposed review of planning policy by the new Government provides an opportunity to consider new approach.</p>																																																																

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<p><b>Agriculture</b></p> <p><b>GHG emissions</b></p> <table border="1"> <caption>Estimated GHG emissions (MtCO<sub>2</sub>) from 2003 to 2022</caption> <thead> <tr> <th>Year</th> <th>Outturn</th> <th>LCTP ambition (UK)</th> <th>Optimistic maximum technical potential</th> </tr> </thead> <tbody> <tr><td>2003</td><td>45</td><td>45</td><td>25</td></tr> <tr><td>2004</td><td>45</td><td>45</td><td>25</td></tr> <tr><td>2005</td><td>45</td><td>45</td><td>25</td></tr> <tr><td>2006</td><td>48</td><td>45</td><td>25</td></tr> <tr><td>2007</td><td>45</td><td>45</td><td>25</td></tr> <tr><td>2008</td><td>42</td><td>45</td><td>25</td></tr> <tr><td>2009</td><td>40</td><td>45</td><td>25</td></tr> <tr><td>2010</td><td>38</td><td>45</td><td>25</td></tr> <tr><td>2011</td><td>37</td><td>45</td><td>25</td></tr> <tr><td>2012</td><td>36</td><td>45</td><td>25</td></tr> <tr><td>2013</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2014</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2015</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2016</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2017</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2018</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2019</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2020</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2021</td><td>35</td><td>45</td><td>25</td></tr> <tr><td>2022</td><td>35</td><td>48</td><td>25</td></tr> </tbody> </table>	Year	Outturn	LCTP ambition (UK)	Optimistic maximum technical potential	2003	45	45	25	2004	45	45	25	2005	45	45	25	2006	48	45	25	2007	45	45	25	2008	42	45	25	2009	40	45	25	2010	38	45	25	2011	37	45	25	2012	36	45	25	2013	35	45	25	2014	35	45	25	2015	35	45	25	2016	35	45	25	2017	35	45	25	2018	35	45	25	2019	35	45	25	2020	35	45	25	2021	35	45	25	2022	35	48	25	<p><b>Agriculture</b></p> <p>Target developed for England (although appears low relative to technical potential). Policy framework developed for delivery through voluntary action and improved advisory services.</p>	<p>Need to develop more robust evidence base on current farming practice and emissions impact of changed practice. Need to consider policies beyond provision of information/encouragement to address barriers. Need to find additional longer-term abatement options and develop policy mechanisms to unlock further potential.</p>
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**Note:**  
1. Please refer to chapters for sources and notes to tables.

# Future work of the Committee

The Committee has a number of deliverables in 2010-2012, either required under the Climate Change Act or requested by Government:

## 2010

- **Low carbon R&D review.** This review was requested by the Government's Chief Scientist. It will include assessments of technologies to be prioritised for support in the UK, and the strategic framework for delivering this support. The review will be published in July 2010.
- **Review of the second phase cap for the Carbon Reduction Commitment.** This review was requested by DECC. It will propose a cap for the second phase of the Carbon Reduction Commitment based on current evidence and set out steps towards finalising the cap. It will also consider broader design questions (e.g. the extent to which the scheme should be used to strengthen incentives for renewable energy investments). The date for publication of this review is September 2010.
- **Advice on the level of the fourth budget.** This advice is required under the Climate Change Act. It will include an assessment of developments in climate change science since our 2008 report, and an assessment of the evolving international framework. It will set out pathways for the UK through the 2020s reflecting global pathways, the 2050 target and feasible emissions reductions. The review will be published before the end of 2010.

## 2011

- **Review of renewable energy ambition.** This was commissioned by the new Government as set out in the Coalition Agreement document. We will consider scope for and desirability of investment in renewable electricity and heat, both to 2020 and beyond, reporting back in Spring 2011.
- **Advice on the Scottish cumulative emissions budget.** This will draw out implications from the analysis of the UK's fourth budget and advise on a cumulative emissions budget for Scotland covering the period to 2050.
- **Third annual report to Parliament.** This will review progress reducing emissions as GDP returns to growth. It will include assessments of emissions trends, progress implementing measures against our framework of leading indicators, and progress meeting policy milestones to drive the required step change in the pace of emissions reduction. It will be published in June 2011.
- **Advice on use of offset credits to meet the second carbon budget.** This advice is required no later than June 2011 under the Climate Change Act.

- **Review of international shipping emissions.**

The Committee has already provided a high-level assessment of international shipping emissions in the context of giving advice on the 2050 target. Further more detailed work is required to underpin advice on inclusion of shipping and aviation in carbon budgets (see below).

- **Review of sustainable bioenergy.** Various forms of bioenergy – biomass, biogas, biofuels – are potentially key to reducing emissions (e.g. in power, heat, surface transport, aviation, shipping, etc.). However, there is uncertainty as regards the level of sustainable biofuels given rising food demand and therefore constraints on available land for growth of feedstock. The Committee has provided a preliminary analysis of bioenergy in the context of the review of UK aviation emissions, and will set out scenarios in the context of the advice on the fourth budget. Further detailed work is required to underpin this high-level analysis, both to inform advice on inclusion of international aviation and shipping in carbon budgets (see below), and to provide more confidence on options for meeting the fourth budget.

## 2012

- **Advice on inclusion of international aviation and shipping in carbon budgets.** This advice is required under the Climate Change Act. The Committee previously recommended that international aviation and shipping should be in the 2050 target, and that international aviation should be reflected in decisions on carbon budgets. The Government implicitly accepted this advice, both in adopting the 2050 aviation target, and in its modelling of pathways to 2050. However, a formal decision on whether the net carbon account should be defined to include international aviation and shipping is required in 2012 under the Climate Change Act, following advice from the Committee. This will build on high-level advice on inclusion of aviation and shipping as part of the broad work on the fourth carbon budget.
- **Fourth annual report to Parliament.** This will consider emission trends, progress reducing emissions and evidence of the step change – which should be happening by this time.



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