House of Commons

Environmental Audit Committee

# Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill

## Seventh Report of Session 2006–07

*Report, together with formal minutes, oral and written evidence*

*Ordered by The House of Commons*
*to be printed Tuesday 10 July 2007*

**HC 460**
Published on Monday 30 July 2007
by authority of the House of Commons
London: The Stationery Office Limited
£0.00

## The Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

### Current membership

Mr Tim Yeo, MP (*Conservative, South Suffolk*) (Chairman)
Mr Martin Caton, MP (*Labour, Gower*)
Mr Colin Challen, MP (*Labour, Morley and Rothwell*)
Mr David Chaytor, MP (*Labour, Bury North*)
Mr Martin Horwood, MP (*Liberal Democrat, Cheltenham*)
Mr Nick Hurd, MP (*Conservative, Ruislip Northwood*)
Mr Mark Lazarowicz, MP (*Labour/Co-operative, Edinburgh North and Leith*)
Mr Shahid Malik, MP (*Labour, Dewsbury*)
Mr Ian Pearson, MP (*Labour, Dudley South) [ex-officio]*
Mr Mark Pritchard, MP (*Conservative, Wrekin, The*)
Mrs Linda Riordan, MP *(Labour, Halifax)*
Mr Graham Stuart, MP (*Conservative, Beverley & Holderness*)
Jo Swinson, MP *(Liberal Democrat, East Dunbartonshire)*
Dr Desmond Turner, MP (*Labour, Brighton, Kempton*)
Mr Ed Vaizey, MP (*Conservative, Wantage*)
Joan Walley, MP (*Labour, Stoke-on-Trent North*)

### Powers

The constitution and powers are set out in House of Commons Standing Orders, principally Standing Order No. 152A. These are available on the Internet via www.parliament.uk.

### Publication

The Reports and evidence of the Committee are published by The Stationery Office by Order of the House. All publications of the Committee (including press notices) are on the Internet at: www.parliament.uk/parliamentary_committees/environmental_audit_committee.cfm.

A list of Reports of the Committee in the present Parliament is at the back of this volume.

### Committee staff

The current staff of the Committee are: Mike Hennessy (Clerk); Sara Howe (Second Clerk); Richard Douglas (Committee Specialist); Oliver Bennett (Committee Specialist); Louise Smith (Committee Assistant); Caroline McElwee (Secretary); and Jonathan Wright (Senior Office Clerk).

### Contacts

All correspondence should be addressed to The Clerk, Environmental Audit Committee, Committee Office, 7 Millbank, London SW1P 3JA. The telephone number for general inquiries is: 020 7219 6150; the Committee's e-mail address is: eacom@parliament.uk

### References

In the footnotes of this Report, references to oral evidence are indicated by 'Q' followed by the question number. References to written evidence are indicated by page number as in 'Ev12'. number HC *-II

# Contents

## Report

# Summary

1. The Climate Change Programme Review revealed a number of weaknesses in UK climate change policy. It became apparent at the outset of the Review that the UK was going to miss its domestic target to reduce annual carbon emissions by 20% by 2010. Estimations of the impacts of carbon reduction policies had to be revised downwards, while projections of social and economic trends in emissions had to be revised upwards. These revisions to projections had not been done frequently enough, so that by the time Ministers knew the 2010 target was significantly off-track there was little time to introduce new policies to meet it. Assessment of policies, meanwhile, was hampered by not considering different ranges and combinations of potential measures. The revised Climate Change Programme was only rescued, in terms of pushing the forecast progress to 2010 back towards respectability, by Phase II of the EU Emissions Trading Scheme. But this, while it looks likely to be much more effective than Phase I and to deliver some real savings in emissions, continues to raise issues over how much it will cut UK emissions by, and how transparently the Government will report this to Parliament and the public.

2. The measures proposed in the draft Climate Change Bill, alongside other developments such as the creation of the Office of Climate Change and the requirements of the Climate Change and Sustainable Energy Act 2006, are broadly well-designed and far-reaching responses to these issues. Establishing statutory targets to 2020 and 2050, with a rolling series of three five-year emissions budgets extending from 2008, should help to focus on the measures necessary to deliver short, medium, and long term emissions cuts. (Although this would be considerably enhanced if this series of budgets was extended all the way to 2050.) Statutory annual reports to Parliament on emissions trends and the impacts of climate change policies should improve accountability and the quality of the policy response to changes in projections. Most importantly, the creation of an independent Committee on Climate Change should provide external challenge and expert input into Government policy, increasing assurance as to progress and helping to depoliticise the consideration of potentially necessary but controversial measures.

3. The UK cannot, of course, tackle global warming on its own. Ultimately—and sooner rather than later—other countries must adopt similar policy frameworks and levels of effort. However, the UK can do much by leading by example, and the measures proposed in the draft Bill represent a large step forward. As we heard from Climate Change Capital, the rest of the world is watching the UK's "experiment" with an independent Committee on Climate Change, and this could be a model which is replicated in many other countries.

4. At the same time, there are some enormously significant issues which must be resolved. The first is over the size of the targets proposed for 2020 and 2050, and the pathway of emissions reductions to follow in order to limit cumulative emissions from the UK to our fair share. Much evidence suggests that the UK's targets in the draft Bill need to be significantly strengthened, in order to remain consistent with the Government's objective of stabilising atmospheric carbon at a level that provides a reasonable chance of holding global warming to 2°C.

5. A second major issue is over the question of when and on what basis the UK's share of emissions from international aviation and shipping will be included within the targets in the Bill. The longer they remain outside a national carbon reduction regime, the greater the uncertainty over the size and timing of the effort required by all other sectors of the economy. Given that it seems inevitable that international aviation and shipping must be included sooner or later, it makes far better sense to include them as soon as possible.

6. Thirdly, questions remain over the Government's plans for emissions trading. The corollary of the truth that the UK cannot tackle global warming on its own is that all countries must make significant efforts to curb their emissions. Anticipating a future global agreement under which all countries have national emissions targets, we would make the obvious point that in order for a country to have surplus carbon credits to sell, it must first be overachieving its emissions targets. Given the challenges that this might entail as targets become tougher, this raises questions over the extent to which the global supply of such credits will in the future be able to meet demand. The Government has yet explicitly to address this uncertainty in the extent to which the UK can rely on emissions trading in order to meet its targets.

7. We recommend that the Committee on Climate Change gives its verdict on these three issues as soon as practically possible. This would be, not just the most significant contribution it could make in its early life, but also the first test of its independence. The Committee, of course, needs to have a worldly understanding of the implications of climate change policy on the economy and society, and of the barriers and limitations which constrain the implementation of policy in the real world. But the core of all its recommendations must be dictated by the best understanding of climate science. If the Government then decides to reject these recommendations, it would have to clearly set out its reasons, which could then be scrutinised.

8. Finally, neither the introduction of statutory targets nor the creation of the Committee on Climate Change will change the fact that climate change policy will still be implemented by elected Governments—not just Westminster, but local government and the devolved administrations—and still take the form of political decisions. The proposed new framework should, however, exert a very powerful influence on policy-making at all levels of government. But in order for policy to be truly effective, it must win public support. This will require political consensus on the need to achieve carbon reductions, and on the policy measures—or at least the principle behind them—required to deliver these savings. This in turn will require politicians to engage closely with the science of climate change as it develops, and encourage their counterparts in other countries to do the same.

# Introduction

9. **Climate change is on a different scale from any other political challenge. Its potential effects could be both physically and economically devastating. It is not just the size but the timing of these effects that poses such a challenge. The lag between emitting $CO_2$ and experiencing the resulting rise in temperatures means we must take bold action today in the hope of preventing dangerous climate change occurring in the future, the impacts of which could be irreversible. Timing is also an issue given the long term planning and investments required to roll out new technologies and infrastructure, and thereby decarbonise the economy.**

10. **These challenges underline the vital importance of getting the structures and systems which support UK climate change policy right. The UK's carbon reduction framework must be firmly embedded in the structures of government and the economy, so as to provide long term certainty and continuity. This necessitates policy-making which seeks to establish and draws on political consensus, which is based and updated on the best available science, and which draws on a detailed understanding of the impacts of policies on emissions, the economy, and everyday behaviour.**

11. This report is about how the Government:

- sets targets for reductions in UK greenhouse gases;
- assesses progress towards these targets by forecasting the likely levels of future emissions;
- chooses policy instruments to deliver the requisite cuts in emissions; and
- revises its package of climate change policies, in the light of experience as to their effectiveness, and reassessments of the scale and urgency of emissions reductions required.

Or, to put it more pointedly, it asks what lessons can be learned from the UK Climate Change Programme Review, and is the Government successfully addressing them? In particular, is the draft Climate Change Bill adequate for the task?

12. Our starting point for this inquiry was the 2004-06 Climate Change Programme Review (CCPR), and its culmination in the revised UK Climate Change Programme (CCP 2006).[1] By 2004 it had become clear that the package of policies in the Climate Change Programme, formally launched only four years before, was significantly off-track to meet the Government's target of reducing UK carbon emissions by 20% by 2010. The length of time the Review took was a further sign of difficulties in the policy-making process. When the Review's conclusions were published in the revised CCP 2006, this was greeted with

1 HM Government, *Climate Change- The UK Programme 2006*, Cm 6764, March 2006

criticism for the modest nature of many of its proposals, and because even with the addition of new policies the UK was still projected to fall short of the original 20% target.

13. Following publication of the revised Climate Change Programme, we took written evidence, and held evidence sessions in July 2006, on the process and outcomes of the Review. At the time we decided simply to publish this evidence,[2] because we wanted not just to pass judgement on something which was already in the past, but to focus on the lessons which could be learned for the future.

14. We asked the National Audit Office (NAO) to examine aspects of the way in which the CCPR was carried out. This resulted in two reports—*Emissions Projections in the 2006 Climate Change Programme Review* (December 2006) and *Cost-effectiveness Analysis in the 2006 Climate Change Programme Review* (January 2007)—both published on the NAO's website. Having received these reports, we launched an appeal for evidence in January 2007, holding evidence sessions in April and May. We also took the opportunity to ask further questions of the Secretary of State for Environment, and the Government's Chief Scientific Advisor, in June 2007.

15. In March 2007, the Government published and opened public consultation on a draft Climate Change Bill. This contains provisions which would have a significant impact on the Government's climate change policy-making processes. The Bill would put the UK's post-2010 carbon reduction targets into statute, define pathways towards these targets by setting successive five-year carbon budgets, make annual reporting to Parliament of progress towards these targets mandatory, and create an independent Committee on Climate Change to provide advice to and oversight of Government policy. While publication of the draft Bill came too late for it to be commented on in much of the written evidence we received, we examined its proposals closely during evidence hearings, and set out our views on them in this report.

# The Climate Change Programme Review

16. The original Climate Change Programme (CCP 2000) contained a package of policies designed to meet the Government's target of a 20% reduction in UK carbon emissions by 2010. It explained that, to support these policy measures, the Government would:

> develop a framework for the evaluation of the programme which identifies areas where further research is needed and establishes early indicators of progress. Key elements will be evaluated to measure their impact, effects and costs and benefits to

2 Environmental Audit Committee, Oral and Written Evidence, *Climate Change – the UK Programme 2006*, HC 1452

> Government and other stakeholders against the estimates developed for this programme. This work will feed into a formal review of the programme in 2004. [3]

17. This "formal review" was launched in September 2004, with a public consultation beginning in December. The outcome of the Review was originally scheduled to be published in March 2005,[4] though in February that year, the then Economic Secretary informed us the Review was "due to come out in early summer".[5] Publication was delayed ultimately until March 2006, with the reason given on the Defra website that this would "allow the outcome of the [2005] Pre-Budget Report to be taken into account".[6] According to the NAO:

> The most significant reason for the delay was […] that by May 2005, unpublished estimates from the DTI were showing that the carbon gap [i.e., the projected shortfall to the 2010 target] was much larger than expected in projections published at the beginning of the […] Review, while the estimates of savings that could be delivered by proposed new measures would not fill the gap. When Ministers met in summer 2005 they requested further analysis to try to find measures that might bring the UK closer to the target. [7]

18. When the updated Climate Change Programme was published, the combination of updated assessments of trends and the introduction of new policies resulted in a new projection that 2010 would see a reduction in UK carbon emissions of 15-18%, depending on the level at which the UK's National Allocation Plan (NAP) for Phase II of the EU Emissions Trading Scheme would be set. In June the Government announced details of the UK NAP, simultaneously confirming that, according to its latest projections, this would result in a 16.2% reduction in UK $CO_2$ in 2010.

19. Reaction to these announcements in the evidence we took last summer was largely critical. The Sustainable Development Commission did "not believe that the CCP 2006 is a sufficient set of policies to prepare the UK to meet the challenge of climate change."[8] The Energy Saving Trust told us that "more clearly can and should be done by the UK to tackle this challenge."[9] WWF argued that "despite this lengthy process the final document offers few convincing new policies."[10] They pointed out that there were only three new policies in CCP 2006 which offered significant reductions in emissions (which they defined as above

---

3 Department of the Environment, Transport and the Regions, *Climate Change – The UK Programme*, Cm 4913, November 2000, p 127

4 National Audit Office, *Emissions Projections in the 2006 Climate Change Programme Review*, December2006, p 25

5 Environmental Audit Committee, Seventh Report of Session 2004-05, *Pre-Budget 2004 and Budget 2005: Tax, Appraisal and the Environment*, HC 261, Q244

6 In our report on Pre-Budget Report 2005 we expressed our disappointment with the modest environmental content of the PBR, in particular because the Government had said that the Climate Change Programme Review had been delayed to take its policy announcements into account. Environmental Audit Committee, Fourth Report of Session 2005-06, *Pre-Budget 2005: Tax, economic analysis and climate change*, HC 882, para 11

7 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 25

8 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 57

9 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 108

10 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 39

0.2 million tonnes of carbon (MtC)). Overall, they concluded that "we have seen effectively the 20% target by 2010 dropped with no real proper explanation why or what could be done about it".[11] RSPB were especially severe:

> I would say that in the Climate Change Programme Review itself it is hard to identify any good points, in that it recognised that the programme is currently clearly failing to deliver on its targets, but it failed […] to do anything like enough to make sure that we do reach the targets and I am not aware of a single new proposition made in the Climate Change Programme Review which moves us significantly faster or further towards our target than was the case before […][12]

20. Drawing on this evidence, as well as the two National Audit Office reports and the evidence we have taken more recently, in this section we review the strengths and weaknesses in the Climate Change Programme Review processes, concentrating on: the forecasting of future emissions; the use of cost-effectiveness analysis to help to select which policies to pursue; and how joined up or otherwise climate change policy-making is.

## Forecasting future emissions

21. In its report *Emissions Projections in the 2006 Climate Change Programme Review* the National Audit Office answers the question why forecasting matters:

> Because projections aim to tell us whether the UK is on course to meet its international and national targets; and because any gaps between target and projected outcome invite or require a policy response which could entail significant costs to taxpayers, industry and consumers. Emissions projections played a key role in the 2006 Review by identifying the extent to which the UK was likely to achieve its Kyoto and 2010 domestic targets for emissions reductions; highlighting the need to identify new or additional measures to meet the UK's domestic target; and informing decisions about the emissions reductions required from the EU Emissions Trading Scheme.[13]

22. Not only is it important, but, as the NAO notes with some understatement, "forecasting is not straightforward." As it illustrates the point:

> Projections of UK progress towards its 2010 domestic target, made at the time of the first Climate Change Policy in 2000, proved to be optimistic. In 2000, government predicted a 19 per cent reduction in carbon dioxide ($CO_2$) emissions by 2010, but by the time of the 2006 Review, this figure had been almost halved. After the 2006 Review, and the introduction of new measures, projected 2010 reductions were back up to a range of 15-18 per cent depending on the level of emissions reductions to be required under the EU Emissions Trading Scheme; the most stringent level of emissions reductions under consideration for this Scheme was later chosen, which

11 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Q150 Mr King

12 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Q150 Dr Jefferiss

13 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 4

would have corresponded to the 18 per cent reduction. Yet three months later, the projections had been reduced again to 16 per cent.[14]

As the NAO explains, making forecasts of future emissions is a complex process, involving many different variables, and that any changes in input data or modelling assumptions are reflected in changes in the final projections. Thus the NAO also notes that a degree of change in projections is to be expected; however, regarding projections for 2010, made in 2000, the extent to which the forecasts have had to be changed was greater than the Government's modelling teams had expected.

23. Within this modelling process used by the Government there are two main elements.[15] The first is the model the DTI uses to project the future development of energy supply and demand, based on a set of equations that are modelled from historical data. As the NAO notes, "The model was first developed in the 1970s, and has been refined and updated on numerous occasions since."[16] The key assumptions in the DTI model, as summarised by the NAO, are:

- fossil fuel prices—energy prices affect both the demand for energy but also the mix of energy supply;
- economic growth—in part this is because higher incomes lead to more consumption and production as well as more travel, all of which increase emissions. The relative growth of different sectors of the economy is also important. Emissions are likely to increase, for example, if the manufacturing sector grows more quickly than service industries; and
- demographics—increases in population and household growth similarly lead to more consumption, production and travel, and thus higher emissions.[17]

While the DTI model yields results in terms of energy demand, for the purposes of emissions forecasting these projections of future energy consumption are converted into $CO_2$ emissions by using known emissions factors relating to different fuels.[18]

24. The second main contribution to UK emissions forecasts is the analysis of the projected impacts of the Government's carbon reduction policies. These are estimated and added to the results of the DTI model in a number of different ways. Those which would have a direct effect on future energy demand—for instance, the Climate Change Levy, effectively an energy tax—are directly incorporated within the DTI model's calculations. The impact

14 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 4

15 The other main elements in the forecasting models are land-use changes, and non-$CO_2$ emissions. As the NAO describes the first of these: "Planting trees, preserving forests, and some cultivation practices increase soil carbon, and thus increase the size of carbon sinks; while the opposite leads to more emissions. The land-use model projects the effect of these changes based on information from the Countryside Survey". Of the second it reports: "Non-CO2 emissions are modelled by consultants (Entec) working for Defra, using a methodology similar to that used to compile the Greenhouse Gas Inventory of historic and current emissions". NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 7

16 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 14

17 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 17

18 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 11

of others is estimated on an individual basis: "For example, the effect of a policy to replace household boilers with more efficient ones is calculated from the 'bottom-up' analysis based on the number of existing boilers and the estimated numbers that would be replaced. The overall amount of energy saved is then subtracted from the forecast energy demand within the DTI model."[19] Finally, the impact of the UK's involvement in the EU Emissions Trading Scheme is added, the Government assuming its impact as being the difference between the cap imposed on the emissions of participating firms under the UK National Allocation Plan and an estimate of what those emissions would otherwise have grown to be under "Business As Usual" conditions without a cap.[20]

25. Both elements of this emissions forecasting model have been subject to significant revision since 2000. For example, the DTI's Energy Paper 68, the projections which underpinned the original Climate Change Programme,[21] forecast that oil prices would decline from their then level of over $30 per barrel (in 1999 prices); and that this, since movements in gas prices tend to be linked to those of oil, would further incentivise a shift from higher carbon coal to lower carbon gas in the power sector, and thus reduce UK emissions. To allow for uncertainties in the future movement of oil prices, Energy Paper 68 did offer two scenarios, including a "high price" scenario, but even this only envisaged oil selling for $20 per barrel (1999 prices) by 2005, and remaining at this level all the way to 2020.[22] In reality, of course, prices remained high and went higher; the average price of a barrel of brent crude in 2005 was $54.50, or $45.75 in 1999 prices.[23] When the DTI published its Updated Emissions Projections in November 2004, near the beginning of the Climate Change Programme Review, the oil price projection for 2010 had been revised to $23.20 in real 2003 prices, or $20.75 in 1999 prices.[24] Towards the end of the CCPR, the DTI's next set of Updated Emissions Projections, published in February 2006, raised this central forecast oil price in 2010 to $35 in 2004 prices, or $30.40 in 1999 prices;[25] and stated that, by incentivising a switch to coal, this would increase the forecast of carbon emissions in 2010 by 1.7MtC.[26] In July 2006, the DTI published another set of updated projections, this time forecasting a central oil price in 2010 of $40 per barrel in 2005 prices, or $37.75 in 1999 prices,[27] with a resultant increase to 2010 emissions of another 0.9MtC above the

19 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 11

20 The Government has decided to treat this estimated carbon saving from the EU ETS as counting as a reduction wholly in UK emissions, even though, this being a trading scheme, it is impossible to be certain of the extent to which reductions will actually take place in this country. That is, UK installations can meet their individual carbon caps either by cutting their own emissions or by buying surplus carbon allowances which could come from any countries involved in the Scheme. Buying surplus allowances would, at least in theory, fund emissions reductions which might take place in any country within or linked to the Scheme.

21 Department of Trade and Industry, *Energy Paper 68: energy projections for the UK*, 2000

22 DTI, *Energy Paper 68*, Table 3.4, p 19l

23 Price figures for 2005, and all price deflators to convert other figures into 1999 prices, from the *BP Statistical Review of World Energy*, June 2006.

24 DTI, *Updated Emissions Projections – Final projections to inform the National Allocation Plan*, November 2004, Annex 2.a, p 15

25 DTI, *Updated Emissions Projections 21*, February 2006, Table 5, p 15

26 DTI, *Updated Emissions Projections 21*, "Changes in relative fuel prices in power stations", Annex C, p 62

27 DTI, *Updated Emissions Projections 26*, July 2006, Table 2, p 3

February projection.[28] Overall, Energy Paper 28 had observed that $CO_2$ emissions in 2000 were increasing over 1999 levels, but concluded: "The assessment made in compiling this report is that in overall terms emissions in the current year are most likely to be a temporary blip and emissions are expected to fall through to 2005."[29] In fact, aside from 2002, annual emissions of carbon dioxide have been higher in every year since 2000.[30]

26. With regard to the impacts of the Government's carbon saving policies, over the course of the CCPR there was a consistent pattern of downgrading projections of their impacts in 2010 (**Figure 1**). For example, in the original CCP 2000 it was projected that the Voluntary Agreement package to reduce the average emissions of new cars would deliver savings in 2010 of 4MtC, the UK Emissions Trading Scheme[31] would deliver 2MtC, and "Action to encourage replacement of community heating systems" would contribute a saving of 0.9MtC. By the publication of CCP 2006 these projected savings had been reduced to 2.3MtC, 0.3MtC, and nothing, respectively. While the impact of some policies was revised upwards—for instance, savings from Climate Change Agreements were projected to go from 2.5 to 2.9MtC—the net effect was to reduce the expected impact of measures in CCP 2000 from a range of around 20-23MtC down to around 17MtC (a decrease of some 16-26%.)[32] The reduced impact of these measures, plus the upwards assessment of social and economic emissions trends, meant that whereas CCP 2000 had originally been forecast to help deliver emissions cuts of 19% in 2010, by July 2006, and taking these original measures on their own, this had been revised down to just an 8.7% reduction. With the new measures in the revised 2006 CCP, this projection was improved, but only to 11.2%. It took the final addition of the UK's National Allocation Plan for Phase II of the EU ETS to bring the forecasts for the 2010 target to a 16.2% reduction, and thus a more respectable outcome against the original 20% target. In a recent report, however, we highlighted our concerns that the contribution of the EU ETS might not in practice be as large as announced, that these savings would not all be taking place within the UK, and that the Government might be failing to make these points adequately clear—with risks to public perception of the need for further domestic actions to reduce $CO_2$ within the UK.[33]

28 DTI, *Updated Emissions Projections 26*, Table 3, "Relative fuel prices / FGD", p 5

29 DTI, *Energy Paper 68*, para 7.2

30 Department for Environment, Food and Rural Affairs, "Estimated emissions of carbon dioxide (CO2) by UNECE source category, type of fuel and end user: 1970 – 2006", http://www.defra.gov.uk/environment/statistics/globatmos/download/xls/gafg05.xls

31 The UK Emissions Trading Scheme ran from April 2002 to December 2006. CCP 2006 described the Scheme as having three main aims: to achieve cost-effective emissions reductions, to enable "learning by doing" ahead of international emissions trading, and to establish the City of London as a centre for emissions trading.

32 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 26

33 Environmental Audit Committee, Second Report of Session 2006-07, *The EU Emissions Trading Scheme: Lessons for the Future*, HC 70, paras 60-1

**Figure 1 Revisions in the Climate Change Programme Review to forecasts of carbon reduction policies from the Climate Change Programme 2000**

| Carbon dioxide emissions savings in 2010 (MtC) | | | | |
|---|---|---|---|---|
| | Evaluation in 2000 | | Evaluation in 2006 | |
| | Policy | Sector total | Policy | Sector total |
| UK Emissions Trading Scheme | 2 | | 0.3 | |
| Carbon Trust | 0.5 | | 1.1 | |
| Building Regulations 2002 | 1.3 | | 0.4 | |
| Building Regulations 2005 | | | 0.2 | |
| Climate Change Agreements | 2.5 | | 2.9 | |
| **Business total[2]** | | **6.3** | | **4.9** |
| EEC 2002-11 (including Decent Homes) | 2.6-3.7 | | 1.6 | |
| Building Regulations 2002 | | | 0.7 | |
| Building Regulations 2006 including 2005 condensing boilers update | | | 0.8 | |
| Warm Front and fuel poverty programmes | 0.2 | | 0.4 | |
| Market Transformation including appliance standards and labelling | 0.2-0.4 | | 0.2 | |
| Action to encourage replacement of community heating systems | 0.9 | | 0.0 | |
| **Domestic total** | | **3.9-5.2** | | **3.7** |
| Renewables Obligation | 2.5 | | 2.5 | |
| **Energy supply total** | | **2.5** | | **2.5** |
| **Agriculture and forestry total** | | **0.6** | | **0.7** |
| **Public sector (including NHS and schools) total** | | **0.5** | | **0.2** |
| **Scottish Executive total** | | **0.1** | | |
| Voluntary Agreement package (including company car tax and vehicle excise duty) | 4 | | 2.3 | |
| Wider Transport measures | 1.6 | | 0.8 | |
| Sustainable distribution (Scotland) | 0.1 | | 0.1 | |
| Fuel duty escalator | 1-2.5 | | 1.9 | |
| **Transport total** | | **6.7-8.2** | | **5.1** |
| **Waste management total** | | | | **0.2** |
| | | | | |
| **Total[2]** | **20.6-23.4[3]** | | | **17.3[3]** |

*Notes:*

*1: National Audit Office, Emissions Projections in the 2006 Climate Change Programme Review, Appendix 1. Drawn from Synthesis of Climate Change Policy Evaluations, April 2006, Department for Environment, Food and Rural Affairs*

*2: The totals shown here do not include the estimated carbon savings from the Climate Change Levy (CCL).This is because DTI incorporate the CCL into their model baseline and do not publish a separate analysis of the effect of this individual policy measure in their 2006 projections. The estimated savings from the CCL given in the Synthesis of Climate Change Policy Evaluations document are taken from an evaluation carried out by Cambridge Econometrics. This estimate is higher than that included in DTI's projections because it assumes an "announcement effect" not replicated in the DTI model. The totals shown here also do not include the estimated effects of policies on non-CO2 emissions, because this was not assessed on a policy-by policy basis in 2000.*

*3: Numbers do not sum due to rounding*

27. The slipping of progress towards the 2010 target was identified by the Environmental Audit Committee early on. In its report on *Pre-Budget 2004 and Budget 2005*, published in April 2005, our predecessor Committee warned:

> The latest data confirms what we knew already—that the Government is way off course in terms of meeting its 20% carbon reduction target […]. We pointed this out in our *Pre-Budget Report 2002* (March 2003), while in our report on energy policy, *A Sustainable Energy Policy? Renewables and the PIU review*, published as early as July 2002, we flagged up our concern that increases in the use of coal-fired generation had led to electricity sector emissions rising rather than falling, in direct contradiction to the predictions contained in DTI's EP68 energy forecast. […]
>
> As we pointed out last year in our report *Budget 2004 and Energy* (August 2004), the DTI's latest energy forecasts suggest that emissions will only fall to 141 MtC—leaving a substantial gap of 9 MtC against the 2010 target of 132MtC. This forecast not only takes account of all policy measures both current and proposed but also assumes that these policies will deliver their full expected benefits. We do not necessarily share such optimism […]
>
> It is distressing that it has taken so long for the Government to acknowledge that its Climate Change strategy is so far off course […].[34]

28. Reviewing the forecasting processes used by the Government in the CCPR, the National Audit Office made a number of findings, some positive, some more critical. On the positive side, it found that:

- the UK's approach to projections received a largely positive assessment in 2003 from a team acting on behalf of the United Nations;[35]

34 Environmental Audit Committee, Seventh Report of 2004-05, *Pre-Budget 2004 and Budget 2005: Tax, Appraisal and the Environment*, HC 261, paras 99-100, 102

35 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, pp 12-13

- the DTI model is subject to expert review, for instance through the Projections Advisory Group, which meets periodically and brings together the DTI modelling team, officials from other Government departments, representatives from industry, and a representative from an environmental NGO;[36]

- key assumptions in the CCPR forecasts—for instance, on fossil fuel prices, economic growth, and demographics—were broadly in line with those used by other relevant organisations, such as Cambridge Econometrics;[37] and

- the Government had taken steps to make the projections used in CCP 2006 more robust than those in CCP 2000, involving more sceptical scrutiny of the emissions reductions to be expected from policy measures, more comprehensive peer review of model data and assumptions, and more detailed analysis of uncertainty.[38]

On a more critical note, the NAO concluded that:

- while the Government recognised in 2000 that emissions in 2010 might be as much as 27% or as little as 11% down on 1990 levels, by January 2006 it had revised its central 2010 projection down to around only 10.6% below 1990 levels—below the lowest boundary of uncertainty it had previously allowed for;[39]

- there was little explicit consideration of optimism or pessimism bias in calculations as to policies' effectiveness;[40]

- peer review of the DTI model could be improved, and in particular more could be done to make explicit how and why projections have changed and to explain how projections compare with historical outcome data, perhaps borrowing from the example of the Bank of England's Monetary Policy Committee;[41]

- the CCPR came too late to allow a full and cost-effective response to the realisation that the UK would fall well short of its 2010 target; earlier and more regular reviews of progress against targets, and trajectories towards them, would thus be of assistance;[42] and

- the Government's projections do not, of course, give a complete picture of current emissions or future trends because they exclude the UK's share of emissions from international aviation and shipping.

---

36 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 14

37 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, pp 17-19

38 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 19, p 14, pp 21-2

39 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 17; DTI, *UEP 21*, para 6, p 8. Note: this projection of a 10.6% reduction in UK carbon emissions was based on existing measures only; i.e., before the new measures of CCP 2006 and the UK's Second Phase NAP for the EU ETS were included.

40 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, January 2007, paras 33-4

41 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 15. The NAO explains how the MPC publishes explicit consideration of its forecasting record which compares outturn against forecasts "to assess how well the MPC's projections have served as a guide to outturns".

42 NAO, *Emissions Projections in the 2006 Climate Change Programme Review*, p 6

29. The Energy Saving Trust (EST) called for the Government to develop a new and bespoke model, specifically designed to model changes in carbon emissions, rather than simply adapting the DTI's existing energy model.[43] EEF, the manufacturers' organisation, called for the Government to make more of the data and assumptions it uses to project future emissions—including the entire computer model into which these data and assumptions are fed—publicly available, so that other bodies "can at least to a certain extent replicate what is going on and test the assumptions behind that model."[44] This was seconded, in our recent inquiry into Government structures and climate change policy, by Mr Nick Mabey, Chief Executive of the environmental think tank E3G. Mr Mabey described the forecasting model used by the Department for Transport as "broken", and said that the DTI's model was not even available for use by other Departments, let alone the public. He compared this to the way in which the computer model used by the Bank of England's Monetary Policy Committee, in their interest rate calculations, was publicly available.[45]

30. EEF also called for the Government to incorporate into its model a broader range of potential future prices, since "Obviously the range and the modelling that was done in […] 2000 did not really capture what happened to gas prices."[46] We note that last year WWF told us, "there are good reasons to believe that the DTI's draft emission projections which underpin the revised programme may be too optimistic. For example, the DTI assumes future gas prices which are considerably lower than expected by many independent experts."[47] We also note the evidence we received last year from Chris Skrebowski, editor of the journal *Petroleum Review*. Mr Skrebowski told us he thought the central fossil fuel price forecasts in the DTI's Updated Emissions Projections 21, published in February 2006, were all too low.[48] This does not, of course, mean that such views are correct; but it does illustrate the fact that there are important minority views outside the consensus which Government forecasting should take into account.

31. In the form of a joint memorandum from Defra and DTI, and oral evidence from the Office of Climate Change (OCC), the Government gave a robust defence of its forecasting processes. For example, in addition to the largely positive assessment given by a UN team in 2003, the Government drew our attention to the fact that the "2007 UNFCCC Review of the UK's Fourth National Communication (which covers the 2006 Climate Change Programme) commended the UK for coherent and consistent reporting."[49] Moreover, the

43 Q144

44 Q30

45 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 19 June 2007, HC ( 2006-07) 740, Q55

46 Q30

47 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 39

48 Environmental Audit Committee, Ninth Report of Session 2005-06, *Reducing Carbon Emissions from Transport*, HC 981-II, Ev 377

49 Ev113

OCC argued strongly that the Government already consults widely on and puts an amount of data and assumptions into the public domain.[50]

32. **Forecasting the future rate of an economy's carbon emissions is a complex business, fraught with inescapable uncertainties. As the review by the National Audit Office shows, the UK's forecasting processes have received approval from reviewers acting on behalf of the UN, and have been in line with assumptions and projections made by external bodies. However, while the NAO explains that a degree of change in projections is to be expected, it also notes that in this case the extent of change was greater than the Government modelling teams had expected. Naturally, there should be continual efforts to improve the models on which projections rely. But it also underlines the need for the Government to treat forecasts for future years with caution, and ensure they are not presented—either to decision-makers within the Government, or to the public—with undue certainty, as though they were concrete descriptions of the future. This applies especially to emissions forecasts which project many years into the future, such as to 2050.**

33. **We consider it unacceptable that it took so long after 2000 for Government projections to catch up with reality. As late as the 2003 Energy White Paper, the Government was still projecting that the 2010 target would be met in full.[51] The delay in producing more accurate forecasts severely retarded and impaired the ability of the Climate Change Programme Review to come up with policies that would get the 2010 target back on track. The Government should perform much more frequent revisions to emissions forecasts.**

34. **Even if many of the Government's key forecasting assumptions were broadly in line with those made by external organisations, the fact that the movement of oil and gas prices in recent years has repeatedly been higher than forecast demonstrates that the consensus view may sometimes be wrong. The Government's forecasting model should consider a wider range of assumptions and scenarios, especially regarding fossil fuel prices.**

35. **The Government does open up the assumptions it uses in its forecasting model to consultation and review. However, while there may be external input into this modelling, its inner workings remain opaque to the outside world. The Government should make its forecasting models publicly available as open source software. This would allow external analysts to test the Government's forecasts by inputting their own projected values for fuel prices, economic growth, energy demand from households, and so on.**

36. **The Energy Saving Trust has called for the Government to develop a new and bespoke model to forecast carbon emissions, rather than simply adapt the DTI's energy demand model. We recommend that the Government should now do so.**

---

50 Qq 123-5

51 DTI, *Our Energy Future – Creating a Low Carbon Economy*, Energy White Paper, Cm 5761, February 2003, p 25

37. **We recommend that the Government should admit the uncertainty range of its emissions projections. It should also regularly publish a review of its previous projections, comparing them against outturn data and latest projections, and analyse what it got right, what it got wrong, why it did so, and what lessons it has learned. These reviews should be consistent in format and categories of data they present, so that it is easy to compare one year with another.** While the DTI currently publishes some of this information in its Updated Emissions Projections papers, these are not published regularly or frequently enough, and nor is the information they contain set out in a consistent, and thus comparable, manner.

38. **The downward revision, by some 16-26%, of the expected impact of carbon reduction policies in the 2000 Climate Change Programme shows, first of all, that the Government must eliminate "optimism bias" from its initial design of climate change policies. Secondly, it highlights the risks inherent in the Government's current approach, whereby it seeks to implement policies which will deliver only just enough carbon savings to span the gap between a "Business As Usual" projection of where emissions are going to be in a certain year and a target level of emissions for that year. Government forecasts of "BAU" emissions have so far consistently been too low, while its forecasts of the impact of carbon reduction policies have consistently been too high. The moral is that the Government should err on the side of caution, and aim to overachieve its targets.**

## Cost-effectiveness analysis

39. As the NAO explains, in the Climate Change Programme Review the Government used cost-effectiveness analysis to evaluate existing measures and appraise possible new policies. This analysis was used, alongside other considerations such as impacts on security of supply and fuel poverty, to inform the Government's decisions as to which policy measures to adopt in CCP 2006.

40. The NAO describes the method of cost-effectiveness analysis (CEA) used as follows:

> As its name suggests, CEA summarises the costs (and benefits) associated with achieving a key policy goal. All costs and benefits are brought to present day values using standard discounting techniques. To allow comparison between policies, a common unit of effectiveness must be chosen (for example, tonnes of carbon emissions saved). Cost-effectiveness is then expressed as the net benefit or cost per unit of effectiveness (in this case, benefit or cost per tonne of carbon emissions saved):
>
> $$\textbf{Indicator} = \frac{\textbf{benefits} - \textbf{costs}}{\textbf{unit of effectiveness}}$$

> Positive indicators represent a net benefit, negative ones a net cost. […] For example, [according to CCP 2006] the Warm Front scheme has a net benefit of £420 per tonne; in contrast community heating systems have a net cost of £20 per tonne.[52]

41. The NAO's report found that cost-effectiveness analysis is "an appropriate tool to appraise policies"—drawing attention to its wide use elsewhere, such as in the IPCC's 2001 report on Climate Change Mitigation[53]—and that as practised in the CCPR it "produced results which were reliable enough to compare policies".[54] The NAO found that the CEA used in the CCPR was more comprehensive and consistent than that used in the original CCP 2000, using standardised guidelines and quantifying more costs and benefits.[55] While the NAO was clear that CEA is necessarily dependent on many assumptions and subject to significant uncertainties,[56] it also reported: "We were satisfied that the evaluations we examined were based on reasonable assumptions and a fair consideration of uncertainty."[57] This conclusion was reinforced by the quality assurance processes used in the Review, including the use of external consultants to assist in the performance of peer review and the consistent synthesising of evaluations. The NAO stated, for instance: "Our review of the minutes of […] meetings suggests that peer reviewers were active in questioning the work done by analysts."[58] Overall, the NAO concluded:

> Officials expressed confidence in the reliability of the cost-effectiveness figures produced by the 2006 Review: the processes described above are at least as rigorous as that used in policy-making elsewhere in government. The use of guidelines, external consultants, sensitivity analysis and quality assurance all add weight to this view. The UK methodology also compares favourably with other countries we looked at.[59]

42. At the same time, the NAO also highlighted a number of potential weaknesses, both in the particular way in which the Government applied cost-effectiveness analysis in the CCPR, and in CEA in principle. For example:

- The focus on the 2010 target meant that policies which would not be in place in time to contribute towards the 2010 target were not considered, even though they could

52 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 12

53 Intergovernmental Panel on Climate Change, *Climate Change 2001: Mitigation – Contribution of Working Group III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*(Cambridge, 2001)

54 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 5

55 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 15

56 As the NAO states: "Even where all assumptions appear to be reasonable, significant uncertainties remain because: estimations are open to bias; there are always uncertainties in predicting the future; there are additional uncertainties when nonmonetary costs and benefits are quantified; and there is usually a greater degree of uncertainty about new policies compared with existing ones." NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 17

57 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 6

58 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 19

59 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 20

contribute to cuts in emissions by 2020 or 2050. (Such policy options included the proposal to establish a supply network of hydrogen fuel stations.)[60]

- The nature of the Review also meant that other types of policy were not considered. Examples included ideas whose costs and benefits were seen as being too difficult to quantify, at least within the timeframe of the Review (such as suggestions to promote local food economies and curtail long-distance transportation of food), ideas which required further analysis that was not possible within the resource and time constraints of the Review (such as measures to enhance the energy performance of buildings and extensions to the Smarter Choices and Sustainable Distribution transport programmes), and ideas that would be technically or administratively impractical (such as legislation preventing businesses leaving lights or appliances on 24 hours a day). The NAO also reported simply that: "Some ideas for new fiscal policies were ruled out by ministers at an early stage, such as linking stamp duty to energy efficiency in homes." (This particular idea was subsequently adopted in Pre-Budget 2006.)[61]

- Most appraisals of new ideas or ways to expand policies were based on a single set of assumptions as to how that policy would be implemented: "For most polices certain variables (the scale of the policy, amount of funding or the type of intervention) were set or assumed before the bulk of the analysis was performed." Thus, for example, when the review teams came to evaluate the cost-effectiveness of Climate Change Agreements they did so only on the basis of existing energy saving targets and industrial sectors covered by the policy. As the NAO stated: "This may have denied policy-makers the ability to determine the optimal level of intervention for each policy."[62]

We would infer from this latter point that it is possible that some policy options which were discarded might conceivably have been adopted, had they instead been presented along with a range of different impacts corresponding to different levels of funding, coverage, or targets.

43. Beyond this, the NAO report discussed some of the limitations which apply to cost-effectiveness analysis in principle. First, by reporting the average cost per unit of benefit over the lifetime of the policy, the single figure which is the outcome of cost-effectiveness analysis conceals the fact that costs may increase over time (e.g., as the most efficient ways of meeting the goal are achieved), or may decrease over time (e.g., as technological know-how increases). This necessarily means that their ranking by cost-effectiveness will change over time. Second, CEA does not reflect the potential scale or timing of a policy effect (i.e., the *total amount* of carbon saved or *how soon* carbon reductions are made—the most important factors in climate change policy). The NAO therefore recommended: "For this reason, the results of CEA should be reviewed alongside forecasts of each policy's total potential to reduce emissions and the time in which these reductions could be achieved."

60 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 21

61 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 21

62 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 6

However, the NAO also stated: "we were satisfied that departments did take account of these limitations, and that their use of the cost-effectiveness indicators was appropriate."[63]

44. Interestingly, the NAO found that, although the policies selected by the Climate Change Policy Review generally corresponded to those which performed well in the cost-effectiveness analysis, this was not always the case. The NAO's report highlighted two major examples of where the Government endorsed policies in CCP 2006 even though their cost-effectiveness was rated as poor:

> The Renewables Obligation (net cost £175 per tonne) was continued because of its wider benefit in supporting the UK's security of energy supply. No monetary value was placed on security of supply, and DTI considered that the policy was more cost-effective than its indicator suggested.
>
> The Voluntary Agreements Package with car manufacturers (net cost £365 per tonne) was continued and will be extended because it is a policy where technology costs were expected to decline over time, bringing the lifetime cost down. It was considered to promote innovation in low-carbon transport technology: an impact which could not be quantified.[64]

Additionally, there was at least one significant case in which a policy which performed very well in cost-effectiveness analysis was not adopted by the Government: the fuel duty escalator (FDE). Figures in the NAO report reveal this to have been adjudged to have had a positive lifetime net present value to the UK of some £17 billion, leading to a net financial benefit for the country of £250 for every tonne of carbon saved; its cost-effectiveness ranking higher, for instance, than the Climate Change Levy and Agreements (together leading to a benefit of £190 per tonne of carbon), the work of the Carbon Trust (£120/tC), and woodlands planting and grants in Scotland and England (together, £90/tC).[65]

45. This raises some questions, both about the robustness of the CEA process itself, and about the way in which it was used in this policy-making process. Certainly, it is striking that so large a benefit as the impact of the Renewables Obligation on UK fuel security could not successfully be factored into its cost-effectiveness evaluation. To aid external understanding of what went into these evaluations, in one place the NAO report featured the individual monetised factors that contributed to the evaluation of another policy, the successor to the Voluntary Agreement package to reduce the average emissions of new cars (reproduced in **Figure 2**). We have not in our inquiry been able to look into such calculations in detail, nor examine the Government teams which performed them. However, we would simply observe that the "Costs and benefits of a successor to the Voluntary Agreement package" depend on a series of heroic and possibly highly questionable calculations. In particular, we wonder about the merits of the monetised valuations which the Government has calculated for such intangibles as "The benefit

63 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 14

64 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 24

65 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, Table 14, pp 26-7

society receives from driving more (£0.69 billion)" and "The benefit society receives from increased use of in-car appliances such as air conditioning (£0.17 billion)".

**Figure 2: Costs and benefits of a successor to the Voluntary Agreement package**

| Costs | Benefits |
|---|---|
| • Costs to business of adopting new technologies (£9.67bn). | • Value of the carbon saved, based on the social cost of carbon (£1.32bn). |
| • Costs to business and consumers of increased congestion, caused by the fact that consumers are expected to drive more as driving becomes cheaper (£7.96bn). | • Savings to consumers, because they will be purchasing less fuel (£3.82bn). This figure takes account of the fact that consumers are expected to drive more as driving becomes cheaper. |
| • Costs of accidents, which will rise in number along with increased congestion. | • The benefit society receives from driving more (£0.69bn). |
| • Air quality will worsen marginally, because consumers are expected to drive more as the cost per km of driving falls. | • The benefit society receives from increased use of in-car appliances such as air conditioning (£0.17bn). |

*Note: Figures are net present values calculated over the lifetime of the policy*

*Source: National Audit Office, Cost-Effectiveness Analysis in the 2006 Climate Change Programme, Figure 8. Drawn from Department for Transport (2005)*

46. **Many of the technical aspects of the cost-effectiveness analysis (CEA) used in the Climate Change Programme Review were done well. As the NAO noted, CEA was appropriate to be used to help decide among different policy options, its use was more consistent and comprehensive than in the original CCP 2000, the assumptions used in it were in line with the analysis of external organisations and their uncertainties recognised, and in the Review it produced evaluations which were reliable enough for different policies to be compared with each other.**

47. **At the same time, there were some weaknesses in the way CEA was used. Because the Review was focused on meeting the short term target of 2010, it did not consider policies which would have a bigger but longer term impact. This represents a missed opportunity to advance UK climate change policy, and, to some extent, a waste of the Review teams and their resources. Some options were not appraised fully or at all because the Review itself was running short of time and resources. This lack of time was compounded by the delay in the Government's identification of how far short of the 2010 target it was projected to fall, and thus how many more policy options were needed.**

48. The problems caused by the delay in analysing the shortfall of progress were, for instance, illustrated to us by the SDC, who were involved in suggesting and evaluating policy options in the Review process, and who told us last year:

> It is increasingly clear that current policies on climate change are not delivering absolute cuts in carbon emissions. This is highlighted by the fact that the 10 MtC projected shortfall from the 2010 target at the beginning of the Review process became 15 MtC by the time the revised CCP was published in March 2006. […] This presents problems when undertaking an analysis of the CCP 2006, as many of the measures we originally recommended are now insufficient to deliver the carbon reductions required.[66]

Such problems also led Mr Tetlow of the Business Council for Sustainable Development-UK (BCSD-UK) give a verdict that the Review

> did not work because it simply took too long. It took too long because the relevant ministries were caught out, realising they were not achieving the objectives, and it has had to become not just a review but rather setting new policy aspects for achieving the 2010 target. It took probably a year longer than it should have done.[67]

And Nick Mabey, now Chief Executive of E3G but during the CCPR at the Prime Minister's Strategy Unit, told us:

> You would not manage a sweet shop using the systems we manage. When we asked to get a read out of how well we were doing, it took three or four months to get the data back from the departments. […] When the data came, we said, "What is the risk around this? What is the range of likely outcomes of these different programmes?" and they went back again, made up some numbers and came back. As somebody who worked in the construction industry, the engineering industry, this is just so poor, I cannot believe it.[68]

**This highlights the need for annual reassessments of progress towards short, medium, and long term emissions forecasts and the carbon reduction policies that can help us achieve them.**

49. **Future use of CEA should ensure that it focuses on different scales of policy implementation, across different timescales, thereby enabling policy-makers to better choose different ways and combinations of implementing certain policies. There should also be more public scrutiny of and debate about the assumptions and calculations which result in CEA indicators for each policy. Most importantly,** the Government must guard against CEA becoming the tail that wags the dog of climate policy. As the RSPB observed to us:

> the 2010 target could have been achieved, if the Government had given a clear signal to those engaged in the review, that they should find the most cost-effective policy mix *to achieve the outcome*. Instead, different work strands appraised policies singly, using different methodologies, and rejected many on the grounds of inadequate cost

66 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 56

67 Q7

68 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 19 June 2007, HC ( 2006-07) 740, Q36

> effectiveness, political difficulties, uncertain outcomes, or limited carbon gains, leaving a 'carbon gap' which could not later be filled. These problems must be addressed in future.[69]

**Emissions targets should be determined by climate science, and CEA only used to help achieve these targets in the most cost-effective manner; rather than in effect setting targets itself, through being used to determine what level of emissions cuts is "affordable".**

50. **The overruling of the CEA indicators in the case of major policies such as the Renewables Obligation and fuel duty escalator suggests that the CCPR was still significantly guided by broader political considerations.** Ruth Davis of RSPB commented: "I found the National Audit Office report very interesting. There is one illustrative story in there about the dismissal of the idea of introducing tighter building regulations without any substantive cost effective analysis, on the basis that it looked like it was essentially politically unpalatable."[70] (A proposal for the introduction of Zero Carbon Homes was subsequently announced in Pre-Budget 2006.) We might also here refer to evidence we took from the Secretary of State for Transport and his officials last summer, on the evaluation and rejection within the CCPR of proposals either rigorously to enforce the current motorway speed limit or to bring it down from 70 to 60 miles per hour. In explaining why these proposals were rejected the Department referred to the expected extra policing costs and the public controversy which attaches to speed cameras.[71] **It is not necessarily wrong for the Government to overrule the recommendations generated by a particular methodology such as CEA; Governments must always take wider political considerations into account. What we recommend is that the Government is braver about the extent of action on climate change that is politically possible. We hope the Government is already moving in this direction, given that having excluded tighter building regulations from the CCPR, it subsequently introduced a policy for Zero Carbon Homes in Pre-Budget 2006. In future, the Government should be bolder about consulting on potential climate change policy options, to test public opinion on their acceptability, and encourage public debate on alternative measures.**

### *Social Cost of Carbon*

51. The NAO found that the Climate Change Programme Review avoided relying on the Social Cost of Carbon (SCC) to evaluate the costs and benefits of different policy options:

> In theory, at least, the indicator could be used to assess whether society will be better off if the policy is undertaken (if the cost per tonne is lower than the primary benefit —i.e. the social cost of carbon). So if a social cost of carbon of £70 per tonne is accepted, a policy that reduces emissions by one tonne at a cost of more than £70 would be rejected. However, the social cost of carbon has been criticised as being too

69 Ev 46

70 Q156

71 Environmental Audit Committee, *Reducing Carbon Emissions from Transport*, Qq 686-695

uncertain to provide the basis of policy decision-making. It has been argued that monetisation of climate change damage, such as loss of ecosystems and large-scale population displacement, cannot be assessed because an upper limit of the cost is so difficult to establish. Recent research carried out on behalf of Defra concluded that a single monetary estimate of the social cost of carbon should be avoided for policy decision-making. In practice, the 2006 Review placed little outright or explicit reliance on the social cost of carbon to inform policy choices: the data was just part of the information available to policy makers. Policies were not selected purely by comparison with the social cost of carbon, although policies which came at very significant cost were rejected.[72]

52. **We have queried the Government's use of the Social Cost of Carbon (SCC) in a number of inquiries. We were interested to learn that, as the NAO put it, the cost-effectiveness analysis in the CCPR "sensibly excluded the social cost of carbon", and that one of the main reasons why the Review opted to use cost-effectiveness analysis in the first place was "because it is not reliant on a firm valuation of the social cost of carbon".[73] We conclude from this that the Government has doubts as to the reliability of the SCC in policy-making. In the light of this, the Government should explain clearly how it intends to use SCC in the future.**

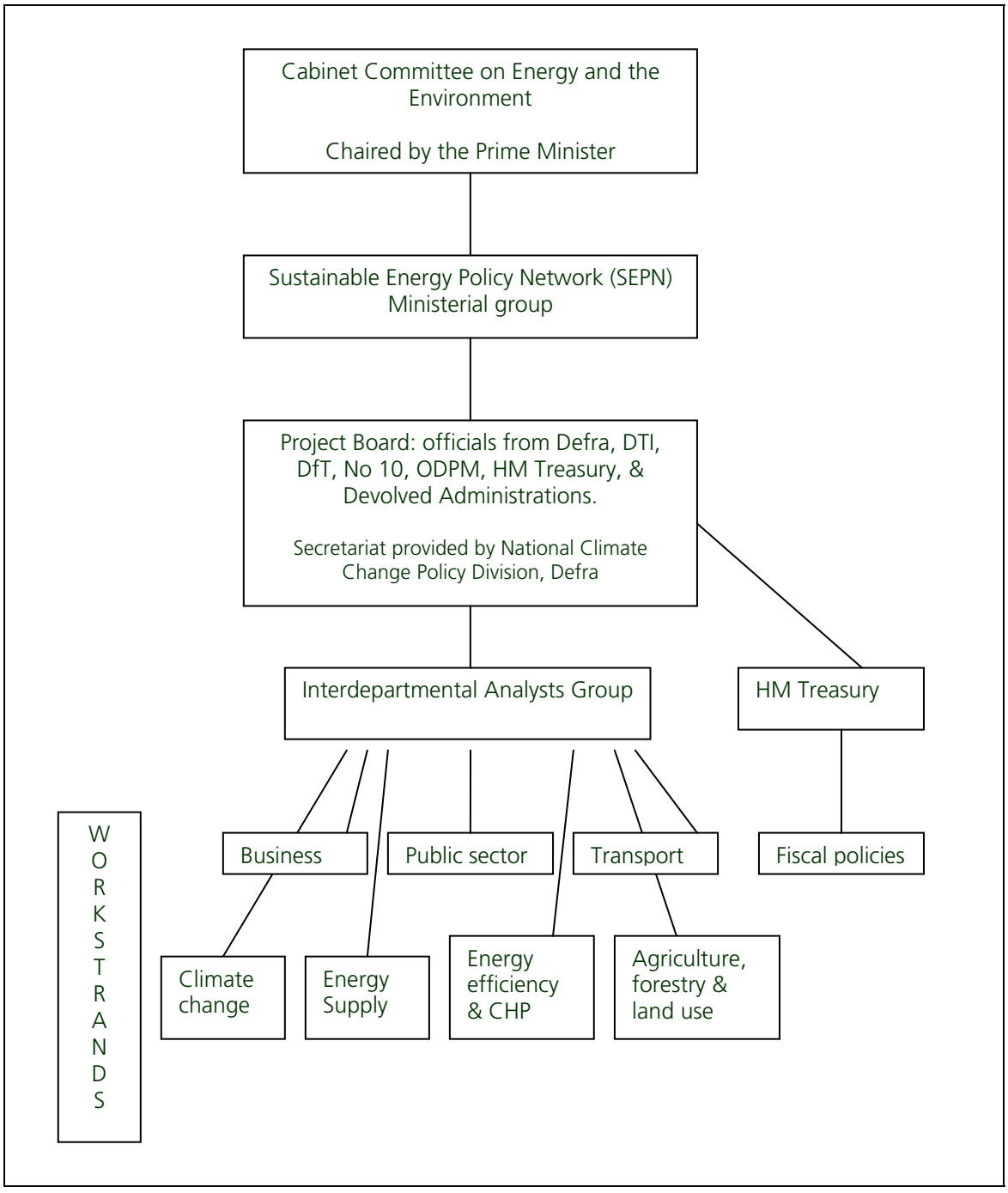
## Joined-up policy-making

53. One of the main themes which emerged, both from the NAO's reports and much of the evidence we received from a variety of organisations, was on the extent to which the Government took a joined-up approach to the Climate Change Programme Review. On the positive side, the Government used several cross-cutting structures within the CCPR, both of officials and Ministers (see **Figure 3**), and brought together officials not just from a range of different Departments but from external organisations as well.

72 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, pp 13-14

73 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 13, p 12

**Figure 3 Government structures used in the Climate Change Programme Review**




*Source: NAO, Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review, para 11*

54. Key in this respect was the Interdepartmental Analysts Group (IAG). Made up of around 50 analysts and chaired by the Director of Strategic Analysis in the Energy Strategy Unit of DTI, the IAG was set up to inform the Government's response to the Royal Commission on Environmental Pollution's recommendation in 2000 that the UK should make a 60% cut in carbon dioxide emissions by 2050. Following publication of the 2003 Energy White Paper, which turned this recommendation into Government policy, the IAG was retained to support and help oversee some of the analytical work going into implementation of the White Paper's commitments. The IAG was then given the role of

overseeing the analytical work, appraising potential policy options, in the Climate Change Programme Review. At a point within the course of the CCPR, membership of the IAG was expanded to include representatives from the Energy Saving Trust, Carbon Trust, Environment Agency, and Sustainable Development Commission. Sub-groups of the IAG were established to commission, scrutinise and run the day-to-day co-ordination of methodological and cross-cutting issues. The NAO approved:

> To ensure a consistent analytical approach, the IAG produced guidance for analysts. These specified templates which Review work strands were required to complete and send to the IAG. The templates facilitated peer review, consideration of overlaps, and consolidation into papers for the Project Board and Ministers. Each evaluation and some appraisals had two peer reviewers, selected from IAG members: usually a policy official and an analyst or economist, with no connection with the policy work strand itself. Some appraisals were reviewed by consultants Oxera rather than the IAG.[74]

55. On a more negative side, we also heard some criticism that the review process was in important respects disjointed; and, more widely, we heard of disconnections between different Departments, and between central, local and regional government. As the NAO described it:

> Fiscal measures were not subject to the same quality assurance processes. They were appraised by analysts working within HMT [HM Treasury] and HMRC [HM Revenue & Customs], and the IAG did not have sight of them. IAG analysts were therefore uncertain of the carbon saving that would be achieved by fiscal measures until a late stage in the Review.[75]

56. This was a specific source of criticism for the Energy Saving Trust, themselves participants in the IAG and thus the CCPR process. To EST, the way in which tax and incentives policy was excluded from the IAG's work meant that it was impossible to make a fully joined-up appraisal of the potential of certain policy options, and that this impaired the ability of the Review to devise and decide on different policies:

> There is one area where, in our view, there is a very significant failing of the Climate Change Programme Review process, which is the absence of any serious debate about fiscal measures. […] It is an obvious thing—you cannot really tackle the problems if you are not able to use all the tools in your toolkit and fiscal measures are a key one. To give you one example: in the household sector you might consider a mix of policies where there is the energy efficiency commitment, a great policy delivering great stuff; there is the Energy Saving Trust providing advice and support; there are building regulations and product standards that are driving it; but the area that is not talked about is any kind of real fiscal measures in terms of, let us say, things that might affect the price of energy. If there was to have been a discussion

74 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 10, p 12

75 NAO, *Cost-Effectiveness Analysis in the 2006 Climate Change Programme Review*, p 20

> around, "Let's look at a policy that looks at all those four as a package", then that would not have got very far in terms of the debate in terms of the Climate Change Programme Review, because Treasury would basically have said, "We can't really talk about fiscal measures". That is one of the major shortcomings.[76]

Additionally, EST made the further observation that, while the IAG had high quality personnel, their work for the IAG was supplementary to their ongoing work in their relevant Departments, and that this reduced the resource capacity of the CCPR to evaluate new policies and different levels of policy implementation.[77]

57. Another key external body which worked as part of the IAG, the Sustainable Development Commission, also had some criticisms of the Review process; as well as some wider criticisms of the lack of a joined up approach to climate change. Regarding the IAG, their chief criticism was the limitations placed on their engagement: "Unfortunately the SDC's participation in this group was restricted towards the end of the Review process, which limited our ability to comment on the final range of policies that was announced."[78]

58. **The Climate Change Programme Review involved the joined up work of officials from several different Departments, as well as key external bodies. But one major failure in this joined up approach was the exclusion of fiscal policy, consideration of which remained the preserve of the Treasury. In the future, there must be an integrated approach to climate change policy-making, which considers the use of taxes and incentives alongside other measures.**

59. Beyond the CCPR, we heard criticism of "consistent inter-departmental incoherence",[79] in the words of Sir Jonathon Porritt, in the development and execution of climate change policy; with further disjointedness between Departments, local government, and regional bodies. The SDC commented:

> Climate change is a cross-departmental issue with huge implications for all areas of public policy. The current system puts very little responsibility for tackling climate change with final consumers, which positions Government departments against each other as they try to achieve a cross-departmental goal with as little pain as possible for their own constituents.
>
> In addition, there is little incentive for local or regional consideration of climate change issues. This leads to patchy performance between local authorities, and a Regional Development Agency system that is heavily focused on economic growth above all else, even when this could be detrimental to climate change objectives.[80]

76 Q134

77 Q142

78 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 56

79 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Q194

80 Environmental Audit Committee, *Climate Change – the UK Programme 2006*, Ev 56

We also heard similar sentiments expressed by the Business Council for Sustainable Development-UK:

> I am very surprised that so much of my day is taken up with Defra when I really think it should be the DTI. Then, when I am talking to the DTI, I think the DTI is constantly referring to the Treasury, so I end up talking to the Treasury. But the Treasury does not understand what I am talking about anyway, so I end up going back to Defra. I go round and round in a huge circle. I do that on a national basis, I do that on a local basis with the RDAs, and then I get into the political quagmire of assemblies and the like – so life is very difficult in trying to deal with government. This issue should be a DTI issue, to my mind, because we are solutions led, we are business led, that is where we sit. To me, the DTI does not have the strength of focus to be the lead department on the subject. Dare I say it, we see a lot of interdepartmental wrangling going on at the moment which is not helpful. […] We would like to see the DTI being the lead role in creating the political framework in which we can function to deliver what society and government wants.[81]

We will explore these problems and make recommendations in our forthcoming report on the structures of Government and climate change policy.

# The draft Climate Change Bill

60. The Queen's Speech last November indicated the Government's intention to bring forward legislation on climate change; in March 2007, the Government published the resulting draft Climate Change Bill. Following public consultation and formal pre-legislative scrutiny from the Joint Committee on the Draft Climate Change Bill,[82] the Government has stated that it aims to introduce the Bill to Parliament in autumn this year.

61. Since the 2003 Energy White Paper, the Government has had a target to reduce UK $CO_2$ emissions by 60% by 2050, "with real progress by 2020". In the draft Climate Change Bill, the Government is proposing to enshrine this 2050 target in statute (at the level of "at least 60%"), and in addition firmly define what "real progress by 2020" is to mean by proposing an additional statutory target reduction of 26-32% by 2020. Additionally, the Bill proposes that the UK set itself rolling series of three consecutive five-year carbon budgets, representing a limit on the total quantity of carbon dioxide emissions over a specified period of time. This design would allow for a trajectory to be set towards the 2020 and 2050 targets, while still allowing year on year flexibility (for instance, to cope with variations in emissions from one year to the next depending on factors such as harsher winters). The Bill further proposes the creation of a new independent body, the Committee on Climate Change, to provide advice to the Government in respect of its emissions

81 Qq 50-1

82 The two Houses of Parliament agreed to establish a Joint Committee on the Draft Climate Change Bill, chaired by Lord Puttnam.

reduction policies. The Committee would produce an annual report on the UK's progress towards the targets and budgets, to be laid before Parliament. Every five years the Government would be required to lay before Parliament a compliance statement on whether that carbon budget has been met, with the Committee on Climate Change assessing its validity. Finally, the draft Bill contains enabling provisions to set up future domestic emissions trading schemes. Key provisions of the Bill are set out in slightly more detail in **Figure 4**.

62. Overlapping our inquiry have been both the formal pre-legislative scrutiny of the Joint Committee on the draft Climate Change Bill, and another inquiry specifically into the terms of the draft Bill which the Environment, Food and Rural Affairs Committee have decided to make as part of their regular programme of inquiries into the policies of Defra. The specific focus of our inquiry differs from theirs: in looking at the draft Bill we have concentrated on how well it provides an adequate response to the issues raised by the Climate Change Programme Review.

**Figure 4 Key Provisions of the Draft Climate Change Bill**

Targets

**• This Bill puts into statute the UK's targets to reduce carbon dioxide emissions through domestic and international action by 60% by 2050 and 26-32% by 2020, against a 1990 baseline.**

**• Five-year carbon budgets, which will require the Government to set, in secondary legislation, binding limits on carbon dioxide emissions during five year budget periods, beginning with the period 2008-12. Three successive carbon budgets (representing 15 years) will always be in legislation.**

**• Emission reductions purchased overseas may be counted towards the UK's targets, consistent with the UK's international obligations. The Government comments: "This ensures emission reductions can be achieved in the most cost effective way, recognising the potential for investing in low carbon technologies abroad as well as action within the UK to reduce the UK's overall carbon footprint."**

Committee on Climate Change

**• A Committee on Climate Change will be set up as an independent statutory body to advise the Government on the pathway to the 2050 target and to advise specifically on: the level of carbon budgets; reduction effort needed by sectors of the economy covered by trading schemes, and other sectors; and on the optimum balance between domestic action and international trading in carbon allowances.**

**• It will take into account a range of factors including environmental, technological, economic, fiscal, social and international factors, as well as energy policy, when giving its advice.**

Enabling Powers

**• The Bill contains enabling powers to introduce new trading schemes through secondary legislation. This increases the policy options which Government could use to stay within budgets and meet emissions targets.**

Reporting requirements

**• The Committee on Climate Change will have a specific role in reporting annually to Parliament on the UK's progress towards achieving its targets and budgets. The Government will be required to lay before Parliament a response to this annual progress report.**

**• Every five years, the Committee's report will contain an explicit review of the UK's performance over the last budget period, and the implications of this for keeping on track to meet future targets and budgets.**

***Reporting Progress on Adaptation***

**• The Bill will also allow Parliament to monitor the Government's proposals and policies for integrating adaptation to climate change into its work by establishing regular reporting to Parliament.**

***Source: "Short summary of the Bill's aims and provisions", Defra, March 2007, http://www.defra.gov.uk/environment/climatechange/uk/legislation/pdf/CCBill-summary.pdf***

## The 2050 target

63. The draft Bill contains provisions to place an obligation on the Government to achieve at least a 60% reduction, from 1990 levels, in the UK's net annual carbon emissions in 2050. In addition, the Bill provides for the Secretary of State by order (i.e., without the need for primary legislation) to amend this percentage; but specifies:

> (4) That power may only be exercised if it appears to the Secretary of State that there have been significant developments-
>
> (a) in scientific knowledge about climate change, or
>
> (b) in international law or policy,
>
> that make it appropriate to do so.

The two main issues on which we took evidence were the percentage level of this target, and the nature of this "trigger clause" concerning circumstances in which it might be amended.

64. The majority of evidence we considered suggested strongly that the 60% target is inadequate. This target level was based on a recommendation made by the Royal Commission on Environmental Pollution (RCEP) in 2000. The RCEP's overarching aim in making this recommendation was that global warming should be limited to a rise of no more than 2°C; according to the science at the time this was adjudged to require stabilisation of the global atmospheric concentration of carbon dioxide at 550 parts per million (ppm) by mid-century, which the RCEP worked out as necessitating a 60% cut in UK emissions. In the intervening time, scientific understanding of the requisite stabilisation total has moved on. This is something the Government itself recognises:

> in the mid-1990s the EU proposed that the aim should be to limit global temperature rise to no more than 2°C to avoid dangerous climate change […] At that time, it was thought that this equated to atmospheric carbon dioxide levels below approximately 550 ppm. The more recent work of the IPCC suggests that a limit closer to 450 ppm or even lower, might be more appropriate to meet a 2°C stabilisation limit.[83]

The Tyndall Centre for Climate Change Research have argued that, according to its calculations, the 60% by 2050 target contained in the Bill implies an atmospheric concentration, not of 550ppm $CO_2$, but of over 600ppm $CO_2$, and possibly in excess of 750ppm $CO_2$. Drawing on research published in the proceedings of the 2005 Exeter Conference on *Avoiding Dangerous Climate Change*, Tyndall argued that such atmospheric concentrations are very likely to lead to a rise in global temperatures of over 2°C; and give rise to a 50% chance of exceeding 4°C.[84] Dr Kevin Anderson of the Tyndall Centre warned: "The scientific evidence is there that 60%, it is a nice idea and helps us to sleep a little bit at

83 Cm 6764, p 13

84 Kevin Anderson and Alice Bows, "A response to the Draft Climate Change Bill's carbon reduction targets", Tyndall Centre for Climate Change Research, Tyndall Briefing Note 17, March 2007

night, but it has very little to do with climate change, so we need to go well beyond the 60%."[85]

65. The Secretary of State for Environment, Food and Rural Affairs confirmed to us that the Government was still completely committed to limiting global warming to a rise of 2°C. By stressing the dangers even of this level of warming, he emphasised the reasons why the UK and EU were committed to holding a rise in temperature at no more than 2°C:

> Just to put that in perspective, I was told—and I am going to try and find out if this is right—that with a two-degree average change it will not be uncommon to have 50°C in Berlin by mid century, so associated with a two-degree change is something that is pretty unprecedented in northern Europe, and I think that is quite a sobering demonstration because 50°C is beyond our experience.[86]

66. Friends of the Earth wrote to us to argue that, in view of the disconnection that appears now to exist between the 2°C target and the 60% target cut in UK emissions, the Government's stated climate change objectives were incoherent. Their comment—typical of much of the evidence we received—was that: "Therefore the whole basis for including a target for a 60% cut by 2050 is—and has been accepted by the Government to be—out of date. We do not therefore believe this target should be included in the Bill."[87] The response to this line of argument by both the Secretary of State and the Office of Climate Change was threefold: the 2050 target could be increased in the future; it was politically straightforward, for the purposes of passing this Bill, to retain a target which had already been broadly accepted, for instance by business groups; and in any case it is less important to get this longer term target right at this moment than to make progress towards the new target for 2020. As the Secretary of State put it to us:

> The starting point is not 60 per cent; it is at least 60 per cent, and those two words "at least", which are on the face of the Bill, are very important indeed […] I think it is right to build on the consensus around the fact that at least 60 per cent in terms of $CO_2$ is the right place to start. The first priority is to get our system of carbon budgeting up and running. That is the first task of the Carbon Committee, to get 15 years' worth of carbon budgets up to 2022, which is what business wants. Business wants that long term certainty about what they are going to be required to do up and running and then we can consider whether or not it is right to shift the figure up, but at the moment business decisions will be governed by the shorter term target of 2020.[88]

67. There was some understanding in the evidence we heard of the Government's position. Climate Change Capital commented, "the use of statutory domestic emission reduction

85 Q260

86 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q10

87 Ev 120

88 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q4, Q6

targets represents new political territory and therefore establishing the Bill with these well-established targets in place is probably a pragmatic first step," while Professor Ekins thought that it might possibly "be easier to get the Bill into statute at the 60% level and then increase the target, if that seems to be even more justified by the science than it currently is. It may be that it will be easier to do it like that than to put an 80% target in from the beginning." Having said this we did not receive any evidence which argued strongly that the 2050 target should *not* be increased. (While BCSD-UK told us they were not pressing for the target in the draft Bill to be increased, they gave as their reason that 60% was the target endorsed by their parent body, the World Business Council for Sustainable Development, rather than arguing that a more ambitious target was to be opposed in principle.) [89]

68. The Tyndall Centre argued that the UK's 2050 target should be increased to around 90%, with a 70% cut by 2030. They arrived at these figures by working backwards from a target to stabilise global atmospheric carbon dioxide at 450ppm in 2050. Above all, they stressed that it was more important to focus on staying within the overall cumulative emissions budget rather than on meeting a target for a percentage reduction in annual emissions in 2050. In fact they have gone so far as to say: "It is an act either of negligence or irresponsibility for policymakers to continually refer to a 2050 target as the key driver in addressing climate change."[90] The logic of their argument is that we need to start making immediate and consistent year on year reductions in our annual emissions. According to Tyndall, this means: "Assuming emissions can actually be stabilised by 2010, the mean annual reduction in carbon intensity between 2010 and 2030 is in the region of 9%, with the decade between 2020 and 2030 requiring a drastic 13% reduction in carbon intensity year on year."[91] We would observe, however, that according to the research Tyndall are drawing on, even if the UK made this profound effort and even if it were matched by the rest of the world, the 450ppm $CO_2$ level it would stabilise at would still lead to around a 70% chance of exceeding a rise of 2°C.[92]

69. **The Government's policy towards the UK's 2050 target is clearly incoherent. The Government remains committed to limiting global warming to a rise of 2°C; but it also acknowledges that, according to recent scientific research, a cut in UK emissions of 60% by 2050 is now very unlikely to be consistent with delivering this goal.** It is true that where the Stern Review talks about the required distribution of emissions cuts between developed and developing countries, it does (just about) correspond to the Government's existing line on its 2050 target. Referring to research which analyses four different mooted ways of apportioning emissions cuts (including Contraction and Convergence), Stern concludes that "for all developed countries, action to meet a 450ppm CO2e goal would require quotas to be set in line with a reduction in emissions of 70-90% on 1990 levels by

89 Q26

90 Alice Bows et al, *Living within a Carbon Budget*, Tyndall Centre Manchester, July 2006

91 Bows et al, *Living within a Carbon Budget*, pp 165-6

92 Tyndall Centre, "A response to the Draft Climate Change Bill's carbon reduction targets", footnote 9

2050, and for a 550ppm CO2e goal the reduction would be at least 60%."[93] But **while the Office of Climate Change was justified in telling us that the "at least 60%" target in the draft Bill is within the range discussed in the Stern Review,[94] this is clearly the minimum in emissions reductions which the Stern Review sets out. In fact, Stern states that this would correspond to a 63%-99% chance of exceeding a warming of 2ºC, and describes this level of global warming as "a dangerous place to be, with substantial risks of very unpleasant outcomes".[95] We recommend that the 2050 be strengthened to reflect current scientific understanding of the emission cuts required for a strong probability at stabilising warming at 2ºC.**

70. **We recommend that the Government publishes the rationale for its 2020 and 2050 targets, preferably including the central formula upon which they are based, in the Climate Change Bill. This rationale should make clear the size of complementary caps on annual emissions required of other blocs of nations, the stabilisation target for global atmospheric concentrations of greenhouse gases, and the resulting projected temperature rises, which are implied by the Bill's targets for annual emissions from the UK, as well as the central assumptions used by the Government in making these correlations. The Bill should state that if the Secretary of State proposes to revise these targets, he must publish the rationale for the new target in like manner.**

71. **Above all, the Government must draw attention, at home and abroad, not just to percentage targets for the annual emissions in a certain year, but even more to the absolutely crucial issue of the cumulative total budget of greenhouse gases that the world can afford to emit by 2050 if it is to have a reasonable chance of holding global warming to 2ºC.**

72. **In terms of the way in which this cumulative global budget is divided up among individual nations, we recommend that the Government explicitly endorses, and promotes internationally, the Contraction and Convergence method, or a method similar to it.** Under this method, emissions budgets allocated to each nation would be progressively amended until all would arrive at an equal per capita level, consistent with an internationally agreed stabilisation level. As we have previously noted, the Government has implicitly accepted this principle by endorsing the RCEP's recommendation for a 60% cut in UK $CO_2$ (which was based on C&C). We have also concluded that any framework which involves radical emissions reductions would in practice resemble Contraction and Convergence, given the current imbalance in per capita emissions between the developed and developing world, and the resultant necessity for the bulk of emissions cuts to come from developed nations in order to meet a global stabilisation target.[96] But this only

93 HM Treasury, *Stern Review on the Economics of Climate Change*, October 2006, p 475. Note: Stern's target range of 450-550 parts per million in the atmosphere was for all greenhouse gases (including, e.g., methane, nitrous oxide, etc.) expressed as carbon dioxide equivalent ($CO_2e$); Stern explained that of this total, around 400-490ppm would be $CO_2$ alone.

94 Q109

95 *Stern Review*, p 292

96 Environmental Audit Committee, Fourth Report of Session 2004-05, *The International Challenge of Climate Change: UK Leadership in the G8 and EU*, HC 105, paras 83-6

underlines the inconsistency in the Government's framing of a target to reduce UK emissions without advocating an international agreement based on Contraction and Convergence, or something very similar.

73. **The Tyndall Centre for Climate Change Research have made a very strong argument that the UK ought to make carbon reductions of 70% by 2030 and 90% by 2050. We recommend that the Government respond to Tyndall's recommendations; and if it is rejecting them, explain why.**

74. **While we note that the Government has included a "trigger clause" in the draft Bill for amending the 2050 target, it states that the Secretary of State *"may only"* revise the target if one or both of its specified qualifications are met. We are concerned that this may put fetters on the ability of future Governments to respond to the threat of climate change. It is perhaps possible that the wording of this clause may encourage or make it easier for opponents of a tougher target to mount a political or legal challenge, based around the test of whether there truly have been "significant developments", in the event that a Government decides to raise the target above 60%. We recommend that the power to amend the target be significantly less circumscribed.**

## The 2020 target

75. The draft Bill also contains a provision to put into law a target to reduce UK carbon emissions, from 1990 levels, by between 26% and 32% in 2020.[97] The Government's consultation document, published alongside the draft Bill, explains that

> there is a risk that a commitment for 2050 alone is too long-term; it might not encourage the action needed over the next few years that will be key to achieving our longer term goals. This is why we also want to put into statute a duty to ensure the trajectory to 2050 is consistent with a reduction in $CO_2$ emissions by 26-32% by 2020, consistent with the trajectory to 2050. We believe this is achievable at acceptable cost with the right policies and actions.[98]

There is a strong case for arguing that this 2020 target is more important than that for 2050; or at least, it is more valuable at this moment to set an interim target than to finalise the target for 2050. This was certainly the view, for instance, of Professor Ekins, who argued: "To be honest, from this perspective in 2007, whether [the 2050 target] is 60 or 80% is much less important than establishing a credible interim target which will start us reducing carbon emissions rather than increasing them from now. That seems to me to be the really key issue which we ought to be focusing on."[99]

76. The provisions in the draft Bill surrounding this 2020 target are similar to those for the 2050 target: this "may only" be done if there are significant developments in climate

97 As Clause 3 explains, the draft Bill in practice would compel the carbon budget for the period 2018-2022 to be set at a level consistent with an average annual total in 2020 that is 26-32% down on 1990 emissions.

98 *Draft Climate Change Bill Consultation Document*, HM Government, Cm 7040, March 2007, para 5.5

99 Q216

science or international law which make it appropriate. However, whereas the draft Bill refers to the level of the 2050 target as "at least 60%", it imposes a maximum limit on that for 2020: "at least 26%, but not more than 32%".[100]

77. Our first question is whether the 2020 target is set at a level sufficiently challenging to be consistent with, not just a 60% target for 2050, but a higher target—perhaps 80% or 90%—should the 2050 target be amended in this direction. The Office of Climate Change were satisfied that one was consistent with the other—at their current levels: "I think it is also important to say that [the 2020 target] it is part of the trajectory to 2050 so, in a sense, as long as the mitigation curve passes through that range on the way to the 60% target by 2050 then that delivers the outcome which the Bill is about."[101] But as for whether it would still be consistent with a higher target for 2050, the evidence we heard from RSPB was less certain: "We have had discussions with Government about what point you would need to be at 2020 still to be on a reasonable trajectory towards an 80 per cent reduction. It would have to be the very top of the range of things that they are proposing at the moment (between 26 and 32 per cent) and possibly slightly higher."[102] This conclusion was echoed by Professor Ekins, who argued: "The only difficulty with 80% is that in my view you would need to bring the interim targets up to make it a credible trajectory".[103] However, the Secretary of State told us: "fortunately the target that has been set for 2020 of 26-32% reduction is consistent with higher levels of reduction come 2050."[104]

78. **The Government should set out in detail where the UK needs to be in terms of emissions reductions by 2020 in order to be on track to meet other possible, and more challenging targets, for 2050. Especially given that some have suggested that that the 26%-32% target for 2020 would have to be increased in order to meet a more stringent target for 2050, we recommend that the restrictions in the draft Bill on amending the 2020 target be taken out. We are also concerned that setting a target range in practice encourages people to aim for the bottom end of the range, as this requires the least effort while still achieving compliance. For this reason, we recommend that the 2020 target be amended to read "at least 32%", rather than "26-32%".**

79. The Secretary of State was very confident when discussing the matter with us that: "We get to 26% reduction by 2020 if we implement all the policies that we have got at the moment, so that is the base on which we are building. Obviously we want to go further […]"[105] The Office of Climate Change were slightly more circumspect, telling us that the 26% figure relates to "the upper end of optimism".[106] The 2007 Energy White Paper clarifies: "If we take the upper end of the range of savings we have estimated, we would be

100 Cm 7040, cl. 3(1)(a)

101 Q102

102 Q159

103 Q218

104 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q5

105 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q55

106 Q102

on course to achieve emissions savings just within the range set out in the draft Climate Change Bill (i.e. achieving just over a 26% reduction on 1990 levels)."[107] The DTI's latest Updated Energy and Carbon Emissions Projections (May 2007), underlying the Energy White Paper and published at the same time, spell this out in more detail: including all the policies in the White Paper, and making assumptions as to the impact of the EU ETS beyond 2012, "emissions are projected to be 119.2-128.8 MtC in 2020; equating to a 20-26% reduction on 1990 levels."[108]

80. **It is clear to us that the Government will have to introduce more radical policies into its Climate Change Programme very soon if it is to meet even the 2020 target as currently set. Current measures, including those introduced by the recent Energy White Paper, are only projected to get us nearly to the bottom end of 2020 target range – and this at what the Office of Climate Change described to us as "the upper end of optimism". The Government has thus far consistently overestimated the impact of its carbon reduction policies, while underestimating the upward trend in emissions from social and economic developments. The lesson of the UK's failure to meet its 2010 target is that the Government must aim to overachieve its target for 2020. We recommend therefore that the Government introduce other measures projected to achieve at least the top end of the 2020 target, a reduction of 32%.**

## International aviation and shipping

81. The draft Bill excludes emissions from the UK's share of international aviation and shipping from the UK 2050 and 2020 targets. This is consistent with the Kyoto Treaty, which excludes international aviation and shipping from any national targets, the reasoning being that there is not yet any international agreement on the method by which these emissions should be divided and attributed to individual states. However, under Kyoto, signatory nations are obliged to keep track of what, under one methodology, is worked out as their share of these emissions, and they are thus entered as memo items in their national emissions accounts. Figures from the UK's inventory show a rise in $CO_2$ from international flights from the UK over the period 1990-2005, from 15.7Mt$CO_2$ to 35Mt$CO_2$, an increase of 123%; for international shipping there has been a small decrease, from 6.7Mt$CO_2$ to 5.9Mt$CO_2$, a fall of 12%.[109]

82. The Government's position on the inclusion of these emissions, expressed to us by Defra and DTI, is that: "The UK is active in lobbying for support within the international community for including international aviation in a post-2012 regime under the Kyoto Protocol. Provision has been made, in the draft Climate Change Bill, for the Secretary of State to amend the baseline and target to include international aviation and shipping

107 DTI, *Meeting the Energy Challenge – A White Paper on Energy*, May 2007, para 10.12, p 282

108 DTI, *Updated Energy and Carbon Emissions Projection*, May 2007, p 2

109 Defra, "Estimated emissions of carbon dioxide ($CO_2$) by IPCC source category, type of fuel and end user: 1970-2005", http://www.defra.gov.uk/environment/statistics/globatmos/download/xls/gatb05.xls . Note: These figures are for $CO_2$ only, and do not take account of any "uplift factor" to reflect other greenhouse gas emissions, nor the enhanced contributions of flying at high altitudes to global warming, for instance through the formation of contrails.

emissions should international agreement be reached."[110] Clause 15(3) of the draft Bill states:

> If there is a change in international carbon reporting practice relating to aviation or shipping, the Secretary of State may make provision by regulations as to the circumstances in which, and the extent to which, carbon dioxide emissions from international aviation or shipping are to be regarded […] as emissions from sources in the United Kingdom.

The Explanatory Notes to the draft Bill underline that the power of the Government to include international aviation and shipping emissions within the UK's targets for 2020 and 2050 "may only be exercised in the event of a change in international carbon reporting practice relating to aviation or shipping."[111] Should this power be exercised, the provisions allow the Secretary of State to define how and when these international emissions would be included within the UK's carbon budget and targets.

83. We received some trenchant submissions which criticised this section of the draft Bill, and called on the Government to include international aviation and shipping emissions from the outset. The Aviation Environment Federation (AEF) criticised the basis of the Government's position by arguing that international negotiations on the attribution of emissions from international aviation remain deadlocked, with little sign of progress:

> reaching an agreement is a distant prospect: both methodological and (we understand) highly sensitive political issues remain to be resolved, and while Europe continues to press for the resumption of talks at the UNFCCC's Subsidiary Body for Scientific and Technical Advice (SBSTA), certain states (notably Saudi Arabia), remain uncooperative. Without consensus, international progress in this forum is effectively blocked.[112]

For this reason, AEF concluded: "the reasons that [the Government] have given for excluding aviation do not really stack up". Friends of the Earth (FoE), among others, argued that, while the ultimate goal should be to arrive at an international agreement on allocating these emissions, there was no reason not to go ahead and include international aviation and shipping within the targets in the Bill, even if this were only a "stop gap" until such international agreement is achieved.[113] FoE and others argued that international emissions could be included in the Bill on the same basis that they are currently recorded as memo items to the UK's Kyoto accounts. AEF commented that this methodology has already been "agreed by the Intergovernmental Panel for Climate change, so there is a measure of international consensus. And anyway it is a domestic target so why do we need international consensus?"[114]

---

110 Ev 114

111 Explanatory Notes to the Draft Climate Change Bill, Cm 7040, para 65

112 Ev 21

113 Ev 120

114 Q79

84. The reason why these submissions were calling for international aviation and shipping to be included from the outset was nicely expressed by Friends of the Earth: "a "carbon management system" that simply leaves these emissions out is a rather like a calorie-controlled diet that opts to exclude calories from chocolate."[115] The longer the delay in bringing these emissions within the UK's statutory declining carbon budget, the bigger the shock to that carbon budget when they are finally added. A sudden addition of extra sources of carbon could make it harder for the UK to meet its next carbon budget, especially given that emissions from aviation would have been following an upward trajectory while the rest of the economy would have already been feeling the pressure to move onto a downward trajectory. In effect, this might necessitate even greater cuts, above those already allowed for, by other sectors of the economy, with all the difficulties this might entail.

85. An alternative concern was that, to avoid these difficulties, the terms under which international aviation and shipping are added would be relaxed—which would mean inflating the UK's overall carbon budget, and undermining the purpose of the Bill. As the AEF explained:

> the Bill […] recognises the fact that aviation emissions have been growing very fast and that if they were to be included from their 1990 levels at some point down the line you would have quite a shock to the targets and they would have to be adjusted in some way, so it makes provision to include them at whatsoever level and in whatsoever manner and with reference to whatsoever baseline the Secretary of State sees fit. So we would then have a dilution of the targets. If 60% is pointing to a given stabilisation target, for example, and aviation emissions are then added into it further down the line at a much higher level, it makes a nonsense of that stabilisation target.[116]

86. We put these points to the Secretary of State and the Office of Climate Change. The main argument of the OCC was to stress the risks of "perverse effects" of including international sources of emissions over which the UK did not necessarily have the power, unilaterally, to curb:

> For example, in shipping, do we end up with ships being registered elsewhere rather than being registered in the UK? […] There is] an argument about whether we have policy levers to immediately take on UK legal responsibility for emissions where we do not control all the levers to reduce emissions. Shipping is the best example where if we took on 50% of emissions for all shipping which passes throughout UK waters, for example, we have precious few ways to act on those outside international agreement; and, therefore, we took the view that it would be much more sensible to allow the Climate Change Bill to evolve and add emissions later, than to artificially take on responsibility for them in advance of any international agreement.[117]

115 Ev 120

116 Q78

117 Q126, Q127

87. On this argument we countered that:

> You are saying, "We don't have the policy instruments to deal with this, so pretend it doesn't exist". It seems a rather backwards way of thinking. Is not the point about policy effectiveness separate from the point about whether these emissions are there in the first place; and we should be trying to do something about them, and trying to think of some more effective way rather than waiting until an international agreement occurs? Your point about the transfer registration, that might work in some cases but not all, so there would be some effect but you would not have the 100% effect you might have if you controlled the whole thing?[118]

We would further observe that the OCC's arguments only referred to shipping, but not aviation, where the issue of a transfer of registration to another country should not apply.

88. We also put to the OCC an argument that was made by EEF: "Government should produce two sets of forecasts—one covering 'domestic' emissions alone and one providing a more complete picture of emissions (i.e. including contributions from international aviation and shipping). […] Tracking all major sources of emissions would provide a more complete picture of the UK's contribution to climate change".[119] OCC responded, first, by referring to the publication of historic emissions from these sectors as a memo item to the UK's Kyoto accounts. Second, they drew our attention to CCP 2006: "there is information in there on projections also of the growth in greenhouse gas emissions from aviation and shipping. The Government publishes that information."[120] On this latter point we would observe that this is not quite what we were talking about. We can find a reference in CCP 2006 to projections of $CO_2$ from aviation,[121] and another to projections of methane and nitrous oxide from aviation and shipping.[122] However, the $CO_2$ projections for aviation are from a White Paper published in 2003,[123] have not been updated since, and are not integrated into the DTI's main emissions forecasting programme; nor are there any projections for $CO_2$ from international shipping.

89. The Secretary of State dwelt on the forthcoming inclusion of aviation within the EU Emissions Trading Scheme, scheduled to commence from 2011. His first argument was that it was sensible to wait until the methodology for attributing international aviation within the EU ETS was finally agreed before doing so in respect of the UK's domestic targets: "Since we have got EU agreement to get this in, since we are going to have 27 nations figuring out the basis of allocation methodology, I think it is not unreasonable for

118 Q130

119 Ev 6

120 Q132

121 Cm 6764, p 71

122 Cm 6764, p 172

123 DfT, *The Future of Air Transport*, Cm 6046, December 2003

me to say let us do it on a basis that everyone else uses and then it will be in and we will be working on a common basis."[124] In more detail, he clarified:

> In respect of aviation, there are two things that are under discussion at the moment that we want to get sorted out before including them. One is the actual measurement and how you include the fact that you are emitting at 35,000 feet, how much more damage does that do, so a calculation of the amount of damage. Secondly, there is the allocation issue. If you are flying from A to B do you allocate to where you are going to or where you have come from, or do you do half and half? We want to get those things sorted out.[125]

90. The first point is essentially asking whether, in including aviation within a carbon budget, one should multiply the size of its emissions of $CO_2$ by an "uplift factor" to take into account the extra contributions of flying to global warming—for instance, from contrails formed at high altitude. It is commonly expressed that aviation's overall global warming impact is between two and four times that of its simple carbon dioxide emissions. On this point we heard some contradictory arguments, relating to a recent scientific paper by Forster et al which questioned the practice of multiplying $CO_2$ emissions by an uplift factor.[126] The main argument of Forster et al is that because $CO_2$ emissions remain in the atmosphere for around a century and thus have a long term impact on global warming, while contrails and emissions of other gases make a more intense but shorter lived impact, it is very difficult to express the sum of these contributions as a simple multiple of the $CO_2$. AEF's comment on this argument was to agree; but to argue that it does not really matter, since however one seeks to calculate it, aviation's contribution to global warming is significantly greater than that of its $CO_2$ emissions alone.[127] The Tyndall Centre were slightly more cautious:

> The problem with these multipliers is that you are trying to compare things that are not like for like, comparing a contrail that lasts for some few minutes over one part of France with global $CO_2$ emissions is not something that we think you could ever mathematically put together and come up with an answer that is going to help policy. The problem is that when you put in a multiplier your policy implication might be to fly lower to get rid of the contrail, because that seems to have more of an impact, but then you are increasing the $CO_2$ and then you have a problem that is with you for another 100 years.[128]

91. Bringing this back to the Secretary of State's specific point, we would merely observe that under current proposals the EU ETS will count $CO_2$ alone rather than using a

124 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q21

125 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q20

126 P.M.d.F. Forster, K.P. Shine and N. Stuber, "It is premature to include non-CO2 effects of aviation in emission trading schemes", Atmospheric Environment 40(6), 2006, 1117-1121

127 Qq 80-83

128 Q282 Dr Bows

multiplier to calculate aviation's emissions under the Scheme; and that this is also the basis of current reporting of international aviation emissions under Kyoto. In other words, these already tally; and thus this raises a question over whether waiting for the inclusion of aviation in the EU ETS is a proper cause for delay in including international emissions in UK targets, on the basis on which they are already recorded as memo items in the UK's Kyoto accounts.

92. As for the Secretary of State's second point, the question of how international emissions will be allocated to individual countries, AEF argued that the Government is unlikely simply to adopt the attribution methodology that will be agreed for the EU ETS, as this looks set to count the emissions of both incoming and outgoing flights. If applied to the UK, it would mean the Government accepting a greater share of global emissions from aviation than it currently records in its Kyoto accounts (where it counts the emissions from all international departures from UK airports, but not arrivals). A further problem will occur if, as is possible, the European Commission sets caps on aviation by airline rather than under each Member State's National Allocation Plan; how would this inform the way in which the UK includes its share of international aviation emissions within its domestic targets?

93. Another argument made by Mr Miliband against the need to bring international aviation immediately within the UK's carbon reduction regime was that, once aviation is included within it, the EU ETS will place a cap on aviation emissions, so that "if, for the sake of argument, aviation grows as fast as or faster than you suggest or technological progress in aviation is slower than you or I expect, the price of carbon will rise within the ETS, thereby increasing the incentive for aviation operators and anyone else to take tougher action against emissions. […] If aviation goes the wrong way in terms of emissions then the price mechanism kicks in in a serious way."[129] On this point, we would re-emphasise the conclusion from our recent report on the EU ETS, that the effectiveness of including aviation in the Scheme depends on the stringency of the cap. Under proposals for the initial inclusion of aviation, the cap—and hence the impact on airfares, and thus demand for flights —is expected to be relatively weak. WWF, for instance, point to reports which suggest that under current proposals the Scheme would, by 2020, raise ticket prices by only €4.6 (£3.10) for a return short haul flight, ranging to only €39 (£26.25) for a long haul return. Given the uncertainty that still remains as to the stringency and effectiveness of future caps, we would argue that this is another argument for taking action now to curb emissions from this sector, and to include them voluntarily within a UK carbon reduction regime.[130]

94. Finally, the Secretary of State argued that even if aviation emissions were projected to carry on rising:

129 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q23

130 Environmental Audit Committee, *The EU Emissions Trading Scheme*, paras 115-117

> it does not seem to be unreasonable for us as a country to make a social, economic and technological choice that aviation should be a rising share of our total allowable emissions as long as we live within our emissions envelope. What it requires though, if aviation is going to become a rising share of the emissions that we are allowed, is that we take more radical action in other sectors—electricity, heat and transport. […I]t seems to me there are technological, social and economic reasons why people might want to choose to fly more. If they do we are going to have much less pollution from other sectors, which is far from impossible.[131]

We would respond to this by drawing attention to the argument that we and our predecessor Committee have made repeatedly: it is going to be difficult enough for different sectors of the economy to meet a 60%—or greater—reduction target, without having to make disproportionately greater cuts to accommodate the rise of aviation.[132] Not only will this be difficult, but according to some scenarios of aviation growth it will be literally impossible. As we highlighted in a recent report, if one combines "High Aviation Growth" figures in research commissioned by Defra with an 80% cut in emissions target, aviation considerably exceeds the 2050 carbon budget for the entire country.[133]

95. A further point we discussed with the Secretary of State was the restriction in the draft Bill on including these emissions "only […] in the event of a change in international carbon reporting practice relating to aviation or shipping."[134] As we asked him: "Does that mean that the rest of the world has a veto on what power you as Secretary of State would have to take unilateral action if you thought that was the right thing to do?" Mr Miliband was adamant that "No, no one else has vetoes."[135] We still have concerns, however, that while no other state would of course have the power under UK legislation to prevent the Government acting unilaterally, this clause might still provide a basis for a legal challenge within this country.

96. **Overall, we are unimpressed by the Government's arguments for excluding international aviation and shipping emissions from the UK's carbon reduction regime. While the draft Bill contains provisions that allow these emissions to be included in the future, we recommend that they be included immediately. Despite the arguments of the Secretary of State, we do not believe the Government needs to wait until the terms under which aviation will enter the EU ETS are fully confirmed before doing this. There already is an internationally agreed methodology for attributing and recording these emissions as memo items to national Kyoto accounts; the Government should simply use this to track these emissions within the UK's carbon budgets. This, in turn, means the Government should only count the simple weight of $CO_2$ from international aviation within these carbon budgets, rather than multiplying it by a factor of 2 or**

131 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q22

132 Environmental Audit Committee, *Reducing Carbon Emissions from Transport*, para 116

133 Environmental Audit Committee, *Pre-Budget 2006 and the Stern Review*, Figure 9, p 50

134 Explanatory Notes to the Draft Climate Change Bill, Cm 7040, para 65

135 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q20

**more to reflect the wider global warming impacts of flying. These extra impacts should not be ignored, however, but merit additional policy responses.**

97. **If the inclusion of international aviation and shipping has to be delayed, the Bill should be more prescriptive about and when they are to be included. The flexibility currently there in the draft Bill threatens to undermine the UK's overall emissions targets. The draft Bill's qualification that a future Secretary of State "may only" include these emissions if there has been an international agreement on them seems potentially to tie the hands of future Governments for no good purpose, and should be removed.**

98. **Finally, if these sectors are not included from the outset, then the Government published figures for the UK's annual emissions and forecasts of future emissions should clearly indicate what the level of these emissions—and progress towards meeting national carbon budgets and targets—would be, once international aviation and shipping were included. This would aid transparency, and focus attention on the effects that an ongoing upward trajectory in aviation emissions has on progress towards the UK's short, medium and long term targets. In order to do this, projections of future emissions from aviation and shipping must be improved, frequently updated, and fully integrated into the Government's Updated Emissions Projections papers.**

## Use of emissions trading

99. The draft Bill would allow for the UK's statutory carbon targets to be partly met through emissions trading—that is, by the UK's funding quantified emissions reductions in other countries, and receiving certified carbon credits in return, to be set against the UK's domestic targets. The draft Bill sets out:

- a duty on Government to produce regulations setting out the types of overseas credits that can count towards the UK's targets, and the amount of carbon dioxide emissions reductions that each type of credit represents;
- a requirement for the Government to report on the number and type of carbon credits used against UK targets;
- powers for the Government to set up an organisation and provide it with funds to purchase overseas credits, if necessary to help the UK meet its targets; and
- a duty on the proposed Committee on Climate Change to advise the Government on the optimal balance between domestic and overseas effort to inform the Government's decision-making.

100. We have previously expressed a number of reservations about the use of emissions trading to help meet domestic carbon reduction targets, while acknowledging the potential benefits of emissions trading (in helping to reduce the costs of mitigation, and in securing flows of finance to fund low carbon development in the developing world) and the potential significance of the EU Emissions Trading Scheme. Our concerns have been, first, the extent to which carbon credits are funding real reductions in global emissions; second, the extent to which the purchase of carbon credits obscures the transparency of public

reporting as to each nation's domestic progress in reducing emissions; and third, the practical feasibility of relying, in order to meet targets for 2050, on finding significant volumes of surplus carbon credits to buy from other countries, when *all* nations will surely find it very challenging to meet their domestic emissions targets for 2050 under any post-2012 regime.

101. Several submissions directed similar criticism towards the role of emissions trading within the draft Bill. WWF argued that if the UK made significant use of carbon credits to meet even its shorter term targets, the pressure within the UK to abate emissions would be reduced, with the result that we would continue to build and invest in high-carbon infrastructure, thus locking us into a high-carbon pathway for decades to come (or necessitating the costly scrapping of much infrastructure).[136] This was an argument developed by Professor Ekins, who stressed that

> the offsetting mechanism needs to be very, very sparingly employed in developed countries' targets and the great majority of them should be through domestic action, so that a rich economy like ours can show that it is possible to maintain civilised life and have low carbon emissions which, at the moment, is the hypothesis that needs to be proved. […] What we know we have to find is the way of living civilised lives with low carbon emissions and that should be the objective that is pursued by the Bill.[137]

The Energy Saving Trust argued that there was no reason not to deliver savings from within the UK, and indeed still plenty of room for finding cuts through simple energy efficiency; thus they "would like to see the majority, if not all, of the emission reductions coming from the UK". Overall, EST argued that the proportion of carbon credits used against UK targets should be capped, perhaps to 5% or 10%, and that much only allowed for sectors in which industrial competitiveness is a concern.[138]

102. Several submissions also discussed the fundamental problems with the robustness of emissions trading. Friends of the Earth stressed the difficulties in assessing whether carbon credits, nominally each equivalent to a tonne of carbon, can really be judged to equal and thus cancel out an equivalent tonnage in actual emissions from the UK: "This depends on a multiplicity of factors – such as assessment of whether that tonne would have been (at least partially) saved anyway, whether it [is] measured as a reduction on current emissions, or from a projection of future demand. It is a problem that bedevils carbon offsetting schemes as well as trading schemes." Such difficulties led FoE to the conclusion, typical of the arguments we heard from other environmental NGOs:

> We are therefore concerned that the Bill should not allow the total freedom to trade carbon credits to meet carbon budgets until the frameworks that such trading takes place within are sufficiently robust to be moving us on the correct trajectory to the carbon cuts we need to see. Until that time we believe serious consideration should

136 Q174

137 Q217

138 Q149

be given to restricting the use of trading as a mechanism to meet the budgets, perhaps by

- Setting a strict limit for the amount of effort to be made to meet budgets domestically, and the amount that can be "bought in".
- Operating a kind of "exchange rate" where independent assessment judges a tonne of carbon saved domestically to be equivalent to, say, just half a tonne under a trading scheme. In such cases, credits for two tonnes would be needed to have the same effect on the budget.
- Restricting trading to only robust schemes.[139]

To the extent that carbon credits are used against UK targets, EST were one of several organisations to argue that there should be "a system of parallel reporting of parallel targets which showed you the reductions achieved just within the UK so that we can clearly distinguish that which is purchased overseas from that which is meeting our own targets from our own efforts".[140]

103. At the same time, RSPB discussed the negative effects that might be caused by very tight restrictions on emissions trading, essentially that this could reduce the flow of funding to build low carbon infrastructure in the developing world. For both RSPB and WWF one solution to this was to ensure that the reduction targets adopted by the developed nations such as the UK were very demanding. As Keith Allott of WWF put it: "The more ambitious the targets the government is prepared to put on the face of the Bill then to an extent the more relaxed we are about using some trading to count towards those targets. Having a weak target (with essentially unrestricted trading) is the worst of both worlds."[141] They also made the argument that low carbon investment in the developing world could be funded from auctioning allowances to emit carbon within cap and trade schemes (such as the EU ETS).[142]

104. Climate Change Capital were much more positive about the use of emissions trading, making a strong argument as to the increasing robustness of current trading schemes such as the Clean Development Mechanism, and stressing the importance of emissions trading in providing the finance for low carbon and sustainable development projects in the developing world. Interestingly, they came up with something of a counter-argument to the point made by WWF, that if the developed world relies too much on buying carbon credits it will become locked into high carbon infrastructure:

> if you take the example, for instance, of the massive rural-urban migration occurring in India and China, which is unprecedented in history and will never occur again, we have one chance to build cleaner infrastructure, to support clean urban planning, to

139 Ev 121

140 Q150

141 Q173

142 Ev 48

> encourage mass transits instead of building of roads, to build clean buildings, close to zero carbon buildings. We have one chance at that because we all know that retrofit is more expensive. If money is sent through well-designed mechanisms towards that kind of effort, I do not really mind whether that slows down retrofit here, because that is a one-chance opportunity that the whole world should be contributing to. Of course, we will have our own objectives and that will be part of the deal; the key thing is the quality of the investments you are doing overseas.[143]

105. We expressed some of the concerns made about emissions trading in the context of the draft Bill in our recent evidence session with the Secretary of State. In response he stressed the limits to be placed on the use of carbon credits under the principle of supplementarity – which he defined as rules "designed to ensure that your purchases abroad are to supplement your domestic effort, not to be instead of it" – and which underpin the restrictions in the draft Bill. [144] To this we would observe that there is still much to be done to define and prove the robustness of these limits. As, for instance, the Defra's own consultation document on the draft Bill explains:

> 5.31 There is a lack of clarity over what precisely the supplementarity principle means in terms of a quantitative limit on emissions reduction effort which can be achieved overseas. For one thing, no quantitative limit is explicitly given in the guidance. For another, the principle refers only to Kyoto project mechanisms (CDM and JI) for complying with Kyoto obligations, whereas it is also the case that EU ETS allowances purchased overseas are strictly speaking international rather than domestic effort. […T]here is no limit on the degree to which organisations within the EU ETS system can reduce their emissions through purchasing allowances, many or all of which could come from other EU Member States.[145]

106. **We have concerns as to the scope in the draft Bill for the UK's carbon reduction targets to be partly met by purchasing carbon credits from other countries. The Government must ensure that carbon credits are not used to forestall the early transition in the UK to low carbon infrastructure in power generation, buildings and transport, as this could mean that the country is locked into carbon-intensive lifestyles for decades to come. At the same time, we certainly recognise the potential importance of trading in providing funds for low carbon infrastructure in the developing world. We would simply argue that this must not become an "either/or": the Government should ensure that the UK's targets are sufficiently challenging that they drive decisive emissions reductions at home and abroad.**

107. **Where emissions trading is used to meet UK targets, it is essential that the Government distinguishes clearly between emissions reductions achieved within the UK and emissions reductions funded by the UK but taking place abroad. Thus far, in reporting the relationship of the EU ETS to UK emissions, the Government has been**

---

143 Q198

144 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 4 June 2007, HC (2006-07) 595-i, Q31

145 *Draft Climate Change Bill Consultation Document*, para 5.31

**less than transparent. The problem with this is that it might foster a false sense of complacency about the progress and policies required to decarbonise the UK. The Government ought to adopt a code of practice for reporting UK emissions, and the Committee on Climate Change should audit Government press and statistical releases.**

108. **Above all, the Government should address the question: if all countries will have to meet challenging emissions targets by mid-century, how many are going to beat their targets and thus be able to offer surplus carbon credits to the rest? The Government has pointed to the research in the Stern Review which concludes that in order to meet a global 450-550ppm $CO_2e$ target, all developed nations would have to make emissions cuts of at least 60%-90%, with many developing world countries allowed only a modest increase or a small decrease; but Stern clearly says that these figures "do not incorporate international emissions trading".**[146] **The Government should clarify what these targets would be once emissions trading is taken into account, under a range of scenarios. In doing this, the Government should be explicit about the maximum range of the UK's carbon budget to 2050 which could be made up by buying emissions credits from abroad, and still be consistent with Stern's global stabilisation targets.**

## Carbon budgets and reporting

109. The draft Bill sets out provisions for the Government to set statutory five-year carbon budgets, prescribing the maximum amount of carbon to be emitted from the UK in that period (while allowing for carbon credits purchased from abroad to be counted against this budget). The consultation document on the draft Bill explains how these would fit with the statutory targets for 2020 and 2050:

> Of course, five years provides insufficient certainty for many businesses making longer term investment decisions. For this reason we are proposing to set a target for 2050 into statute, and provide additional short and medium term clarity by proposing that the trajectory to our 2020 target should be represented by setting in place three five-year carbon budgets, for the periods 2008-12, 2013-17, and 2018-22. This would provide a full fifteen year horizon of expected $CO_2$ emissions reductions, and a strong, clear signal about the subsequent direction. Future carbon budgets would then be set to ensure that there were always three budget periods' worth of carbon budgets in statute, giving medium-term clarity whilst recognising that it is not realistic to guess conditions more than fifteen years in advance.[147]

The Bill also allows for carbon budgets to be revised, in similar though not as prescriptive terms as the provisions for amending the 2050 and 2020 targets.

110. In addition, the draft Bill sets out a number of provisions aimed at aiding Parliamentary and public scrutiny of the Government's policy framework for reducing emissions, as well as progress made by the UK in actually doing so. The Government has

146 Q109

147 *Draft Climate Change Bill Consultation Document*, para 5.16

recently given itself a legal requirement to report to Parliament an annual assessment of its progress on greenhouse gas emissions reductions, under Section 2 of the Climate Change and Sustainable Energy Act 2006.[148] The draft Bill proposes to build on this, by requiring the Committee on Climate Change to report annually to Parliament, setting out its views on the UK's progress towards meeting its five-year carbon budgets, and the targets to 2020 and 2050; the Government would be obliged to respond publicly to these reports. Beyond this, the draft Bill also proposes that after setting the carbon budget for the next budgetary period, the Secretary of State would report to Parliament on how it—and the following two carbon budgets—would be delivered, giving details of the policies which would be implemented. After each budgetary period, meanwhile, another provision would oblige the Government to report to Parliament on whether and how the budget was met.

111. One major issue arising from these proposals is whether the five year carbon budgets are too long to prove effective in applying a consistent pressure to reduce emissions, or in holding the Government to account for meeting them. Friends of the Earth, which has spearheaded a long running campaign for the introduction of statutory annual reductions in emissions, expressed their concern that:

> The Bill must therefore ensure that every Government is held to account, and cannot pass the buck to a future Government—or blame a previous one. There is a very real danger that as drafted—with five year budget periods that will almost inevitably overlap with two Parliaments—the Bill will fail to do this. […] It is far from impossible to imagine a situation where a Government approaching an election might duck some tricky decisions, or opt for tax cuts rather than investment in necessary low-carbon infrastructure or technology. […] After all, in such cases the blame for missing the budget would actually [be] taken by the successor Government. But the successor Government may feel it can get away with using the flexibility in the Bill to amend the budget, while blaming the previous Government who did too little to get on track for the budget that every[one] wanted to see met. Everyone blames each other—but crucially our carbon emissions are not cut as required.[149]

On this point David Middleton from BCSD-UK told us: "We are concerned about issues of responsibility amongst ministers. If it is a five-year reporting period, is there any retrospective responsibility on acts which have happened during the period of a minister when that minister may no longer be in post?"[150] The other main concern we heard about five year budgets was that it could foster complacency in the first two or three years; as EST expressed it: "We should not have that kind of luxury of being at the start of a 5-year period and what we do now perhaps does not matter too much as we will catch up later on."[151]

148 According to Defra and DTI, this will be made up of assessments of the impact of individual measures, as well as recent trends in emissions, collected by the Interdepartmental Analysts Group and previously only reported internally to the Climate Change Programme Board, a cross-departmental board of senior officials, on a quarterly basis. Ev 117

149 Ev 121

150 Q2

151 Q147

The answer favoured by EST, as well as the environmental NGOs, was that there should still be annual targets within strict three or five year carbon budgets. This would provide the flexibility to exceed a certain year's targets due to unforeseen circumstances, while still providing the continual attention to, and accountability for, delivery.

112. Another significant issue concerns the provisions in the draft Bill to allow the Government to "bank" or "borrow" emissions between one five-year carbon budget and another:

- "Banking" would mean that if the UK were going to finish one five-year carbon budget "under budget"—that is, emitting even less than it was entitled to—the Government could choose to "carry over" the excess emissions entitlements into the next carbon budget, in effect inflating the next five-year carbon budget and making it easier to achieve.

- "Borrowing" would mean that if the UK were having difficulties in making its carbon budget for one five-year period, the Government could "borrow" a proportion (limited to no more than 1%) of the budget for the next five-year period; in turn, this would decrease the next carbon budget by the same amount, thereby making it harder to achieve.

The draft Bill requires the Secretary of State to obtain the advice of the Committee on Climate Change, and take this advice into account, before banking or borrowing, but does not require the Secretary of State to obtain Parliamentary approval. The advantages of the ability to bank and borrow are put forward in the Partial Regulatory Impact Assessment which accompanies the draft Bill: banking would help to incentivise the UK to make even steeper cuts in the short term, while borrowing would help the Government to cope with unforeseen circumstances in the final year of a five-year carbon budget.[152]

113. These provisions, and the rationale put forward for them, were largely endorsed by our witnesses. Tony White of Climate Change Capital stressed the reassurance that this provision of flexibility would give to investors—since: "Markets are concerned about things happening that are not expected, governments panicking and then you just do not know what is going to happen."[153] Paul Ekins, meanwhile, argued that banking, in particular, was very important:

> It is absolutely critical that banking at least is allowed. Banking and borrowing are rather different in this field. Banking is critically important in order to give confidence in the carbon market, so that people will reduce emissions now, they will take early action, they will go for it right up to the limit of economic feasibility or economic viability, in the knowledge that if they save more carbon than they think they are going to, they will be able to offset those emissions against these very tough targets that are coming in the future. That is a very, very important incentive.[154]

152 *Draft Climate Change Bill – Partial Regulatory Impact Assessment*, Cm 7040, March 2007, paras 5.1.40-5.1.52

153 Q180

154 Q228

Borrowing was more problematic, he believed, and needed to be kept within very tight limits, since "the natural instinct of practically everybody is going to say "Let's not do it today, let's do it tomorrow and then we can borrow against the future". Of course, if too many people borrow against the future, the future becomes unachievable."[155] The Bill does propose limiting borrowing to 1% of the budget, but Professor Ekins maintained: "That should be an absolute maximum because one per cent of quite a large number is quite a large number."[156]

114. A final issue which we looked at in relation to carbon budgeting is the steepness of the emissions pathways which ought to be set through them. EEF welcomed the 15 year horizon proposed for these carbon budgets, believing this would enable industry to build in requirements to adjust into their regular investment plans; however, EEF also argued that any requirement for steeper emissions cuts ought to be delayed, as the development and deployment of new technology would require long lead times. EST and others, meanwhile, argued strongly against this and in favour of "front-loading" emissions cuts. Their rationale for this was that, because carbon dioxide remains in the atmosphere for around century, the focus should not simply be on targets for reductions to be made in a certain year, but on constraining the cumulative total of emissions—and thus: "The earlier you prevent carbon emissions going into the atmosphere, the less the impact is on climate change."[157]

115. In the consultation document on the draft Climate Change Bill, the Government does explicitly discuss this as a reason for seeking to introduce its successive five year carbon budgets.[158] However, a number of submissions argued that it was not going far enough. EST, for instance, argued that the 15 year horizon of carbon budgeting proposed by the Bill was too short, and that it ought to be extended to 2050, in order to ensure there was a continual focus on short, medium, and long term efforts required.[159] The implication of their argument was that, by only setting budgets 15 years ahead, the Government might agree to initial carbon budgets that were set at too high a level, through not being made to focus on plotting an optimal path, with balanced demands on the UK in every carbon budgetary period, all the way to 2050. These comments were seconded by Nick Mabey, who argued that if the Government merely focused on meeting a carbon budget over a 15 year horizon it would be pursuing the wrong policies, as long term reductions were dependent on replacing high carbon infrastructure in power generation, buildings, and transport.[160]

116. Dr John Rhys and Mike Parker of the British Institute of Energy Economists (BIEE) Climate Change Group made a related argument, stressing that the Government should be more prescriptive in setting out the extent and timing of cuts required from different

---

155 Q228

156 Q230

157 Q148 Mr Staniaszak

158 Draft Climate Change Bill Consultation Document, paras 5.14-5.15

159 Q147

160 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 19 June 2007, HC ( 2006-07) 740, Q53

sectors of the economy. This, they argued, was necessary in order to provide realistic guidance as to what needs to be done to meet the UK's longer term targets. For instance, the BIEE Group observed:

> Given the long lead-times involved in removing sources of inertia, introducing low carbon technologies and making the associated changes to infrastructure and institutions, the successful implementation of any 60-80% path is on a very tight schedule. To provide clarity and credibility there is a need to draw up time critical pathways for three particularly significant sectors—electricity, transport, and buildings. These account for about 85% of CO2 in the UK. A UK reduction of 80 % by 2050 is not feasible unless all three achieve close to 80%, or at least two achieve close to 100% while the third still achieves around 50%.[161]

117. **We welcome the Government's proposals to introduce a national carbon budgeting system. Setting successive five year carbon budgets will help to span the gap between annual emissions figures and the target for 2020. We hope that these carbon budgets will ensure that there is constant political pressure to meet them every five years. They should also help define the pathway of emissions reductions through time that the UK will need to follow in order to meet its medium and longer term targets. In addition, the introduction of rigorous annual reports to Parliament on trends in emissions and on the impacts of carbon reduction policies, as well as reports setting out the suite of policies and their projected impact for each budgetary period, will show whether the UK is managing to follow its required emissions pathway, and should lead to a timely revision of policies if progress is slipping off track.**

118. **It makes sense for each carbon budget to run for longer than one year, to allow for unforeseen variations in emissions from year to year. But the Government should still set out an indicative target for UK emissions in each year, so as to apply continual pressure to reduce emissions. We also recommend that the successive series of carbon budgets should extend out all the way to 2050, so that all carbon budgets are consistent with the UK's overarching emissions objective.**

119. **Earlier budgets should contain steeper reductions: as the Stern Review made clear, early cuts in emissions are disproportionately beneficial. The Government should also examine the feasibility of introducing sector-specific emissions pathways to be defined to 2050, notably for power generation, buildings, and transport; this would help to identify in more detail the scale, timing, and nature of the developments needed in order for the UK as a whole to meet its targets.** The desirability of such sectoral plans is illustrated by the lack of progress so far in reducing carbon emissions from transport, and the complacency about this shown by the Department for Transport. Writing to us last year, that Department assured us of their commitment by arguing that, according to DTI

161 "Bringing Urgency into UK Climate Change Policy", BIEE Climate Change Policy Group, December 2006, p 5

projections, by 2050 emissions from transport will be at the same levels as they were in 1990.[162]

120. **One further aspect of the provisions in the draft Bill which we welcome is the proposed introduction of five-yearly reports on the impacts of climate change in the UK and policies for adaptation.** RSPB have taken a lead in scrutinising this, and discussing its potential:

> We have had conversations with the [Office of Climate Change] and others about this. Their interpretation of this is somewhat stronger than ours was initially. They take the view that the requirement is not just a reporting requirement but a requirement to bring forward a programme of action. That is certainly what we would like. We will be looking to strengthen the language so that other people cannot interpret it in the way we did which was just as a reporting requirement. We have a particular perspective on this as the RSPB because we are facing a situation where wildlife is already under substantial threats from all kinds of other pressures and is now faced with an additional, potentially knock-out blow as a result of climate change. We have what we believe is a totally reasonable expectation that, since these are human impacts, we find the resources and put forward the policies to allow wildlife to adapt. We take the view that that is important in the UK, but we also are talking to colleagues within the Stop Climate Chaos Coalition who work in the development movement and who have passionate concerns about funding for adaptation internationally as well as funding for the UK. We would like to explore the possibility of including an obligation for the government to report on the efforts it is making in terms of global equity to address the impacts of our emissions on the world's poorest people.[163]

**We recommend that this requirement is accompanied by a Government programme of action on adaptation in the UK. The Government should incorporate into such a formal programme of action an international development strategy which identifies and works to address the impact of climate change on the world's poorest and most vulnerable communities. Following our recent suite of reports on the Government's approach to trade, development, and the environment, we may look more closely at the adaptation proposal in this draft Bill—and any wider initiatives it develops—in the future.**

## Committee on Climate Change

121. The draft Bill would provide for the creation of a new Non-Departmental Public Body (NDPB), to be called the Committee on Climate Change (the Committee). The Government's Consultation Document describes the purpose of this new body, at its

162 Environmental Audit Committee, Twelfth Report of Session 2005-06, *Transport Emissions: Government Response to the Committee's Ninth Report of Session 2005-06 on Reducing Carbon Emissions from Transport*, HC 1718, para 4

163 Q178

briefest, as being "to independently assess how the UK can optimally achieve its emissions reductions goals". Further details are set out in **Figure 5**.

**Figure 5 Outline of roles and duties for the Committee on Climate Change**

**The draft Bill contains provisions for the Committee:**

- **to provide advice to the Secretary of State on the level that ought to be set for the UK's five-yearly carbon budgets;**
- **to report annually to Parliament on the progress towards meeting both these budgets and the targets for 2020 and 2050; and**
- **to provide other advice or assistance to the Secretary of State on request.**

**In more detail, it is intended that the Committee should advise the Government on:**

- **whether the 2010 target for a 20% reduction in $CO_2$ could be achieved in the first carbon budget period (2008-2012), and the costs and benefits of achieving such a budget;**
- **the extent to which carbon budgets should be met by domestic emissions reductions versus emissions reductions purchased overseas;**
- **the respective contributions towards meeting the budgets of those sectors of the economy covered, and those not covered, by trading schemes;**
- **its use of banking and borrowing between carbon budgets; and**
- **broadly, how to achieve $CO_2$ emissions reductions as cost-effectively as possible.**

**The draft Bill hints that the Committee may be asked to advise on matters including the production of greenhouse gas statistics, and whether the UK's carbon budgets and targets should be widened to encompass all greenhouse gases.**

**Appearing before us, the Office of Climate Change said that the Committee would be "producing very explicit advice on both what the trajectory should be but also on what the spread of effort across different sectors of the economy should be, and between domestic effort and overseas effort."**

*Source: Draft Climate Change Bill and Consultation Document; Q93 Mr Mortimer*

122. A variety of different organisations broadly gave the proposal for the Committee a welcome; in particular, there was support for its being an independent body. There were two ways in which this was perceived as being a good thing. The first was so that it could provide oversight of the information published and analysis performed by the Government, the need for which had been highlighted by the failings of the Climate Change Programme Review. The Sustainable Development Commission had told us last year that they would welcome more independence in the production or at least auditing of Government emissions forecasts. As Sir Jonathon Porritt put it:

> We have had discussions with ministers in Defra about this matter, and we have indicated that we regard it as hugely important. I genuinely cannot see any downside to it for government. If there is to be embarrassment on these issues it is better that they surface via a transparent process that others can point to rather than by something that is suddenly released at the dead of night by a government body that

> may well feel constrained by putting that data into the public domain. This is critical. We do not necessarily know that we are on track to achieving some of these targets.[164]

123. The Committee's independent status was also seen to enhance its ability to advise the Government on the level of carbon reductions required and the policies necessary to achieve them. Climate Change Capital were among many who hoped that the Committee would be able to help Government match its political response to the recommendations provided by the science, by depoliticising the debate over the introduction of potentially radical or unpopular measures:

> The key issue is really de-politicisation. […] The Climate Change Committee, by de-politicising the process, by giving ministers the political space to say on an independent evaluation of the scientific evidence and the economic issues we think is the best way forward. Until now that has not existed. If you think about the impact that the Stern report has had, we are talking about a series of mini-Sterns, focused on the UK's policymaking specifically, which will give those decision makers some political space. [165]

CCC also stressed the importance of the Committee as an example which other governments might follow: "[E]verybody is watching this experiment […] If this works, people will sign up to it in some countries, not all, but there is a real chance that within the EU in particular the traded sector will be carved out of national policy making and put in a place that, over long periods, people can rely on."[166]

124. In relation to this discussion as to the advantages which the Committee's independent role could bring, we heard much debate about the parallels between the Committee on Climate Change and the Bank of England's Monetary Policy Committee (MPC), to which in 1997 the Chancellor handed the power to set interest rates. EST, BCSD-UK, and the Institute of Mechanical Engineers explicitly likened the proposed Committee to the MPC. Climate Change Capital argued that:

> There are some parallels there because at the moment the Government manage the inflation using interest rates and it has given this responsibility effectively to the MPC. […] T]he Government will say they want to move to this level in emissions over this period and you have to write a letter if our emissions exceed that over a five-year average period, or something. It is very, very similar. The Government will say that this is the kind of level of emissions reductions they want from the United Kingdom and you give us recommendations to get there.[167]

125. At the same time, CCC and others also stressed the differences between the MPC and the proposed Committee on Climate Change. Kate Hampton of CCC, for instance, stressed

---

164 Environmental Audit Committee, *Climate Change – the UK Programme 2006*,Q209

165 Q188

166 Q195

167 Q191-3

that: "It is not a panacea. You still have to have willingness of the ministers to accept those judgments, but it is better to have a process of independent evaluation going forward than none."[168] Meanwhile, Paul Ekins told us:

> No-one is proposing and I certainly would not propose that the policy recommendations of the committee were mandatory for Government in the way that the Monetary Policy Committee recommendation on the interest rate is mandatory, it actually takes the decision; because the policies on climate change are much too far-reaching, and because it is right that there should be political accountability for them.[169]

Rather, for Professor Ekins, the great value of the Committee's policy recommendations would not be that the Government should be bound to accept them, but that if it rejected them it would formally have to explain why and publicly offer an alternative, but equally effective, approach:

> if they decide that they do not want to go along with those recommendations, then they will have to propose something else and that comes back to what I said right at the start about the importance of this Bill: they will not simply be able to say "No, I don't like that" because there will be a slug of carbon which these policies are scheduled to take out from emissions and they will have to find some other way of doing that.[170]

126. We heard much discussion as to exactly what the main roles of the Committee should be, whether and what priorities it should have prescribed for it, what resources it should have, who should sit on it and how they should be chosen. Much of this discussion focused on the place in the draft Bill which spells out a list of policy considerations which the Committee would be expected to take into account in formulating its recommendations, and equally, essentially the same list of considerations, which is given by the draft Bill as illustrating the backgrounds of the Committee's membership:

168 Q188

169 Q222

170 Q222

**5 Matters to be taken into account in connection with carbon budgets**

[…]

(2) The matters to be taken into account are-

(a) scientific knowledge about climate change;

(b) technology relevant to climate change;

(c) economic circumstances, and in particular the likely impact of the decision on the economy and the competitiveness of particular sectors of the economy;

(d) fiscal circumstances, and in particular the likely impact of the decision on taxation, public spending and public borrowing;

(e) social circumstances, and in particular the likely impact of the decision on fuel poverty;

(f) energy policy, and in particular the likely impact of the decision on energy supplies and the carbon and energy intensity of the UK; and,

(g) international circumstances.

**Schedule 1**

THE COMMITTEE ON CLIMATE CHANGE

*Membership*

[…]

(3) In appointing a member, the Secretary of State must have regard to the desirability of securing that the Committee (taken as a whole) has experience in or knowledge of-

(a) economic analysis and forecasting,

(b) business competitiveness,

(c) financial investment,

(d) technology development and diffusion,

(e) energy production and supply,

(f) climate science,

(g) emissions trading, and

(h) climate change policy, and in particular the social impacts of such policy.

127. RSPB were far from alone among environmental groups in questioning the ranking of "climate science" in the Bill's list of areas of expertise required of the Committee's members. Given, they argued, that the Committee's "main role is going to be in objective advice on science":

> We are concerned that the first set of skills and experience that are being asked for relates particularly to understanding of pure economics or of impacts on fiscal issues and poverty. Those are clearly very important things but as it stands at the moment we feel there should be a better balance with those people with responsibility for and understanding of the environmental policy expertise.[171]

Additionally, RSPB and WWF called for another area of expertise to be taken into account —the wider environmental considerations of sustainable development:

> It does seem slightly odd to us in terms of the criteria that the Committee has to take account of. It does not seem to represent the conventional view of the three legged stool of sustainable development. There are criteria to do with economics and social impact but nothing in terms of wider impacts on the environment.

Ruth Davis of RSPB explained further:

> One very important issue for those working in the environmental sector is that alongside duties to take into account issues around economic impacts and impacts

171 Q161

> on social equity we think that the Committee should have some kind of duty to take account of sustainable development in the way that it sets its aspirations for the balance between sectors. For example, if there was a massive preponderance of reliance on the power generation sector to the exclusion of everything else, we would have to understand what the implications of that were in terms of nuclear power but also in terms of the impacts of barrage projects and of major wind. We would like to be confident that the Committee had thought about that in the way that it was deciding to establish a balance between different sectors, as it is required to think about the impacts on social causes and poverty reduction.[172]

128. Other organisations also made their own requests for further issues to be prescribed for the Committee to consider. The Energy Saving Trust called for the Committee's membership to include someone with experience in helping businesses and individuals reduce their demand for carbon-intensive goods and services.[173] BCSD-UK, meanwhile, called for the Committee to be given an explicit target to maintain sustainable economic growth.[174] In terms of who would become members of the Committee, BCSD-UK argued that these should predominantly come from business:

> I would like to see the people appointed to it being, as I think we have mentioned before, from areas of expertise that can help formulate that helpful direction for government, so I think it is likely to be business, to be honest. […] I would like to see it predominantly business-led but with academic input that sits closely with the business community as distinct from pure academic. **[…]**[175]

Commenting on BCSD-UK's recommendation that the Committee be charged with a duty to promote economic growth, WWF responded:

> There are plenty of other government institutions which are charged with that duty already. In terms of the government's own modelling and the impact on long term GDP growth, the figures are talking about a modest shaving off what by 2050 is a very significant growth in the nation's GDP. We are not talking about grinding the economy to a halt. We are talking about a significant investment in a lower carbon future which we need to make anyhow. Stern clearly sets out that the impacts that the UK and the world would avoid by adopting that strategy would greatly outweigh the costs of the transition to a low carbon economy. That is the classic example of somebody trying to lumber the Committee with an inappropriate duty.[176]

129. However, WWF and BCSD-UK, as well as a number of other witnesses, were all in agreement that the members of the Committee should be selected for their individual expertise, and serve in a personal capacity, rather than being the representatives of a range

172 Q161

173 Qq 139-140

174 Ev 1

175 Qq 54-58

176 Q166

of stakeholder groups. BCSD-UK, for instance, clarified: "I think we are talking about the type of people who should be on the board rather than their affiliation. We are not saying that there should be a member of the CBI appointed to the Committee."[177] EST argued "it is important to make sure that all sectors are actually represented on the Committee by experts but not sector representatives."[178] RSPB said: "it would be dangerous and destructive to get into a role where you have representatives of sectors on the Committee. We would like to see representatives come forward on the basis of their individual competence and expertise."[179] Dr John Rhys was clear that Committee membership "should not be based on special interest groups, as this would weaken its independence and its credibility."[180]

130. A number of witnesses went beyond this, to discuss the process that ought to be used to select members of the Committee. EST stressed "it is important that the members of the Committee are selected on their expertise in a clear and transparent manner. The Committee has to be independent, and it will only work if it is independent and, therefore, selection should meet with the recommendations and findings of the Nolan Report." RSPB, meanwhile, told us:

> We have been discussing potentially the idea of a committee such as yourselves having a role in agreeing the appointments to the Committee on Climate Change. That would seem a rational thing to do and it would be interesting at some point to discuss that further.[181]

131. **We support the Government's proposal to establish an independent Committee on Climate Change. The creation of such an independent body should make a significant contribution to the quality and transparency of Government climate change policy. One particularly valuable aspect of the Committee's work would be in providing challenge to, and public reporting on, Government forecasting and policy analysis. As part of the Committee's proposed statutory role to report to Parliament on UK emissions and the progress made in reducing them each year, it should be given a duty to audit the Government's publication of emissions statistics to ensure these are transparent, differentiating between emissions reductions made in this country and those funded abroad. It should also have a duty to comment annually on the assumptions and modelling used by the Government to forecast future emissions and estimate the impact of individual policies. Furthermore, the Committee should be able to make detailed policy recommendations to Government.**

132. Another major contribution which the Committee on Climate Change could make would be to help to depoliticise the consideration of policies to reduce emissions, including measures which could be potentially very contentious. (We might observe that this is the

177 Q57

178 Q139

179 Q161

180 Ev 76

181 Q161

same principle which has lain behind the recommendations, made over a number of years by ourselves and our predecessor Committees, for the creation of a Green Tax Commission.) **There has been much discussion of the parallels between the Committee on Climate Change and the Bank of England's Monetary Policy Committee. The latter illustrates the advantages that can be gained by devolving key responsibilities to a non-party political committee of experts. At the same time, the issues involved in climate change policy are bigger and more complex than those devolved to the MPC. We conclude that, while the Committee on Climate Change could make some detailed recommendations, the Government must still choose which policies to implement. The virtue of the Committee will be that the Government must respond to it; and if Ministers reject any of the Committee's recommendations, they will have to set out why, and propose others to deliver equivalent emissions savings.**

133. **These virtues, of course, depend on the Committee's enjoying—and being seen to enjoy—a very high level of both subject expertise and independence. We consider that, as the conditions for membership are set out in the draft Bill, "climate science" is not given enough prominence. We recommend that this should be spelt out as the most important area for the Committee to understand and take into account. We further recommend that the Committee be given a duty to consider the wider environmental aspects of sustainable development.**

134. **In order to strengthen the independence of the Committee—and public perceptions of its independence—it is essential that members be appointed for their individual expertise, and serve in a personal capacity, rather than as representatives of different stakeholder groups. The appointment process itself should be open and transparent, preferably in accordance with the recommendations of the Nolan Report. To increase transparency and perceptions of independence, and in view of the importance of their role, all new appointees to the Committee should first be required to appear before the Environmental Audit Committee, to provide assurance to Parliament as to their suitability, and to highlight their thinking on tackling climate change.**

### *Relationship of the Committee on Climate Change to the Office of Climate Change*

135. One major development since the Climate Change Programme Review has been the creation of the Office of Climate Change (OCC). The OCC keeps a very low profile; very little information about it has been published, and it has neither a website of its own nor any pages devoted to it on the Defra website. However, the Head of the OCC, Mr Jonathon Brearley, wrote to us in connection with this inquiry to supply us with the following information:

- The OCC was set up in Autumn 2006. Its broad role is to work across Government, providing departments with advice on analysis and policy options for them to consider;

- Its approach is similar to that of the Prime Minister's Strategy Unit: to identify specific policy problems and put together a strong cross-Government team to develop and recommend options for departments to consider. Typically, projects last between 3 and 6 months, with two to eight staff working on each;

- The OCC has a headcount allocation of 35 full time equivalent staff. Staff are recruited from Defra and are brought in on loan from other government departments and secondment from other organisations.

- Among its work so far has been:

- Development of the draft Climate Change Bill.

- Supporting Defra in analysing the UK position on Phase 3 of the EU ETS.

- A review of the departmental governance of climate change policies.

- Analytical Audit of the economic rationale for government intervention to reduce greenhouse gas emissions and what mitigation policies the UK has in place.

136. We were interested in how the OCC and the Committee on Climate Change would demarcate their roles and work together, and how each would work with the Interdepartmental Analysts Group. When we questioned the OCC on this, two things became apparent: first, that this was still very much a work in progress; and two, that the OCC's priority was to avoid an inefficient and unnecessary duplication of effort:

> Our relationship with the Committee on Climate Change I think is still an ongoing question. Clearly the Committee on Climate Change will need access to a huge amount of data, and a huge amount of analysis. What we do not want to have necessarily is duplication between what Government does, what the OCC does and what the Climate Change Committee does. At the moment we are thinking essentially about which models of Climate Change Committee might allow us to do both.
>
> We are working very closely with the IAG on that and the Committee. We are looking at a number of alternatives. One really important issue is not to duplicate existing Government analysis; and also to recognise that quite a lot of the analysis which will be needed by the Committee will have to be done by Government in any case; so the Department for Transport is always going to want to have a transport model which would be relevant to the Committee. We are looking at a number of different models ranging from one where the Government effectively acts as an intelligent customer for the Committee's advice and another where more is outsourced to the Committee and have not arrived at a conclusion on exactly the shape of this model as yet.[182]

182 Q87 Mr Brealey, Mr Mortimer

137. In view of the evidence we had heard from EST and others, that the exclusion of fiscal policy from the main analytical work performed during the Climate Change Programme Review hampered its outcomes, we asked whether the OCC was able to analyse and combine all aspects of Government policy. The answer, however, was not entirely reassuring: "I think fiscal policies remain the ground that Treasury covers; so the OCC does not carry out any work on fiscal policies."[183] Nick Mabey suggested that the OCC would not by itself be able to join up Government policy, where this was already disjointed due to conflicting policy priorities, but that it should still be able to offer some innovative solutions:

> On the political level, the Office of Climate Change really makes no difference at all. It does not help you ensure that housing policy and climate policy are joined up or [aviation] policy. […] I do not think you can organisationally solve that problem; it has to be done at Cabinet level. In terms of […] finding innovative and integrated solutions, I think the Office of Climate Change has huge potential […] I think there has been a lot of people fighting about how much restrictions to put on housing and how fast to move in that sector, […] but no one was gripping that because it fell between everybody's stools in terms of departments. That is the kind of problem where the OCC should get a break out of the impasse. That is the main thing it can do, to provide creative, integrated solutions that previously were languishing in gaps between departments.[184]

138. **We conclude that the Office of Climate Change is doing valuable work, and will help to improve the quality of Government climate change policy. Its main role appears to be to provide a resource which individual Departments can access for discrete pieces of research on climate change policy. It remains to be seen, however, whether it will have the remit to design truly cross-cutting policies, or the influence to ensure that all Departments build climate change into their thinking at an early stage. The OCC's lack of responsibility for considering fiscal policies is a sign that this is not the case. Also, it cannot, by itself, ensure that Government policies are joined up, so that major policy programmes—for instance, DfT's airport expansion programme—do not run directly counter to the effort to reduce carbon emissions. This requires a joint effort of Ministerial will.**

139. A further issue here concerns the resourcing that is being planned for the Committee on Climate Change, and the extent to which it will be able to use its own staff and commission its own research, as opposed to relying on the data provided by the IAG and OCC. EEF saw this as being important in guaranteeing the Committee's independence:

> We would like to see the Committee on Climate Change independent. We would like to see the secretariat of the Committee being independent of government as well, so it can effectively scrutinise government policy. We think that the Committee

183 Q111

184 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 19 June 2007, HC ( 2006-07) 740, Q50

> should have access to an analytical resource, including modelling, again to be able to report back effectively to government on the issues and pressures.[185]

EST had particularly strong recommendations here:

> In the Bill it talks about the committee being supported by a standing secretariat of staff on detailed analysis. […] If that staff is 20 or 30 people or analytical experts, it may well be able to do all that analysis. However, if we are talking of a fairly modest staff complement, it would be insufficient to do the task in hand. We have done it on the cheap, if I can call it that, through bringing people in for specific pieces of work and that has worked up until now. The reality is that the challenge for us is far greater and we need a professional, dedicated resource to do that kind of analysis. It does not remove the need for individual work at departmental levels but the way to coordinate it across departments needs to be professional and in a permanently staffed manner.[186]

140. The Bill's Regulatory Impact Assessment states that the Committee's full staffing budget will be £2 million, and this will result in total staff numbers of around 15 to 20. This would suggest that, as planned, the Committee would have less than the complement of analytical staff which the EST believes is essential. Professor Ekins, meanwhile, believed that those staffing numbers might be sufficient (so long as all 15-20 referred to were high quality analysts; i.e., rather than 15-20 being the entire number of staff, with the number of such analysts being perhaps 10-15), but wondered about what size of research budget the Committee would be given:

> I am slightly worried that the budget would not be large enough to support the level of outside research that will be necessary to make the policy recommendations properly grounded. I am not expert in what Government spends on external research, but it would be very interesting for example to see how much it had spent on external support for the Energy White Paper process that has been going on now for a couple of years and to see whether that was in any way perceived to be adequate and would cover the range of issues that the Committee on Climate Change would be expected to cover.[187]

141. **The Government is right to seek to ensure that the Committee on Climate Change, the Office of Climate Change, and relevant parts of Government share resources and do not unnecessarily duplicate each other's work. But the Committee on Climate Change must have the resources to ensure that its work is wholly independent, and does not merely have to rely on the conclusions given to it by individual Departments. This point is underlined by the way in which, in the Climate Change Programme Review, the Interdepartmental Analysts Group only supplied decision-makers with one scenario for each potential policy, thus preventing the CCPR from considering the impacts of**

185 Q2

186 Q143

187 Q223

**different scales and combinations of policies.** As Nick Mabey put it, "It cannot just be a passive recipient of whatever is there, or it will be, perhaps, that people can hide things from it."[188] **Given the importance of the Committee it needs a high quality secretariat which is adequate to support all its work and a budget for commissioning external research.**

188 Uncorrected transcript of oral evidence taken before the Environmental Audit Committee on 19 June 2007, HC ( 2006-07) 740, Q55

# Conclusions and recommendations

## Introduction

1. Climate change is on a different scale from any other political challenge. Its potential effects could be both physically and economically devastating. It is not just the size but the timing of these effects that poses such a challenge. The lag between emitting $CO_2$ and experiencing the resulting rise in temperatures means we must take bold action today in the hope of preventing dangerous climate change occurring in the future, the impacts of which could be irreversible. Timing is also an issue given the long term planning and investments required to roll out new technologies and infrastructure, and thereby decarbonise the economy. (Paragraph 9)

2. These challenges underline the vital importance of getting the structures and systems which support UK climate change policy right. The UK's carbon reduction framework must be firmly embedded in the structures of government and the economy, so as to provide long term certainty and continuity. This necessitates policy-making which seeks to establish and draws on political consensus, which is based and updated on the best available science, and which draws on a detailed understanding of the impacts of policies on emissions, the economy, and everyday behaviour. (Paragraph 10)

## The Climate Change Programme Review

### *Forecasting future emissions*

3. Forecasting the future rate of an economy's carbon emissions is a complex business, fraught with inescapable uncertainties. As the review by the National Audit Office shows, the UK's forecasting processes have received approval from reviewers acting on behalf of the UN, and have been in line with assumptions and projections made by external bodies. However, while the NAO explains that a degree of change in projections is to be expected, it also notes that in this case the extent of change was greater than the Government modelling teams had expected. Naturally, there should be continual efforts to improve the models on which projections rely. But it also underlines the need for the Government to treat forecasts for future years with caution, and ensure they are not presented—either to decision-makers within the Government, or to the public—with undue certainty, as though they were concrete descriptions of the future. This applies especially to emissions forecasts which project many years into the future, such as to 2050. (Paragraph 32)

4. We consider it unacceptable that it took so long after 2000 for Government projections to catch up with reality. As late as the 2003 Energy White Paper, the Government was still projecting that the 2010 target would be met in full. The delay in producing more accurate forecasts severely retarded and impaired the ability of the Climate Change Programme Review to come up with policies that would get the 2010 target back on track. The Government should perform much more frequent revisions to emissions forecasts. (Paragraph 33)

5. Even if many of the Government's key forecasting assumptions were broadly in line with those made by external organisations, the fact that the movement of oil and gas prices in recent years has repeatedly been higher than forecast demonstrates that the consensus view may sometimes be wrong. The Government's forecasting model should consider a wider range of assumptions and scenarios, especially regarding fossil fuel prices. (Paragraph 34)

6. The Government does open up the assumptions it uses in its forecasting model to consultation and review. However, while there may be external input into this modelling, its inner workings remain opaque to the outside world. The Government should make its forecasting models publicly available as open source software. This would allow external analysts to test the Government's forecasts by inputting their own projected values for fuel prices, economic growth, energy demand from households, and so on. (Paragraph 35)

7. The Energy Saving Trust has called for the Government to develop a new and bespoke model to forecast carbon emissions, rather than simply adapt the DTI's energy demand model. We recommend that the Government should now do so. (Paragraph 36)

8. We recommend that the Government should admit the uncertainty range of its emissions projections. It should also regularly publish a review of its previous projections, comparing them against outturn data and latest projections, and analyse what it got right, what it got wrong, why it did so, and what lessons it has learned. These reviews should be consistent in format and categories of data they present, so that it is easy to compare one year with another. (Paragraph 37)

9. The downward revision, by some 16-26%, of the expected impact of carbon reduction policies in the 2000 Climate Change Programme shows, first of all, that the Government must eliminate "optimism bias" from its initial design of climate change policies. Secondly, it highlights the risks inherent in the Government's current approach, whereby it seeks to implement policies which will deliver only just enough carbon savings to span the gap between a "Business As Usual" projection of where emissions are going to be in a certain year and a target level of emissions for that year. Government forecasts of "BAU" emissions have so far consistently been too low, while its forecasts of the impact of carbon reduction policies have consistently been too high. The moral is that the Government should err on the side of caution, and aim to overachieve its targets. (Paragraph 38)

### *Cost-effectiveness analysis*

10. Many of the technical aspects of the cost-effectiveness analysis (CEA) used in the Climate Change Programme Review were done well. As the NAO noted, CEA was appropriate to be used to help decide among different policy options, its use was more consistent and comprehensive than in the original CCP 2000, the assumptions used in it were in line with the analysis of external organisations and their uncertainties recognised, and in the Review it produced evaluations which were reliable enough for different policies to be compared with each other. (Paragraph 46)

**11.** At the same time, there were some weaknesses in the way CEA was used. Because the Review was focused on meeting the short term target of 2010, it did not consider policies which would have a bigger but longer term impact. This represents a missed opportunity to advance UK climate change policy, and, to some extent, a waste of the Review teams and their resources. Some options were not appraised fully or at all because the Review itself was running short of time and resources. This lack of time was compounded by the delay in the Government's identification of how far short of the 2010 target it was projected to fall, and thus how many more policy options were needed. This highlights the need for annual reassessments of progress towards short, medium, and long term emissions forecasts and the carbon reduction policies that can help us achieve them. (Paragraph 47-48)

**12.** Future use of CEA should ensure that it focuses on different scales of policy implementation, across different timescales, thereby enabling policy-makers to better choose different ways and combinations of implementing certain policies. There should also be more public scrutiny of and debate about the assumptions and calculations which result in CEA indicators for each policy. Most importantly, emissions targets should be determined by climate science, and CEA only used to help achieve these targets in the most cost-effective manner; rather than in effect setting targets itself, through being used to determine what level of emissions cuts is "affordable". (Paragraph 49)

**13.** The overruling of the CEA indicators in the case of major policies such as the Renewables Obligation and fuel duty escalator suggests that the CCPR was still significantly guided by broader political considerations. It is not necessarily wrong for the Government to overrule the recommendations generated by a particular methodology such as CEA; Governments must always take wider political considerations into account. What we recommend is that the Government is braver about the extent of action on climate change that is politically possible. We hope the Government is already moving in this direction, given that having excluded tighter building regulations from the CCPR, it subsequently introduced a policy for Zero Carbon Homes in Pre-Budget 2006. In future, the Government should be bolder about consulting on potential climate change policy options, to test public opinion on their acceptability, and encourage public debate on alternative measures. (Paragraph 50)

### *Social cost of carbon*

**14.** We have queried the Government's use of the Social Cost of Carbon (SCC) in a number of inquiries. We were interested to learn that, as the NAO put it, the cost-effectiveness analysis in the CCPR "sensibly excluded the social cost of carbon", and that one of the main reasons why the Review opted to use cost-effectiveness analysis in the first place was "because it is not reliant on a firm valuation of the social cost of carbon". We conclude from this that the Government has doubts as to the reliability of the SCC in policy-making. In the light of this, the Government should explain clearly how it intends to use SCC in the future. (Paragraph 52)

### *Joined-up policy-making*

**15.** The Climate Change Programme Review involved the joined up work of officials from several different Departments, as well as key external bodies. But one major failure in this joined up approach was the exclusion of fiscal policy, consideration of which remained the preserve of the Treasury. In the future, there must be an integrated approach to climate change policy-making, which considers the use of taxes and incentives alongside other measures. (Paragraph 58)

## The Draft Climate Change Bill

### *The 2050 target*

**16.** The Government's policy towards the UK's 2050 target is clearly incoherent. The Government remains committed to limiting global warming to a rise of 2°C; but it also acknowledges that, according to recent scientific research, a cut in UK emissions of 60% by 2050 is now very unlikely to be consistent with delivering this goal. While the Office of Climate Change was justified in telling us that the "at least 60%" target in the draft Bill is within the range discussed in the Stern Review, this is clearly the minimum in emissions reductions which the Stern Review sets out. In fact, Stern states that this would correspond to a 63%-99% chance of exceeding a warming of 2°C, and describes this level of global warming as "a dangerous place to be, with substantial risks of very unpleasant outcomes". We recommend that the 2050 be strengthened to reflect current scientific understanding of the emission cuts required for a strong probability at stabilising warming at 2°C. (Paragraph 69)

**17.** We recommend that the Government publishes the rationale for its 2020 and 2050 targets, preferably including the central formula upon which they are based, in the Climate Change Bill. This rationale should make clear the size of complementary caps on annual emissions required of other blocs of nations, the stabilisation target for global atmospheric concentrations of greenhouse gases, and the resulting projected temperature rises, which are implied by the Bill's targets for annual emissions from the UK, as well as the central assumptions used by the Government in making these correlations. The Bill should state that if the Secretary of State proposes to revise these targets, he must publish the rationale for the new target in like manner. (Paragraph 70)

**18.** Above all, the Government must draw attention, at home and abroad, not just to percentage targets for the annual emissions in a certain year, but even more to the absolutely crucial issue of the cumulative total budget of greenhouse gases that the world can afford to emit by 2050 if it is to have a reasonable chance of holding global warming to 2°C. (Paragraph 71)

**19.** In terms of the way in which this cumulative global budget is divided up among individual nations, we recommend that the Government explicitly endorses, and promotes internationally, the Contraction and Convergence method, or a method similar to it. (Paragraph 72)

**20.** The Tyndall Centre for Climate Change Research have made a very strong argument that the UK ought to make carbon reductions of 70% by 2030 and 90% by 2050. We recommend that the Government respond to Tyndall's recommendations; and if it is rejecting them, explain why. (Paragraph 73)

**21.** While we note that the Government has included a "trigger clause" in the draft Bill for amending the 2050 target, it states that the Secretary of State "may only" revise the target if one or both of its specified qualifications are met. We are concerned that this may put fetters on the ability of future Governments to respond to the threat of climate change. It is perhaps possible that the wording of this clause may encourage or make it easier for opponents of a tougher target to mount a political or legal challenge, based around the test of whether there truly have been "significant developments", in the event that a Government decides to raise the target above 60%. We recommend that the power to amend the target be significantly less circumscribed. (Paragraph 74)

### *The 2020 target*

**22.** The Government should set out in detail where the UK needs to be in terms of emissions reductions by 2020 in order to be on track to meet other possible, and more challenging targets, for 2050. Especially given that some have suggested that that the 26%-32% target for 2020 would have to be increased in order to meet a more stringent target for 2050, we recommend that the restrictions in the draft Bill on amending the 2020 target be taken out. We are also concerned that setting a target range in practice encourages people to aim for the bottom end of the range, as this requires the least effort while still achieving compliance. For this reason, we recommend that the 2020 target be amended to read "at least 32%", rather than "26-32%". (Paragraph 78)

**23.** It is clear to us that the Government will have to introduce more radical policies into its Climate Change Programme very soon if it is to meet even the 2020 target as currently set. Current measures, including those introduced by the recent Energy White Paper, are only projected to get us nearly to the bottom end of 2020 target range – and this at what the Office of Climate Change described to us as "the upper end of optimism". The Government has thus far consistently overestimated the impact of its carbon reduction policies, while underestimating the upward trend in emissions from social and economic developments. The lesson of the UK's failure to meet its 2010 target is that the Government must aim to overachieve its target for 2020. We recommend therefore that the Government introduce other measures projected to achieve at least the top end of the 2020 target, a reduction of 32%. (Paragraph 80)

### *International aviation and shipping*

**24.** Overall, we are unimpressed by the Government's arguments for excluding international aviation and shipping emissions from the UK's carbon reduction regime. While the draft Bill contains provisions that allow these emissions to be included in the future, we recommend that they be included immediately. Despite the arguments of the Secretary of State, we do not believe the Government needs to

wait until the terms under which aviation will enter the EU ETS are fully confirmed before doing this. There already is an internationally agreed methodology for attributing and recording these emissions as memo items to national Kyoto accounts; the Government should simply use this to track these emissions within the UK's carbon budgets. This, in turn, means the Government should only count the simple weight of $CO_2$ from international aviation within these carbon budgets, rather than multiplying it by a factor of 2 or more to reflect the wider global warming impacts of flying. These extra impacts should not be ignored, however, but merit additional policy responses. (Paragraph 96)

**25.** If the inclusion of international aviation and shipping has to be delayed, the Bill should be more prescriptive about and when they are to be included. The flexibility currently there in the draft Bill threatens to undermine the UK's overall emissions targets. The draft Bill's qualification that a future Secretary of State "may only" include these emissions if there has been an international agreement on them seems potentially to tie the hands of future Governments for no good purpose, and should be removed. (Paragraph 97)

**26.** Finally, if these sectors are not included from the outset, then the Government figures for the UK's annual emissions and forecasts of future emissions should clearly indicate what the level of these emissions and progress towards meeting national carbon budgets and targets would be, once international aviation and shipping were included. This would aid transparency, and focus attention on the effects that an ongoing upward trajectory in aviation emissions has on progress towards the UK's short, medium and long term targets. In order to do this, projections of future emissions from aviation and shipping must be improved, frequently updated, and fully integrated into the Government's Updated Emissions Projections papers. (Paragraph 98)

### *Use of emissions trading*

**27.** We have concerns as to the scope in the draft Bill for the UK's carbon reduction targets to be partly met by purchasing carbon credits from other countries. The Government must ensure that carbon credits are not used to forestall the early transition in the UK to low carbon infrastructure in power generation, buildings and transport, as this could mean that the country is locked into carbon-intensive lifestyles for decades to come. At the same time, we certainly recognise the potential importance of trading in providing funds for low carbon infrastructure in the developing world. We would simply argue that this must not become an "either/or": the Government should ensure that the UK's targets are sufficiently challenging that they drive decisive emissions reductions at home and abroad. (Paragraph 106)

**28.** Where emissions trading is used to meet UK targets, it is essential that the Government distinguishes clearly between emissions reductions achieved within the UK and emissions reductions funded by the UK but taking place abroad. Thus far, in reporting the relationship of the EU ETS to UK emissions, the Government has been less than transparent. The problem with this is that it might foster a false sense of complacency about the progress and policies required to decarbonise the UK. The Government ought to adopt a code of practice for reporting UK emissions, and the

Committee on Climate Change should audit Government press and statistical releases. (Paragraph 107)

**29.** Above all, the Government should address the question: if all countries will have to meet challenging emissions targets by mid-century, how many are going to beat their targets and thus be able to offer surplus carbon credits to the rest? The Government has pointed to the research in the Stern Review which concludes that in order to meet a global 450-550ppm $CO_2e$ target, all developed nations would have to make emissions cuts of at least 60%-90%, with many developing world countries allowed only a modest increase or a small decrease; but Stern clearly says that these figures "do not incorporate international emissions trading". The Government should clarify what these targets would be once emissions trading is taken into account, under a range of scenarios. In doing this, the Government should be explicit about the maximum range of the UK's carbon budget to 2050 which could be made up by buying emissions credits from abroad, and still be consistent with Stern's global stabilisation targets. (Paragraph 108)

### *Carbon budgets and reporting*

**30.** We welcome the Government's proposals to introduce a national carbon budgeting system. Setting successive five year carbon budgets will help to span the gap between annual emissions figures and the target for 2020. We hope that these carbon budgets will ensure that there is constant political pressure to meet them every five years. They should also help define the pathway of emissions reductions through time that the UK will need to follow in order to meet its medium and longer term targets. In addition, the introduction of rigorous annual reports to Parliament on trends in emissions and on the impacts of carbon reduction policies, as well as reports setting out the suite of policies and their projected impact for each budgetary period, will show whether the UK is managing to follow its required emissions pathway, and should lead to a timely revision of policies if progress is slipping off track. (Paragraph 117)

**31.** It makes sense for each carbon budget to run for longer than one year, to allow for unforeseen variations in emissions from year to year. But the Government should still set out an indicative target for UK emissions in each year, so as to apply continual pressure to reduce emissions. We also recommend that the successive series of carbon budgets should extend out all the way to 2050, so that all carbon budgets are consistent with the UK's overarching emissions objective. (Paragraph 118)

**32.** Earlier budgets should contain steeper reductions: as the Stern Review made clear, early cuts in emissions are disproportionately beneficial. The Government should also examine the feasibility of introducing sector-specific emissions pathways to be defined to 2050, notably for power generation, buildings, and transport; this would help to identify in more detail the scale, timing, and nature of the developments needed in order for the UK as a whole to meet its targets. (Paragraph 119)

**33.** One further aspect of the provisions in the draft Bill which we welcome is the proposed introduction of five-yearly reports on the impacts of climate change in the

UK and policies for adaptation. We recommend that this requirement is accompanied by a Government programme of action on adaptation in the UK. The Government should incorporate into such a formal programme of action an international development strategy which identifies and works to address the impact of climate change on the world's poorest and most vulnerable communities. Following our recent suite of reports on the Government's approach to trade, development, and the environment, we may look more closely at the adaptation proposal in this draft Bill and any wider initiatives it develops in the future. (Paragraph 120)

### *Committee on Climate Change*

**34.** We support the Government's proposal to establish an independent Committee on Climate Change. The creation of such an independent body should make a significant contribution to the quality and transparency of Government climate change policy. One particularly valuable aspect of the Committee's work would be in providing challenge to, and public reporting on, Government forecasting and policy analysis. As part of the Committee's proposed statutory role to report to Parliament on UK emissions and the progress made in reducing them each year, it should be given a duty to audit the Government's publication of emissions statistics to ensure these are transparent, differentiating between emissions reductions made in this country and those funded abroad. It should also have a duty to comment annually on the assumptions and modelling used by the Government to forecast future emissions and estimate the impact of individual policies. Furthermore, the Committee should be able to make detailed policy recommendations to Government. (Paragraph 131)

**35.** There has been much discussion of the parallels between the Committee on Climate Change and the Bank of England's Monetary Policy Committee. The latter illustrates the advantages that can be gained by devolving key responsibilities to a non-party political committee of experts. At the same time, the issues involved in climate change policy are bigger and more complex than those devolved to the MPC. We conclude that, while the Committee on Climate Change could make some detailed recommendations, the Government must still choose which policies to implement. The virtue of the Committee will be that the Government must respond to it; and if Ministers reject any of the Committee's recommendations, they will have to set out why, and propose others to deliver equivalent emissions savings. (Paragraph 132)

**36.** These virtues, of course, depend on the Committee's enjoying—and being seen to enjoy—a very high level of both subject expertise and independence. We consider that, as the conditions for membership are set out in the draft Bill, "climate science" is not given enough prominence. We recommend that this should be spelt out as the most important area for the Committee to understand and take into account. We further recommend that the Committee be given a duty to consider the wider environmental aspects of sustainable development. (Paragraph 133)

**37.** In order to strengthen the independence of the Committee—and public perceptions of its independence—it is essential that members be appointed for their individual expertise, and serve in a personal capacity, rather than as representatives of different

stakeholder groups. The appointment process itself should be open and transparent, preferably in accordance with the recommendations of the Nolan Report. To increase transparency and perceptions of independence, and in view of the importance of their role, all new appointees to the Committee should first be required to appear before the Environmental Audit Committee, to provide assurance to Parliament as to their suitability, and to highlight their thinking on tackling climate change. (Paragraph 134)

### *Relationship of the Committee on Climate Change to the Office of Climate Change*

**38.** We conclude that the Office of Climate Change is doing valuable work, and will help to improve the quality of Government climate change policy. Its main role appears to be to provide a resource which individual Departments can access for discrete pieces of research on climate change policy. It remains to be seen, however, whether it will have the remit to design truly cross-cutting policies, or the influence to ensure that all Departments build climate change into their thinking at an early stage. The OCC's lack of responsibility for considering fiscal policies is a sign that this is not the case. Also, it cannot, by itself, ensure that Government policies are joined up, so that major policy programmes—for instance, DfT's airport expansion programme—do not run directly counter to the effort to reduce carbon emissions. This requires a joint effort of Ministerial will. (Paragraph 138)

**39.** The Government is right to seek to ensure that the Committee on Climate Change, the Office of Climate Change, and relevant parts of Government share resources and do not unnecessarily duplicate each other's work. But the Committee on Climate Change must have the resources to ensure that its work is wholly independent, and does not merely have to rely on the conclusions given to it by individual Departments. This point is underlined by the way in which, in the Climate Change Programme Review, the Interdepartmental Analysts Group only supplied decision-makers with one scenario for each potential policy, thus preventing the CCPR from considering the impacts of different scales and combinations of policies. Given the importance of the Committee it needs a high quality secretariat which is adequate to support all its work and a budget for commissioning external research. (Paragraph 141)

# Formal minutes

## Tuesday 10 July 2007

Members present:

Mr Tim Yeo, in the Chair

| | |
|---|---|
| ***Mr Martin Caton*** | ***Mr Mark Pritchard*** |
| ***Mr Collin Challen*** | ***Jo Swinson*** |
| ***Mr David Chaytor*** | ***Dr Desmond Turner*** |
| ***Martin Horwood*** | ***Joan Walley*** |
| ***Mr Nick Hurd*** | |

The Committee deliberated.

Draft Report (*Beyond Stern: From the Climate Change Programme Review to the Draft Climate Change Bill*), proposed by the Chairman, brought up and read.

*Ordered*, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 115 read and agreed to.

Amendment proposed, paragraph 116, line 3 of the paragraph, delete the word "indicative".—(Martin Horwood.)

Question put, That the amendment be made.

The Committee divided.

| **Ayes, 1** | **Noes, 5** |
|---|---|
| **Martin Horwood** | **Mr Martin Caton** |
| | **Mr Colin Challen** |
| | **Mr David Chaytor** |
| | **Dr Desmond Turner** |
| | **Joan Walley** |

Amendment negated.

Paragraph 116 agreed to,

Paragraphs 117 to 141 agreed to.

*Resolved*, That the Report be the Sixth Report of the Committee to the House.

*Ordered*, That the Memoranda reported to the House on 20 February be appended to the Report.

*Ordered,* That other Memoranda received by the Committee be reported to the House.

*Ordered*, That the Chairman make the Report to the House.

*Ordered,* That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No.134.

[Adjourned till Tuesday 17 July 2007 at 10am

# Witnesses

# List of written evidence

# Past reports from the Environmental Audit Committee since 1997

### 2006-07 Session

| | |
|---|---|
| First | The UN Millennium Ecosystem Assessment, HC 77 |
| Second | The EU Emissions Trading Scheme: Lessons for the Future, HC 70 |
| Third | Regulatory Impact Assessments and Policy Appraisal, HC 353 |
| Fourth | Pre-Budget 2006 and the Stern Review, HC 227 |
| Fifth | Trade, Development and Environment: The Role of FCO, HC 289 |
| Sixth | Voluntary Carbon Offset Market, HC 331 |

### 2005-06 Session

| | |
|---|---|
| First | Greening Government: the 2004 Sustainable Development in Government Report, HC 698 |
| Second | Sustainable Timber, HC 607 |
| Third | Sustainable Procurement: the Way Forward, HC 740 |
| Fourth | Pre-Budget 2005: Tax, economic analysis, and climate change, HC 882 |
| Fifth | Sustainable Housing: A follow-up report, HC 779 |
| Sixth | Keeping the lights on: Nuclear, Renewables, and Climate Change, HC 584 |
| Seventh | Sustainable Development Reporting by Government Departments, HC 1322 |
| Eighth | Proposals for a draft Marine Bill, HC 1323 |
| Ninth | Reducing Carbon Emissions from Transport, H C981 |
| Tenth | Trade, Development and Environment: The Role of DFID, HC 1014 |
| Eleventh | Outflanked: The World Trade Organisation, International Trade and Sustainable Development, HC 1455 |
| Twelfth | Transport Emissions: Government Response to the Committee's Ninth Report of Session 2005-06 on Reducing Carbon Emissions from Transport, HC 1718 |

### 2004-05 Session

| | |
|---|---|
| First | Housing: Building a Sustainable Future, HC 135 |
| Second | Corporate Environmental Crime, HC 136 |
| Third | World Summit on Sustainable Development 2002: A UK Progress Report, HC 381 |
| Fourth | The International Challenge of Climate Change: UK Leadership in the G8 and EU, HC 105 (*Reply Cm6617*) |
| Fifth | Environmental Education: Follow-up to Learning the Sustainability Lesson, HC84 (*Reply Cm6594*) |
| Sixth | Sustainable Public Procurement , HC 266 |
| Seventh | Pre-Budget 04 and Budget 05, HC 261 (*Reply HC 528*) |

### 2003-04 Session

| | |
|---|---|
| First | Annual Report 2003, HC 214 |
| Second | GM Foods – Evaluating the Farm Scale Trials, HC 90 |
| Third | Pre-Budget Report 2003: Aviation follow-up, HC 233 |
| Fourth | Water: The Periodic Review 2004 and the Environmental Programme, HC 416 *(Reply, HC 950)* |
| Fifth | GM Foods – Evaluating the Farm Scale Trials, HC 564 |
| Sixth | Environmental Crime and the Courts, HC 126 *(Reply, HC 1232)* |
| Seventh | Aviation: Sustainability and the Government Response, HC 623 *(reply, HC1063)* |

| | |
|---|---|
| Eighth | Greening Government 2004, HC 881 *(Reply, HC 1259)* |
| Ninth | Fly-tipping, Fly-posting, Litter, Graffiti and Noise, HC 445 *(Reply, HC 1232)* |
| Tenth | Budget 2004 and Energy, HC 490 *(Reply, HC 1183)* |
| Eleventh | Aviation: Sustainability and the Government's second response, HC1063 |
| Twelfth | Environmental Crime: Wildlife Crime, HC 605 *(Reply, HC 438)* |
| Thirteenth | Sustainable Development : the UK Strategy, HC 624 |

### 2002-03 Session

| | |
|---|---|
| First | Pesticides: The Voluntary Initiative, HC100 (*Reply, HC 443*) |
| Second | Johannesburg and Back: The World Summit on Sustainable Development–Committee delegation report on proceedings, HC 169 |
| Third | Annual Report, HC 262 |
| Fourth | Pre-Budget 2002, HC 167 (*Reply, HC 688)* |
| Fifth | Waste – An Audit, HC 99 *(Reply, HC 1081)* |
| Sixth | Buying Time for Forests: Timber Trade and Public Procurement - The Government Response, HC 909 |
| Seventh | Export Credits Guarantee Department and Sustainable Development, HC 689 (*Reply, HC 1238*) |
| Eighth | Energy White Paper – Empowering Change?, HC 618 |
| Ninth | Budget 2003 and Aviation, HC 672 (Reply, Cm 6063) |
| Tenth | Learning the Sustainability Lesson, HC 472 *(Reply, HC 1221)* |
| Eleventh | Sustainable Development Headline Indicators, HC 1080 *(Reply, HC 320)* |
| Twelfth | World Summit for Sustainable Development – From rhetoric to reality, HC 98 (*Reply, HC 232*) |
| Thirteenth | Greening Government 2003, HC 961 *(Reply, HC 489,2003-04)* |

### 2001-02 Session

| | |
|---|---|
| First | Departmental Responsibilities for Sustainable Development, HC 326 (*Reply, Cm 5519*) |
| Second | Pre-Budget Report 2001: *A New Agenda?*, HC 363 (*HC 1000*) |
| Third | UK Preparations for the World Summit on Sustainable Development, HC 616 (*Reply, Cm 5558*) |
| Fourth | Measuring the Quality of Life: The Sustainable Development Headline Indicators, HC 824 (*Reply, Cm 5650*) |
| Fifth | A Sustainable Energy Strategy? Renewables and the PIU Review, HC 582 (*Reply, HC 471*) |
| Sixth | Buying Time for Forests: *Timber Trade and Public Procurement*, HC 792-I , (*Reply, HC 909, Session 2002-03)* |

### 2000-01 Session

| | |
|---|---|
| First | Environmental Audit: *the first Parliament*, HC 67 (*Reply, Cm 5098*) |
| Second | The Pre-Budget Report 2000: *fuelling the debate*, HC 71 (*Reply HC 216, Session 2001-02*) |

### 1999-2000 Session

| | |
|---|---|
| First | EU Policy and the Environment: An Agenda for the Helsinki Summit, HC 44 (*Reply, HC 68*) |
| Second | World Trade and Sustainable Development: An Agenda for the Seattle Summit, HC 45 (Including the Government response to the First Report 1998-99: Multilateral Agreement on Investment, HC 58) (*Reply, HC 69*) |

| | |
|---|---|
| Third | Comprehensive Spending Review: Government response and follow-up, HC 233 (*Reply, HC 70, Session 2000-01*) |
| Fourth | The Pre-Budget Report 1999: pesticides, aggregates and the Climate Change Levy, HC 76 |
| Fifth | The Greening Government Initiative: first annual report from the Green Ministers Committee 1998/99, HC 341 |
| Sixth | Budget 2000 and the Environment etc., HC 404 |
| Seventh | Water Prices and the Environment, HC 597 (*Reply, HC 290, Session 2000-01*) |

**1998-99 Session**

| | |
|---|---|
| First | The Multilateral Agreement on Investment, HC 58 (*Reply, HC 45, Session 1999-2000*) |
| Second | Climate Change: Government response and follow-up, HC 88 |
| Third | The Comprehensive Spending Review and Public Service Agreements, HC 92 (*Reply, HC 233, Session 1999-2000*) |
| Fourth | The Pre-Budget Report 1998, HC 93 |
| Fifth | GMOs and the Environment: Coordination of Government Policy, HC 384 (*Reply Cm* 4528) |
| Sixth | The Greening Government Initiative 1999, HC 426 |
| Seventh | Energy Efficiency, HC 159 (*Reply, HC 571, Session 2000-01)* |
| Eighth | The Budget 1999: Environmental Implications, HC 326 |

**1997-98 Session**

| | |
|---|---|
| First | The Pre-Budget Report, HC 547 (*Reply, HC 985*) |
| Second | The Greening Government Initiative, HC 517 (*Reply, HC 426, Session 1998-99*) |
| Third | The Pre-Budget Report: Government response and follow-up, HC 985 |
| Fourth | Climate Change: UK Emission Reduction Targets and Audit Arrangements, HC 899 (*Reply, HC 88, Session 1998-99*) |

# Oral evidence

## Taken before the Environmental Audit Committee

## on Tuesday 17 April 2007

Members present:

Mr Tim Yeo, in the Chair

| | |
|---|---|
| Mr Martin Caton | Mr Nick Hurd |
| Colin Challen | Mark Lazarowicz |
| Mr David Chaytor | Joan Walley |
| David Howarth | |

---

**Memorandum submitted by the Business Council for Sustainable Development**

The Business Council for Sustainable Development—United Kingdom (BCSD-UK) is the only affiliated branch in the UK of the Geneva based World Business Council for Sustainable Development (WBCSD).

We are a not-for-profit, limited liability company and a multi-sectored group run by a Management Committee with representatives from Arup; ConocoPhillips; Corus; Eversheds; Lafarge; Ondeo; Shell; UPM-Kymenne; WSP.

We are a highly active organisation with a focus on the practical implementation of sustainable development. We promote and promulgate best practice, identify barriers to progress and seek to find ways of removing them; and believe society has to transform the way it functions to become sustainable. To do that, it needs new innovation; new technology; new products and services. Those in the main will come from the business community. The aspiration to transform society into a sustainable society is, therefore, a major business opportunity for the business community.

Within a busy action programme we have developed several Action Groups. One, the Energy Action Group, submits this response to Government on behalf of the BCSD-UK.

Within our programme of activity we stage Sustainable Development Business Summits. Within these, we focus on six key focus areas and explore how businesses are tacking sustainable development implementation within them. One such focus area is on Energy. Much of the findings and recommendations of this report originate from the inputs and outputs of those Summits.

### Executive Summary

In response to the inquiry launched by the Parliamentary Environmental Audit Committee (EAC) into the adequacy of the Government's current approach to evaluating the impact of the Climate Change Programme, the Business Council for Sustainable Development—United Kingdom (BCSD-UK) welcomes the opportunity to summarise the results of Sustainable Development Summits held in Scotland and the Midlands during 2006.

Our response recognises the challenges set by the Stern Review and more recently by the World Business Council for Sustainable Development's Energy and Climate policy proposals published March 2007. The first document is produced by a UK economist led review group. The second is by an independent body of some 180 major corporations operating globally. The two documents are entirely of the same opinions and findings and complement each other.

BCSD-UK proposes that the "Carbon Committee", referenced in the Stern Review and announced in the Queen's Speech as an independent body, should be given a target to maintain growth within a sustainable UK economy, based upon secure energy supplies, and meeting targets accepted by government in global negotiations. Using the factual analysis in Stern and in the WBCSD report, BCSD-UK contends that the goal of sustainability implies control and eventual elimination of harmful emissions into the atmosphere. Current perception of energy values ignores supply failure risks and climate impact costs. Future awareness of these things depends upon the UK population accepting the assertions of the Carbon Committee, because they will be consistent, professionally focussed, and because the public would benefit from the results of its work.

As emphasised in the letter from the Prime Minster to the Lahti conference last year, we are faced with a dilemma—"To ensure well being for a growing world population with unfulfilled needs and rising expectations, we must grow our economies. Should we fail, conflict and insecurity will be the result. To grow our economies we will continue to need energy. Much of that energy will be in the form of fossil fuels. The logic of this dilemma is that we must treat energy security and climate security as two sides of the same coin."

In the same way as we now dismiss the suggestion that party politics can determine the science of monetary policy, we must recognise that it is not the profession of government to analyse technologies for their intrinsic quality, to measure their effectiveness in reaching our carbon reduction targets, to assess business solutions, or to judge the risks of our dependency on any one fuel. Equally, Stern illustrates that economists are very well equipped to find sound bases on which cost-effectiveness evaluations can be carried out.

Many UK companies, already seeking to establish sustainable business practices, have joined BCSD-UK. Some are also members of the WBCSD. Much of the logic associated with daily decision-making on sustainability has been thought through. Our conclusions associated with energy diversity, climate control, social responsibility, efficiency and materials optimisation are provided here. BCSD-UK proposes that this expertise is installed in the Carbon Committee. The pathway to a constructive and prosperous future is created from the long-term vision of individuals who are able to judge the directions of science, technology and business from the inside of those professions.

## 1. Chapter 1—Inquiry Issues

### 1.1 *Forecasting*

#### 1.1.1 Fit for purpose

*In the light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?*

(a) First, it is imperative that the "forecasts" are defined in universally recognised expressions, and progress is measured using a consistent sample over the years of existence of the Carbon Committee. Like the method of measuring inflation, this implies robustness through definition of terms and uniformity of metering.

(b) Only some of the activities promoted by the Carbon Committee will actively take carbon equivalents from the atmosphere. All activities will have a calculable impact on UK emissions. Forecasts will be associated with the relationship between the calculated results of activities and the measured impact on targets.

(c) BCSD-UK believes that a single emission reduction target would not lead to activities which would sustain the economy.

#### 1.1.2 Forecasting issues

*In developing its approach, how should the Government deal with the following issues:*

— *whether there can be a greater role for independent assurance;*

— *how the Government should respond to the unavoidable uncertainties in forecasting; and*

— *whether or not future domestic targets and forecasts should include international aviation and shipping.*

(a) Not only must "independent assurance" have a greater role, future acceptance by the UK population of the unpalatable measures needed will depend upon the integrity and sincerity of the Carbon Committee. Consistency and professional focus must be easily recognised, and public support will follow as they benefit from the results of Carbon Committee work.

(b) It should be the responsibility of the Carbon Committee to refine the sustainability model as experience adds simplicity, complexity, order or chaos to the challenge—not government.

(c) The Carbon Committee model should consider all consumer and fuel provider variations.

#### 1.1.3 The medium term targets

*As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?*

(a) In terms of atmospheric impact, it must be recognised that the medium term is the shortest period over which the results of the work of the Carbon Committee can be measured.

(b) The projections of carbon saving activities will be made from scientific analyses of the technologies available and their deployment, and regularly improved by extrapolation of their measured performance. The 2020 and 2050 emission targets will be achieved through modification of the sustainable development model, or "pathway".

(c) The most dangerous situation faced by the Carbon Committee is one where European and Global agreement regarding the climate change control activities is not forthcoming. Paradoxically, in this situation, the sustainability of our economy will depend upon the acceleration of our requirement for energy—to power a greater coverage air conditioning in the workplace.

1.2 *Cost-effectiveness analysis*

1.2.1 Social cost

*Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

(a) Stern has shown that carbon emissions have been growing a national carbon debt for a considerable time. The credit limit is about to be exceeded. Recent measures by the fuel producing nations have illustrated that energy security has also been waning for many years, without adequate measures to re-instate it. BCSD-UK members include business sustainability and corporate social responsibility as central business aims.

(b) Repayment of the national carbon debt requires urgent, unpalatable measures. But the opportunity to provide business and society with perpetual, secure energy will offer both the medium to long term business planning situation, and the daily living environment which society needs.

(c) To avoid energy poverty, it would be possible for the Carbon Committee to administer a mechanism through which carbon currency would be provided for, and "sold", by those in society meeting a government criterion, in exchange for energy. However, credits provided at the consumer end of emissions control do not provide the right signals. BCSD-UK would recommend that measures in this arena are kept outside the Carbon Committee remit.

1.2.2 The short-term targets

*Has the government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focusing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

Cost-effectiveness can be evaluated properly, only when the true cost of inaction, often termed "Business As Usual" (BAU), is included in the assessment. BCSD-UK accepts and supports government expressions of the urgency of the problem, which has brought about a 2010 target and measures to achieve it. However, BCSD-UK asserts that the existing approach under-values renewable energy, because energy prices to reflect the true value are unpalatable. Further data are emerging all the time to support government actions—although the balance of measures would probably have been different, and expenditure would have been more immediate and an order greater, if assessed by a Carbon Committee.

For example, the security of supply of the wind, wave and tidal energy around the UK is 100%. The security of fossil or mineral fuel supplies varies from day to day, and will reduce as the impacts of climate change move North. In pure economic terms, we deploy the machines to benefit from this source of fuel as an insurance policy, or we risk the loss of Gross Domestic Productivity.

Stern has set the size of the investment to be made. It is many times that currently underway.

1.2.3 The short-term targets

*The NAO briefing has also raised a number of other issues, including:*

— *the failure to explore sufficiently different scales of policy intervention;*

— *the balance between expanding existing measures and introducing new ones;*

— *the range of policy options considered and the criteria for appraising them; and*

— *the timing and scope of future cost-effectiveness evaluations.*

*In the light of such concerns, how should the Government improve its approach to the use of cost-effectiveness evaluation?*

(a) To BCSD-UK members, academic study of the scale of policy intervention to date is not productive. In the UK, it is only in the light of the clarity, provided by Stern and the WBCSD report, that the message of sustainable business through new, clean energy security is visible to a majority.

(b) A number of studies have agreed that the "feed-in" energy tariffs of Denmark and Germany have accelerated the introduction of wind power in a way that Renewable Obligation Certificates have not. As ever, this can be refuted on the grounds that each country has other historical or cultural reasons for the success of their wind industries. Independently of these arguments, BCSD-UK would point out that feed-in tariffs defeat the market. If we accept that the evidence of the last century is that the market will ultimately prevail, then feed-in tariffs cannot be sustainable.

(c) BCSD-UK asserts that the true cost, including carbon debt, of most product purchased, service delivered, or fuel expended, is not known to the UK consumer, either because its calculation is contentious or is impossible. If there is one exercise by government, which has been globally neglected, and which would support Carbon Committee activities over the next 50 years in the

fields of efficiency, renewable energy, carbon sequestration, spent fuel storage, energy storage, alternative fuel production and economic sustainability, it is carbon equivalent, emission debt evaluation.

(d) In the short-term, referred to in this question, actions by the Carbon Committee, to secure the solutions to climate change and sustainable energy supplies, must be borne by charges on products, services and fuels sold in the UK, according to a much coarser measure of the carbon debt they incur. This is discussed later. Transportation incurs cost, but also incurs a carbon debt, which must be repaid. Ideally, this is in the country it is produced. If not, it must be repaid in the UK.

1.3 *Accountability, targets, and reporting*

1.3.1 Monitoring and reporting

*What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

(a) These are totally dependent on the parameters to be set for the Carbon Committee to control, the authority it is given to interpret these in terms of a cost, and the other political measures taken outside its remit.

(b) A control mechanism is proposed by BCSD-UK in Chapter 2.

1.3.2 Roles, responsibilities, powers and remit

*What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee? In particular, how should the Carbon Committee be constituted, and what should be its powers and remit?*

(a) A control mechanism is proposed by BCSD-UK in Chapter 2 (Midlands Summit).

1.3.3 Short-term targets with a long-term goal

*What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

(a) BCSD-UK is very aware that the Carbon Committee model is the first of its kind, and will be starting from an inadequate experience base. However, as described in the response in Chapter 2, the debates concluded that adequate knowledge has been developed over the past 20 years to allow the mechanism to be set up. As experience is added to the "pathway", a clearer picture of the long-term goal is possible. External influences will impact significantly in the short-term, but the model will eventually become immune, even to these.

CHAPTER 2—RECOMMENDATIONS

2.1 A view within the Energy Group of BCSD-UK aligns with Stern that, if government targets for the Carbon Committee were monthly set-points, they would be constantly at the whim of political expedience. In the same way as this government recognised that political control of The Bank of England base rate had become counter-productive, due to speculation, a moveable target for the Carbon Committee would defeat the point of independence.

2.2 The UK public appears to be accepting the concept of carbon offsetting. It is not an inconceivable leap to the concept of a carbon currency.

2.3 The following must be accompanied by a reward to the UK for taking the measures, or a penalty to importers, if their goods are not subject to the same controls.

2.4 As a result of further negotiations, similar to Kyoto, the UK government will accept a longer-term emissions target. Consider the Carbon Committee being charged with meeting it. In the same way that the Monetary Policy Committee is a vehicle of the Bank of England, it would be necessary for the Carbon Committee to be controlling a measure in the hands of a "UK Bank of Carbon", perhaps an interest rate on the carbon currency.

2.5 Dirty energy or waste producers (to be defined), not also producing an offset of clean energy, would borrow. Clean energy producers would save. Interest would be paid and received in real money. Instead of the interest rate being the "cost of capital" it would be the "cost of carbon emitted".

2.6 Clean energy producers would earn carbon currency, while the dirty energy producers would pay interest, according to the Carbon Committee model.

2.7 While there are few clean producers, the interest rate they earn is high. As dirty producers become fewer, the interest available to clean producers would decline.

2.8 Lender and borrower interest rates would be controlled by the Carbon Committee on a monthly basis, with the intention of breaking even. If the underlying carbon reduction rate were insufficient to reach the annual target, the rates would be increased. The model would need to take account of the UK's annualised performance.

### Chapter 2—Basis of Response

This BCSD-UK response is based on the focus on energy at two BCSD-UK Business Summits so far held, one in Scotland, one in the Midlands. BCSD-UK is working towards a series of such Summits at which six key subject areas are explored in a business to business format.

Involved in presentations and debates on Energy at the Scottish and Midlands Business Summits were representatives from Converteam Limited; Wardell Armstrong; Eversheds; Scottish & Newcastle; Scottish Power; Shell, and Summit delegates.

Accounts of the two Summits can be seen at:

Scotland—where the concept of a "Bank of England" independent type body to take responsibility over carbon values was first muted. http://www.bcsd-uk.co.uk/Portals/0/PDF/Scot%20Summit%20Report.pdf

Midlands—where the concept was developed. http://www.bcsd-uk.co.uk/Default.aspx?tabid = 124

In addition, the BCSD-UK Energy Action Group has met to consider the Stern Review and outputs from the Summit including the idea of an independent, Bank of England like body.

A BCSD-UK General Meeting in February 2007 was given a preview of the WBCSD's 2050 Energy and Climate policy document. The issue of an independent body was again explored at that meeting.

The WBCSD 2050 Energy and Climate document, approved 9 March 2007, will be available via www.wbcsd.org

*March 2007*

---

## Memorandum submitted by EEF, the Manufacturers' Organisation

### Introduction

1. EEF is the representative voice of manufacturing, engineering and technology-based businesses with a membership of 6,000 companies employing around 800,000 people. Comprising 11 regional EEF Associations, the Engineering Construction Industries Association (ECIA) and UK Steel, EEF is one of the leading providers of business services in employment relations and employment law, health, safety and environment, manufacturing performance, education, training and skills.

2. This note is a submission in response to the Environmental Audit Committee's call for evidence on the role and adequacy of emissions forecasting and cost-effectiveness analysis in climate change policy. The note has been structured around the ten questions posed.

1. *In light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?*

3. EEF notes that a recent UN review gave the government's emissions forecasting methodology a largely positive assessment and welcomes the improvements made to the methodology in the 2006 Climate Change Programme Review. However, the NAO[1] rightly identifies a number of areas in which further improvements could be made.

4. The forthcoming Climate Change Bill aims to create a flexible long-term framework for climate change policy. The central element will be a long-range emissions reduction target for 2050. The government's approach to emissions forecasting will need to adjust to this longer time horizon and the greater level of uncertainty which will have to be dealt with as a consequence. The main changes that will need to be introduced are:

- more regular and frequent forecasting; and
- a broader range of modelling scenarios.

Essentially, forecasting will need to move away from being a short-term tool used to assess a relatively narrow range of policies and more towards being a rolling long-range forecast which can be used to measure progress towards emission reduction targets over a time horizon spanning several decades rather than years.

[1] National Audit Office, *Emissions Projections in the 2006 Climate Change Programme Review,* December 2006.

2. *In developing its approach, how should the Government deal with the following issues:*

— whether there can be a greater role for independent assurance;

— how the Government should respond to the unavoidable uncertainties in forecasting; and

— whether or not future domestic targets and forecasts should include international aviation and shipping?

5. EEF notes that the EAC has previously expressed an opinion that emissions forecasting should be undertaken by an independent "sustainable energy agency".[2] However, we are cautious about investing assurance of emissions forecasts with a single organisation. Doing so might imbue forecasts with an unrealistic sense of accuracy. Instead, "assurance" (ie validation of the assumptions and methodology used to generate forecasts) might be better achieved through consultation on forecasts with as wide a range of experts and stakeholders as possible.

6. Uncertainty is inherent in forecasting. Developing and reporting a wider range of scenarios, preferably with probabilities attached to each, would better reflect this uncertainty. A broader range of scenarios would be especially valuable in the case of future fuel prices—a key assumption in emissions forecasting. Fuel prices are notoriously unpredictable and what later transpired to be unwarranted optimism over fuel prices in the 2000 Review was largely responsible for the misleading forecasts that that exercise generated. A further measure available for addressing uncertainty is testing of the upper and lower bounds of fuel price scenarios with market data—(eg forward prices for fuels such as gas, electricity and crude).

7. Government should produce two sets of forecasts—one covering "domestic" emissions alone and one providing a more complete picture of emissions (ie including contributions from international aviation and shipping). Whilst current Kyoto targets and the longer-range targets anticipated in the Climate Change Bill are based on domestic emissions, there would be value in monitoring emissions from international shipping and aviation. Tracking all major sources of emissions would provide a more complete picture of the UK's contribution to climate change and build up a historic data set that would enable emissions from international aviation and shipping to be included in the EU ETS at a future date. Government has already decided that all emissions savings attributable to the UK's EU ETS NAPs will count towards domestic targets—whether or not they are achieved in this country.

3. *As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?*

8. Improvement in long-range emissions forecasting is essential because, over the longer-term, the potential for error in the assessment of costs and benefits becomes greater.

9. Uncertainty increases as forecasts become more long range. Assumptions must be made about how a host of complex economic (eg GDP growth), demographic (eg population growth) and technological variables (eg innovation rates) will develop over several decades. Such uncertainty is best addressed through more regular and frequent reporting (ie regular annual reports on emissions forecasts) and developing wider range of scenarios (see above).

10. However, just as emissions forecasting must be more flexible to cope with the uncertainties resulting from longer time horizons, so must emission reduction targets. Rigid targets can be counter-productive and lead policy-makers to introduce more costly policies than is necessary. For example, the 2006 Review's focus on the 2010 target may have resulted in it overlooking longer-term policies that might have delivered more cost-effective emissions reductions over time. Long-range forecasts can be used to validate distant targets (eg as forecasts become more robust they may start to suggest that targets are either set too high or too low).

11. A balance needs to be struck between focusing on targets which are so close that a policy response is not a practical option and those which are so distant as to be shrouded in significant uncertainty. Medium-term targets which are in keeping with the investment horizon and allow sufficient lead-time for policies to be introduced that can induce behavioural change are the most relevant.

4. *Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

12. The "Social Cost of Carbon" (SCC) is a value which aims to quantify the damage to society (eg to public health, the environment and the economy) caused by each tonne of carbon dioxide emitted. Therefore, an accurate and comprehensive SCC would provide a very valuable yardstick against which to assess the cost-benefit of climate change policy. However, the National Audit Office (NAO), the Stern Review and the academic literature on the subject all rightly emphasise the great uncertainty over to the

[2] Environmental Audit Committee, *Sixth Report of Session 2005–06, Keeping the Lights On: Nuclear, Renewables and Climate Change,* HC 584.

value of the SCC. Research to narrow the range of estimates and improve understanding of the SSC should be a high priority. Until such time as there is broad consensus over the SCC, its role in policy appraisal should be limited.

13. The 2006 Review measured the cost-effectiveness of policy by assessing its "cost per tonne of carbon saved". Whilst a useful tool for comparing the relative cost-effectiveness of policies, it is far from a complete measure of the cost-benefit of a policy. As well as supplementing the assessment with a comparison of cost versus the expected emissions savings priced according to the best estimate of the SCC, the impact of climate change policy on the competitiveness of business is a crucial element of cost-benefit analysis.

5. *Has the Government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

14. Evaluation of climate change policy should not be restricted to the short-term and should be in keeping with any long-range targets set by government. In particular, assessment should include the potential scale and timing of policy. Given the long-term nature of government targets, the latter is especially important to ensure that policies are introduced at the most opportune and cost-effective moment. Longer-term policies may have little impact in the near-term, but prove cost-effective in the longer-run (ie when assessed over the full time horizon of government climate change policy). For example, phasing in energy efficiency policies over time may be both more cost-effective and more environmentally effective as technology develops over time expanding abatement opportunities and reducing abatement costs.

15. The 2006 Review assessed climate change policy on the basis of an average cost per unit of benefit (ie emissions reduction) over the life of individual policies. However, an aggregate measure such as this conceals the fact that costs may increase (eg as most efficient abatement opportunities are exploited) or decrease (eg as technology development expands abatement options) over time. EEF believes that government's approach to cost-effectiveness should attempt to capture this complexity because it could play a significant role in controlling the costs of climate change policy.

6. *The NAO briefing has also raised a number of other issues, including:*

- the failure to explore sufficiently different scales of policy intervention;
- the balance between expanding existing measures and introducing new ones;
- the range of policy options considered and the criteria for appraising them; and
- the timing and scope of future cost-effectiveness evaluations.

*In light of such concerns, how should Government improve its approach to the use of cost-effectiveness evaluation?*

16. Government should assess the relative costs and benefits of different scales of policy intervention by subjecting policy scale to sensitivity analysis in the same way as other variables such as fuel prices. The recent impact assessment for the Energy Performance Commitment offers an example—the impact of different eligibility thresholds, which translates into different sized emission trading schemes, were assessed in terms of their costs and emissions reduction potential.

17. As with emissions forecasting, given the potential significance of the threat posed by climate change and the resources required to address that threat, the cost-effectiveness of climate change policies should be reviewed regularly and frequently—ideally this should be done on an annual basis. Analysis should cover both existing policies and new policies under consideration.

18. Cost-effective analysis of each policy, as far as possible, should be carried out according to the same methodology and by the same group policies to ensure consistency. However, EEF notes that fiscal measures were excluded from the 2006 Review and considered instead by HM Treasury. Furthermore, the NAO report noted that fiscal measures were not subject to the same "quality assurance" as other elements of the climate change policy package.

19. The 2006 Review decided to retain several policies that government analysis concluded were not cost effective (eg the Renewables Obligation (RO)). Where such policies are retained, any alternative, qualitative, measures (eg security of supply) used to justify then should be defined as clearly as possible and the assessment against them made publicly available. In fact, it could be argued that where the implied cost of carbon associated with a climate change policy significantly exceeds the working definition of the SCC employed by government (as in the case is the RO) then there is a strong case for reforming or replacing that policy to deliver emissions reductions more cost-effectively. Even if considerable uncertainty exists around

the value of the SCC any policy purportedly designed, at least in part, to address climate change should be seriously scrutinised if its implied cost of carbon is in the uppermost range of SCC estimates.

20. Finally, the Better Regulation Commission (BRC), in its response to the Stern Review, proposed seven policy principles which the government should be mindful of when proposing, developing and assessing climate change policies. Three of which are particular pertinent from the perspective of value of cost-effectiveness.

21. First, policy should be tested against a carbon price benchmark. Even in the absence of an accurate SCC around which there is a broad consensus, the cost of climate change policy must still be consistently assessed against a carbon price the government believes represents value for money. Failure to do so runs the risk of imposing unnecessary costs.

22. Second, carbon pricing policies must be "efficient". Specifically, overregulation whereby by the same carbon emissions are, explicitly or implicitly, priced by two different policies. Arguably this is the case with the Climate Change Levy, directly, and the EU ETS, indirectly, which both price emissions associated with energy consumption.

23. Third, government should reform or discontinue climate change policies which transpire to be inefficient or ineffective. Climate change is a relatively new challenge and government must guard against inertia stemming from reliance on the revenue of an ineffectual policy or concern over the political consequences of discontinuing an ineffectual policy in an atmosphere in which mitigation of climate change is seen as urgent. The priority should always be implementation of the most cost-effective policy option.

7. *What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

24. Government should publish the models (including assumptions) and, where not commercially sensitive, the data sets it uses to produce its emission forecasts. This would strengthen the assurance framework by allowing stakeholders to replicate the forecasts. It would also address the concern, highlighted by the NAO, that the DTI model was subject to "little detailed peer review".[3]

25. Regular reporting of emissions forecasts and on the cost-effectiveness of climate change policies should include a measure of the relative contributions of and impact on each sector of the economy (ie the trend in emissions from each sector and how the burden of climate change policy is spread across the economy is reported).

8. *What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office for Climate Change, and the Proposed Carbon Committee? In particular, how should the carbon committee be constituted, and what should be its powers and remit?*

26. There is limited information available in the public domain regarding the roles of the Interdepartmental Analysts Group (IAG) and the recently created Office for Climate Change (OCC) (ie the body established in September 2006 to coordinate climate change policy across government). However, an obvious principle is that overlap between the activities and responsibilities of these two cross-departmental bodies should be minimised. In fact, a clear case needs to be made for the continuing involvement of both in the assessment of climate change policy. For example, an alternative might be for the OCC to be endowed with sufficient analytical capability to review climate change policy without the need for involvement of the IAG.

27. The role of the Carbon Committee should be to provide independent advice to government on climate change policy, to provide independent scrutiny of progress towards emissions targets and to provide independent assessment of the cost-effectiveness of policies implemented and proposed to meet emissions targets. In this role, the Carbon Committee should be mindful of the climate change policy principles recommended by the BRC in its response to the Stern Review.

28. To ensure independence and effective decision-making, the constitution of the Carbon Committee should be based on relevant expertise rather than stakeholder representation. Its members must possess the scientific, economic, legal and technological expertise to assess climate change policy. Explicitly stakeholder-based membership could undermine the independence of the Carbon Committee. However, the membership must possess sufficient understanding of all sectors of the economy impacted by climate change policy.

[3] National Audit Office, *Emissions Projections in the 2006 Climate Change Programme Review,* December 2006, p 5.

9. *The Government wishes to "ensure that the [Carbon] Committee's advice is transparent, equitable and mindful of sectoral and competitiveness impacts, including the need for secure energy supplies at competitive prices". What use should the Carbon Committee make of cost-effectiveness analysis and what difficulties might it face in doing so?*

29. Ensuring that the burden of climate change policy is as evenly spread across the economy as possible will be a key role for the Carbon Committee.

30. EEF is concerned to note that the "competitiveness" impact of climate change policy on industry is considered "non-quantifiable" in the IAG guidelines. At the very least, this seems at odds with the quantitative analysis of the impact of climate change policy as part of the Stern Review. Policies that result in higher energy prices or increase the cost of industrial emissions can significantly affect the profitability of manufacturers whose margins are already under pressure. EEF believes that the potential impact of ill-conceived climate change policy on industrial competitiveness is significant and that quantitative analysis in this area is essential. We would be happy to work with government or the Carbon Committee in developing an approach.

10. *What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

31. If, as is anticipated under the forthcoming Climate Change Bill, long-range domestic emission targets are introduced through legislation, then flexible interim targets should be established to guide climate change policy and measure progress. Short-term targets should be flexible enough to accommodate unforeseen events (eg extreme weather patterns, rapid economic growth and technological breakthroughs) and their frequency should take account of investment cycles and be compatible with the timescales of international agreements (eg the five-year phases of the EU ETS or the 15-year time horizon of the Kyoto Protocol).

*March 2007*

---

*Witnesses:* **Mr Gareth Stace,** Head of Environmental Affairs, EEF, **Mr Roger Salomone,** Energy Adviser, EEF, **Mr Jeff Tetlow,** Chairman, **Mr John Hill,** BCSD-UK member from Converteam, and **Mr David Middleton,** CEO, Business Council for Sustainable Development—United Kingdom, gave evidence.

**Q1 Chairman:** Good morning and welcome to the Committee. For our benefit, could we ask you to introduce yourselves and say which of the organisations you belong to and in what capacity, please.

***Mr Hill:*** I am John Hill. I am from Converteam, which was previously out of the power conversion sector of Alstom, and previous to that CEGELEC Projects and—here is a name you will finally recognise—GEC. Throughout that period of transition we have been profitable and we are now the UK's biggest supplier to the wind industry.

***Mr Tetlow:*** The three of us are BCSD-UK. I am Jeff Tetlow and I am the Chairman of the Management Committee of the Business Council for Sustainable Development. Presently I am a consultant to the oil and gas industry and I have had a long career with major oil companies, primarily in the area of developing their large oil and gas field developments.

***Mr Middleton:*** Good morning everyone. My name is David Middleton. I am intensely privileged to be the Chief Executive of the Business Council for Sustainable Development—UK. We are the UK's only affiliated branch of the World Business Council for sustainable Development.

***Mr Stace:*** Good morning. I am Gareth Stace. I am Head of Environmental Affairs at EEF, the Manufacturers' Organisation.

***Mr Salomone:*** Good morning. I am Roger Salomone and I am a colleague of Gareth's at the EEF and I advise on energy and climate change issues.

**Q2 Chairman:** Thank you very much. We may direct some of the questions specifically to one or other of you; otherwise, it is really a matter of whoever feels they want to answer, so do not feel obliged to answer every question unless pressed to do so by one of us. Just to start off with, could you give your general reaction to the draft Climate Change Bill?

***Mr Salomone:*** Generally, from EEF's point of view, we welcome it. It is a very positive development in terms of providing that longer time-horizon framework which will help us to take better decisions, particularly the long-term targets and rolling 15-year carbon budget horizons. That is an essential base of carbon management costs of climate change policy and also to help business invest and realise opportunities as well. We also welcome the introduction of an independent body that is going to be able to scrutinise and advise government on policy. I would just flag up one key area of concern or for further discussion, and that is around these review clauses where you can open up the long-term targets. There are a couple of triggers at the moment. One is a change in climate change science and the other one is development of international policy; so maybe no Kyoto or Kyoto cuts or whatever. We want to make sure there is sufficient flexibility in there, potentially to review things on economic grounds as well, because there are going to be significant costs with climate change, and flexibility will give the policy credibility. But in general very positive.

***Mr Middleton:*** We echo that as well. We have always felt that sustainable development provided a major business opportunity and that was reflected through Stern. Therefore, we do welcome the draft Bill. We have some concerns. We would be very concerned to make sure that the targets suggested within the Bill are robust enough. We have some concerns about the proposal regarding the Committee acting in an advisory role. We would rather see it as a more independent body. We are concerned about issues of responsibility amongst ministers. If it is a five-year reporting period, is there any retrospective responsibility on acts which have happened during the period of a minister when that minister may no longer be in post? Obviously it is a very complex issue, sitting within international situations as well. We do wonder about the effects of the Bill on issues to do with carbon values, which is an issue of concern to us, and the ETS, which we would like to see performing more robustly.

***Mr Stace:*** We would like to see the Committee on Climate Change independent. We would like to see the secretariat of the Committee being independent of government as well, so it can effectively scrutinise government policy. We think that the Committee should have access to an analytical resource, including modelling, again to be able to report back effectively to government on the issues and pressures.

**Q3 Joan Walley:** In terms of what you have just said, how would you see that relating to Parliament, as opposed to government, and to select committees, such as our own?

***Mr Stace:*** In terms of reporting to Parliament, we think that the Committee would be called to give evidence on a very regular basis. Are you asking in terms of its independence or in terms of it being able to report back to government and to Parliament?

**Q4 Joan Walley:** In relation to Parliament, where would it sit? In terms of what you are suggesting, where would Parliament, as opposed to government, relate to that?

***Mr Stace:*** It would obviously be accountable to committees such as this. Is that what you are asking?

**Q5 Joan Walley:** I am interested in your views on where Parliament sits in the greater picture of the accountability of the Climate Change Office and Commission.

***Mr Hill:*** Technically, this problem does yield to analysis but the model will be poor in its first years. One of the things which we do not want to see is too much political influence on the work done by the professionals on the Committee in developing that model to the point where it becomes perfect in perhaps 25 years from now.

**Q6 Chairman:** Twenty-five years is a long way away to achieve perfection. Perhaps we can look at what is happening at the moment. Why do you think progress towards the Government target of a 20% cut in carbon emissions by 2010 has been inadequate?

***Mr Tetlow:*** Without getting too far into the specifics of what has happened, we see a lack of overall accountability for this; in other words, that very many departments are working the same problem, each with their own constituencies of interest, whether it is Transport, or various aspects of the DTI and Environment. It is the sort of situation that needs to change for the future. There needs to be an urgency and an overall accountability for the work of achieving the carbon change objectives that we are angling towards. If it continues in the future as it has in the past, government/Parliament/the people of the country will spend forever talking about it and put not much effort into pushing ahead. In the past there has been a lack of up-to-date information on what the current state of carbon emissions was. The Government set policy with certain forecasts. Those were seen not to be delivering but it took an awfully long time to discover that they were not delivering, that in fact the emissions to the end of 2004 were just not known and therefore the connection with the policy was not there. For me, it is a lesson that needs to be learned about how to do it in the future and how to be much more on the ball about what is happening to our environment through the economy and connections with policies and so on.

***Mr Salomone:*** I think there are two main issues. One is the area which has just been outlined, and, hopefully, the Climate Change Bill will resolve these issues. There was not regular annual reporting. In fact the time horizon was a lot shorter, so it was harder to track progress. I think we had two reviews between 2000 and 2006. We are hopefully moving to a framework that is more responsive under the Climate Change Committee for tracking emissions and reporting back to Parliament, which should give us more scrutiny and control over policy. There is also the modelling angle. In the National Audit Office Report there is a reasonably broad consensus that, while we are where we are and we have not achieved our targets, people did not predict the higher gas prices and the switch to mainly coal as a consequence. One thing we touched on in our response is having a broader range of scenarios in terms of fuel prices.

***Mr Middleton:*** I think there is a great willingness in the business community to work with government to find solutions to some of these complex problems and particularly to ensure the UK wins out of this change in society. Stern talked about the change that society needs to go through to mitigate against climate change. It is, without a doubt, a massive opportunity for the business community, but it needs to work with government and I think we find it very difficult sometimes to do that. The bureaucratic complexity of working with multi-departmental issues is sometimes stifling, to say the least.

**Q7 Chairman:** Given those inadequacies and problems, did you think that the Climate Change Programme Review process was an effective response and analysis?

***Mr Middleton:*** No, in essence. We again found it difficult to engage with it. Perhaps that is possibly our fault. I think the interface between us and the

process was not as good as it could have been. That may well have been our fault but we were treading into new territory. I think it is indicative of the fact that sometimes we find it very difficult to know who we are talking to, what we are talking to them about and which department is the lead department. To take my Chairman's view—and I said this at a meeting with you recently, sir, at which Mr Cameron was present—we really would like to see this issue functioning as a cross-departmental issue. It does not seem to be—or not harmoniously, anyway.

***Mr Tetlow:*** I think it did not work because it simply took too long. It took too long because the relevant ministries were caught out, realising they were not achieving the objectives, and it has had to become not just a review but rather setting new policy aspects for achieving the 2010 target. It took probably a year longer than it should have done.

**Q8 Mr Chaytor:** Could I ask both the EEF and BCSD about your general response to Stern. Do you think Stern has it broadly right?

***Mr Middleton:*** In response to that, may I table this document. We are the UK branch of the World Business Council. The World Business Council published this yesterday. It is called *Policy Direction to 2050: Energy and Climate*. The team in Geneva that produced this are spitting bullets that they were not out in the market before Stern. It reflects Stern significantly. Although we responded to Stern before this was available to us, when we responded to Stern we were very much in favour of it. We remain in favour of it and our World Business Council colleagues reflect Stern wholeheartedly. They are showing a trajectory through this document through to 2050 and key milestone marks down the trajectory. It shows me—and Stern did as well—that to achieve the targets which we manifestly need by 2050 and before, we need more tangible action now. If we do not get it, we are going to miss the trajectory, and I am very fearful for my children and my grandchildren. I feel hugely responsible for that. I feel we need more action now and I get very frustrated at the lack of action in deliverables now. Although I think Al Gore did a wonderful thing with his film, for me it was the wrong message. I think the message should have been about the solutions and not about the problem. Manifestly, a lot of the solutions are available to us. It is just: How do we deliver those solutions into the market by a partnership between business and the political community? We are not good at that at the moment and I think we need to get that act better. That means new dynamics in the relationship between business and Parliament.

**Q9 Mr Chaytor:** Do you think the majority of your member companies share that view?

***Mr Middleton:*** Wholeheartedly.

**Q10 Mr Chaytor:** Are they fully aware of the dramatic changes there will be to the kind of products and services that they are delivering?

***Mr Middleton:*** John, would you like to respond to that, as you are one of my members in your manufacturing.

***Mr Hill:*** Absolutely. We are desperately trying to put together a second generation of wind turbines, a third generation of wind turbines. It is surprising that we are coming from so far back. The technology that was available in wind from Denmark and Germany was not quite appropriate to the UK's requirement, specifically offshore, and of course there is this economic truth that innovation is risky whereas proven technology, albeit slightly inappropriate, is less risky. Even pushing forward a second generation of wind turbines with no gearboxes and with full grid interfaces, is something that has only been going in earnest for about three years in the UK. The development of a new wind turbine is a five-year project. It is just like with a motor car or perhaps more a motorcycle: from the time you decide you want to make it, to the time when you have developed the supply chain adequately to produce one thousand a year, is five years. Perhaps—to answer the Chairman's earlier point—the reason that 2010 is proving to be so challenging is that people did not quite understand that there would be that five-year delay in producing the technology.

**Q11 Mr Chaytor:** In terms of technology and renewable energy, this is a big opportunity for many businesses but, equally, there are many businesses locked in to producing emission intensive products.

***Mr Salomone:*** We have a slightly more nuanced view. We welcome Stern. It is probably one of the first attempts at a very wide-ranging, quantitative look at climate change policy, but maybe one of the areas of concern for us was its examination of competitiveness, where it looked at some of the more energy-intensive, internationally traded sectors. They assumed a £70 per tonne carbon price and basically inputted that into the economy and looked at what it would do to the cost of a number of key industrial sectors. The overall conclusion was that there would not be much impact, basically, that there would be limited impact on the macro economic level. We were concerned on a number of accounts. Profitability was not really looked at and that analysis needs to be developed as profitability is key for all these companies which are going to invest and hopefully bring on line all these low carbon products that are going to get them to the 2050 target. It did not look at fixed costs either. We know of a lot of long-lived capital intensive assets out there in these industries—I am talking about furnaces in the electricity supply industry—and some of those could become sunk costs very quickly. That again could affect the profitability. Lastly, looking at the cumulative impact of costs, it was very much looked at in isolation: carbon price. We know that you might get a higher carbon price and you might get energy price inflation at the same time. As you move along the carbon constraint, these could ramp up and have quite a big impact. Some of the economists looked at Stern and said that you might be better off ramping your climate change policy up over time to

meet the target, because, hopefully, over time, we will have more abatement opportunities and the cost of climate change policy could and should, in theory, go down. So we need to think very carefully about the pace of climate change policy, particularly for internationally traded sectors.

**Q12 Mr Chaytor:** The EEF represent entirely manufacturing businesses.
***Mr Salomone:*** Absolutely.

**Q13 Mr Chaytor:** To what extent do the typical medium-sized manufacturing businesses that comprise your membership have an awareness of the issues that we are talking about this morning?
***Mr Salomone:*** Energy efficiency is one subset of all this. That is quite an issue for a lot of businesses and has been for a number of years: it very much affects their bottom line. On a related issue, you know about the Energy Performance Commitment, which is another potential emissions trading scheme, and when I was getting in touch with our members about that there was not a lot of knowledge out there about these government proposals. That is another danger, that there are a lot of policies coming out at the same time, so you need to think carefully.
***Mr Middleton:*** We touch into EEF members. It is not only John's project but others which are major projects, like the carbon sequestration project. They are big projects, but when you run them down through the supply chain you get down into third, fourth tier suppliers. If I may talk in terms of Birmingham SMEs, West Midlands SME type manufacturers, they probably do not even know where their products ultimately end up but we are trying to educate that SME fraternity about the business opportunity dimension. With respect to them, whilst they are ignorant about the policy issues, they are equally ignorant about the potential business opportunity, and I really do try to drive this agenda off the business opportunity dimension because I think it is phenomenal.

**Q14 Mr Chaytor:** Stern quotes a figure of 1% of global GDP to mitigate the effects of climate change now but that is on the assumption that the emissions will be at the higher level, so it is entirely possible that that 1% of global GDP could be higher if things turn out differently and it is necessary to introduce more stringent policies. Again, are you basing your assumption on the fact that 1% of GDP will be it and you could live within that sort of parameter or are you prepared to accept something more expensive than that if it becomes necessary to take more stringent action?
***Mr Middleton:*** I think we took a lead from the business leaders group, who quite some time ago accepted 1% of GDP as being an acceptable cost. That was pre-Stern. I think we are happy about that, with certain limited variables either side of it. I am sorry to be boring but I am entrenched in this belief that we are looking at a major opportunity. If we can create new jobs and secure jobs out of the opportunity that is confronting us, then the negative social costs also come into the equation, and they are often not costed. I think we need to be holistic in our view of the pluses and the negatives of the account on this. Every time I look at it, I come out on the plus side.
***Mr Salomone:*** We are very conscious that there are going to be costs of climate change policy and it is a very good rationale for having climate change policy. In terms of specific figures, in terms of what we might be prepared to accept, I think it is quite hard to say, because really the 1% is very speculative, is it not, like a lot of these targets are? You need to put a marker in the sand but we might get 20 or 30 years down the line and realise that the costs are a lot less or a lot more. We always factor in things like carbon capture and storage and that has not even been trialled on an end-to-end basis, let alone commercially deployed. The costs are quite hard to estimate but they will be quite significant really. Stern says we have to more or less decarbonise our entire electricity supply to 60% plus, so there are significant costs and it is going to be key that we manage them across society and that all the sectors participate, including the domestic sector, the business sector, transport. That is the way to keep them down and to introduce them sensibly over time.
***Mr Stace:*** Costs would obviously vary for different sectors. We have sectors within our membership that have very limited abatement opportunities going forward now—abatement has occurred in the past—and are internationally tradable commodities, so the cost to those sectors would be far, far greater.

**Q15 Mark Lazarowicz:** Let us try to get into a bit more detail on some of the specifics we are talking about here. I am directing this question particularly at the Business Council because this is something you mention in your memorandum. You talk about the need for "urgent, unpalatable measures" to reduce the UK's carbon emissions. Could you give us a bit more of an idea of what you have in mind there?
***Mr Hill:*** It is always easiest with that question to look at the specific. One which is perhaps before everyone at the moment is grids. There are perhaps three ways of putting right the grid situation. The first is with pylons: they are cheap, but environmentally and probably to a lot of the population they are unacceptable. We can bury the grids: that is expensive but it is reasonably cheap to maintain. Or we can go offshore with grids: that is very expensive and quite difficult to maintain unless we make the topology appropriate. Each of these three has its own unpalatable aspect: a visual one, ranging right through to a cost one. Those unpalatable messages can be put across by a carbon committee—if they are totally detached, independent, professional people—perhaps easier than a politician.

**Q16 Mark Lazarowicz:** You also in your memorandum quote, I think approvingly, the Prime Minister at the Lahti conference on the need to maintain global economic growth even while decreasing emissions, to avoid potential social and

international conflicts breaking out. How convinced are you that it is possible to maintain economic growth and to make the kind of steep cuts in emissions that Stern talks about?

***Mr Middleton:*** I would have to say that I am personally of the belief that it is achievable. I have looked at this at a macro and a micro level. I think it is interesting to look at it at a micro level. We have looked at it in community levels and we have looked at cities and looked at regeneration areas. We have looked at it in terms of reducing emissions, reducing the carbon footprint, looking at what is needed to achieve that, but then—and, I am sorry, I am back to it again—looking at the business opportunity of what you need to get to that and looking at what that does in terms of a contribution to the local economy, jobs creation and so on. We think the balance sheet works again.

**Q17 Mark Lazarowicz:** Are you really facing up to this? Without jumping ahead to later questions which I think my colleagues will ask, there is the example of aviation. We assume that future growth will depend upon aviation increasing and, at the same time, there are issues about whether that is sustainable or not. Is business facing up to the really fundamental changes here or not?

***Mr Middleton:*** Aviation is the difficult one that we are concerned to make comment about. However, we have said in response to this Committee that we do not think non-hypothecated taxation, as demonstrated in the last Budget, is anything like an answer to it. But that is a difficult one. To a certain extent, we are not sure how it is manageable within the UK because it is such an international issue.

***Mr Stace:*** We think that all parts of the economy must do their bit, so to speak: aviation, road transport and domestic. We are concerned, in terms of abatement opportunities, in terms of aviation and the effect that might have on the future carbon price, therefore, again having a negative effect on our members in terms of the cost of mitigation abatement.

**Q18 Mark Lazarowicz:** My point was more concerned with the general issue. It is very easy to find exceptions in every single challenging area of emissions in the economy because we do not want to affect economic growth. I will just ask you again if you think this is something which has been really taken on board by business so far.

***Mr Tetlow:*** I think there is a long way to go for businesses, like parliamentarians and the general public, to understand what the total challenges are. David Middleton referred to the WBCSD report earlier. In there, they have done a lot more work (because it is more heavily funded than anything we have done in the UK) on what the pathways to much lower carbon emissions in 2050 look like. In there, they map out various scenarios, including a huge reduction in carbon for power generation, big changes in the carbon output from transport and so on, but they do map it out in a way that says these are not necessarily the only changes you would make but they are possible and they are potential. They require new technologies and they require big leaps in current technologies. We will rely on their work, which they have done over several years, to come up with that work. There is certainly a path forward which is achievable in a business sense. This is 180 companies, many of them major companies, quite a number of them UK and European companies, who have studied this in great detail and come up with a scenario which we think is compelling. It is going to be hard work. Coming back to my earlier point about urgency, it is urgent that we do something. We need to get on with new technology developments and we need to get on with mapping out what the future course of action for the UK might be, because we do not have that.

***Mr Salomone:*** To answer your question directly, a lot of especially our larger members are already quite aware that tough decisions being made. A lot of manufacturing sectors, particularly steel, have reduced their emissions quite considerably per output over the past 20 or 30 years. They are captured by a lot of climate change policies that engage them automatically in these processes: EU ETS, Climate Change Levy and Climate Change Agreements. Going back to what I was saying about the pace of climate change policy, it is going to be important. You have to recognise there will be points when there are technological constraints upon industries reducing their emissions further and then you get into these difficult decisions as to whether maybe you relax the constraints for a while before ramping them up when the technological opportunities become available or whether you just impose tighter and tighter absolute emissions. There are hard choices ahead.

**Q19 Colin Challen:** The Government has set of target of 60% to be put in the Bill of emissions cuts. Is that the right target? On a scale of one to 10, where 10 is very difficult, how achievable do you think it is?

***Mr Stace:*** I would say we could be saying 10; we could be saying five or one. In terms of the target of 60% in 40 years time, that might be very easily achieved in terms of unproven and undiscovered new technologies and the global economy. We might be able to achieve 70% or 80%. I think achieving that, though, depends on the costs that society would need to bear or would be prepared to bear. You stake your claim to a figure but I think it is still very much an unknown as to how that is achievable.

***Mr Middleton:*** We would again endorse the view of the business leaders group, in that setting a tough target is a good stimulant to robust efforts to meet the target and particularly a stimulant to innovation. Although it may be a target which, ultimately, with the advantage of the passing of time and experience has to be modified, I think it is essential to set a high target now. All this is about the challenge the planet confronts and we really have to start doing stuff now and as big and as fast as we possibly can. I think a high target is appropriate and again it is a stimulant to business opportunity.

***Mr Tetlow:*** Can I make the obvious point that if it is not adopted internationally then what we do in the UK is immaterial. We are all aware of that. The UK

needs to take a lead because it can then more purposefully persuade the others, the rest of the world, that it is possible and that there is a way forward. Whether it should be 60% or 80% is for the climate scientists. It is not something on which we have an independent view, but 60% or, Stern argues, maybe 70 or 80%, if that is it, that is where we need to go.

**Q20 Colin Challen:** Are you happy with 60%? Would you like to see it higher? I can quote an example. HBOS recently proudly claimed that since 2004 they have reduced their carbon footprint by 65%. That is three years now. Does that not tell us something about our level of ambition?

***Mr Hill:*** Technically there is no question that it is achievable. The wave technologies that we are developing, the superconducting generators we are going to have on line by about 2010, ocean current and tidal schemes, grids, it is all technically achievable, but, answering your question, yes, only with appropriate social drive and economic drive. There are aspects in the model which are seemingly parallel but interact in very interesting new ways and those things have to be all part of the target. Yes, if 60% is set, a carbon committee can work out how to do it.

**Q21 Colin Challen:** This Committee recently did a report on the Stern Review and had considered that perhaps an 80% target would be more appropriate. If that were the case, how soon do you think that could be brought about? Starting with 60%, if we were to say that we could achieve 80% would that change happen over two or three years or would you see it having an impact over a longer period? How soon can we learn the lessons to update these targets?

***Mr Hill:*** There is another technical answer to that. Some of the breakthroughs are going to be groundbreaking. I cannot express it better. The classic example is hydrogen. If we cannot even make 60% without a lot more buses going up and down motorways using hydrogen rather than fossil fuels, if we do decide on hydrogen and we decide that night wind is going to produce the hydrogen and we have pipes or appropriate grids to get that hydrogen to the ends of the motorways, then, at a stroke, we might suddenly discover that either we do 55% or if we go for hydrogen we do 80%.

***Mr Salomone:*** I think it will take a minimum of a couple of decades. To tackle many side backers on the harder parts of the economy to decarbonise, like the energy supply industry, we are talking about long-term build programmes. We are talking about nuclear build, carbon capture storage that have not come on line yet, or we are maybe talking about a 10 or 15-year minimum lead time if and when we see a nuclear plant, so you are probably going to have to say at least 10 or 15 years before we know whether 60% is radically too high or too low. We are going to have to keep a watching brief on it.

**Q22 Colin Challen:** There is also a conflict between that answer and what is required to solve the problem.

***Mr Middleton:*** Yes. I have a slightly different view because I think that both answers have been quite narrow. If you widen it out to everything we potentially could do that we are not doing, it surprises me every time I look at this how much we could do that we are not doing and how many solutions there already are at our fingertips that we are not deploying. All we need to do is to kick the ball harder to start it going faster now rather than waiting another five years or 10 years or whatever and just make the problem bigger. We keep coming back to the same issue, as far as I am concerned, that we need to do more now. We are capable of doing more now and we are somehow not doing it.

**Q23 Colin Challen:** It is a bit of a chicken and an egg: is the investment community waiting for the Government to set the bar at a higher level or is the Government waiting for the business community to say what is possible?

***Mr Middleton:*** You are absolutely right it is chicken and egg, but I think it is helpful if the Government sets a framework which reflects what we have just been talking about. The investment sector can then take that as being a robust, entrenched situation to which they can work. At the moment they do not know what they are working to, so therefore the investment sector is nervous.

***Mr Tetlow:*** I think it has to have a society drive behind it which manifests itself as a government target—which is agreed in Parliament, all the things it needs to do. Without that, there is not the framework in place to require and allow all of the industrial commercial activities to work towards the same goal and hence begin to absorb the costs. Presumably part of it is going to be a taxation issue about switching over the focus of taxation into green initiatives which are going to drive carbon reduction.

**Q24 Chairman:** To be clear about the implications of this, if there were a phase 3 of the EU ETS which extended to industries which you may represent which are not currently covered, and if the cap on allocations or perhaps optioned permits were tapered steeply down and in that way you could guarantee you would achieve a cut, you would be happy about that?

***Mr Tetlow:*** Yes, provided that some reasonable cost-benefit analysis had been done that looked at, in a fairly broad band way: "Is that the lowest cost of achieving carbon reductions?" If on the other hand you are saying: "All the carbon reductions will come from business activity and we will not worry at all about personal transport and homes and so on," then that would not work. As long as each of the sectors is looking at similarly tough measures—

**Q25 Chairman:** Hang on a minute. That seems to cut across what you said about the cost-benefit analysis. It might well be that it is more cost beneficial for business to do it than for people to do it through

personal transport or homes. If you want to use cost-benefit analysis as one of your criteria, you have to allow that to apply across different sectors, have you not?

***Mr Tetlow:*** I am saying that, yes.

***Mr Hill:*** Perhaps I could come in with something I was dying to include today, which is slightly outside the remit of the Committee, I think. One aspect of the benefits of everything we are doing in renewable energy is energy supply security and at the moment, that seems to have no value in the documents that are before us. Energy supply security may be the one thing that can kick the market into the investments that are necessary for, yes, 80% or whatever, but it is certainly not given adequate consideration today.

***Mr Salomone:*** On the EU ETS point, I think the answer to that is probably not necessarily would we be happy with an EU ETS with the cap just ramped down very quickly over time. One of our issues is that it has to respect knowledge or the technological reality, so if you are talking about energies that have limited abatement potential you might want to be careful about how quickly you tighten the screws in the cap. It is something we have spoken about before in terms of Stern: the demand for steel is not going to go away if you are not exporting that production overseas, with their less stringent standards. So you need to be careful.

***Mr Stace:*** It might increase overall global emissions from the steel sector, so it would have the opposite effect of what you are trying to achieve.

**Q26 Colin Challen:** Given that the Government is in a consultation period on the Climate Change Bill, will you be saying yes to 60% or would you, in the light of your knowledge, be pressing for a higher target?

***Mr Middleton:*** We will stay with 60% because it is reflected by our parent body, the World Business Council.

**Q27 Joan Walley:** Should you not be pushing the boat out? In view of what you have said, there seems to be an obvious preference for going even further. Bearing in mind what you were saying earlier on about the public needing to be in support of these policies as well, if you do not push the boat out, who is going to do that?

***Mr Tetlow:*** I think we need to distinguish between what is necessary and what individual companies are prepared to do—as in your HBOS example. A lot of companies are quite likely to accept targets and the good thing about that is that individual companies are using sustainable development issues, climate change issues as marketing tools. The fact that they are is very attractive to all of us, because it means it has some value to it. That is good. As a business organisation, we are not the scientists, as in the IPCC, who are projecting what the consequences of climate change are going to be, and we will defer to that. There is no reason for us to propose a different target. I think we have to look to the scientific community and some of those NGOs who are going to propose different targets because they have done more scientific work. We do not do the scientific work on what are the consequences of climate change, so that is not really a question for us. If, however, individual companies want to set their targets, that is up to them and we certainly would encourage them to do that. In terms of pushing the boat out, I would like to push the boat out faster than it is happening at the moment.

**Q28 Mark Lazarowicz:** I would like to ask a couple of questions about government forecasting of the emission levels. They really come out of the written evidence from EEF, so I suspect they will primarily be directed at you. You have called for the Government to put into the public domain the data assumptions and the methodologies for emissions forecasts so that they can be looked at by anyone and not just the Committee on Climate Change. What do you think will be the practical benefits from that greater transparency?

***Mr Salomone:*** I think it will provide a lot more credibility to government forecasts. It will give industry assurance over where those forecasts are coming from. A good analogy is in the electricity industry, where National Grid releases into the public domain the model which they use for calculating transmission charges. They put a model into the public domain that industry can then use to replicate their calculations. That may be in an ideal world. We are talking about a far more complex model here in terms of the climate change model. To be able to have credibility in a policy, it is ideal that the bodies that are scrutinising and have to buy into the costs associated with that policy can at least to a certain extent replicate what is going on and test the assumptions behind that model. Those assumptions exist anyway, do they not, within government departments somewhere, so making them available to the wider world gives more opportunity for debate around what sensible assumptions should be. Surely that is a good thing, to be open about those kinds of factors. More transparency gives more assurance and more people can get involved in determining what is right.

**Q29 Mark Lazarowicz:** Thank you. You also called for the Government to use a broader range of scenarios when it forecasts future emissions and in particular to anticipate the impacts of different trends in future fuel prices. You have mentioned that this morning. We understand, however, that the DTI already uses four different scenarios for future emissions depending on different trends in oil, coal and gas prices.

***Mr Salomone:*** Yes.

**Q30 Mark Lazarowicz:** What else in addition to that do you want to see?

***Mr Salomone:*** It is a difficult question because there is an infinite range of possible future pathways or scenarios so it is hard to say that $x$ or $y$ amount of scenarios is the perfect amount of scenarios. I am talking more about a broader range. There could still be four scenarios but you might want to cover a broader range of potential future fuel prices.

Obviously the range and the modelling that was done in, I think, 2000, did not really capture what happened to gas prices.

**Q31 Mark Lazarowicz:** Thank you.

**Q32 David Howarth:** My question is also primarily for EEF. It goes back to what you were saying much earlier about the social cost of carbon. You were talking about Stern and the present £70 per tonne social cost. Stern implies a much higher social cost of carbon than that: three times higher. You say in your memorandum that this is all a bit vague and you do not want the social cost of carbon to be used very much in policy making. Are you really saying that or are you saying that you just do not like the policy implications of using the higher social cost of carbon for your members?
***Mr Salomone:*** If you look at Stern, there is a range from zero to $400 per tonne of carbon. There is a huge uncertainty about what the social cost of carbon is.

**Q33 David Howarth:** It is not zero, whatever it is.
***Mr Salomone:*** If you ended up using figures within the very lower range and the very upper range of that estimate, you could basically be introducing policies that are just not cost effective. I think we need to do a bit more research into what an accurate cost of carbon should be. Right now, its potential use is at the wider ranges. If you are bringing forward a policy that is way beyond the upper estimate of social cost of carbon, it should start some alarm bells, but I think it is adding a spurious accuracy right now to the social cost of carbon because you use it to do a direct cost-benefit analysis of each policy.

**Q34 David Howarth:** So you reject the conclusions of the Stern Report on what the social cost of carbon should be.
***Mr Salomone:*** I would not want to pick a particular social cost of carbon out of that and say, "Yes, that's the cost of carbon that I think is appropriate." I do not think there is the knowledge to do that right now.

**Q35 David Howarth:** You said it could be nought. Do you really think it could be nought?
***Mr Salomone:*** That is the range. I do not think it is nought, no.

**Q36 David Howarth:** You must have in your mind some kind of minimum figure. What is the minimum figure?
***Mr Salomone:*** I do not have a minimum figure in my mind.

**Q37 David Howarth:** I think there is a contradiction in those last two answers. Let us move on. It did sound to me as if you were saying that you were objecting to carbon costing which threatened the interests of your members and then you were saying that the reason for that was that they need time to adjust and the knowledge base, the technological base was not there to produce abatement in time. Is not the response to that that the whole point of setting the higher cost of carbon is to induce technical change? I will give an example. It does not have to be just physical technical change; it could be organisational technical change. I was looking at an organisation which had managed, so it said, to reduce the cost of a particular range of environmentally friendly goods—in this case solar thermal heating—by a very large amount, not by inventing new materials but simply by changing the organisation of the work. Surely the whole point of a high cost of carbon is to induce—
***Mr Salomone:*** I would like to draw a distinction between the social cost of carbon and, say, a cost of carbon which could just be the cost of a tonne of carbon saved—you know, basically the pounds per tonne of carbon saved. I think that is the approach that the Climate Change Review has been using to date, primarily because there is a lot of uncertainty around the social cost of carbon. That is the more appropriate way forward at the moment and you could compare the cost effects of the different ways to reduce carbon. I think it is highly speculative to say that we have a very accurate picture now of the social cost of carbon across the whole of society.

**Q38 David Howarth:** But even if you do that you still have to do it in a way that is compatible with the long-term target of carbon reduction.
***Mr Salomone:*** Absolutely, and that is something we support.

**Q39 David Howarth:** Does that not produce an implied social cost of carbon anyway?
***Mr Salomone:*** What do you mean exactly by a social cost of carbon?

**Q40 David Howarth:** The social cost of carbon as we normally talk about it in terms of the Stern Report: the emission cost of carbon in total terms.
***Mr Salomone:*** It does have an implied cost, I guess, yes.
**David Howarth:** Yes. Thank you.

**Q41 Joan Walley:** My questions are really to EEF and they go back to the discussion that we had earlier on about cost-benefit analysis as part of the Climate Change Programme Review. You note the point about looking at cost-benefit analysis in the short term and not putting the value on cost-benefit analysis over time. How would you refactor time? The point made earlier on was that we can go quicker once we start to get into the trajectory that would take us there faster? How do you weight time? Is it sufficiently weighted at the moment? If not, how could it be?
***Mr Salomone:*** The National Audit Office made quite a good point in their report on cost-benefit analysis. Instead of just looking at the average figure—so you take the lifetime of the policy and see how many tonnes of carbon you are saving for a certain amount of money and you average it across its lifetime—it could be more interesting to look at how in each individual year or each phase of that policy as the

costs change, and that gives you a better picture of whether you want to introduce it now or potentially later or whether there is a time when you might want to terminate it.

**Q42 Joan Walley:** Do you want to come in on that?
***Mr Hill:*** The time dimension is one that I feel needs to be considered in the description of how the Carbon Committee reports and, indeed, how the Carbon Committee itself considers the next move that it must make. Things could change literally month to month. For example, with respect to the impacts of changes in China, a policy change in one or two countries around the world could instantly mean that we have to have another re-think here. At the moment, the second generation machines use permanent magnets. One of the few places in the world where we can buy the rare earths is China: they decide not to export them and we are in trouble. We will have to change immediately. I believe, yes, the Carbon Committee should be involved in deciding on changes like that.

**Q43 Joan Walley:** Who do you think worldwide has this expertise to enable time—medium-term, long-term, short-term issues—to be factored into the kinds of new thinking and new innovative thinking that needs to come about. Who has that expertise who could be putting that expertise into the thinking?
***Mr Middleton:*** There is a lot of if within our membership, I have to say.

**Q44 Joan Walley:** Is this constantly in their thoughts? Are they grappling with this?
***Mr Middleton:*** I think it is now. This has been such a fast-moving game. I have been battling with this now for 15 years and I have never seen such a sea change as I have seen in the last 12 months. It is absolutely extraordinary. I am over the moon—I feel "Job done" in a way, but now we have to get on to the solutions bit. I think businesses increasingly are looking at solutions. I have seen one of my major members in the brewing industry who dismissed renewable energy four years ago now completely revising their commitment to renewable energy, but not only doing that looking at off-grid, localised, produced renewable energy but seeing how they can do that in relationship with the community in which their factories function and that is creating a revolutionary new relationship between business and society which is really exciting. There is a lot of exciting stuff going on out there. I think we need to capture it better and move it forward in a more planned way than we are at the moment. It is very piecemeal at the moment. I would take delight if we could work better with government to move it all forward in a more concise and better way. At the moment, that is challenging, but we really have to do more now. I am sorry to keep coming back to that.

**Q45 Joan Walley:** Could I ask a question on the Climate Change Bill. I know we are on the subject of cost-benefit analysis and we have slightly strayed from the subject, Chairman, but, in terms of that partnership-working and that strategic planning, which needs to encompass business, planning, the work of the regional development agencies, for example, in our own West Midlands, do you feel that the Climate Change Bill should have regard to the role and function of local policies and that kind of partnership-working in how this aspect of time is accommodated?
***Mr Middleton:*** Yes. Please. If we could work in a cohesive, comprehensive manner with the RDAs and the LGAs and the assemblies, that would be a phenomenal step forward. At the moment, there is inconsistency between them. Whichever region you go into, the structures are different. The RDAs are working competitively against each other at times when we are dealing with a national issue. When we are looking at where we are with Converteam, looking at creating a UK turbine which crosses over about four RDAs and the Government is asking us to fund that support through the RDAs, it is extremely difficult. That is not what happens in Germany. It is not what happens elsewhere, where they are taken as national issues and supported from a national pot from a national government. Here we make it complex, difficult, desperately bureaucratic and slow and cumbersome.

**Q46 Joan Walley:** Does that mean that your organisation will be putting that kind of evidence during this pre-legislative scrutiny of the Bill. Even if you are not going to go from a 60 to 80% target, will you be putting a strong view about the way in which you could have that kind of collaborative working at the regional development agency level?
***Mr Middleton:*** Yes. We have a project which we call Future Communities and we are working with already three cities to deliver that.

**Q47 Joan Walley:** Which three cities?
***Mr Middleton:*** Could I mention just one in particular, because the other two are very embryonic. Nottingham is very advanced in its discussions with us and we hope to contract with them soon. That is bringing the public sector and the private sector within that city together to look at what collectively they can do in terms not just of carbon footprint issues but how they can move together into one "carbon economy" if you like.

**Q48 Joan Walley:** Could I suggest that you invite Stoke-on-Trent to do likewise.
***Mr Middleton:*** We would very much like to come and talk to you about these issues.
**Colin Challen:** And Leeds.

**Q49 Joan Walley:** I think that shows how a city like Nottingham, that is very much at the cutting edge of bringing together private framework programmes for its own city, is then going to be even better equipped to be at a further leading edge in relation to these discussions. Just to get back to the issues you raised in the evidence, the cost-benefit analysis does not really add value or give weight to the competitiveness issue. In our previous inquiry, we took evidence and we found that there was not a

proper understanding of the effects of all this on the competitiveness of British industry. In relation to your evidence, how could that get factored in to the cost-benefit analysis that will be needed as we move forward?

***Mr Salomone:*** It goes back to what I was trying to explain earlier. We would like to build on what Stern has done in trying to look at the variable cost aspect, a kind of snapshot of how it might affect industry. We would like to look at other indicators, like how it would affect profitability, because that is really the key driver for investments by companies and investments in companies; looking at how it would affect fixed costs, all the assets that industries have such as factories, power stations, forges, furnaces: seeing how it affects assets when they get sunk and whether that money can be recovered; and also trying to look at a wider picture as well, the cumulative costs. You do not only have to look at the price of carbon, you have potentially energy prices and all other kinds of costs that could be ramping up at the time, just trying to take a broader look at costs, basically to develop that and build on what Stern has started.

**Q50 Mr Hurd:** A consistent theme coming through is that of a need for a more effective partnership between business and government and a more effective way for business to interface with government, tearing out the bureaucracy and the confusion and the chaos. You clearly feel very strongly, but how could we make this work more effectively for you and get all these competitive inputs within a process that interfaces with sustainable development and works?

***Mr Middleton:*** Perhaps I could give you a working man's answer to that. I hit it every day. I am very surprised that so much of my day is taken up with Defra when I really think it should be the DTI. Then, when I am talking to the DTI, I think the DTI is constantly referring to the Treasury, so I end up talking to the Treasury. But the Treasury does not understand what I am talking about anyway, so I end up going back to Defra. I go round and round in a huge circle. I do that on a national basis, I do that on a local basis with the RDAs, and then I get into the political quagmire of assemblies and the like—so life is very difficult in trying to deal with government. This issue should be a DTI issue, to my mind, because we are solutions led, we are business led, that is where we sit. To me, the DTI does not have the strength of focus to be the lead department on the subject. Dare I say it, we see a lot of interdepartmental wrangling going on at the moment which is not helpful.

**Q51 Mr Hurd:** But that is not an answer to how because you are saying it should be so even if the department does not work.

***Mr Middleton:*** I would love to see a clear remit for the DTI to be the clear interface with us as the business community that wants to be the solution provider. We would like to see the DTI being the lead role in creating the political framework in which we can function to deliver what society and government wants.

***Mr Salomone:*** In terms of the "hows", one thing we are doing is submitting into the EU ETS review what we think about competition and how we might develop a different way of looking at competition, and we are hoping that this will be one of the key roles of the Committee on Climate Change. They are charged specifically with looking at a whole range of issues, one of which is competition, so we would hope to at least be able to work with them and make suggestions to them about how this might be looked at, and that is the hope, that there will be a good working relationship going forward.

**Q52 Joan Walley:** If I could just go back to the more mundane levels of cost-effectiveness, could I just ask what you make of the fact that two key policies, the Renewables Obligation and the Voluntary Agreement package to reduce new car emissions, were each endorsed by the Climate Change Programme Review even though their cost-effectiveness was rated as poor. Do you have any views on what that tells us?

***Mr Salomone:*** I guess obviously it is slightly disappointing that the Renewables Obligation, if you agree with the focus, has turned out to be not as cost-effective as we might have hoped. I think when it was first introduced, it was introduced, if I am right, as a climate change policy and there seems to have been a little bit of post-rationalisation that has gone on after that to say that its benefits lie more in security of supply. I think that is where we have to be very clear about what policies are for, whether they are introduced for climate change reasons or not. There was an interesting piece in Stern where he talks about reviews of the feed-in tariffs across Europe, saying that giving someone just a flat rate per unit of megawatt produced has actually deployed more renewable energy at a lower cost than the Renewables Obligation, so it might point to the fact that maybe a trading scheme and the Renewables Obligation is not always the best way, but hopefully those costs will come down over time. The reality is that renewables are very costly. We have seen record wholesale prices over the past three or four years. There is a subsidy going to renewables up to the tune potentially of one billion and some of them are still struggling and companies are exercising a buy-out clause rather than building renewables. It also feeds into something we talked about which is problems getting connections to the Grid because there are issues there, but I think you do have to wonder when a policy does come out as massively not of cost benefit.

***Mr Hill:*** The feed-in tariffs in Denmark and Germany have obviously had their impact but they cannot go on for much longer. Our view as sustainable business people is that the market over the last 50 years has proved to be the only thing that will actually work in a steady state economy. However, we are in a period of transition and the problem in this period of transition is probably more that the technical innovation is not seen as being a

market driver. The market is driving down the cost of electricity not improving the technology that is used to achieve the 2050 emissions targets.
***Mr Middleton:*** Can I also add about the Renewables Obligation, we have heard constantly from our members that maybe the analysis of the effectiveness of the Renewables Obligation scheme is questionable in terms of the external interference there has been from a political dimension and that the obligation has never had consistency. It seems to be fiddled with year-on-year-on-year-on and without that consistency we think it has negated perhaps the value of the Obligation.

**Q53 Joan Walley:** Can I just finally ask the EEF, in your evidence that you gave to us you set out the recommendations of the Better Regulation Task Force in respect to all of this. Where do you think the gap is between what they are saying and those aspects of that that you have highlighted and actual Government policy and what are the lessons in respect of the draft Climate Change Bill?
***Mr Salomone:*** I guess I would probably summarise it by saying that we need to have more regular cost-benefit analysis and this is what we are hoping the Climate Change Committee and the framework that is being introduced as part of the Climate Change Bill is introducing because the ones I highlighted in the submission were (i) having a kind of idea of what your benchmark price of carbon would be, so what you think is acceptable in terms of whether the policy is cost-effective and whether or not the cost can be borne, and (ii) being able to say this policy did not work and discontinuing it, and maybe the Renewables Obligation is a case in point, I do not know; we have to keep it under review and make hard decisions. The third one was about the over-regulation. A classic example is we have got the same set of emissions potentially being costed three times over, so you have got the EU ETS which is pushing up electricity prices, you have got the Climate Change Levy which is applied on it, and you have potentially got the Energy Performance Commitment as well, so we do not necessarily want to regulate the same emissions three times over.

**Q54 Colin Challen:** I wonder if you could say a bit more about what you think the role and the duties of the Committee on Climate Change should be, who should be appointed to it, and, particularly, do you think it should go beyond the simple monitoring exercise and reporting to Parliament; should it recommend policies?
***Mr Middleton:*** Personally I would like to see it functioning as the revised Sustainable Development Commission now functions, and that is slightly distanced from government and independent of government but acting in an advisory capacity to government. I would like to see the people appointed to it being, as I think we have mentioned before, from areas of expertise that can help formulate that helpful direction for government, so I think it is likely to be business, to be honest.

**Q55 Colin Challen:** Science backgrounds, business backgrounds, academic backgrounds or a mixture?
***Mr Middleton:*** Absolutely, but I would like to see it predominantly business-led but with academic input that sits closely with the business community as distinct from pure academic.

**Q56 Colin Challen:** Would this not just be a back door to a different kind of political influence from the business community?
***Mr Middleton:*** Sorry?

**Q57 Colin Challen:** It may not be party political but the business community would exercise political influence, so would that not be a back door to the business community to have an undue share of influence in that Committee and maybe people might not see it as really independent?
***Mr Tetlow:*** I think we are talking about the type of people who should be on the board rather than their affiliation. We are not saying that there should be a member of the CBI appointed to the Committee.

**Q58 Colin Challen:** How should they be appointed, do you think? By public advertisement or Buggins' turn or because you know somebody?
***Mr Tetlow:*** I think it is the same process that you go through for any appointments to any of the various agencies. It would be advertised, because you have to be open about these things, and you would choose the best people who meet the job requirements that are developed for it, and those do not exist yet but that is what you are talking to us about. What we are saying is that there should be a strong representation of business people as distinct from political animals or academic animals or economists, which is important because some economists are business people as well so they may have two functions.
**Chairman:** If you will excuse me I have to go as I have a got another rather unexpected and urgent engagement but Joan Walley will take the chair. I am grateful to you. We have almost come to the end of your session anyway and I am very grateful to you all.

*In the absence of the Chairman, Joan Walley was called to the Chair*

**Joan Walley:** Mark?

**Q59 Mark Lazarowicz:** This is directed to the EEF. You have argued that the emphasis should be very much on medium-term targets. What is your view then on the proposal for a 2020 target in the Climate Change Bill and also what are your views on the five-year rolling carbon budgets suggested as well?
***Mr Salomone:*** I think in general we very much welcome the five-year budgets for a lot of reasons. Three consecutive budgets starts to give you that medium-term horizon of 10 to 15 years which are the kinds of timescales that a lot of businesses operate on in terms of investment. You are also going to need that kind of timescale from a Government perspective when you are trying to influence behaviour, whether it is business or domestic, so I

think that goes quite a long way towards providing that medium-term horizon and it is quite welcome from the point of view of business.

**Q60 Mark Lazarowicz:** What is your view of the suggestion of a three-year or even one-year budget or target?
***Mr Salomone:*** If you did go for a one-year budget, the budgets would be a hostage to fortune. You would be very likely to regularly miss those budgets because we all know that gas prices can spike, you can have different fluctuations in weather year-on-year, whereas over a five-year period those kinds of things are going to be more stable and I think if you did have the yearly budgets and those unforeseen fluctuations, whether it is in growth, weather or gas prices, you would probably end up borrowing from the next one quite heavily, and I do not think that is the idea of carbon budgeting.

**Q61 Mark Lazarowicz:** What is the Business Council's view of that area?
***Mr Middleton:*** I think we would largely agree with what has just been said, sir. I think we are also worried about the issue of responsibility of reporting within the framework. As I mentioned earlier on, where does responsibility lie, and although we welcome five-year periods as being periods which stimulate investment and forward business planning, from a political dimension if the target has been set who, five years down the track, is responsible if that target is not achieved? We like the idea of this all going into statute but where does the responsibility lie in terms of accountability within Parliament as to who set the game in place in the first instance?

**Q62 Mark Lazarowicz:** Can I ask one other question to the Business Council as well. You have a proposal in your paper for a carbon currency with the Committee on Climate Change setting interest rates. It is probably quite a complex proposal so unless you want to comment briefly on it today, it would be helpful, if you have any information or a paper giving more details about the proposals, if you could send that to the Committee.
***Mr Middleton:*** If I may say in response to that, Chairman, we like the idea but in all honesty we need to do a lot more work on it ourselves. We are very taken with the idea but please do not question us in detail about it yet. I would just put my hand up and say we have not done that. We would welcome the opportunity of doing that and we would welcome the opportunity of working with government to explore that idea further. If you can do it with monetary policy we think there is a similarity in terms of carbon value.

**Q63 Mark Lazarowicz:** When you have looked at it in more detail and you think it works it would helpful to let us know!
***Mr Middleton:*** We would certainly like to come back to you.
**Mark Lazarowicz:** Thank you.

**Q64 Joan Walley:** On that point I think we will watch this space with interest. Can I thank each of you. It has been a very informative session and thank you for the work you do and for taking the time and coming along and sharing it with us today.
***Mr Middleton:*** Thank you very much for the opportunity, Chairman.
***Mr Salomone:*** Thank you.

---

## Memorandum submitted by the Aviation Environment Federation

The Aviation Environment Federation welcomes the opportunity to respond the Committee's enquiry "Beyond Stern: forecasting, cost-effectiveness, and climate change". As an NGO working exclusively on controlling and reducing the environmental impacts of aviation, we will confine our comments to two of the questions raised by the committee which are relevant to the sector.

### Summary

There is no justification whatsoever for excluding emissions from international aviation (or shipping) for the purposes of setting the UK's domestic carbon reduction targets. They should be brought inside the Climate Change Bill's overall emissions totals without delay.

Stern's estimate of the social cost of carbon should prompt a reconsideration of the aviation industry's environmental costs and bring a renewed sense of urgency to the commitment to internalise them.

We would be very concerned, however, if any estimated figure were used in a simplistic cost-benefit analysis to justify investment in long-term, carbon-intensive infrastructure—especially if the carbon produced were to be outside the UK framework for emissions reduction.

Question: *Should future domestic targets and forecasts include international aviation and shipping?*

Yes.

Aviation is the fastest-growing source of greenhouse gas emissions in the UK. Without action to tackle emissions from the sector, independent research (by, amongst others, the Tyndall Centre for Climate

Change Research[4]) has demonstrated that aviation is on course to use up the UK's entire carbon budget. The Committee reached a similar conclusion in its Ninth Report of Session 2002–03 (page 9); below we update that table to include Tyndall's projections to 2050.

| | *Forecast Growth in Aviation Emissions* | | |
|---|---|---|---|
| | *Total UK emissions (excluding aviation) Million tonnes $CO_2$* | *Aviation emissions Million Tonnes $CO_2$* | *Aviation emissions plus radiative forcing Million Tonnes $CO_2$* |
| 2000–2001 | 572 | 30 | 75 |
| 2030 | | 70–80 | 175–200 |
| 2050 60% target | 229 | 110[A] | 275[B] |

*Source:* Environmental Audit Committee, except [A] Tyndall Centre for Climate Change and [B] derived from Tyndall Centre for Climate Change using a multiplier of 2.5.

The Government's preferred policy for tackling aviation $CO_2$ emissions is to include them within the European Emissions Trading Scheme. This would allow the aviation industry to grow, on condition that it purchase carbon permits from other sectors. Emissions reductions would then be made wherever across the economy they cost the least, and total emissions would, so the theory goes, be capped in line with climate change targets.

Given this policy framework of granting flexibility to individual sectors within a reducing overall total, there can be no justification for exempting any individual sector from our domestic climate change targets.

Nonetheless, the recent Draft Climate Change Bill does exclude emissions from international aviation from the 2020 and 2050 targets. Although it makes provision for including them at a later stage, this would only happen:

> *if a new multilateral agreement requires the UK to act differently . . . for example . . . if emissions from international aviation and/or shipping are included in emissions reductions targets in the future.*
>
> (*Source:* Draft Climate Change Bill, March 2007, Introduction para 5.23 and note 29)

In AEF's opinion reaching an agreement is a distant prospect: both methodological and (we understand) highly sensitive political issues remain to be resolved, and while Europe continues to press for the resumption of talks at the UNFCCC's Subsidiary Body for Scientific and Technical Advice (SBSTA), certain states (notably Saudi Arabia), remain uncooperative. Without consensus, international progress in this forum is effectively blocked. See the Annex to this submission for a list of options presented to SBSTA, which illustrates the complexity of the issue.

The longer aviation is excluded from the targets, the more they will have to be adjusted when it is eventually introduced. We are doubly alarmed, then, that Section 15 of the proposed Bill makes provision for flexibility as to the baseline year for aviation emissions, the periods to be taken into account and the manner of their inclusion (Section 15, Clauses (4) and (5)). Since the crucial factor in tackling climate change is not just the arrival at a 60% reduction but the stock of GHGs in the atmosphere, any such partial inclusion of aviation emissions would undermine the integrity of the Climate Change Bill's trajectory.

Although there is little prospect of international consensus on allocation for *the purposes of binding targets* in the short term, there are accepted IPCC guidelines to states on how to report emissions from international bunker fuels. The UK is required to submit this information as a memo item to UNFCCC along with our annual GHG inventory.

Clearly, for the purposes of a domestic target, the UK does not need to seek international consensus on allocation, and the Government has for a number of years counted and forecasted emissions from international aviation.[5] There is no reason why the Netcen figures could not be used with immediate effect. If this suggestion were adopted, the recalculation of targets and realignment of emissions pathways necessary when international consensus is finally reached is likely to be an order of magnitude smaller than if aviation were then included for the first time.

AEF therefore believes there is an unanswerable case for including emissions from international aviation in our domestic targets and forecasts, using the bunker fuel methodology employed by Netcen and ratified by UNFCCC. Our NGO colleagues with an interest in maritime environmental issues report that emissions from international shipping could and should be included on the same basis and for similar reasons.

[4] www.foe.co.uk/resource/reports/aviation_tyndall_research.pdf

[5] Historical emissions back to 1990 are reported by Netcen for the UK GHG inventory on the basis of fuel sold in the UK. Projections made by the Department for Transport of future emissions are modelled on a route-by-route basis for all flights departing the UK. The former method is a sufficiently good approximation to the latter that DfT can and do treat the two sets of data as a seamless whole.
Since 2006, IPCC guidelines have offered states the possibility of estimating emissions on a route-by-route basis, the so-called Tier 3 methodology. It is as yet unclear whether Defra have instructed Netcen to use this method.

*We will be seeking amendments to the Bill during the consultation and legislative phases to incorporate emissions from international aviation and shipping in the 2020 and 2050 targets with immediate effect. We ask that the Committee make this recommendation to Government in the strongest possible terms.*

Note: the Bill provides circumstances that would trigger the revision of the proposed 2020 and 2050 targets, and separate circumstances for the revision of the proposed five-yearly carbon "budgets" which would measure progress towards those targets. These are rather confusing as regards aviation. Note 30 to para 5.24 of the Introduction to the Bill suggests that the inclusion of aviation within the EU ETS would trigger revision of the budgets. We fail to understand why this should be the case if it did not also trigger revision of the targets, since within the framework of the Bill, nothing would have changed. We ask that the committee seek clarification of this point with the Secretary of State for Environment, Food and Rural Affairs, whose public comments have also left the matter somewhat opaque.

Question: *Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

This question is relevant to aviation in two ways. Firstly, the Government has a long-standing commitment to ensure that aviation pays its full external costs. The recent increase in Air Passenger Duty was a small step in this direction, but with Stern's recognition that the Social Cost of Carbon (SCC) may be much greater than previous estimates, the goal of full internalisation is more distant than ever.

In a previous submission we have argued that the cost of carbon suggested by Stern implies climate change externalities for UK aviation of £6–£12 billion annually[6] while APD is expected to bring in a little over £2 billion.

The eventual inclusion of aviation in the European Emissions Trading Scheme will do little to make up the shortfall, as the following calculations show. Although we accept that trading is designed to reduce the cost of mitigation rather than to impose full damage costs, the majority of aviation's impact on the global environment will remain unaccounted for as long as the bulk of permits are still allocated free of charge, no account is taken of the non-$CO_2$ impacts of aviation, and the overall cap is not set in line with emissions reduction targets. In these circumstances the precautionary principle demands that alternative economic instruments should be used to internalise costs and thereby curb the growth in emissions.

### Emissions Trading and Aviation—The Cost to the Industry

Stern's carbon price of £280/tC in today's prices translates to \$112/t$CO_2$. If the European Commission's recent proposal is implemented in its current form, the aviation industry estimates that it could be required to buy up to 40% of its permits in the scheme's first year (due mainly to growth from the suggested 2004–06 cap, as well as the small percentage that would be auctioned). Furthermore, the scheme is likely to cover $CO_2$ only, with no account taken of aviation's other climatic impacts, which we will take as multiplying the damage by 2.5 times, in line with Treasury estimates and previous EAC reports.

So, using the European Commission's illustrative values for $CO_2$ of \$6 and \$30[7] we can calculate that for every tonne of $CO_2$ emitted by airlines:

Damage caused: \$112 x 2.5 = \$80

Cost under ETS: \$6 x 0.4 = \$2.40 or \$30 x 0.4 = \$12

In other words, even at the higher market price envisaged for carbon, and assuming the scheme delivered is as robust as that proposed by the Commission, emissions trading for aviation would internalise just 4% of the climate change costs of the industry. At the lower end of the estimates, the figure is less than 1%.

NB at the time of writing, a tonne of $CO_2$ is trading at just over \$1, having rallied from a recent low of 80 cents;

this analysis assumes no costs are passed on to consumers;

we have uncritically accepted Stern's estimate of the social cost of carbon for the purposes of illustration. In the section below we argue that the value of £280/tC should, in fact, be considered a working minimum.

*AEF therefore recommends that the Committee invite the Government to bring forward its plans to internalise fully the environmental costs of the Air Transport Sector in the light of Stern's increased estimate for the Social Cost of Carbon.*

---

[6] See AEF's submission to the committee's inquiry *Pre-Budget Report 2006,* p 3.

[7] http://ec.europa.eu/environment/climat/pdf/aviation_ets_impact_sec2006-1684.pdf page 34 ff.

Our second reason to engage with the question of the cost of carbon is that the Department for Transport has recently proposed a new "Emissions Cost Assessment" for major airport infrastructure, explicitly referring to the conclusions of both the Eddington and Stern reports.[8]

The shape of the Emissions Cost Assessment (ECA) is as yet undetermined, since DfT plans to consult on it this year. Nonetheless, we feel it appropriate to offer some preliminary comments on the basis the Progress Report, which states that the ECA would be used "to further enhance our consideration of climate change costs alongside economic benefits when appraising new airport capacity" (para 2.35).

We would strongly oppose an ECA that simply counted the economic benefits and the carbon costs of a new runway and gave the green light to development if the former outweighed the latter. This is because both sides of the equation are subject to considerable uncertainty (and therefore manipulation). The Government's estimates of the economic benefits of aviation have to date relied heavily on research co-sponsored with the aviation industry, which has been shown to rely on a number of uncritical assumptions.[9] The uncertainties around the value for the SCC are even greater.

Stern's cost is that associated with stabilising atmospheric $CO_2$ at around 550 ppm equivalent, on the basis of economic optimality—this is where the cost of abatement matches the damage cost.[10] Nonetheless, Stern himself acknowledges "that 550ppm $CO_2$e would be a dangerous place to be, with substantial risks of very unpleasant outcomes."[11]

More formally, according to one suite of models used in Stern's report, stabilisation at 550 ppm yields a 69% chance of exceeding a mean global surface temperature rise of 3°C.[12] If, as many scientists are warning[13] a temperature rise of 3°C would take us past a climatic tipping point where positive feedback mechanisms lead to a major acceleration of the warming process, then a linear model is simply inadequate to estimate the cost of the damage for this sort of warming. Put another way, there is no meaningful upper bound to the SCC.

So while it offers a plausible benchmark for internalising the industry's environmental costs, we do not think even Stern's estimate of the SCC is sufficiently robust to form the basis for calculations that could justify major new carbon-intensive development (let alone current Government estimates).[14] This is particularly the case when the carbon produced will not even be counted in the UK's overall reduction targets. Spurious economic objectivity is no substitute for the demonstration that a proposed development is consistent with a pathway to a low-carbon economy.

This criterion can never be fulfilled while the Government continues ignore UK aviation's fast-rising $CO_2$ emissions—its current policy amounts to banking them in an off-shore account.

**Annex**

## OPTIONS FOR ALLOCATION OF EMISSIONS FROM INTERNATIONAL AVIATION

In 1996, SBSTA was presented with the following allocation options for emissions from international aviation and marine bunker fuels:

Option 1—No allocation.

Option 2—Allocation of global bunker sales and associated emissions to parties in proportion to their national emissions.

Option 3—Allocation according to the country where the bunker fuel is sold.

Option 4—Allocation according to the nationality of the transporting company, or to the country where an aircraft or ship is registered, or to the country of the operator.

Option 5—Allocation according to the country of departure or destination of an aircraft or vessel; alternatively, emissions related to the journey of an aircraft or vessel shared by the country of departure and the country of arrival.

Option 6—Allocation according to the country of departure or destination of passengers or cargo; alternatively, emissions related to the journey of passengers or cargo shared by the country of departure and the country of arrival.

---

[8] Air Transport White Paper Progress Report 2006: www.dft.gov.uk/about/strategy/whitepapers/air/aviationprogressreportsection/aviationprogressreport para 2.34.

[9] See for instance *The Contribution of Aviation to the Economy—Assessment of Arguments Put Forward,* CE Delft, October 2005. http://norunway.com/BWstudy.pdf

[10] See eg fig 13.3, part iii, p 291.

[11] 13.5, part iii, page 292.

[12] Box 8.1, part iii, page 195.

[13] "Serious risk of large scale, irreversible system disruption, such as reversal of the land carbon sink and possible destabilisation of the Antarctic ice sheets is more likely above 3°C" *Avoiding Dangerous Climate Change—Executive Summary,* page 2. www.defra.gov.uk/environment/climatechange/research/dangerous-cc/pdf/avoid-dangercc-execsumm.pdf

[14] Stern makes a similar point in more general terms: "while the credibility of policy is still being established and the international framework [for carbon pricing] is taking shape, it is critical that governments consider how to avoid the risks of locking into a high-carbon infrastructure." *Full Executive Summary,* page xix.

Option 7—Allocation according to the country of origin of passengers or owner of cargo.

Option 8—Allocation to a party of all emissions generated in its national space.

It noted that further work was required on adequate and consistent inventories, and in 1997, decided that the basis for further work on this issue should be confined to Options 1, 3, 4, 5, and 6.

*March 2007*

---

*Witnesses:* **Mr Peter Lockley,** Policy Officer, and **Mr Jeff Gazzard,** Board Member, Aviation Environment Federation, gave evidence.

**Q65 Joan Walley:** A very warm welcome to the Aviation Environment Federation. I think you have sat through some of the previous session so thank you very much indeed for coming along to this second session. By way of introduction would you like to tell us a few words about your Federation?

***Mr Gazzard:*** I do not think we have covered this properly at any of the sessions at which we have appeared before; we have always been straight into questioning. We are a very small non-governmental organisation. There are only three of us with a couple of volunteers so you have got two-thirds of us here today. I am Jeff Gazzard and I am the board member of the AEF and Peter has joined us and been with us now for about 19 months and works on policy development. Our membership is parish councils, individuals, community groups around airports, so we work at grass-roots level on planning and impact assessment issues and help with campaigning and media and stuff like that. We also work up the hierarchy of government institutional advocacy and representation. We are policy advisers to an all-party parliamentary group here and we launched, for instance, just before Christmas the Environmental Change Institute, Oxford's report that got a lot of media coverage on transport sustainability issues. We have representational status at the two big bodies that govern civil aviation—the European Civil Aviation Conference which, as it sounds, is a very grand standing conference of civil aviation authorities, and equally our Director, Tim Johnson, who is not here today, has the same observer status at ICAO and CAPE, so we deal with grass-roots issues and communities under threat, policy development and political policy-making. I have just been made an adviser to the World Health Organisation on transport and environmental health issues and Tim Johnson, our Director, is a recognised consultant to the European Commission and we have been working quite closely with those on the development of a commentary on what is in the Emissions Trading Scheme as far as aviation is concerned. That is a brief snapshot of what we do.

**Q66 Joan Walley:** Thank you for that snapshot. Can I kick off then by asking you for your thoughts on the Stern Review and its implications for aviation and what changes, if any, have you detected in respect of government policy towards aviation post-Stern?

***Mr Gazzard:*** Stern was a seminal piece of work and you would expect us to say that. It was not vitally new in many respects. It brought together a lot of econometric analysis about the costs of climate change and the range of implications. We have spoken, for instance, over the last three or four years to global reinsurance companies like Swiss Re and Munich Re who have been saying several of the same things about the potential financial implications and the cost of climate change. It is difficult to heap hyperbole on it. It is very good, it is very sound. There has been some criticism from the Sir Nigel Lawson end of the spectrum and one or two scientists have also queried it, but there are some responses and there is a lot of discussion still going on about Stern's look at future discount rates and that kind of thing which is beyond our competence. We took it at face value. We think its value is almost limitless because—and this might sound like a bit of Marxist rhetoric—it is an analysis of capitalism and how capitalism and conventional economies and chancellors should deal with the problem of climate change. Although we might be categorised as a green group, our view of the world is we want to see benign capitalism because there is nothing else on the table that would work, and I think Stern is exactly what that is. That said, in terms of aviation it is useful for us in that it puts a social cost on carbon which is causing the Government to think again about its own analysis of this. We have had a promise from the Department for Transport that they are going to look again at the cost of carbon, particularly in respect of some kind of analysis of greenhouse gas emissions assessment for aviation. I think Stern spurred them on to do that but all of that work and analysis is still going on and the kind of range of costs of carbon that were kicking around pre-Stern in our sector were liked by the aviation industry because of course it is sixpence on the price of a ticket and no real impact, but I think Stern, as you heard from the previous witnesses, has brought everybody up short in terms of the potential range of costs. That is its value to us; it is a document about the economics of how business should be dealing with climate change. You cannot just sit there and say, "We don't like the price." Those are the costs, the time-frame is established, we have to reduce from 40–46 billion tonnes of $CO_2$ equivalent today to Stern's figure of five billion tonnes of $CO_2$. It does not specify a year but presumably that is 2030, 2040 or 2050, and one of the things I would like to say personally and professionally to the Committee is if it is possible to forecast forwards, it is also possible to backcast to look at that five billion tonnes of worldwide anthropogenic $CO_2$ and say, okay, what will that comprise, how much of that will be the engineering sector, how much of that will be transport, including aviation? I think that is one of the really valuable things for me in Stern, it puts a

figure on what global anthropogenic $CO_2$ should be—five billion tonnes—so work backwards, allocate some to aviation. Just to put that into context, and then I will get off my hobbyhorse here, we have just had a very authoratative summary of databases that are run by regulators and institutions—and I will let you have it but just to spend a minute on this if I may because this is a crucial thing for us about the future of aviation—these are databases that are run by the FAA, the Department of Transport's Volpe Centre in Cambridge, Massachusetts, EuroControl and our own QinetiQ here and they forecast global $CO_2$ emissions from aviation through to 2025. There are four databases that they use and the FAA American one is the lowest, but if I can tell you that global $CO_2$ from civil aviation in 2025 is estimated to be somewhere between 1.2 to 1.4 billion tonnes and today it is currently about 600 million tonnes (and that is without any radiative forcing) so if you were to look at that just on $CO_2$ terms alone, that is an awful lot of $CO_2$ out of a five billion target that appears to be allocated just by forecasting to civil aviation. If you times it by two for radiative forcing, I do not consider it to be at all likely that nearly half of the world's future $CO_2$ emissions capacity is going to be caused by civil aviation.

**Q67 Joan Walley:** We will come on to a little bit of the detail of that in a moment but can I just ask you very quickly and very briefly your perception of the reaction of the aviation industry to Stern?
***Mr Gazzard:*** They did not like it simply because of the costs. The best estimate of the costs of carbon currently is what is in the proposals from the European Commission for ETS, and Peter can take you through that. It is a range of 0.6 of a cent to something like €9 as a maximum on a ticket price and the Commission says that will save 3.5 million tonnes of $CO_2$ through demand management and some supply side improvements, but that is just a nominal figure. It is less worse than it otherwise would be; it is not a real saving.
***Mr Lockley:*** That said, the Government's only response in terms of aviation policy so far has been emissions cost assessment, which Jeff touched on before. I think that is something that the aviation industry would be more in favour of because they have had historically some quite favourable estimates of the economic benefits of airport expansion and if they feel that they can set those against whatever the costs might be—and we have not yet had an indication that the Government accepts Stern's social cost of carbon—I think the aviation industry probably feel that through that mechanism they can still achieve the expansion that they are hoping for.

**Q68 Mark Lazarowicz :** The Government says, does it not, that its policy is to ensure that aviation pays its full external costs. How far is that the actual reality as you perceive it?
***Mr Gazzard:*** We have said to the Committee in previous evidence, and we will say to anybody who listens, that the complete range of external costs are about €54 at 2000 prices every time one passenger travels 1,000 kilometres and for freight about 271 per tonne kilometres, and that is from the report that included the external costs of all modes of transport—and we can let the Committee have that—and it is endorsed and publicised by the European Environment Agency. We had, I think probably three years ago, access to the Department for Transport's passenger allocation model and the Treasury's computer analysis of future GDP, and if you put, effectively in pound note terms, 3.6 pence per passenger kilometre onto ticket prices it is likely to halve the future rate of growth, so instead of having three to 4% growth annually we would have 1 to 2% growth annually. The neat synergy about that is 1 to 2% efficiency is what the industry tells us it can deliver from better air traffic management, better airframes and better engines. There is no point in arguing about that, I am quite happy to accept that. One to 2% per annum for the next 20 years is about as good as they are going to deliver in terms of fuel efficiency.

**Q69 Mark Lazarowicz :** And how has DfT reacted to that conclusion of yours?
***Mr Gazzard:*** We mention it to them every time we see them, every time we ring them up, almost on a weekly basis, and they just are not interested in putting those kinds of costs on ticket prices. They are only interested in discussing the element of externalities as it applies to climate change, that is the Defra figure, and as far as they are concerned it has no impact on growth, the current £70 per tonne range. They have done all this in the White Paper and it still comes out at 500 million passengers by the year 2030. They did an analysis, some of which they still have not published the background papers for so I am actually in the dark, Mr Lazarowicz, on exactly what their current thinking is. They published a review of the White Paper in December but we have not had any of the background papers on some of these economic assumptions yet.

**Q70 David Howarth:** I just come back to the points you were making about the social cost of carbon. Assuming that the Government does adopt—which we hope it does—the Stern figures as opposed to the present figure, what effect do you think that would have on things like airport expansion policies and ticket prices and demand and things you have been mentioning?
***Mr Lockley:*** We are two stages away from that because (i) we do not have the Government's acceptance of Stern's cost and (ii) we do not have any proposed mechanism for then imposing that cost on the aviation industry. We have seen a small rise in air passenger duty recently which took the tax take from aviation up to £2 billion but we calculate the externalities of climate change alone to be between £6 and £12 billion based on Stern's cost. The only other proposed mechanism is emissions trading and, as Jeff took you through earlier, that is only going to add a few euro cents on a ticket, so if those costs were imposed then all the forecasting models the DFT uses show that demand would be

reduced, but we do not have policies that would impose them and we do not have a recognition of the costs.

**Q71 David Howarth:** I am asking you to imagine a better world!
***Mr Gazzard:*** I was just going to say in a better world it would halve the demand. It is about the 10 billion figure that was the work that we did about three years ago. In the external cost report that I referred to most of those external costs are climate change at a shadow price for $CO_2$ plus the 2.7 times multiplier. The shadow price of carbon that INFRAS use, which is this external costs study to which I referred, was about €120 a tonne and the social cost of carbon Stern in euros is about €112 per tonne, so we are there or thereabouts. There is an element of noise and some other externalities in that figure of 3.6 pence but essentially demand is halved. In a UK context that means instead of having 500 million passengers by 2030, you would be around 315 or 317 million. Sorry to be so exact but that is what the model tells us, and that does away with the need for most new runway construction. There are some extensions, some terminal facilities, but we are not saying do away with civil aviation; what we are saying is get its growth in line with what its efficiency targets are and we think that is a fair and equitable solution. It is demand management but it is based on every single technical report that the Committee knows as much about as we do that say this is what has to happen if we are to deal with climate change. It is a no-brainer.

**Q72 David Howarth:** Just to go to an even more ideal world, you have some doubts about whether the Stern estimates are right, and perhaps you might explain that?
***Mr Lockley:*** Towards the top end it becomes very difficult to say what the price would be if climate change does turn out to be a snowball with run away effects. It is notable that the concentrations that Stern is talking about stabilising at translate, temperature wise, to about three degrees centigrade. Those are rises that the scientists are saying will trigger the run away effects, they will trigger the melting of the icecaps, the dieback of the forests and then you come into the secondary phase of climate change. How we can say what the costs of that would be is beyond me, so effectively there is no upper limit to the social cost of carbon.
***Mr Gazzard:*** The good thing about Stern is that it takes the emotion out of the debate. We were always accused of being emotional and here are some facts and figures. I am quite happy to argue the toss on pure economic terms.

**Q73 Mark Lazarowicz:** The Government says that it is awaiting an international agreement through ICAO on how to attribute international emissions to individual nations. I think you are somewhat sceptical as to the timescale for such an agreement. What is your current assessment of the state of play in terms of these negotiations? When might we actually get that? What do we need to change to make it possible?
***Mr Lockley:*** We are not allowed to talk about it at the UN body that would decide it.

**Q74 Mark Lazarowicz:** Why not?
***Mr Lockley:*** Because the Saudis block any vote that would even allow it to be brought to the table so, again, we are more than one step away from even discussing the matter.

**Q75 Mark Lazarowicz:** Why are the Saudis against it in particular?
***Mr Gazzard:*** They are oil producers and driven by the American lobby. Tim and I went to the summary for policymakers of the 1999 UN IPPC's report on aviation and the global atmosphere and it was just astonishing to sit there with Abu Dhabi down here and Zimbabwe up here and see the lobbying working in front of you. The UK Government, to its credit, does try and allocate emissions fairly. In its figures and its research in the White Paper it does accept half of a trip, and they are to be commended for that. The fact that 70% of the passengers on that trip are UK so the figure should probably be a bit higher is possibly us being slightly anally retentive but that is a good start. The way that emissions inventories are reported is going to change shortly anyway and I think it is tier three—and Peter will correct me if I am wrong on that—but the way that the Commission and the European Union are proposing to allocate emissions is actually even more favourable in that they are proposing to put a levy on both incoming and outgoing flights, so it is not quite the same as allocation but it is quite a good deal in terms of getting coverage of $CO_2$ if that is how the policy works out.
***Mr Lockley:*** The point there is that the Government would be unlikely to accept the allocation that would be decided by the Commission for the purpose of emissions trading because it would allocate more emissions to the UK on the basis of all arriving and all departing flights, so we should not buy the line that emissions trading, which is just around the corner in 2011, will trigger the inclusion of aviation emissions within the climate change targets. To go back to your original question as to what would we estimate for international agreement? A decade. It is crystal ball stuff, it is not even on the table.

**Q76 Mark Lazarowicz:** Is there any prospect of any meaningful international agreement being built from the bottom up, for example building on a EU-wide scheme and then developing a scheme which involved at least some other significant nations in the arrangements?
***Mr Lockley:*** The EU is leading the way and is experiencing resistance from the rest of the world, so the only significant region of the world that is taking this issue forward is the EU, but, as we saw, the allocation that will derive from the EU will not be acceptable to the UK Government and so we are not going to see an acceptable allocation methodology

coming from that. The other point to note is that we do already have one, albeit not for the purposes of binding targets, because we are required by the Kyoto Protocol to report emissions from international aviation and shipping.

**Q77 Mark Lazarowicz:** I was wondering about the possibility of it being an international agreement building up from the EU as a basis.

***Mr Gazzard:*** Two very quick points. The Environment Directorate and the Transport Directorate at the Commission are at one on this. They view ICAO as a bit of a waste of space, and speaking to officials from both those departments yesterday face-to-face, their view is, without giving the game away, they are expecting negotiations at ICAO on the European scheme to be extremely confrontational. In fact, that is a view that they might push for so that they can go it alone and not have the bother of dealing with ICAO, which perversely is only a bureaucracy. It is not as if it is the international tax department for civil aviation. It has assumed that by default and, to be quite honest, we would welcome what is called an exception or what in normal terms is called a flaming international row and to let ICAO do whatever it wants to do, which is virtually nothing anyway. We would want to see the Commission tell ICAO where to get off and to go it alone on its scheme and then work bilaterally with other countries through air service agreements over time to do this. I think the last three months' worth of reports from the UN IPPC about climate change must show developing countries that, whilst they have a right to develop, spending your first IMF loan on a fleet of Airbuses might not be the most sensible thing to do in the future. I know that sounds horribly patronising, but there is a lot of opposition to emissions trading from the countries who are going to suffer the worst of climate change in Montreal, and their permanent reps there have model aeroplanes hanging from the rooms of their offices and that is the business they are in; they are not in the business of climate change.

**Q78 Mr Caton:** Continuing on the same theme but looking at the UK's domestic emissions targets, what difference will the timing of when international aviation, and indeed shipping, emissions are finally included within the UK's target make to our carbon reduction efforts and what should the Government be doing to prepare for their inclusion?

***Mr Lockley:*** This is precisely why we are so concerned by the form of the Bill as we have it at the moment, because it recognises the fact that aviation emissions have been growing very fast and that if they were to be included from their 1990 levels at some point down the line you would have quite a shock to the targets and they would have to be adjusted in some way, so it makes provision to include them at whatsoever level and in whatsoever manner and with reference to whatsoever baseline the Secretary of State sees fit. So we would then have a dilution of the targets. If 60% is pointing to a given stabilisation target, for example, and aviation emissions are then added into it further down the line at a much higher level, it makes a nonsense of that stabilisation target.

***Mr Gazzard:*** It is the Stern Review: the sooner the better, and that must apply to civil aviation. There is this dichotomy where the Department for Transport has fairly taken on board the fact that there is a huge amount of tonnage (the UK total is probably about 36 or 38 million tonnes right now) and you cannot not allocate that, you cannot have it floating around somewhere, and this again is where the Commission's policy is going to be very useful. They have categorically said to us a couple of weeks ago that the overall supranational allocation of an amount of $CO_2$ for civil aviation under their scheme will count towards their two degree centigrade policy. It is not quite the same as an allocation and it is very detailed but they are not shying away from making civil aviation part of that whole. Obviously you are back to the argument of emissions trading; we can save here and give it to civil aviation. That is irrelevant for the purpose of attributing it in the first place in some shape or form and that is good and the Committee has remarked on this in the past, the idiocy almost between the Department for Transport saying, "Yes we know there is this chunk out there and we will include it on our forecasts," but, "No, we do not want to take it into account in any climate change policy." It is just daft.

**Q79 Mr Caton:** So you are concerned that as the Climate Change Bill moves from being a draft to a proper bill that the flexibility that does appear to be built in at the moment will be removed?

***Mr Lockley:*** We are calling on the Government simply to strike that out because we think the reasons that they have given for excluding aviation do not really stack up because there is a methodology that they could use, it is a methodology that they have used for estimating their emissions, and it is agreed by the Inter-Governmental Panel for Climate change, so there is a measure of international consensus and anyway it is a domestic target so why do we need international consensus?

**Q80 Joan Walley:** Just one last question, if I may, on the issue of radiative forcing and $CO_2$ emissions. We had British Airways before the Committee fairly recently and they referred us to a paper by Forster et al which really casts doubt on the practice of multiplying $CO_2$ emissions of aviation by a number such as 2.7 to reflect its overall contribution to global warming, and I just wondered if you have any views on that?

***Mr Gazzard:*** Oh yes. A table in the paper and a couple of comments that they made were very straight forward—Table 1 and the paragraph under it. The rest of the report was slightly overblown in terms of its language. What you have got to look at is the timetable that they are using. They are actually saying that over 100 years then what they call an emissions weighting factor, which is their synonym for RFI, would be smaller than 2.5. I am quite happy to accept that in 100 years' time there will be more

$CO_2$ than there are the shorter, instantaneous impacts of NOx and condensation trails and cirrus clouds, but that is in 100 years' time, so I am sorry to Forster *et al* and Keith Shine (?) and all the rest of them, but if they want to talk about what is happening civil aviation wise and its RFI factor in 100 years' time, "Too late," was the cry. They actually go on to say that if we are looking at now it should be higher than 2.5 so there is a table, it is an emissions weighting factor table, and a paragraph of explanation that I am happy to buy into but the rest of the report—and I do not want to be too critical about it because they are good guys—what they are saying is an RFI is a bit of an arbitrary thing, it is the best we have got at the moment, let us have an emissions weighting factor (which is their new word for it) but when you look at the timetable in 100 years' time I really could not care less if it is 1.9, 2.5, 2.1 recurring, or what have you; it is still double the $CO_2$. How bad do you want it to be?

***Mr Lockley:*** The reason that the ratio to $CO_2$ goes down is because the $CO_2$ is getting more damaging as the concentrations build up in the atmosphere. Each extra unit of $CO_2$ is forcing more warming so the other impact relative to the $CO_2$ is it will multiply up the $CO_2$'s damage by a smaller factor but the total damage is still going up.

***Mr Gazzard:*** I was not trying to be critical of the paper.

**Q81 Joan Walley:** We just wanted your views on it.

***Mr Gazzard:*** I was trying to be critical of what BA were trying to pretend it was saying because it is just not saying that. The other thing is there is research, as I am sure you know, into $CO_2$ on one end of the scale that we know a bit about right through to condensation trails and cirrus clouds which we do not. We know a lot about $CO_2$; we do not know as much as we should do about condensation trails and how they coalesce into cirrus clouds and indeed the effects of cirrus clouds from civil aviation, but there is a project going on right now which includes some of those scientists and we understand that instead of the short-term RFI being in the range of two to four it could be as high as four to 11, so that is going to report, it is a project quantifier, and it is done under the auspices of the German Aerospace Research Department and funded by the European Commission and it is likely to say that there is a huge problem with cirrus clouds. Whether they will still be there in 100 years' time or not I do not know. I do not want to be too dismissive about it. I understand what the science is saying but BA were trying to say there is not a problem with RFI and there damn well is.

**Q82 Mr Chaytor:** In terms of what the Forster research says about now, what is the multiplier?

***Mr Gazzard:*** They just say a much higher factor than 2.5 might be more appropriate.

**Q83 Mr Chaytor:** For now?

***Mr Gazzard:*** For now.

**Q84 Joan Walley:** Right, okay, it was a short session but it was important to us that we included aviation, so can I thank you very much indeed and we shall continue with our enquiries at a later stage. Thank you very much indeed.

***Mr Gazzard:*** I am sorry if we went on a bit.

**Q85 Joan Walley:** No, you were fine.

***Mr Gazzard:*** But it is our subject and we are very passionate about it.

## Tuesday 24 April 2007

Members present:

Mr Tim Yeo, in the Chair

Colin Challen
Mr David Chaytor
David Howarth
Mr Nick Hurd
Mark Lazarowicz
Dr Desmond Turner

*Witnesses:* **Mr Jonathon Brearley** Head, **Mr Robin Mortimer,** Team Leader on the Climate Change Bill and **Mr Tom Taylor,** Head of the Analytical Audit Team, Office of Climate Change, gave evidence.

**Q86 Chairman:** Good morning and welcome to the Committee. I wonder if you could introduce yourselves, because I know you are all relatively new to the job, and say a bit about how you got there and where you are at.

***Mr Brearley:*** First of all, I would just like to say that I am very grateful to the Committee for inviting me and my colleagues here today to talk about the work of the Office of Climate Change. As you all know, I am Jonathon Brearley, Director of the OCC; this is Tom Taylor who has been leading on our analytical audit; and this is Robin Mortimer who has led on the development of the draft Climate Change Bill. As you know the OCC is a relatively new organisation and therefore this is a great opportunity for us to set out where we are and what we have been doing to date. Like all parts of the Civil Service obviously we need to give private advice to ministers; but our aim is to be as open as possible and to share our analysis essentially as widely as possible. First of all, what the OCC is: the Office of Climate Change is a cross-departmental unit which reports to ministers and officials from six departments with the strongest interest in climate change, and reports to Treasury and Number 10. Those departments are: Defra, DTI, DCLG, DfT, DFID and the Foreign Office. As set out in my letter, we have three main functions. The first essentially is supporting and improving management arrangements for climate change policy and delivery across Government. Secondly, running time-limited policy-focussed projects: these are usually staffed by a mix of officials from different departments and over time we would like to get people from outside Government actually working on those projects as well and we do have one person doing so now; and essentially these projects are run in a manner very similar to other organisations, such as the Prime Minister's Strategy Unit and aim to put up choices to ministers to consider collectively. Thirdly, we do consolidate existing analysis and essentially identify where we think more work might be needed and that work is on going. In addition to all these functions we do have a smaller role which is working across Government acting as advocates on climate change and presenting to other departments about climate change issues and how that might affect them. What I would like to do is just run you through our work programme to date. First of all, we have been setting up unified management arrangements for climate change and energy within Government; we have been consolidating existing analysis, which I mentioned. That has already reported on science and there is a publication on the Defra website which sets out essentially our summary of the science but otherwise is ongoing. We have run policy focus projects on: the draft Climate Change Bill; an ongoing project on household emissions—how we address carbon emissions from households; decarbonising of heat supply—how would you carbonise the supply of heat; the future of EU Emissions Trading particularly Phase 3; and we have carried out a small project on aviation offsetting which fed into the offsetting guidance issued earlier this year. Overall our aim is to support Government to deliver on what I think is a very challenging and, as you all know, a very important issue. As I mentioned before, we very much welcome ongoing dialogue as we do so.

**Q87 Chairman:** Thank you very much. Could you just say how you worked with the Interdepartmental Analysts Group, and how you think you may work in the future with the proposed Committee on Climate Change which will be established?

***Mr Brearley:*** I think the Interdepartmental Analysts Group essentially is made up of analysts from across Government who work on emissions. They are spread across a number of different departments and indeed a number of different organisations, like the Carbon Trust and Energy Savings Trust et cetera. Their job essentially is to coordinate with each other and ensure that emissions projections are consistent following a set of guidelines issued by Defra. Our job essentially is to, first of all, consolidate all of that analysis and to check where we are in terms of the Government's progress; but, secondly, considering a coordination role. Essentially the IAG is a group of analysts who come together to discuss issues. There may be a case for the OCC to play a small role in helping those analysts coordinate with each other, ensuring that where analysis of one part of Government changes that is reflected in similar analysis in another parts of Government. Our relationship with the Committee on Climate Change I think is still an ongoing question. Clearly the Committee on Climate Change will need access to a huge amount of data, and a huge amount of analysis. What we do not want to have necessarily is duplication between what Government does, what the OCC does and what the Climate Change Committee does. At the moment we are thinking essentially about which models of Climate Change Committee might allow us to do both.

***Mr Mortimer:*** We are working very closely with the IAG on that and the Committee. We are looking at a number of alternatives. One really important issue is not to duplicate existing Government analysis; and also to recognise that quite a lot of the analysis which will be needed by the Committee will have to be done by Government in any case; so the Department for Transport is always going to want to have a transport model which would be relevant to the Committee. We are looking at a number of different models ranging from one where the Government effectively acts as an intelligent customer for the Committee's advice and another where more is outsourced to the Committee and have not arrived at a conclusion on exactly the shape of this model as yet.

**Q88 Mr Chayter:** From the point of view of the world outside, businesses and local authorities, does not the establishment of a new body actually confuse or fragment the issue further? Can I ask, are you now responsible for all Defra's work on climate change?
***Mr Brearley:*** Absolutely not.

**Q89 Mr Chayter:** There are some responsibilities still fragmented within the Department, quite apart from the division of responsibilities between departments? The thrust of my question is: do you see this as a major problem, the creation of a new body; is it not going to confuse the world outside; and what are you doing to try and provide a coordinative approach across Government departments?
***Mr Brearley:*** First of all, just to be clear the OCC is not part of Defra but actually stands between departments. We do not lead on policies.

**Q90 Mr Chayter:** You are not formally part of Defra?
***Mr Brearley:*** For pay and rations we are.

**Q91 Mr Chayter:** You are located in the same building.
***Mr Brearley:*** We are located in the same building but are governed by six departments and funded by six departments. Our business is to support those departments to work together. We do not run policy as, for example, Defra does in parts of the Climate Change Policy, as does the DTI. I think what the OCC offers is a much more coordinated approach by Government. If you think about what we have done on the Government's arrangements, we have created a single energy environment group which is going to be supported by two cross-departmental groups to allow that to happen. I think essentially the work of the OCC should lead to a rationalisation and a simplification of what is there, rather than a duplication.

**Q92 Mr Hurd:** Talking about the 2010 target, the 20% target, two questions arise from that. As I understand it in 2005 emissions were approximately 6.4% down on 1990 levels, which is just over a quarter of the way to the target. What do you think are the key lessons that we should learn from the difficulties this country has had in achieving that 2010 target? Secondly, it seems to have taken Government a very long time to realise they were off-track in terms of meeting that; in fact they were making quite optimistic announcements about it back in July. What lessons should we extract in terms of the efficiency of the Government forecasting machine?
***Mr Brearley:*** I think looking at the NAO analysis they were very complimentary about a lot of the analysis the Government carries out. I think we need to recognise that our analysis is scrutinised by the United Nations and scrutinised by an external panel of experts. Given that, projecting your emissions has a number of uncertainties which are extremely difficult to manage. For example, the prices of fuel et cetera all have quite significant impacts on what we do. In terms of the 2010 target I think Government recognises already it is going to be very, very difficult to meet that target. I think we need to focus much more on the long-term and how we get to 2020. Tom has been doing some work on the analysis and perhaps could comment on that in more detail.
***Mr Taylor:*** I was surprised at quite how complimentary the NAO report was on the analysis, not because I had any preconceived ideas about the analysis here but perhaps because of my background working on other areas, like benefit fraud and benefit process where you do not typically encounter such favourable NAO reports. I think it is quite clear that the analysis has improved from the original programme work that was done in 2000. The NAO acknowledged that is more consistent; it is more comprehensive; and it is much more robust; and there are clear signs that there is a more cautious approach to the estimates that have been taken both in the projections and the policy appraisals.

**Q93 Mr Hurd:** What about key lessons to be learned in terms of meeting these targets?
***Mr Brearley:*** I think one thing we do need to do is strengthen the accountability we have around our targets, and that is exactly what I think the Climate Change Bill aims to do, both in terms of embedding our longer terms targets (and essentially that is the game we are in—it is delivering against our longer-term targets) but also in setting a pathway to get there. Essentially Climate Change Committee is something I think will fully strengthen that.
***Mr Mortimer:*** I think that is right. Part of the answer is the Climate Change Bill, for two reasons: one because I think it will create a new policy framework within which trade-offs will have to be made. I think those will become more explicit, with the Committee producing very explicit advice on both what the trajectory should be but also on what the spread of effort across different sectors of the economy should be, and between domestic effort and overseas effort. I think all of that will become much more transparent and I think that will change the context in which Government makes policy towards meeting the targets. The second point would be, as Jonathon said, the accountability framework. You are right that, in a sense, we are four years away from 2010 at which point it becomes more obvious that 2010 is more challenging. I think by setting out a 15-year

framework, which the Climate Change Group proposes, there will be an annual process of review looking 15 years ahead, and therefore the level of scrutiny on how far the UK is on-track or off-track with its budget will be that much greater. I think the Bill offers quite a lot towards the question you are asking.

**Q94 Mr Hurd:** I think the Committee would like some reassurance that a system of projection in the 2003 Energy White Paper which was telling us we were on track to meet the 2010 target (when in fact at best we are likely to achieve about half of it in terms of domestic reductions) has been improved to such a significant extent we can rely on it in the future?
***Mr Brearley:*** Taking your first point on domestic reductions, I think the way we define reductions in our emissions in the future has to include what happens within EU emissions trading in the future and perhaps in global trading if we get there. Therefore, in terms of when we assess where we are, I think we do need to take into account essentially what is part of those systems. For example, EUETs covers 50% of our economy. I think that over time we have to learn lessons about how we manage our analysis better; and essentially how we can begin to improve on the things we are doing by looking back on our projections and essentially comparing those against what was forecast in the first place. As Tom has said, the NAO has been very complimentary about our work and we should not under-estimate the difficulties in doing so.

**Q95 Colin Challen:** The Climate Change Bill sets down a target of 26–32% cuts by 2020. To what extent are you focusing on that new range of potential cuts? What policies do you think will be required to meet them, and how will that set of proposals be informed by our previous targets?
***Mr Brearley:*** I think that the Energy White Paper will come forward with a series of proposals which will take us to that range you mentioned for 2020. It is probably not for me to pre-empt that. Clearly there is an awful lot for us to do to get there, but that is part of the Government's process.

**Q96 Dr Turner:** You say you anticipate that the Energy White Paper will save your office the necessity to work out anything else. Are you confident in that, because the Energy White Paper will basically address the question of electricity generation; that is only one part of the $CO_2$ imaging economy. Does it not need something to deal with the rest?
***Mr Brearley:*** Yes, I think we do need to deal with the rest of the economy and it is probably not for me to pre-empt the Energy White Paper's projections either. There is plenty for us to do to get to 2020, but also there is a big question about how we get beyond 2020. If you think about the investment cycles for most industries, including transport and heat generation which I mentioned before, there are very long investment cycles to get us to a place where we can begin to reduce emissions. Therefore, there is lots of work.

**Q97 Dr Turner:** If someone else is going to do all the work finding the policies that may or may not achieve results, what are you going to do?
***Mr Brearley:*** My point is that there is an awful lot to do to get us to not only our 2020 but our 2050 goals. The OCC will contribute to both of those. Part of our work is feeding into the Energy White Paper.

**Q98 Mr Chayter:** What do you think are the most urgent priorities that Government has to take on board between now and 2020? Can we talk about the specifics? What are the areas of emissions reductions that we have not yet done enough about that you believe from your point of view have to be priorities and are achievable between now and 2020?
***Mr Brearley:*** I think as we all know there is more to do in electricity generation and work is ongoing. I think the OCC is beginning to look at the supply of heat and supply of gas and what can be done to decarbonise those. To be honest, it is too early for us to say how much is possible by 2020 simply because that is a very early piece of work but clearly there is potential there. The transport sector, which is the other big part of the UK economy, I think is very difficult and very challenging and it is going to take a long time to change round. In terms of the OCC work I would argue there is potentially more we can do with heat. As I say, electricity generation is where a lot is happening and where we should be focussing a lot of our effort.

**Q99 Mr Chayter:** Are you just writing off the transport sector?
***Mr Brearley:*** Absolutely not.

**Q100 Mr Chayter:** The motorist lobby is too strong?
***Mr Brearley:*** I think we already have the renewable transport fuel obligation, for example, and we have other policies for transport. I do think there are quite strong technical issues within that sector.

**Q101 Colin Challen:** The outturn to the period of 2010 is, what, about 18%, do you think, in terms of cuts, against the 20% target; or do you think you will actually reach the 20% target?
***Mr Brearley:*** I think the outturn so far is 16.2% is my understanding.

**Q102 Colin Challen:** Does that high probability in failing to meet that target influence the fact that, in terms of the legislation that is being proposed, we can meet a target by only getting up to 26%? It is not terribly ambitious, is it? If we had met our 2020 target, perhaps we still will, we could then perhaps do another 6% in 10 years. Is it your view that that is sufficiently ambitious?
***Mr Brearley:*** I think you need to balance up a number of things in climate change policy-making in general but particularly how you deliver against climate change versus economic growth and also poverty. What we need is a clear path to our 2050

goals. I think the interim roles will be set out in the Energy Review and it would seem entirely sensible to get us there. In terms of the 2010 target, we are going to ask the Committee on Climate Change to recommend a pathway to 2020 which will include helping us understand whether or not the 2010 target is achievable.

***Mr Mortimer:*** I think it is ambitious actually the 26–32% range. I think you need a range and therefore the trajectory could be at the higher end of that or the lower end of that but the legal requirement is 26%. The Energy White Paper, and measures which included transport as well as the electricity sector, takes us at the upper end of optimism to the current 25.2%, and actually bridging that gap is not insignificant. I think that it is ambitious. I think it is also important to say that it is part of the trajectory to 2050 so, in a sense, as long as the mitigation curve passes through that range on the way to the 60% target by 2050 then that delivers the outcome which the Bill is about. For both those reasons I would defend the 2020 target for being really ambitious.

**Q103 Colin Challen:** Who do you talk to when actually deciding what is ambitious or not? We have heard that Ken Livingstone, for example, said the 2030 target was under the 60%. Is that wildly over-optimistic? Have you discussed with his office how they think they can achieve that kind of target?

***Mr Mortimer:*** I guess the starting point in terms of deciding the level of ambition would be to look internationally. We have been very conscious in the work on the Climate Change Bill to be particularly mindful of the European context. As you know, the European Council has set a 20% target and 30% on a conditional basis, which is the greenhouse gas target. I think the range in the Climate Change Bill which is for $CO_2$ only is consistent with the upper limit of that, assuming burden-sharing on an historical basis. Even if the EU goes for its ambitious target of 30%, the UK Climate Bill range is already within that. On that, that would be one measure of recognition that the UK is at the front of the pack, if you like, within Europe. I think it is slightly difficult to compare sub-national actions in the way you describe. Obviously the Department has contacts with the Mayor's office but I do not think it is a direct comparison, because we have to look across the economy. There are different abatement opportunities in different parts of the economy. I am not sure the analogy quite works in the same way at the sub-national level. I think the ambition should be related more to the international context rather than the sub-national.

**Q104 Colin Challen:** Looking at the 2050 target of 60%, the Bill contains provisions to update the target "if there have been significant developments in scientific knowledge about climate change". We know that the 60% figure arrives out of an RCD(?) report from 2000. When can we expect any scientific developments to take place, as if there have not been any in the last seven years? There have been two significant reports from the IPCC, we have the Stern Review, we have had the Exeter Conference Report(?), all of these point to a higher target being necessary. Could you say a bit more about whether we should be going for a higher target and, if we should, how will that come about? Is it going to have to be a process of years trying to change something in the Bill, because that does seem to suggest it can only be changed really rather exceptionally.

***Mr Mortimer:*** The first thing to say is I do not think the process of years point is right because the Bill contains specific provision to allow the target to be amended through secondary legislation in the light of significant development internationally or in climate science. That is the first point, that it does contain that scope for amendment. I think the second point is really to go back to what the purpose of the Bill is. Obviously part of it is about providing international leadership, and the Bill does represent the first of its kind. It is also extremely ambitious in relative terms compared with many of our international partners. The question is whether the UK should be putting an even more ambitious offer on the table at the start or, in a sense, waiting to develop that in the context of multilateral talks. I think the Government's position has been that we have got this ambitious target of 60%. There has been a consensus around that across large sections of society, including the business groups. Things have moved on a bit so that consensus is not, as you say, as firm as it was in 2000–01. Nevertheless, we are going into the international discussions with a very, very ambitious offer. I think the Government have always made it clear that if and when it is required to take on a more ambitious target as part of a multilateral context then it would be prepared to do so.

**Q105 Colin Challen:** Our target is no different from the European Union's, how is that showing international leadership? We are just following the crowd. We are not actually distinguishing ourselves in any way. One could say that Norway in its recent announcement, although there will be a lot of off-setting involved in that, seeking to be carbon-neutral by 2050 is being rather more adventurous?

***Mr Mortimer:*** I think you have to take the Bill as a package. It is not just about targets. One of the unique things about the Bill is that it is not just about setting the long-term goal; it is also about creating an underpinning framework to ensure we manage our way towards it in a sensible way. I think the really interesting thing about the UK's Bill is the idea of embedding carbon budgeting in a domestic framework. Having three five-year carbon budgets in place sends a much more important signal for business to make intelligent investment decisions based upon a medium-term horizon. It is more important than a 2050 goal. I am not dismissing the 2050 goal, but I think that the budgeting framework is the more important part when it comes to businesses and Government making the investments in policy decisions.

**Q106 Colin Challen:** Are you saying that we can perhaps ignore the 2050 goal to a certain extent provided that we have these interim measures? I cannot quite follow the logic you are making. Surely everything flows from the headline core target in this Bill. If it does not, is there really any point in having it there?
***Mr Mortimer:*** I am certainly not saying we should ignore the long-term target, but merely in a sense both Government and certainly businesses will be making investment decisions particularly over the 15–20 year timeframe; and, therefore, the 2020 target, which pins the trajectory in the middle if you like, is particularly important; as are the five-year budgets which provide certainty over the 15-year period. I am not in any sense trying to say the 2050 target is irrelevant. I am simply saying, going back to your question about the ambition in the Bill, that is a very unique aspect to it which is not present in other European legislation.

**Q107 Colin Challen:** Is the Office of Climate Change preparing contingency plans to look at different scenarios with different long-term targets? Do you have a range of options? Are you simply working and focussing entirely on the one that is laid out in the Bill?
***Mr Brearley:*** I think we should be clear that we have now handed back the implementation of the Bill to Defra who are working on this. Essentially as part of that work, as we did, there will be ongoing discussion around the level the target should be and what the implications of those targets are.

**Q108 Chairman:** Going back to what Mr Challon said at the start, what in your view would constitute a significant development in scientific knowledge about climate change over and above the reports we have had since the 60% target was set in 2000? I think many observers would say we have had some pretty substantial developments since 2000 in scientific knowledge. If those do not justify raising the target then what on earth does it need to take the Government to rethink it?
***Mr Mortimer:*** I go back to the point the Bill is intended to provide the UK with a very firm framework in which to go to the international context. The Government basically made clear that if there is new evidence or there is development internationally which justifies it then it is prepared to look again at those targets. Yes, there have been developments since 2000–01; no doubt there will be further development in science looking forward. I am not sure I can pre-empt those. I think the point simply to make is that the option is there to up the target in the light of change, and that is what the Bill provides the flexibility to do.

**Q109 Dr Turner:** I think it could be further said that the scientific evidence is before us, and virtually the scientific consensus is there already. The Government Chief Scientist has himself been saying for the last two years, to my certain knowledge, that we should be aiming for 80% in the UK, like similar industrial countries, if the world is going to achieve 60%; and if we are going to achieve a higher target then we need to recognise that as early as possible and we need to adjust the trajectory on the way to it so the interim waypoint targets need to be more ambitious. Are you doing any work on that because this is inevitable? The 60% target is obsolete before we actually legislate for it.
Mr Mortimer: I think the important thing is that the work that is going on on this in the Department is really in the context of the multilateral discussions. The UK as part of the EU is developing its position internationally and that is the context in which it is looking forward, to look at what obligations the UK should take on internationally. I would not disagree with much of what you said in your question, other than to say I think there is certainly no uniform consensus around a different figure. The Stern Report talked about developed countries taking on 60–80% consistent with 550 parts per million stabilisation, and obviously the UK target is in that range. There is a debate to be had on it; in a sense that is what we are now doing on the context of the draft Bill publication. I do not think there is yet a single consensus on what exact figure the UK should offer.

**Q110 Dr Turner:** Two of the main policy strands that were invoked in the Climate Change Programme Review last year, and which the National Audit Office commented on, the Renewables Obligation and the Voluntary Agreement to reduce new car emissions, the National Audit Office reckoned that they performed rather poorly in terms of cost-effectiveness. We also know that both of them are performing rather poorly in absolute terms, because we show no sign of achieving the renewables obligation of 10% by 2010 and we are well behind on reducing new car emissions. What is your role in bringing these policies into some sort of effect?
***Mr Brearley:*** To date the OCC has not been asked to look at either of those issues. If we were to do so then we would run similar projects to the ones run at the moment.

**Q111 Dr Turner:** One of the other comments of the National Audit Office is the fact that fiscal policy is entirely the preserve of the Treasury, and is not subject to the same sort of assessment progress that other policies are throughout Government. Does the Office of Climate Change have any remit to consider fiscal policies in this area?
***Mr Brearley:*** I think fiscal policies remain the ground that Treasury covers; so the OCC does not carry out any work on fiscal policies.

**Q112 Dr Turner:** I am finding it difficult to find things you do have any grounds for working on. Your letter to us mentions the "Analytical Audit" work that you are doing "looking into the economic rationale for Government intervention to reduce greenhouse gas emissions". That is a fairly basic sort of aim—could you tell us how you are going about this?

***Mr Taylor:*** Phase 1 of the Analytical Audit looked at synthesizing what we know about the science and the measurement and projections process, and we actually published a report on the internet at the time, at the launch of the draft Climate Change Bill, which focussed predominantly on the science in order to produce a very accessible précis of the scientific orthodoxy at the time, which was consistent with the IPCC third and fourth reports. Phase 2 of the Analytical Audit, as Jonathon Brearley has said, is moving into the economic realm looking at the economic rationale for intervention; and there predominantly what we are doing is taking the logic laid down in the Stern Review, deconstructing that a bit more in the UK context and mapping out how the UK policy sits against the framework laid down by Stern.

**Q113 Dr Turner:** Forgive me but that sounds a trifle vague.
***Mr Taylor:*** I am sorry, I did not mean to sound vague. Stern outlayed a number of principles—

**Q114 Dr Turner:** We know what Stern said. We are familiar with Stern.
***Mr Taylor:*** If you are familiar with Stern then all we are simply doing is seeing how the UK policy mix maps against what Stern said.

**Q115 Dr Turner:** Have you come up with any specifics?
***Mr Taylor:*** We have not finalised our report yet. We are still in the preliminary finding stage and we are checking our findings around various experts. As soon as we finish our reporting stage, in line with the principles of disclosure that Jonathon outlined earlier, we would be happy to share the analysis underpinning our conclusions with the Clerk.

**Q116 Dr Turner:** When will that be available?
***Mr Taylor:*** The project is due to finish in mid May.

**Q117 Dr Turner:** Because hopefully it may help illuminate the drafting of the final Climate Change Bill?
***Mr Taylor:*** Indeed, but of course we have been working very closely throughout our audit with Robin's team who worked up the draft Climate Change Bill, and we continue to work closely with all the departments involved, including the DTI drawing up the Energy White Paper.

**Q118 David Howarth:** Could I ask about one of the specifics of the Stern Review, it is about the Social Cost of Carbon. Stern implies a much higher Social Cost of Carbon than the Government is using at the moment, up to three times more. We have had the Financial Secretary to the Treasury here before us and we have put it to him that it seems to be an implication of Stern that the Stern higher value should be used in the policy evaluation as opposed to the present lower value. He said to us that, no, that was not the case because Stern had to do with global cost rather than cost in the UK. As the person putting the question I did not quite understand what that meant. If you have any comments on that I would be grateful. He also said that some work was going on about how to update the use of the Social Cost of Carbon in Government policymaking as a consequence of Stern. I was wondering whether you could give us any progress on that particular work?
***Mr Taylor:*** First of all, I am not sure it is actually the case that the Stern Review recommendations on the Social Cost of Carbon are that different from the Government's current guidance. The Government's current guidance is that the Social Cost of Carbon for policy appraisal processes should be considered in a range of £35/tC up to £140/tC, with a central range of £70/tC. Stern's recommendations, if I recall them correctly, were in a range between £60/tC and roughly £200/tC, and that reflected the different mitigation path that one would assume to be on. A business's usual mitigation path would obviously be towards the higher end of that range. I think it is pretty clear that the Government's current estimates fall well within the Stern range.

**Q119 David Howarth:** They do not fall within it—they overlap it, which is a rather different thing.
***Mr Taylor:*** Fair enough. It is clear they are not terribly different. In fact, the Stern recommendation on what the Social Cost of Carbon is around the 550 parts per million mitigation path is roughly £68/tC, which is nearly bang on the £70/tC the Government is currently using. However, I think it is pretty clear it is an area that is very complex; it is an area that it is difficult to come to any firm view on; and the Government committed to reviewing its guidance on the Social Cost of Carbon when it introduced it in 2002, I believe. I think that plans are to publish something later this year in the summer on updating the Social Cost of Carbon in the light of Stern.

**Q120 David Howarth:** The idea it depends on a mitigation path of course implies that we know what mitigation path we are on, and that assumes the success of existing policy. The problem was, right at the start of our session, we were struggling to understand policy not succeeding. Is that going to be taken into account, or will the report simply assume that the policy will work?
***Mr Taylor:*** I would not like to pre-empt what the chief economists around Government will conclude on this matter, but I imagine that they will take into account the range of mitigation paths; and a different Social Cost of Carbon therefore theoretically applies depending on what mitigation path one is on. Clearly the decision on what kind of path we believe we are on is a very complex one and it is based not only on the UK's performance, given that we account for only 2% of global emissions, but crucially, as Robin was saying earlier, the international dimension and where we think we are moving on international agreements for mitigation.

**Q121 Mr Hurd:** Are any other countries doing any serious work on the Social Cost of Carbon?
***Mr Taylor:*** I am not aware of that, but that does not mean to say that there are not any.

**Q122 Mr Hurd:** You are doing the work, the Office of Climate Change, but you are not aware of any work being done in any of the other countries?
***Mr Taylor:*** I should clarify, the work being done on reviewing the Social Cost of Carbon in light of Stern and reviewing it every five years that is being done by a range of Government chief economists, but predominantly Defra.

**Q123 Dr Turner:** Figures, forecasts and targets et cetera get bandied about all over the place. We had a very reasonable and logical request from the Engineering Employers' Federation last week that the Government should put the data, assumptions and the methodologies that they use to generate emissions forecasts into the public domain—at the moment they are not, and they are figures that could just well have been plucked out of thin air. They are calling on Government to use a broader range of scenarios when it forecasts future emissions and to anticipate the impacts of different trends of, say, fuel prices and the impact that could have on emissions. What is your reaction to that?
***Mr Taylor:*** It is an interesting perspective. I am not sure it is technically correct in all aspects, because by far and away the largest element of the Government's projections for greenhouse gases comes from the DTI's energy model, and very many of the central assumptions within the DTI energy model are not only transparent but also publicly consulted on. There are consultations that run on the oil price, the oil price to plug into the model, and the prices for other fossil fuels; and the growth assumptions that feed into the model are, of course, derived from the Treasury's assumptions on growth, which the NAO in their reports agreed were cautious and reasonable. I could go on. There are a range of assumptions that are plugged into the different models around Government including, for instance, on the transport models and various consultations go on about which assumptions should be plugged in. I actually do think there is already a pretty transparent process that is going on there. However, I think one of the advantages of the Committee on Climate Change, should it come to pass, is that that will make the process even more transparent because its analysis will be much more open.

**Q124 Dr Turner:** What do you say to their point, which I think is a very fair one, that you really ought to be looking at alternative possibilities depending on which assumption of fuel prices or fiscal measures you put into the mix? You may find some surprises.
***Mr Taylor:*** It is certainly true that if you play around with different scenarios you are going to get different results. The nature of modelling in this area is that it is far from a precise science and one has to apply judgments, and all you can hope is that you apply those judgments professionally and with the best knowledge of evidence out there. I think the DTI do an awful lot of sensitivity analysis on their model and play around with different oil price assumptions and so on. Scenario planning is very much part of the kind of modelling that goes on for particularly longer-term targets. The 2050 targets are less suitable for the kind of time series models that we use for nearer-term projections, and we have to use more scenario-based modelling, where you test the assumptions of various scenarios using, for instance, the insights developed from the Office of Scientific Innovation and the Foresight Programme and so on.

**Q125 Dr Turner:** This work will help you understand the mechanisms that are going on and help you devise policy instruments that will actually achieve the results that you want. Would it not be helpful to publish all this stuff more widely?
***Mr Taylor:*** As I said before, there is an awful lot of sensitivity analysis that is done and there is a lot of consultation that goes on on the assumptions and that is, therefore, published. When the DTI publishes its series called the *Updated Energy Projection Series*, the UEP Series, it actually has some annexes in there which compare different scenarios based upon different inputs of oil prices and so on. It is a complex and, as far as I can see, largely transparent process.

**Q126 Mr Hurd:** Turning to international aviation and shipping, we had a nice letter from Friends of the Earth to say that in leaving out emissions from those sectors the targets in the Climate Change Bill are "rather like a calorie-controlled diet that opts to exclude calories from chocolate". How accurate and meaningful are targets and forecasts that leave out these sources of emissions?
***Mr Brearley:*** There is an issue for both shipping and aviation in the sense that these are international and, as yet, there is no agreement on how we allocate emissions between countries. One of the risks of including these within the Climate Change Bill, for example, is that we have perverse effects on policy-making itself. For example, in shipping, do we end up with ships being registered elsewhere rather than being registered in the UK? I would argue, until we have an international agreement that would allow us to understand better how we allocate emissions, it is quite a challenge for us to include those within our domestic targets.

**Q127 Mr Hurd:** That is a bit of a cop-out, is it not? "We haven't got an agreement—therefore we don't publish". What is the argument against us publishing a parallel set of emissions forecasts that include those, because that would send quite a strong signal that this position is untenable in the medium or long-term. It would provide quite a good lead from this country, would it not?
***Mr Mortimer:*** There is a leadership argument, but there is also an argument about whether we have policy levers to immediately take on UK legal responsibility for emissions where we do not control all the levers to reduce emissions. Shipping is the best example where if we took on 50% of emissions for all shipping which passes throughout UK waters, for example, we have precious few ways to act on those outside international agreement; and, therefore, we took the view that it would be much more sensible to allow the Climate Change Bill to evolve and add emissions later, than to artificially take on

responsibility for them in advance of any international agreement. It is a mixture of not having an agreed basis for allocating them but also not having the international agreement, as yet, on the policy measures to reduce them.

**Q128 Mr Hurd:** Presumably Government does use some form of forecasting of these emissions internally, do you not; otherwise you are in danger of having everything thrown completely off course?
***Mr Mortimer:*** That is rather different from taking on the legal responsibility for emissions over which we require international agreement.

**Q129 Mr Hurd:** I am not sure I am talking about taking on legal responsibility for emissions; I am just talking about actually having a rather more honest dialogue with the country in terms of the forecast of emissions; because the reality is there is a little elephant in the corner of the room that is getting bigger and bigger and bigger and in danger of completely dwarfing what you are trying to do. That is not transparent to the public because you are all hiding behind this saying, "We don't have an agreement on that, therefore, we're not going to publish it".
***Mr Mortimer:*** I think there is a separate question about whether the Government should be publishing data not necessarily in the context of the Climate Change Bill but about emissions from international aviation and shipping. Some of that data is published, but I think that is a very different question. From the Climate Change Bill where there is a very good quality policy argument to be had for saying, "Let's primarily pursue this in an international forum rather than taking on responsibility legally".

**Q130 David Howarth:** Is there not something the wrong way round? You are saying, "We don't have the policy instruments to deal with this, so pretend it doesn't exist". It seems a rather backwards way of thinking. Is not the point about policy effectiveness separate from the point about whether these emissions are there in the first place and we should be trying to do something about them, and trying to think of some more effective way rather than waiting until an international agreement occurs? Your point about the transfer registration, that might work in some cases but not all, so there would be some effect but you would not have the 100% effect you might have if you controlled the whole thing?
***Mr Brearley:*** To emphasise, we are not saying you should not address these sectors and you should not essentially be putting in place policies that do address emissions from these sectors—for example, PPR is one of the measures that is intended to do that. I think that is different from essentially giving yourself a statutory obligation to address emissions in the sector where you do not really have full control because you are dependent on international action to do so. The Climate Change Bill essentially is about tackling climate change, about tackling UK emissions, but it is also about doing so in such a way that is credible, allows Government to be able to do this but also balances off economic growth and poverty and other objectives which the Government has. If we give ourselves an objective which we think is extremely difficult to meet under current circumstances then we do not have a credible framework to take forward, say, to 2050. As we pointed out before, there is a clause within the Bill that does allow us to amend this if we do get international agreement, and if we do get a fair way of allocating emissions between countries.

**Q131 Dr Turner:** Have we not already gone some way down the road of getting international agreements? Aviation is going to be included in the European Commission's trading scheme—now that is a big enough area to be enforceable and to have a major effect. You must surely be factoring that into your calculations, and it will be a very small step to extend that to shipping?
***Mr Mortimer:*** I am sorry to go back to the clause which allows us to amend it but the clause allows the Bill to be amended to add emissions from international aviation at the point at which there are international developments. That is one international development which might be in that category. It has not happened yet. The Government will be free in 2011/2012 when that comes in to effect that decision.

**Q132 Dr Turner:** To go back to the point that Mr Hurd made, there is nothing stopping you now from publishing parallel figures that take this into account which will illustrate the necessity for doing it?
***Mr Taylor:*** May I come in on that. There may have been some confusion. We do actually publish those items under the Kyoto Protocol, because there is an agreement on how the international aviation and shipping items should be accounted for nationally. They are actually recorded as a "memo item", so they are recorded in the tables, but they are recorded so you do have this parallel set of figures there already. In the Climate Change Programme Review, I was just looking through here, there is information in there on projections also of the growth in greenhouse gas emissions from aviation and shipping. The Government publishes that information. It just may not always be apparent to everybody that just looks at the core set of international report figures.
**Chairman:** Thank you very much for a very helpful session. I am sure we will see you again before long.

**Memorandum submitted by the Energy Saving Trust**

FORECASTING

1. *In the light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?*

The UK Government's approach to forecasting emissions has evolved largely from DTI's energy model, the primary purpose of which is to project energy supply and demand. From this, it is relatively straightforward to compute carbon emissions, and add in non-energy sources of greenhouse gases (GHGs) from other models. Over the last few years, there have been a large number of updates and refinements that will have helped improving modelling expertise as a result.

However, given the importance of climate change as, to quote the Prime Minister, *". . . probably the greatest long-term challenge facing the human race",* we suggest that Government should consider whether a "next generation" bespoke single model, with a primary focus on the vitally important task of forecasting future greenhouse gas emissions, is required. In this respect we note that the DTI energy model was not designed to undertake the long term forecasting that is required for GHGs. Any such model will need to interface closely with the existing historic emissions database led by Defra and required for IPCC reporting purposes.

2. *In developing its approach, how should the Government deal with the following issues*

Whether There can be a Greater Role for Independent Assurance

There is a clear need for greater independent assurance. The detailed workings of the model are known by a small handful of officials. We believe it would be an appropriate role for the Carbon Committee to make available the assumptions and calculation methodology, and to host periodic (eg annual) gatherings of renowned experts and other interested parties for expert scrutiny. In our view, we believe that the information should also be available on the internet, in a format that would allow a wide variety of interested parties to examine the forecasts, both for the whole economy and for specific sectors/end uses that may be of interest to them.

How the Government Should Respond to the Unavoidable Uncertainties in Forecasting

It is recognised that forecasting is an imprecise discipline, and good practice dictates that a range of scenarios is produced. However, the tendency is to use a "central" estimate of the outcome—which is again understandable as it provides a single figure to work with. However, the recent track record in forecasts has shown they tend to err towards an optimistic outcome. Until such a time as modelling improves to the extent of providing more accurate forecasts of the future, we advocate that it would be prudent to take a more cautious view (ie a higher carbon forecast) as the basis for policy making. It is also important to distinguish between uncertainties external to the Government (eg world prices) and those under Government control eg taxes and regulations.

Whether or not Future Domestic Targets and Forecasts should include International Aviation and Shipping?

Yes—unequivocally.

Aviation in particular is an important, and rapidly growing, sector of emissions which contribute to global $CO_2$ and other greenhouse gas emissions. It is particularly important to take full account of radiative forcing. However, we accept that reporting against the Kyoto Protocol targets requires aviation and shipping emissions to be excluded.

3. *As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?*

As noted above, the existing DTI model was not designed with the kind of timeframes in mind that need to be considered for climate change purposes. This reinforces the argument of the need for a bespoke greenhouse gas projection model.

COST-EFFECTIVENESS ANALYSIS

4. *Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

We believe that there is an urgent need for Government to reappraise the social cost of carbon (SCC), in the light of Stern, the latest IPCC report and other evidence. The current dual system (Stern/Government) is unhelpful as it results in uncertainty and provides an excuse for inaction.

SCC reflects the externalities associated with the emission of greenhouse gas pollutants. As such, it sets a benchmark cost against which to consider emission abatement options. Put simply, policies that have negative cost effectiveness, but which are above the SCC, should be pursued, along with all policies with positive cost effectiveness.

While there is inevitable uncertainty about the level of SCC, the prudent approach, noted earlier, dictates that the more pessimistic end of the range of SCCs should be used as the benchmark. This is because, as the Stern review points out, the SCC is only low if the worst outcomes of climate change are avoided, which will only be likely if there is concerted international action.

5. *Has the government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

Yes.

Although at the time the Review was announced, it was probably appropriate to focus on meeting the 2010 $CO_2$ goal, as this was, and still is, a stated government objective. It is also worth noting that the Kyoto targets also imply a short-term approach. However, given the length of time taken to undertake the review, the growing recognition that the 2010 goal was unattainable, and the increasingly strong evidence base of the damage that climate change will cause, there is now an urgent need to establish a structured approach to policy appraisal, implementation, evaluation and review, with a view to meeting 2020, 2050 and all interim goals.

Inevitably this resulted in a more short-term approach rather than the longer policy review that is ultimately required for instance it does not allow for the incorporation of new technologies. However, the Energy Review has provided indications that a longer-term approach is now being considered. Clearly long-term post Kyoto targets are also required.

6. *The NAO briefing has also raised a number of other issues, including: the failure to explore sufficiently different scales of policy intervention; the balance between expanding existing measures and introducing new ones; the range of policy options considered and the criteria for appraising them; and the timing and scope of future cost-effectiveness evaluations. In the light of such concerns, how should the Government improve its approach to the use of cost-effectiveness evaluation?*

The Interdepartmental Analysts Group (IAG) undertook what can only be described as a mammoth task in evaluating and appraising the range of existing and potential new policies. Inevitably, though, officials operated under existing constraints.

To our knowledge, no additional resources of note were made available to undertake the additional work. As a result, most input was on the basis of existing or planned policies, for which, at least within individual departments, there was already a set of working assumptions, given existing budgetary and other constraints, about the size, scope and timing of policies, including whether they would be rolled out/extended. The mindset and resources of the group, while open to challenges and suggestions on policies, was therefore not one where vastly different scales of activity or of approach could readily be contemplated. This inevitably served as a major constraint on policy development.

Specific mention must be made of fiscal options. As noted in the NAO report, these were not subject to the same level of scrutiny as other policies. The Energy Saving Trust firmly believes that the absence of discussion and challenge on fiscal measures was one of the most significant failings of the Climate Change Programme review process. Put simply, it is not possible to take a holistic UK-wide perspective of how to tackle the problem of climate change without due consideration of all potential fiscal measures, including taxation. This is clearly evident as the most efficient response to the known externalities of GHG pollution is to reflect this in the price of the commodity.

Clearly, taxation alone cannot be relied upon to solve a problem on the scale of that posed by climate change. However, it can and should work in conjunction with other policy initiatives, including emissions trading and direct subsidy schemes. A shift towards a higher proportion of environmental tax, while at the same time reducing taxes elsewhere, will send the right signals throughout the economy as to the direction in which the UK needs focus its priorities.

The consumer cost of a full "carbon tax", while significant, is not prohibitive. Assuming a SCC of £100/tC (within the range of both Stern and Government estimates) equates to 1.2p/kWh on the price of electricity and 0.5 p/kWh on the price of gas. Although measures will be required to mitigate social impact, these levels are within the range of increases that consumers have witnessed in response to changes in world energy prices within the last two years and which have begun to fall again. Of course, the resulting revenue raised can then be at least partially recycled into climate change mitigation policies.

The benefit of setting this as a baseline "carbon price" is that it gives all players a clear signal and benchmark against which to plan long term. By incorporating the full SCC a cost/benefit analysis emerges which provides a fuller picture of the outcome of a particular policy. Alternative pricing signals, notably from emissions trading schemes, may be subject to high levels of volatility and reflect an abatement cost, not necessarily a social cost. In addition, at times like the present, the price can be artificially low reflecting the short-term economics of supply and demand, rather than any fundamental considerations.

## Accountability, Targets, and Reporting

7. *What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

As noted earlier, the Carbon Committee should be given a remit to report and publish monitoring results on a regular (say, annual) basis, for open and widespread public scrutiny. It is important to ensure a robust evaluation process of each implemented policy measure. Regular reviews based on actual observations from a variety of sources are needed to evaluate whether the policy is still effective. Such reviews should be transparent; and have input from all parties affected by the policy.

8. *What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee? In particular, how should the Carbon Committee be constituted, and what should be its powers and remit?*

The scale of the challenge, and the experience of the CCPR process, indicates that IAG, in its current form, is not the right vehicle going forward to provide the analytical evidence base to underpin Government's climate change objectives.

In our view, the role of the Carbon Committee is that of a separate, dedicated body, independent of Government similar to the Bank of England's Monetary Policy Committee (MPC). It should be responsible for overseeing the analysis, reporting and forecasting on matters pertaining to meeting a series of carbon targets (see 10 below) and to help ensure Government remains on track with its climate change objectives. Consequently, Government should be obliged to formally respond to any recommendations that the Committee might make.

The Office of Climate Change, which must be independent of any individual department or policy area, would then be a cross-departmental body supporting the work of the Committee by undertaking the policy analysis, appraisal and forecasting roles directly, and by interfacing with policy officials in each department, including HM Treasury and HMRC. The IAG could then be stood down.

The Energy Saving Trust would welcome the opportunity of being represented on the Carbon Committee.

9. *The Government wishes to "ensure that the [Carbon] Committee's advice is transparent, equitable and mindful of sectoral and competitiveness impacts, including the need to secure energy supplies at competitive prices" [see Note 3] What use should the Carbon Committee make of cost-effectiveness analysis and what difficulties might it face in doing so?*

Robust cost effectiveness analysis should be the cornerstone of the Committee's analysis and evidence base in deciding on the mix of policies needed to meet the $CO_2$ targets. Key to this is having good data. In this context, existing policies have a clear advantage over new ones—witness the CCPR process, where a number of policies were rejected either for timing reasons or because it was not possible to undertake a full appraisal. It is therefore essential that bold new policies are not disadvantaged by virtue of a simple lack of data. Likewise, reaching the key long term targets will require innovation so short term cost effectiveness is not the sole criterion.

10. *What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

The experience of the CCPR has shown that the focus on a particular timeframe (in this case 2010) results in a sub-optimal analysis of options, including rejection of policies that have minimal impact in the given timeframe. The Energy Saving Trust believes that a regular series of targets needs to be set from now to 2050 although we do not believe that annual targets are practical, due to changes in weather or economic activity. Conversely, targets over a five-year timeframe, or longer, are too infrequent to assess progress towards the 60% goal.

The Energy Saving Trust therefore proposes a series of rolling five-year average targets. These would be set every year, from now to 2050, on the basis of an equal percentage reduction each year towards the 60% goal. So, while there would be a *nominal* target for each year between now and 2050, *actual* targets would be set for the end of each rolling five-year period. The target would be the average of the five nominal annual targets up to and including the given year. The annual percentage reduction required to achieve the 60% goal is 1.7%.

This is illustrated in the table below. 2005 emission levels were 656 M tonnes of $CO_2$ equivalent ($MtCO_2e$),[1] while a 60% reduction from the 1990 baseline gives a 2050 target of 310 $MtCO_2e$. The first full five-year target period would end in 2009, for which the five-year average target would be as shown in the middle column, ie 635 $MtCO_2$. The target for 2010 would then be 624 $MtCO_2$, and so on. The final column shows that greater absolute reductions in emissions are required in the earlier part of the period than later. We believe this percentage reduction approach is better than a straight line approach since the scope for absolute savings now is higher than it will be once emissions approach the target figure.

Of course, detailed targets need to be informed by economic analysis of long-term options.

| *Year* | *Straight-line nominal annual target emissions $MtCO_2$ equivalent* | *Rolling five-year average target emissions $MtCO_2$ equivalent* | *Actual year-on-year reduction $MtCO_2$ equivalent* |
|---|---|---|---|
| 2005 | 656 | | |
| 2006 | 645 | | 11 |
| 2007 | 635 | | 11 |
| 2008 | 624 | | 10 |
| 2009 | 614 | 635 | 10 |
| 2010 | 604 | 624 | 10 |
| 2011 | 594 | 614 | 10 |
| 2012 | 584 | 604 | 10 |
| 2013 | 574 | 594 | 10 |
| 2014 | 565 | 584 | 9 |
| 2015 | 556 | 574 | 9 |
| 2016 | 546 | 565 | 9 |
| 2017 | 537 | 556 | 9 |
| 2018 | 528 | 546 | 9 |
| 2019 | 520 | 537 | 9 |
| 2020 | 511 | 529 | 9 |
| 2021 | 503 | 520 | 8 |
| 2022 | 494 | 511 | 8 |
| 2023 | 486 | 503 | 8 |
| 2024 | 478 | 495 | 8 |
| 2025 | 470 | 486 | 8 |
| 2026 | 463 | 478 | 8 |
| 2027 | 455 | 470 | 8 |
| 2028 | 447 | 463 | 8 |
| 2029 | 440 | 455 | 7 |
| 2030 | 433 | 447 | 7 |
| 2031 | 426 | 440 | 7 |
| 2032 | 419 | 433 | 7 |
| 2033 | 412 | 426 | 7 |
| 2034 | 405 | 419 | 7 |
| 2035 | 398 | 412 | 7 |
| 2036 | 392 | 405 | 7 |
| 2037 | 385 | 398 | 6 |
| 2038 | 379 | 392 | 6 |
| 2039 | 372 | 385 | 6 |
| 2040 | 366 | 379 | 6 |
| 2041 | 360 | 373 | 6 |
| 2042 | 354 | 366 | 6 |
| 2043 | 348 | 360 | 6 |
| 2044 | 343 | 354 | 6 |
| 2045 | 337 | 349 | 6 |
| 2046 | 331 | 343 | 6 |

[1] http://www.defra.gov.uk/news/2007/070131a.htm

| *Year* | *Straight-line nominal annual target emissions $MtCO_2$ equivalent* | *Rolling five-year average target emissions $MtCO_2$ equivalent* | *Actual year-on-year reduction $MtCO_2$ equivalent* |
|---|---|---|---|
| 2047 | 326 | 337 | 5 |
| 2048 | 321 | 332 | 5 |
| 2049 | 315 | 326 | 5 |
| 2050 | 310 | 321 | 5 |

*March 2007*

*Witnesses:* **Mr Brian Samuel,** Head of Policy Research and **Mr Dan Staniaszek,** Director of Evaluation, Energy Savings Trust gave evidence.

**Q133 Chairman:** Good morning and welcome. Thank you very much for coming along to talk to us. Could I start with a general question about what your reaction to the Draft Climate Change Bill is—not in every single detail, but a general response?
***Mr Samuel:*** Thank you for inviting us again. Basically, in regard to the principles of the Climate Change Bill, we strongly support them. We support the fact that there are unilateral targets; they are long-term targets; and they are legal targets. We support the fact that there will be an independent Carbon Committee advising Government and providing analysis on progress. We also support the fact that the focus is on carbon dioxide. If you look at where we are today with recent increases in carbon dioxide emissions, it is apparent that must be the focus. We also support the fact that it allows for additional policy mechanisms, particularly trading instruments, to be implemented quickly rather than go through the primary legislation process. However, there are a number of areas on the detail that perhaps we think could have been stronger and more environmentally friendly. We have heard previously in relation to the fact that the −20% target by 2010 is going to be unachieved, but we do then have a range of 26–32% targets for 2020. Clearly 26% over a further 10-year period is somewhat low, and we would certainly prefer to see the target set at the top end of the 32% reduction. Again, is 60%, the right number for 2050. We do not actually know at the moment but I suspect we may need to go further; and, therefore, we welcome the fact that there is allowance for targets to be reviewed but they should only be reviewed upwardly i.e. there is potential for tighter targets in the future. Of course a key point is we actually now need the policies and the tools to make it all happen.

**Q134 Mr Chayter:** Could I ask specifically about the question of the cost-effectiveness analysis of different policy options in the Climate Change Review Programme. Are you happy with this concept? Do you think it is carried out with sufficient integrity and has broadly come to the right conclusions about the most cost-effective policy options?
***Mr Staniaszek:*** To a large degree, yes. We think the analysis that has been undertaken is of a high quality, and I think the NAO confirmed that. There is one area where, in our view, there is a very significant failing of the Climate Change Programme Review process, which is the absence of any serious debate about fiscal measures. I think that was also flagged by the NAO. It is an obvious thing—you cannot really tackle the problems if you are not able to use all the tools in your toolkit and fiscal measures are a key one. To give you one example: in the household sector you might consider a mix of policies where there is the energy efficiency commitment, a great policy delivering great stuff; there is the Energy Saving Trust providing advice and support; there are building regulations and product standards that are driving it; but the area that is not talked about is any kind of real fiscal measures in terms of, let us say, things that might affect the price of energy. If there was to have been a discussion around, "Let's look at a policy that looks at all those four as a package", then that would not have got very far in terms of the debate in terms of the Climate Change Programme Review, because Treasury would basically have said, "We can't really talk about fiscal measures". That is one of the major shortcomings.

**Q135 Mr Chayter:** So this has damaged the final outcome of the Review, Treasury's stranglehold about the debate on fiscal measures, has it?
***Mr Staniaszek:*** I think we have ended up with a good result, but I think it could have been better had there been a more open and honest discussion around some of the fiscal measures—particularly how they interact with some of the other policies.

**Q136 Mr Chayter:** How would it have been different? The process may have been better and had more integrity, but how would the outcome have been different? Could you give us one or two specific examples?
***Mr Staniaszek:*** We might have ended up with a different mix of policies. It is difficult to speculate because the analysis has not been done. What you would want to do is look at a wide range of options, including things that might seem a bit unlikely to happen but you need to consider those. One of those might have looked a lot more favourable than, say, the policy mix we ended up with and might have included stronger fiscal measures.

***Mr Samuel:*** Perhaps I could give an example. The evaluation of the policies clearly identify that household energy efficiency is one of the most cost-effective means of reducing carbon. Looking at the constraints that were put in place on the fiscal side, without some of those then perhaps you might have seen council tax incentives for energy efficiency in households; and providing access for finance for those people who perhaps find it difficult to do so; and deliver cost-effective savings for them; plus the carbon saving benefits for the wider community as well.

**Q137 Mr Chayter:** Just coming back to the cost-effectiveness analysis, there has been some criticism that in one or two policies, where the cost was really very high, there was then a retrospective justification as to why those policies were still proceeded with. Are you happy with that approach—even where the cost-effectiveness analysis shows a particularly high cost in reducing emissions—that other factors were brought into play to justify the continuation of the policy? My recollection is the renewables obligation was a classic example of that?
***Mr Staniaszek:*** Yes, that is one where you acknowledge, for perhaps other reasons, such as promoting other forms of electricity generation, that in a sense is a factor that is taken into account and perhaps overrides the straight cost-effective analysis. One can look at a range of policies and the various scenarios and rank them in terms of their cost-effectiveness and there are charts that do that, and they are published charts; if economics were the only pure consideration then you would take all the policies in order until you get to your target level of savings and that is one way of doing it. The reality is that there are always other factors that come into play, and with renewables it is about promoting alternative forms of electricity generation.

**Q138 Mr Chayter:** In addition to your concerns about the absence of the debate about fiscal measures, are there other specific points you think should be included in any future Climate Change Programme Review, or are you broadly content with the approach?
***Mr Staniaszek:*** I think the Review took longer than was originally planned, and that is partly because of the scale of the problem. The actual task at hand was immense and I think that was only recognised part way through the process. Much of the analysis was undertaken by the Interdepartmental Analysts Group (IAG) which, in a sense, is a grouping of existing officials from various departments who have all got day jobs. They are brought in to in the IAG, do extra work, compare analysis and do peer reviews. To our knowledge there were no significant additional resources added to that. If there had been a sort of professional secretariat, or a group which did this work, then I think the whole process could have moved more quickly and we could have had a more reasoned outcome at the end of the day.

**Q139 Colin Challen:** You liken the proposed Committee on Climate Change to the Bank of England's Monetary Policy Committee. Who do you think should serve on this new Committee; how should they be appointed; and what should their role and duties be?
***Mr Samuel:*** I think it is important to make sure that all sectors are actually represented on the Committee by experts but not sector representatives. For example, at the moment if you look at the illustrative make-up of the Committee you do not have experts from the demand side on there; it is very much focussed on supply and the private sector. The first point I would actually make is you need to have a balance; and at the moment there is definitely a gap on the demand side. I think it is important that the members of the Committee are selected on their expertise in a clear and transparent manner. The Committee has to be independent, and it will only work if it is independent and, therefore, selection should meet with the recommendations and findings of the Nolan Report.

**Q140 Colin Challen:** Do you think that the people on that Committee should be experts who come from a certain perspective and they obviously have delegates from that sector? Should those people be more or less domestically focussed or should they also have an international focus as well. From previous evidence, there is this disjunct between our own policy-making, international consequences and other engagements of it.
***Mr Samuel:*** I would like to see the majority, if not all, of the emission reductions coming from the UK although I would advocate the need to take into account the international perspective. The experts should predominantly be UK experts so we can ensure that we deliver UK emissions in the most cost effective and best manner.

**Q141 Colin Challen:** What I am trying to get at is whether or not they should also have an eye on the international, global responsibilities because it seems difficult to have our own target as if we have a glass wall erected around the UK.
***Mr Samuel:*** One of the roles of the committee should be to help other countries both within the EU and internationally adopt the same approach as the UK and also to learn from the modelling and analysis work that the UK undertakes. My experience is that the UK is ahead of the majority of countries in doing that. The committee has a role to play in sharing that best practice and helping other countries take steps to improve their own modelling work and ultimately to take the binding targets themselves.

**Q142 Colin Challen:** You have also argued that the Interdepartmental Analysts' Group is not the right vehicle for assessing future climate change policies and that this should be handed over to the Committee on Climate Change, supported by the Office of Climate Change. Can you tell us something about why you think that would be beneficial and an improvement?

***Mr Samuel:*** The people within the IAG are probably the right people. They are the experts and they have a lot to add. However, they have their day jobs as well. I think the format of the IAG itself is wrong. Over time it has been brought together perhaps on a more *ad hoc* basis to meet the requirements of government rather than to be in place on a continuous basis providing the support required. The IAG members themselves have a lot to add and can be seconded in to whatever team undertakes that analysis work. However, they have to be given the right direction and managed accordingly on a continuous basis to do that. It is important not to lose the expertise and on top of that the members of the IAG are departmental members and we'll need to have that access to departments. At the end of the day, you need to have an overriding team responsible for that work. That is why I think it ought to be integrated more into the OCC Carbon Committee structure.

**Q143 Colin Challen:** If that integration did not take place, do you think that the new committee would be properly served? How would it be properly served if it did not have that independence in terms of the advice it gets?

***Mr Staniaszek:*** In the Bill it talks about the committee being supported by a standing secretariat of staff on detailed analysis. What is not clear is the size of that staffing. We saw earlier from the OCC's discussion that in a sense the exact roles are still being formulated. If that staff is 20 or 30 people or analytical experts, it may well be able to do all that analysis. However, if we are talking of a fairly modest staff complement, it would be insufficient to do the task in hand. We have done it on the cheap, if I can call it that, through bringing people in for specific pieces of work and that has worked up until now. The reality is that the challenge for us is far greater and we need a professional, dedicated resource to do that kind of analysis. It does not remove the need for individual work at departmental levels but the way to coordinate it across departments needs to be professional and in a permanently staffed manner.

***Mr Samuel:*** The other difference is that the work that the IAG does has historically been much shorter term—i.e., the 2010 target. We have to now move to the longer term. It is perhaps a different focus and inevitably requires more resources as you are grappling with more complicated, longer term issues.

**Q144 Dr Turner:** You are clearly not entirely satisfied with the current forecasts of emissions, especially as they do not always turn out to be quite right. You suggest there should be a new, bespoke model that the government should use to forecast emission levels in the future. Can you expand on this and tell us how such a model would differ from the one that is currently used by the DTI?

***Mr Staniaszek:*** The current modelling has evolved over time from existing bits of models. The main one is the DTI model but that has been devised for a very specific purpose and, through adding bits of analysis, it has grown into the climate change for the $CO_2$ emission forecasting model. In doing so, it has improved greatly. We need a recognition of the long term nature of the problems to take all that learning and develop a new, bespoke model that is focused on reducing $CO_2$ emissions so that it is not driven by energy supply but by $CO_2$ reduction. That is the fundamental thing. I am not a modelling expert but I would envisage all the learning that we have from the current approach would be needed to develop that new approach and there may be a period when they operate in parallel just to compare the results.

**Q145 Dr Turner:** Your memo also points out, not unreasonably, that government forecasts of emissions have proved to be consistently optimistic. Why do you think this is?

***Mr Staniaszek:*** It could be down to the inadequacy of the model. I use that term advisedly. You are perhaps not looking at all the factors that are influencing $CO_2$ emissions. We want all those factors to be taken into account in this new model. It is a bit like a climate model anyway. The number of parameters you need to take into account is phenomenal and we are not meeting anything like that amount at the moment. There are probably things that we are missing in terms of what is driving $CO_2$ emissions.

**Q146 Dr Turner:** How does the current DTI model compare with models used in other countries? Are other countries developing new models? We are trying to generate multinational approaches to climate change but if different countries are using different models the figures we are all working with are not comparable. It makes it difficult to evolve policy.

***Mr Staniaszek:*** I am not an expert so I do not know what other countries use in terms of modelling. As far as I can judge, I assume that the UK model is a reasonably good one in terms of what is out there. Undoubtedly, it has been evolved for different reasons. A different country might have a different driver and be using a tool that has been developed in different ways. It would be good to continue to share best practice. No doubt there are some countries that are very significantly behind in the sense of adopting our current UK approach but we should always work with other governments and other countries to share best practice and perhaps aim at some point in the future to have an agreed modelling methodology.

**Q147 David Howarth:** Can I ask about carbon budgets? In your memo you set out a system of five year rolling average carbon budgets, reducing by a percentage each year. In the light of that I was wondering what you thought of the proposals in the draft Bill which are different from that.

***Mr Staniaszek:*** There are three main differences. Firstly, the proposal in the draft Bill is for three five year periods. That takes us only 15 years ahead. I do not think that is long enough. We need to set our goals on the 2050 targets, whether that is 60% or some other figure. Secondly, the rolling target

enables us to constantly keep on the ball. Every year we need to be sure we meet the targets. We should not have that kind of luxury of being at the start of a five-year period and what we do now perhaps does not matter too much as we will catch up later on. Having that five year rolling period provides that constant focus on getting there. The third element is that we have set out the path to get to the 2050 goal as a constant percentage reduction so we know what needs doing. It ensures that whoever is planning the time frame is looking at the short term, the medium term and the long term. The real danger of only having a 15 year target time frame is it ignores the next 25 years. It is not clear that that has been looked at, whereas if you have the 50 year time frame there should be people looking at all of those and seeking to meet all those targets as we go through.

**Q148 David Howarth:** Can I pick up on the point you made about a percentage decrease over the entire period each year? That implies larger absolute increases in the early part of the period and smaller ones in the later part, a curve rather than a straight line. Can you elaborate on why you think it ought to work that way and perhaps compare and contrast with the view that was put to us last week by some business organisations that, if it was the other way, it would be loaded towards the end of the period to allow technical development to take place?
***Mr Staniaszek:*** We kicked this around quite a lot and it is the fairest way. We know where we want to get to by 2050. We are spreading that burden equally over the period. Yes, you are right. In the initial periods the absolute savings would be greater but the level of impact is equal over the period. Every year we need to reduce it by 1.7%. Each year the amount we are asking the country to do as a whole has the same impact. If you were to save less carbon in the early period, perhaps the impact would be a 1% reduction in the early period but it may be a 5% reduction towards the end which is much more challenging. The earlier you prevent carbon emissions going into the atmosphere, the less the impact is on climate change. We think leaving it to the last minute is not sustainable. We need to start reducing carbon now and be continuing at that same level throughout the period for the next 45 years and beyond.
***Mr Samuel:*** There is a large amount of cost effective carbon saving that can be achieved now. It is already available through existing technologies without the need to develop new technologies. Let us get what we can get now and develop those new technologies for the future as well.

**Q149 David Howarth:** Can you tell us what your position is on the use of emissions credits purchased in other countries as a means of meeting targets?
***Mr Samuel:*** For those sectors that are not subject to international competition, there is no clear rationale for why the emission reductions should not be made within the UK. For the household sector, I would assume that all new targets should be delivered from the UK. There are a number of issues that have been widely mentioned in the press about the credibility of some of the international mechanisms. Some of the environmental NGOs have developed the CDM Gold Standard to try and address some of these issues—so there are problems about the real deliverable additionality of emission reductions overseas. Secondly, there is still a large amount of potential for business within the UK to deliver its own emissions. From an ideological point of view, I would expect that the majority of emissions should be delivered in the UK. However, for competition reasons, I can see why a small percentage—perhaps five, maybe a maximum of 10%—could be delivered from overseas. The reason I say that is you have the existing EU ETS which is a tradable instrument and therefore you can perhaps expect people to work within that framework. However, the overall amount should be capped.

**Q150 Mark Lazarowicz:** Bearing that in mind, would it make sense to have a system of parallel reporting of parallel targets which showed you the reductions achieved just within the UK so that we can clearly distinguish that which is purchased overseas from that which is meeting our own targets from our own efforts?
***Mr Samuel:*** Without doubt, yes.

**Q151 Dr Turner:** You are concerned about the price of carbon, quite rightly. You make a suggestion which is very close to my heart in your memo that a carbon tax could have considerable potential benefit in guaranteeing a sensible baseline price for carbon. Would you like to expand on your ideas for the carbon tax and how you see it fitting in with emissions trading and other measures?
***Mr Samuel:*** The real issue is that there is not a robust, transparent carbon price for the UK in all sectors. However, within the EU ETS, there is a price. Perhaps you need a floor tax level, a minimum level, to ensure that the current problems of too low a price are overcome. However, the priority perhaps should be to introduce more robust, national allocation plans to make sure that you do have a robust carbon price. In the business sector you have the climate change levy. I would argue that it is too low. In the household sector, for instance, you do not have a clear carbon price but you do have the energy efficiency commitment which is a very strong and good instrument, about to get stronger, and you have the renewables obligation. However, individual customers do not see those prices and relate those necessarily to the carbon price even if they do see them. You need transparency of carbon pricing. That is the key point. Then you need to bring in what the true social cost of carbon is into each of those sectors. How you do it probably needs to take account of the existing policies so ultimately over time you would want a single, transparent carbon price from the UK but meanwhile you can build upon the energy efficiency commitment by making it a more tradable instrument with a clear, transparent price, perhaps going through a white certificate trading type approach which allows third parties to directly deliver energy efficiency savings, and make that price more transparent on the bills.

There is a big issue with the social sector. Certain policies would need to be put in place to counteract fuel price increases due to a real, more appropriate social cost of carbon being introduced.

**Q152 Dr Turner:** Do you not see it as a way of encouraging, for instance, renewable electricity generation because you obviously would not be taxing energy production which was carbon free?
***Mr Samuel:*** Yes, it would help increase the take-up but you do have the renewables obligation which is in place and perhaps needs other mechanisms to help it work. I believe that banding will make the renewables obligation more cost effective.

**Q153 Mr Hurd:** You mentioned the energy efficiency commitment and the renewables obligation, both of which increase energy prices for the consumer but in a way that is almost stealthy in that it is not particularly visible. Are you arguing that those two should be made more transparent and perhaps branded as some sort of carbon premium so that there is a transparent value for carbon?
***Mr Samuel:*** I believe that would be most helpful. You need a transparent price of carbon to the public as well as to industry and business. That needs to reflect what the true social cost is. In terms of the household sector, if you look at the recent price rises which are now beginning to fall back, if you translate the social cost of carbon at, say, around £100 a tonne, which is reasonably consistent with both Stern and the government ranges, it translates into 1.2p a kilowatt hour electricity and a 0.5p a kilowatt hour gas price. It is not that much more substantial than the recent price increases which we are now seeing falling back.

**Q154 Mr Hurd:** Are you suggesting that the price increases as a result of policy instruments should be made explicit on the utility bill as a carbon premium or are you suggesting the policy instruments should be scrapped?
***Mr Samuel:*** I would not want to move away from the energy efficiency commitment. It is working. It is delivering. There are faults in it and hopefully the next consultation will cure some of those. In particular, we do need to move to a more tradable white certificate type approach which will allow greater transparency of carbon price. That then needs to be reflected in the bills.
**Chairman:** Thank you very much indeed for a very helpful session.

---

## Memorandum submitted by the RSPB

SUMMARY

The RSPB believes that forecasting greenhouse gas emissions can be a valuable tool in designing policy but believes:

- ultimately the Government should be seeking to set absolute limits on emissions through a carbon budgeting process linked to targets;
- aviation and shipping emissions should be included in these projections; and
- cost-effectiveness analysis should be a tool to assist with selecting the right policies, and not a means of determining whether or not a previously agreed Government target should be met.

The RSPB welcomes the publication of the draft Climate Change Bill, believes that it represents an important landmark on the path to a low carbon economy but believes that:

- there should be recognition in the bill that the UK should assume an equitable share of reductions needed to limit the average global temperature rises by two degrees above pre-industrial levels;
- trading schemes should be restricted to those sectors where they will be cost-effective;
- five-year carbon budgets should be complemented by annual reporting against milestones;
- emission reduction targets should be identified for particular sectors;
- the Committee on Climate Change should be subject to a sustainable development duty to ensure a sustainable approach to addressing climate change; and
- provision of the investment at home and abroad necessary to ensure that wildlife survives the ravages of human-induced climate change.

### FORECASTING

*Is the Government's current approach to forecasting "fit for purpose"*

1. Projections are an important tool in designing policies that will allow the UK to meet emission reduction targets. However, we must not perpetuate the current situation, where emission reductions are calculated as a percentage reduction from business as usual (BAU), and where no means exist to increase that percentage promptly, in line with the absolute limits on carbon emissions established through a carbon budgeting process.

2. To illustrate this, we would like to draw the attention of the Committee to the way in which National Allocation Plans under the EU Emissions Trading Scheme make use of projections. At present, the UK National Allocation Plan is established by identifying a range of potential percentage reductions from the projected BAU case, initially without reference to the absolute reductions necessary to achieve relevant targets. Whilst the top of this range was chosen for the current National Allocation Plan, in an effort to bridge the "carbon gap" left by other policies, this approach could not ultimately address the problem of rising BAU emissions resulting in a still greater gap as time went by.

3. We welcome the Committee's interest in this subject, and in the future would like to see a system of greater consistency and transparency in developing projections, with regular revisions allowing rapid adjustment of policies to keep emissions on target. Projections should also include all significant sources of emissions, including aviation and shipping.

*How should the Government deal with whether there can be a greater role for independent assurance; unavoidable uncertainties in forecasting; and whether targets and forecasts should include international aviation and shipping*

4. The Committee on Climate Change, proposed in the draft Climate Change Bill, could usefully oversee the work of the Government in relation to projections.

5. Unavoidable uncertainties in forecasting could be better managed by adjusting for optimism bias, and taking the upper part of the range of projected emissions as the model for establishing policy. The urgency of the climate crisis should dictate that we err on the side of making greater savings, rather than over-shooting targets. We also believe that this makes economic sense—early savings are likely to prove cost-effective, whilst missing targets at this stage passes on an increased burden for the future.

6. Aviation and shipping emissions should be included in projections. Their exclusion from Kyoto targets is widely acknowledged as a policy failure. Action to include aviation within the EU ETS will go some way to address this, but not far enough. Including air and shipping emissions in UK projections would demonstrate international leadership and bring forward early measures to help UK carriers adapt to future market conditions. Allocation methods may need to be adjusted to reflect international agreements as these are made; provision for this should be included in the Climate Change Bill.

*What improvements are needed in long-term forecasts their production and use*

7. We are not qualified to comment on the design of models to improve long-term forecasts about the scale and direction of economic growth. However, it is important that budget allocations over the next fifteen year period, as proposed in the draft Climate Change Bill, do not leave those in the future with a mountain to climb, to achieve medium to long-term targets. Gains made now are likely to be more cost effective than "back-loading"; to the extent that our best (and possibly only) chance of staying below the two-degree global safety limit, depends on seeing emissions peak and decline by 2015.

## Cost-effectiveness Analysis

8. We recognise that cost-effectiveness analysis can be a useful tool in designing the best policy mix to achieve government goals. However, the 2006 Climate Change Programme's failure to establish policies capable of achieving the 2010 $CO_2$ target raises questions about the partial manner in which it was applied.

9. Cost-effectiveness analysis should be a tool to assist with selecting the right policies, and not a means of determining whether or not a previously agreed government target should be met. The 2010 target could have been achieved, if the Government had given a clear signal to those engaged in the review, that they should find the most cost-effective policy mix to achieve the outcome. Instead, different work strands appraised policies singly, using different methodologies, and rejected many on the grounds of inadequate cost effectiveness, political difficulties, uncertain outcomes, or limited carbon gains, leaving a "carbon gap" which could not later be filled. These problems must be addressed in future.

10. Cost-effectiveness analysis in future should be undertaken under the supervision and guidance of the Committee on Climate Change. A single method should be applied to all policies, including fiscal policies within the domain of HM Treasury. Sufficient time must be allowed to appraise all potential policy ideas, including those are not part of the current mix. Policies should be appraised for their effectiveness across a number of time-scales, including the target for 2050. Finally, further efforts must be made to understand the full range of ancillary costs and benefits associated with a particular approach; for example, the net social and environmental costs of renewable energy supply and biofuels.

*Is the social cost of carbon an appropriate basis for future policy appraisal*

11. There is intense debate around the social cost of carbon (SCC) which will continue as long the impacts of climate change are uncertain and the methods use to calculate costs vary. We are therefore broadly in agreement with the decision not to use the SCC as means of appraising individual policies. Moreover, by setting its own emission reduction target, the Government has clearly signalled that action to achieve it will, in its view, be broadly cost effective. If this is the case, it should not be left to individual appraisals of different policies, to decide whether or not to use SCC as a determinant of cost effectiveness. Despite the uncertainty surrounding the SCC, however, it remains a powerful means of communicating the external costs associated with carbon emitting activities.

*Has the Government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target*

12. The rejection of policies likely to be crucial in achieving a low-carbon economy in the medium to long term, is a particular weakness of the current approach to cost effectiveness analysis (CEA). The continuing increases in emissions from key sectors such as transport, send out warning signals about our ability to meet targets at 2050. We must therefore begin to consider, and implement, more radical approaches with longer pay-back times.

13. It is instructive that at the time of the Climate Change Review CEA, policies for amending the building regulations to achieve carbon zero new build were rejected prior to CEA being applied, on the grounds that it would be difficult to achieve "buy-in" from the house building sector. Subsequent events have proved this to be false—a forward-thinking regulatory approach has seen house-builders embrace new environmental challenges with relish. It would appear that in certain cases, therefore, the Government did not even reach the point of applying CEA, because of political reluctance in key departments. The Climate Change Bill must address this, by recognising that our long-term ambitions will require action in all sectors; and determining patterns of carbon reduction in the short, medium and long-term which enable this to happen.

## Accountability, Targets, and Reporting

*What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction*

14. The draft Climate Change Bill makes considerable progress towards establishing a more transparent reporting and monitoring framework. However, it is vital that whilst budgets are set on a five-year cycle, reporting against annual milestones drives policy adjustments when these become necessary.

*What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee*

15. The Committee on Climate Change should, in our view, have overall responsibility for advising on:

(i) Appropriate targets to enable the UK to make an equitable contribution towards avoiding dangerous climate change (that is, limiting global temperature rises to no more than two degrees average above pre-industrial levels; and ppmv $CO_2$ equivalent to 450).

(ii) A reduction trajectory that enables the UK to meet its targets in the most economically, environmentally and socially efficient manner, determining budget allocations for five-year cycles within this, and annual milestones.

(iii) The balance of reductions between sectors, to ensure that they are achieved in the most economically, environmentally and socially efficient manner.

16. It should also inform government reporting against annual milestones; five-year budgets; and progress towards national and international targets (short and long-term). To do this, the Committee on Climate Change must include members with expertise on climate science; economics; social sciences; and environmental policy. It must also have a duty placed on it, to undertake its work according to the principles of sustainable development; with guidance outlining how this duty should be applied.

*What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions*

17. We agree with the Government's proposal in the draft Climate Change Bill, to approach short-term target setting through budgetary cycles, but believe this must be supplemented with reporting against annual milestones. The nature of the budget allocations themselves must be determined by establishing a rational emissions reduction trajectory, of the kind described above.

RSPB Policy Priorities for the Draft Climate Change Bill: a Summary

*Climate science and level of effort*

18. The Government has committed itself through the Energy Review 2003, and through its membership of the EU, to help limit average global temperature rises to two degrees above pre-industrial levels. Evidence from the Intergovernmental Panel on Climate Change has demonstrated that to have a reasonable chance of achieving this goal, ppmv $CO_2$ equivalent must rise no higher than 450. Yet the Government has neither acknowledged the need to aim for 450 ppmv, nor set its long-term target in relation to this goal. This must be addressed in the Climate Change Bill, by requiring that future targets will be established on the advice of the Committee on Climate Change, in line with the UK assuming an equitable share of the reductions needed to keep within the two-degree and 450 ppv limit.

*Balance of effort between international and national action, and role of international and domestic trading schemes*

19. The Government has indicated its interest in creating a series of linked trading schemes, capable of delivering reductions in $CO_2$ emissions in the most cost effective manner. In theory, we support approach. However, we have grave reservations about the ability of the international carbon market to deliver the reductions needed now. Our principle objections take three forms.

20. Firstly, the caps in place as Kyoto targets, and as National Allocation Plans in the EU ETS, are demonstrably inadequate. Trading with these schemes, therefore, is trading in a context where the market cannot drive significant cuts in emissions.

21. Secondly, trading with "uncapped" players, unless strictly limited, undermines the market and its ability to drive emission reductions. In the case of the EU ETS, Kyoto credits (CDM and JI) are available in sufficient numbers to undermine its effectiveness.

22. Thirdly, we are not convinced of the efficiency of adopting a cap and trade scheme in some sectors, for example surface transport. In this area, improvements in vehicle efficiency and fuel quality are likely to be a more cost effective way of tackling climate change. We would be similarly concerned about the introduction of cap and trade scheme focussed on farming and land-use.

23. We would therefore prefer government to place limits on trading with international carbon markets where possible,[2] until those markets have a cap commensurate with achieving the two-degree/450 ppmv limit, are not distorted by trade with uncapped players. We also wish it to restrict new trading schemes to those sectors where they will be demonstrably cost effective. These conditions should be reflected in the provisions of the Climate Change Bill, along with a signal from Government that it intends to achieve the great majority of its domestic targets through efforts at home.

24. We recognise that one danger of restricting international trading to meet UK commitments, is to cut off the flow of capital to developing countries to help them decarbonise. In our view, this problem should be addressed either by increasing our level of ambition (in which case we could afford to be more relaxed about achieving a greater proportion of our domestic target through international trading), or by using funds from auctioned credits in cap and trade schemes, to fund clean development.

*Budgetary cycles and annual reporting*

25. We warmly welcome Government's decision to place carbon budgeting at the heart of the draft Climate Change Bill. We also welcome the five-year budget cycle, in line with commitment periods under international agreements. However, we will argue strongly for annual reporting against milestones, to ensure that policies and emissions reductions stay on track in the budget period.

*Ensuing that policies deliver on targets*

26. At present, the draft Climate Change Bill is proposing a national framework of targets, which do not drill down to sectoral level. Whilst we sympathise with the need to ensure flexibility in delivery, we are not convinced that this approach will overcome the failures in the 2006 Climate Change Programme, in particular, the failure to consider long-term goals, and the risk of "lock-in" to high-emitting policies. We recognise that advice from the Committee on Climate Change will take into account these issues, but wish to see this carried through into policies, by obliging the Government to identify sectoral targets, under Section 6 of the Climate Change Bill.

[2] We acknowledge that companies currently trading within the EU ETS must continue to do so, but do not believe that further links should be made with domestic trading schemes and international markets until the market itself is working efficiently to drive down emissions.

*Ensuring sustainable delivery*

27. Climate change is a massive environmental problem requiring urgent solutions. However, it is not the only threat to our natural environment and resources, and the people who depend on them. We believe that at present there is a risk that all other environmental considerations will be subsumed in the drive to reduce emissions, and that the wider environment, and specifically biodiversity, may be harmed as a result. Examples include the inappropriate location of large-scale windfarms; and the promotion of biofuels produced in ways which displace important habitats, damage wildlife, or threaten local livelihoods.

28. To ensure a sustainable approach to addressing climate change, we believe that the Committee on Climate Change should be subject to a sustainable development duty, to be defined by guidance from the Secretary of State. We also propose that representation on the Committee on Climate Change includes experts in environmental policy.

*Investing in adaptation at home and abroad*

29. The draft Climate Change Bill includes a reporting requirement in relation to adaptation, but very little else. In our view, the Bill represents an important opportunity for the Government to build and implement a robust programme of action on adaptation.

30. Wildlife in the UK and abroad is facing a massive threat from human-induced climate change. A recent paper in Nature predicted that up to one third of land-based species could be committed to extinction by the middle of this century, if we do not act to mitigate and adapt.

31. We will be seeking a commitment from the Government during the passage of the Climate Change Bill, to provide the investment at home and abroad necessary to ensure that wildlife survives the ravages of human-induced climate change.

*Devolution*

32. The RSPB is a UK organisation, with country offices in Northern Ireland, Scotland and Wales. The powers to create targets and implement policies in relation to climate change are a complex mixture of the reserved and devolved, and we are aware that additional legislation at the country level will be required to ensure that we reach our environmental goals. Like others, we will work closely with colleagues across the UK to ensure an appropriate mixture of UK and country-level law and policy, capable of supporting rapid and significant emission reductions and robust action on adaptation.

*March 2007*

---

**Memorandum submitted by WWF-UK**

INTRODUCTION

The implications of the Climate Change Draft Bill have relevance for the EAC inquiry "Beyond Stern: Forecasting, cost-effectiveness, and climate change". This paper is a short summary of WWF-UK's position on the Climate Change Draft Bill, to help inform the Committee. WWF-UK will be responding in full to the Defra consultation on the draft Bill in full in due course.

SUMMARY

Publication of the Climate Change Draft Bill is a considerable achievement, for which the Government should be congratulated. However, in order to fully deliver on the UK making its fair share of the international effort needed to prevent average global temperature rises exceeding 2°C, the Bill needs to commit to:

- Reducing UK carbon emissions by at least 3% each year up to 2050.
- Setting binding carbon budgets with annual milestones.
- Including the UK's share of international aviation and shipping in the carbon budgets.
- Annual reporting against those carbon budgets, scrutinised by an independent committee with the power to advise on corrective action to be taken if carbon emissions go over budget.
- Obliging every government to publish a strategy for reducing emissions in line with the carbon budgets, which specify the emissions reductions by sector, and the instruments by which the Government will ensure that each sector stays within its carbon budget.

### Level of Effort

The science shows that the Bill's target of a 60% emissions reduction by 2050 will not be enough to prevent global temperature rises exceeding 2°C, unless the bulk of those reductions are achieved early on in this period. Slow progress at the turn of the century means that the 2050 target will need to be tougher to compensate. At least a 3% reduction every year from 2010 to 2050 will be required, which would lead to an overall emissions reduction of at least 80% over this period. The Bill should make this target explicit: as the Stern Report shows, postponing emissions cuts will carry far greater economic costs than facing up to them now.

### Climate Bill Sectoral Coverage

Currently, the draft bill does not propose the framework covers emissions from international aviation and shipping. It is essential that these emissions are included and reduced as part of the overall 2050 target.

### Carbon Budgeting

The Bill rightly adopts carbon budgeting as the basis for achieving emissions reductions. Climate change is driven by the total amount of carbon we put into the atmosphere, not just the annual emissions in 2020 or 2050. However, the Bill currently suggests five year budget periods. With Parliaments frequently lasting only four years, failure to reduce emissions under this scenario would too easily be blamed on past governments' mistakes.

WWF-UK favour annual carbon budget milestones. They would be the short-term objectives of the national emissions reduction strategy, calculated to add up to a *binding carbon budget* set over three-year intervals in line with the government's Spending Review cycle.[3] If in any one year the annual milestone is exceeded, the Secretary of State would have a duty to implement proportionate contingency measures to ensure that the excess emissions are eliminated over the course of the following year and are not carried over into future years' carbon budgets.

WWF-UK has always agreed that the Government needs some flexibility to deal with factors (like cold winters) that fluctuate from year to year. Annual milestones achieve this, but there must be a binding carbon budget set over the three-year period. The whole system would have little meaning if excess emissions could be carried over from one budget period into the next, which would allow governments to pass on the burden of past failures to future governments.

### Committee on Climate Change

We support the establishment of a Committee on Climate Change as proposed in the Bill. However, it must be genuinely independent and have real power not only to monitor progress, but also to advise on any corrective action that may be necessary. It should be free to make decisions guided by the latest climate science, without being subject to short-term political pressures.

### Trading in Credits

The EU Emissions Trading Scheme already covers nearly half of the UK's $CO_2$ emissions, meaning emissions reductions achieved outside the UK already contribute towards the UK's emissions targets. However, the independent Carbon Committee should also report annually on the actual emissions from the UK. It should highlight any excessive reliance on imported credits or allowances, either through the EU ETS, or under Kyoto's Clean Development Mechanism, expressed as a percentage of the total UK carbon budget for that year.

The Committee should set a limit on the use of allowances or credits, and if this limit is exceeded, the Committee should investigate and make recommendations. This would allow Parliament to consider whether the UK is moving towards a low carbon economy or simply buying its way out of the problem in the short term, while locking us into a high carbon infrastructure for the future. Tough limits should also be set for the total use of CDM credits by business and government. This would give real teeth to the principle that we have a moral obligation to make our own fair share of emissions cuts within the UK, rather than relying on buying emissions reductions from poor countries.

March 2007

[3] Three-year periods would allow alignment with government departments' planning cycles within the Treasury's Spending Review process: carbon budgets would be allocated alongside spending budgets.

*Witnesses:* **Ms Ruth Davis,** Head of Climate Change Policy, RSPB, and **Dr Keith Allott,** Head of Climate Change, WWF, gave evidence.

**Q155 Chairman:** Good morning. Welcome. I think you heard most of the earlier exchanges. Kicking off on the Bill, you will know that we sympathise with your view that the science has moved on a bit since the 60% target was set but here we see the 60% target reappearing in the Bill. Why do you think the government is sticking to this so determinedly?

***Dr Allott:*** I wish I knew the answer to that question. We welcome the Bill but we are very concerned that the Bill ends up putting into primary legislation a target which is obsolete, a target based on an atmospheric concentration of carbon dioxide of 550 parts per million $CO_2$ which is equivalent to over 600 parts per million $CO_2$ equivalent. That means global warming of about four degrees which we think is catastrophic and should not be contemplated. The Stern Review was talking about a range of 450 to 550 parts per million $CO_2$ equivalent. We are bemused as to the lack of policy coherence that the government is taking. In the context of the G8, the UK is supporting the German position which is global emission reductions of 50% by 2050. Even that may not be adequate. The UK is a leading industrialised, rich country which historically has responsibility and it clearly needs to do considerably more than 50%. We would argue 60% does not do the trick. In terms of international leadership, we have already alluded to Norway who are talking about going carbon neutral. We are talking about going to 60% reductions also with unlimited use of emissions trading mechanisms, so the government is having its cake and eating it in terms of the ambition on the target and the unlimited access to imported credits. Even California has been talking about an 80% reduction.

***Ms Davis:*** I have a few ideas as to why I think we are sticking to the 60% target. For the moment, it is partly due to the historical genesis of the Bill. I think the intention originally was to represent a framework for what was existing government policy. They did not expect to find themselves being pushed further and further in the direction they have been. It is possibly also because of the difficulty which the OCC, Defra and other more progressive parts of government have had in achieving any consensus across other parts of government, probably notably the Treasury. The argument they put forward themselves was the one you heard earlier, that in some way or another what they are doing on the face of the Bill is making some kind of international offer. I do not think that holds up because the basis of what our negotiating position needs to be internationally is to be talking about what our equitable share is of making the cuts necessary to stay within that two degree limit. It is very hard to sustain a position of international leadership when you are not prepared to be honest about what that represents in the context of your own country's emission reductions.

**Q156 Chairman:** If we move from 60 to 80%, what would that mean? How difficult is that going to make life for both businesses and individuals?

***Dr Allott:*** It makes life harder but this is a massive global challenge and we need to rise to it. I would like to point to some of the information in the government's own documents, in the regulatory impact assessment. On page 39 there is a very interesting table which makes clear that, in terms of GDP cost of going for a 60% reduction without any use of trading, that would be 0.7% in 2050. That is assuming possibly quite optimistic fossil fuel prices. Under a high fossil fuel price future, which I think many would see as quite reasonable, that falls to a 0.3% reduction in GDP. The government is talking, for illustrative purposes, about achieving a third of that 60% reduction from import credits which will reduce the cost of GDP by another third. In the context of Stern only a few months ago, Stern was talking about the global GDP investment needed being in the order of 1% to avoid damage costs of 5 to 20% of GDP. We have a situation where the government which was behind the Stern Review, which talks about the global GDP in terms of cost that we should be prepared to pay being about 1% of GDP, in a domestic context talking about a maximum of 0.7%, possibly falling to 0.3% or lower. It does not seem to stack up.

***Ms Davis:*** The question as to how hard it is is partly a question as to whether government is prepared to extend the reach of its carbon policies into sectors which it is simply not touching at the moment. Several questions earlier on in the discussion raised that issue. I found the National Audit Office report very interesting. There is one illustrative story in there about the dismissal of the idea of introducing tighter building regulations without any substantive cost effective analysis, on the basis that it looked like it was essentially politically unpalatable. It turned out six to nine months later that because of some very good work within the Department for Communities and Local Government the civil servants delivered a subsequent decision committing to zero carbon housing. If we looked to make similar extensions of the policy reach into the transport sector away from the power generation sector or through both, we would have a much better chance of meeting this target. At the moment the government's concentration remains very heavily just in the power generation sector. It is hard to meet an 80% reduction target in that context.

**Q157 Chairman:** Is there a risk, if they leave the introduction of a tougher target too long, that 80% becomes almost impossible to achieve?

***Dr Allott:*** That is very true. This is a massive problem. We need an element of planning our way out of it. There is a real danger in the government's approach of, firstly, lock-in through high carbon investment, partly because the short term targets are not ambitious enough. That would be reinforced by open ended access in terms of imported credits, both of which are in danger of fuelling continued investment in high carbon infrastructure, high carbon policy decisions in the UK, which will be very difficult to reverse later on. The science is very clear and compelling.

**Q158 Chairman:** Have you done anything about how soon you might get to that tipping point in terms of investment taking place in high carbon infrastructure? There will come a stage at which we simply would not be able to row back to an 80% target. What are we going to do in 10 years' time?
***Dr Allott:*** I can answer it from a global context in terms of what the world needs to do to have a reasonable chance of staying below two degrees. We need to see global emissions peaking and falling within a 10 year time frame. That is including all of the rapidly industrialising economies. To filter that through to a richer, advanced country like the UK which has huge potential to reduce emissions, the cost effective potential right now because of the untapped energy efficiency potential and massive low carbon, renewable energy resources is a huge missed opportunity if we do not tap into this straight away.

**Q159 Dr Turner:** The Bill currently has a provision for revising the 2050 target but if you are going to revise that upwards the implication is you have to revise upwards the weigh point targets and the trajectory towards 80% or whatever the final figure is. Would you wish to see provision for uprating the interim targets also included in the Bill?
***Ms Davis:*** That would make logical sense. We have had discussions with government about what point you would need to be at 2020 still to be on a reasonable trajectory towards an 80% reduction. It would have to be the very top of the range of things that they are proposing at the moment (between 26 and 32%) and possibly slightly higher. You are right. You would need provision for potentially changing that 2020 target. The point that you made earlier is a strong one. It seems perverse to embed a target which sets us on the wrong trajectory and puts us in the wrong place for an intermediary target right at the stage of initiating the Bill. We do not need to go through that additional process of complexity. We can use the best science now.

**Q160 Dr Turner:** The trigger reasons for changing the target are changing the science or international law policy. We have also had the suggestion from the Engineering Employers' Federation last week that there should be a third trigger and that would be the economic effects that can transpire from pursuing carbon reductions. What do you think about that as an extra driver for changing targets?
***Dr Allott:*** Our working assumption is that we are going to have an effective, international agreement. That is what we are all working towards. The Climate Change Bill, if it is put forward properly in other parts of the world, we want to see as strong as possible because it gives a very strong lead in that debate. This is a global problem and we need to have a global, effective agreement. We do not want to contemplate a future where the UK is the only country which has a target. That is the only circumstance in which those arguments come into play, in 20 years' time if we are the only country with a target. What we are talking about here is an international effort.
***Ms Davis:*** It would be interesting to know where we are talking about the economic effects taking place. These are our emissions but they have an impact globally and we have global responsibility for understanding and taking account of the effects they have both on the poorer world but also on the world's environmental resources. Unless the proposal was to take this into account, we would be a little sceptical. I am much more optimistic than that. The evidence has generally been that business responds vigorously and well to technical challenges imposed by environmental regulation or market forces, as in this case. Most people in this context believe that taking action quickly will give us an economic and competitive advantage rather than a disadvantage.
***Dr Allott:*** The history of some of the complaints we have seen about competitiveness in the context of the emissions trading scheme and other policy mechanisms shows that repeatedly we have seen concerns of that competitiveness impact grotesquely overplayed by many sectors.

**Q161 Mr Hurd:** Can we talk about the Committee on Climate Change? Who do you think should be on it? How should they be appointed? What should their responsibilities be?
***Ms Davis:*** We welcome the creation of the Committee, particularly because we see it as having an important role in articulating the nature of the science and what flows from that. We accept the government's proposition that the Committee should be there to advise independently on trajectories, on budgets and sectoral distinctions rather than necessarily have a detailed policy making role. Its main role is going to be in objective advice on science. We are concerned that the first set of skills and experience that are being asked for relates particularly to understanding of pure economics or of impacts on fiscal issues and poverty. Those are clearly very important things but as it stands at the moment we feel there should be a better balance with those people with responsibility for and understanding of the environmental policy expertise. We would agree very strongly with the EST's view earlier that it would be dangerous and destructive to get into a role where you have representatives of sectors on the Committee. We would like to see representatives come forward on the basis of their individual competence and expertise. We have been discussing potentially the idea of a committee such as yourselves having a role in agreeing the appointments to the Committee on Climate Change. That would seem a rational thing to do and it would be interesting at some point to discuss that further. One very important issue for those working in the environmental sector is that alongside duties to take into account issues around economic impacts and impacts on social equity we think that the Committee should have some kind of duty to take account of sustainable development in the way that it sets its aspirations for the balance between sectors. For example, if there was a massive preponderance of reliance on the power generation sector to the exclusion of everything else, we would

have to understand what the implications of that were in terms of nuclear power but also in terms of the impacts of barrage projects and of major wind. We would like to be confident that the Committee had thought about that in the way that it was deciding to establish a balance between different sectors, as it is required to think about the impacts on social causes and poverty reduction.

***Dr Allott:*** It does seem slightly odd to us in terms of the criteria that the Committee has to take account of. It does not seem to represent the conventional view of the three legged stool of sustainable development. There are criteria to do with economics and social impact but nothing in terms of wider impacts on the environment. A key principle for us is that the Committee should not be subject to short term political pressures in its decision making. It is a strategic body and if it is blown around too much by immediate pressures to do with the current fiscal regime or what have you in any given year we are going to lose the focus on the long term objectives. These are some of the problems that we have seen historically. This is another case where the government's reliance on imported credits does come in. The degree to which the government is offering maximum flexibility in terms of using imported credits is possibly a safety valve here if there is a sudden impact on the economy. They need to be much more transparent about how they are trading those two dynamics off.

**Q162 Mr Hurd:** The core objective of the Committee is to give the government best advice on the science. Would you consider under the circumstances that their first job is to advise the government on whether it should be 60 or 80 or the appropriate stabilisation target that should go into that on the international stage? In relation to the sustainable development point, do you think the absence of that reflects a dilution of the concept or the importance attached to sustainable development within government and do you think there is a risk of overloading this Committee if you bolt this on?

***Ms Davis:*** In terms of the science, I can see the case for having the Committee advise on the 60 versus the 80% target but at this stage we do not believe that there needs to be an immediate delay in establishing that 80% target. If anything, that is probably the bottom range of the estimates at the moment as to what we will have to do to achieve staying within two degrees in a globally equitable way. In the long term, giving the Committee responsibility for making recommendations about changing the target should the science evolve is the rational thing to do. For all the reasons we have discussed earlier, embedding a target at 60% is patently incompatible with the science and the government's own stated objectives and seems foolish to me.

**Q163 Mr Hurd:** It might be helpful to have it reinforced by an independent, credible committee.

***Ms Davis:*** Indeed.

**Q164 Mr Hurd:** It seems to me their reservation is political.

***Dr Allott:*** The Committee should be given some guidance in terms of the objective of sustaining two degrees in a globally equitable way. The 80% figure we think comes out of the numbers already.

**Q165 Mr Hurd:** What about the sustainable development?

***Dr Allott:*** One potential scenario may be that the UK could potentially choose to meet whatever target is set by the Bill through wholesale use of unsustainably sourced biofuels which, even from a carbon point of view in a global sense, may not be a sensible strategy, let alone the wider sustainability or environmental impacts of that particular strategy. Within the narrow constraints of the Bill as currently defined and the reporting boundaries that are currently proposed for the Committee, that strategy might be entirely viable but it might be a very bad decision because there is no reason for them to look at the carbon impacts or wider environmental impacts on the particular course which is adopted.

**Q166 Mr Hurd:** The Business Council for Sustainable Development last week said they wanted the Committee to be given a duty to promote long term economic growth. What do you think about that?

***Dr Allott:*** There are plenty of other government institutions which are charged with that duty already. In terms of the government's own modelling and the impact on long term GDP growth, the figures are talking about a modest shaving off what by 2050 is a very significant growth in the nation's GDP. We are not talking about grinding the economy to a halt. We are talking about a significant investment in a lower carbon future which we need to make anyhow. Stern clearly sets out that the impacts that the UK and the world would avoid by adopting that strategy would greatly outweigh the costs of the transition to a low carbon economy. That is the classic example of somebody trying to lumber the Committee with an inappropriate duty.

**Q167 Colin Challen:** The proposal in the Bill for five year carbon budgets has come in for a teensy-weensy bit of criticism from NGOs. I am just wondering what your thoughts are on the five year carbon budgets and if you have made representations what feedback did you have from government on this?

***Dr Allott:*** Our fundamental principle here is that we are very keen to ensure that the Bill contains clear annual yardsticks to measure progress. The EST set up a particular model which allows for some sort of annual tracking and reporting of progress against targets. It is a vital principle for us that there should be very strong annual milestones which could be used on whatever length of budget period we have to assess and check that policies are delivering, that the government is on track. A key problem with the five year time frame which is currently proposed, especially in the absence of annual milestones, is that five year periods span governments and we will see a lot of buck passing between different administrations. Maybe that is unduly cynical but

we just look at experience in terms of the progress so far against the 2010 target and we see, even with the same political party in charge, the difficulty with continuity of focus, delivery of policies and reinforcement of policies if they are not delivering. We need an annual review cycle.

**Q168 Colin Challen:** Do you not think annual reports to Parliament would become perhaps *de facto* annual milestones?
***Ms Davis:*** I think there is a subtle distinction between the two things. You could report on your savings so far within a five year budget period and make the claim that, whatever they looked like, they were appropriate as the first stage towards achieving the total budget at the end of a five year period. If you had to establish some kind of indicative trajectory during that five year period, it is a lot easier to see whether or not you are on track and it is a lot more transparent if a government decides it is going to backload the whole of that budget into the last two or three years. You are absolutely right in the sense that an informed audience interpreting the report would probably be able to get that information anyway. There is something about being able to state this in a way which is obvious to the vast majority of people to understand. That is important here.
***Dr Allott:*** We see a case also for looking at a three year budget cycle which is of interest because it overlaps with the CSR periods. It would help to allocate responsibility for delivery of certain parts of the budget to the relevant departments who have the lead responsibility in certain areas to build it into part of the whole CSR allocation.

**Q169 Colin Challen:** Given that you have three year CSRs, why do you think the government is so insistent on five year carbon budgets?
***Ms Davis:*** Their argument would be that it relates to commitment periods within international agreements. Given the focus that they have on using trading instruments as one of their main routes of achieving targets in the long term, the aspiration—although to a certain extent I think it is an economist's wet dream—is that all of these trading schemes link to each other seamlessly; and therefore it is rational for them to have a temporal relationship with each other as well as open portals for trading.

**Q170 Colin Challen:** RSPB has asked also for the government to set sectoral carbon budgets. What is the importance of doing that?
***Ms Davis:*** What we have been asking for is to place a duty on the government to identify sectoral responsibility for parts of the budget as it brings forward the total budget. The reason for that goes back to some of the conversations earlier about the need to have a rational balance of effort between sectors. There is a danger that we will continue to attempt to meet our short term targets by focusing heavily on the power generation sector and on our capacity to trade internationally. We know, looking at the long term, that without some action in particular in the transport sector there is no way that we can get to 80%. In our view, that means that what we need to do is to identify clearly a role in each budget period for the major emitting sectors to take and to make sure that the departments and the Secretaries of State have responsibility for delivering that. It is too easy with an overall government target for people to play pass the parcel between departments and it nearly always ends up with the power generation sector anyway.

**Q171 Mark Lazarowicz:** I can see the powerful arguments for a sectoral body but I can also see how that fits even less into the quite short term, interim targets because inevitably different sectors will be able to adjust at different rates. Have you any feeling as to how you would put some timescale into sectoral targets?
***Ms Davis:*** I think that is a really important point. This is where we need to explore the relationship between the role of the Committee in identifying appropriate trajectories and the balance between sectors and the budgeting process. We have at least three budget periods to plan ahead and that may mean that what the Committee is advising on is not just the scale of the budgets but the balance between sectors at different points during those three year budget periods. For example, we might say we need to be achieving in the third budget period a certain proportion of reduction from transport. That will therefore require policies to go in place now which will not deliver for the first budget period. The Committee has an important role to play in advising on that. I think there is a gap—and we need to talk more to government about how to deal with it—which does not deal with the issue of whose responsibility it is to absolutely avoid lock-in to high carbon technologies and to put in that long term lesson, to make sure we will meet targets further down the line.

**Q172 Mark Lazarowicz:** This is going to mean the Committee is involved in quite a detailed way in terms of policy as well. That may be a good thing but that is again extending the role of the Committee, is it not?
***Ms Davis:*** I think that is right. It is problematic because, for the Committee to be able to give sensible advice on what the trajectory should look like, to a certain extent they have to understand what the policies in different sectors look like. It is rather a circular argument. I cannot really see that they are going to be able to do that job sensibly without having help. What are the lead-in times, for example, for investment in renewable energy to deliver a particular outcome? Given that, the explanation earlier about the relationship between them and the OCC is probably very important.

**Q173 Dr Turner:** Can you outline your views on the relationship between the carbon targets and budgets proposed in the Bill and the use of emissions trading?
***Dr Allott:*** From our perspective it is integrated in the numbers of the targets. What do we mean by a target? We need to specify what the treatment is of imported credits in an emissions trading scheme.

Our concern is that at the moment there are issues to do with the environmental integrity of the EU Emissions Trading Scheme with the over-allocation in phase one, but also with the clean development mechanism—earlier we heard references to the Gold Standard[1]. There are a lot of concerns that there are many non-additional projects under the current CDM framework. To our way of thinking there is something of a trade-off. The more ambitious the targets the government is prepared to put on the face of the Bill then to an extent the more relaxed we are about using some trading to count towards those targets. Having a weak target (with essentially unrestricted trading) is the worst of both worlds. We are also trying to construct a framework looking ahead many years when we have no idea what the shape of the future emissions trading markets will be or how environmentally robust they may be. We are hopeful that we are moving towards a much more robust trading regime but we are certainly not there at the moment. This requires us to have some quite smart measures. One of our recommendations would be to have some sort of dual reporting in terms of what the emissions are net of trading and gross of trading. The Committee should be charged with some sort of trigger levels. If we are carrying on with emissions stable or even rising while our reported emissions are capped under the trading scheme and going down and there is a very big divergence between those two tracks, then we are seeing a very worrying trend. We would be getting locked in to high carbon investment because of short term use of trading mechanisms. We need to have some quantified limit on the use of trading and that should be informed by an assessment by the Carbon Committee of the robustness of the trading markets which we are linking to.

**Q174 Dr Turner:** RSPB have identified a possible problem if the use of emissions trading is over-restricted because this might impede the flow of investment to developing countries in order for them to develop a low carbon infrastructure. Does it follow from that that you would like to see the UK's 2050 target being made tougher than 80% so that not only does the UK reduce its own emissions to a reasonable share of the global total, but it also helps to finance the reduced growth of emissions in poorer countries?

***Ms Davis:*** That is certainly the case. We cannot see any justification for having less than 80% immediately on the front of the Bill but the more robust the target is the more comfortable we are with international trading in that context and the more potential that allows for that trading to increase the capital to the developing world.

**Q175 Chairman:** When do you think the government are going to bring aviation and shipping into their domestic targets?

***Dr Allott:*** The indications are at the moment not very promising in terms of this reliance upon the international agreements on reporting protocol. Our view is that aviation in particular should be in from the start. We heard reference earlier on to a memo item on reporting. We already report our international aviation emissions based on bunker fuel sales. That should be a pretty good proxy for the emissions from outbound flights. We report it in a fairly robust way. We do not see any reason why that should not be included on the face of the Bill from the outset. I accept that for the shipping sector it is more complicated in terms of trying to articulate what is the UK's fair share. There is no reason why a focused bit of work should not be done by the Committee on Climate Change or even the OCC to try and come up with some workable way of doing this. I would endorse the quote earlier from Friends of the Earth. It is clearly part of our responsibility. The justification for aviation growth is good for our economy—we should accept the down sides of that in terms of the carbon disbenefits.

**Q176 Chairman:** What are the consequences of not bringing this into our targets? We are in a state of denial but what are the policy consequences in terms of how it may affect what we need to do later?

***Dr Allott:*** If aviation, for instance, were to be included in the Bill in 10 years' time, by which time aviation emissions will have grown by a very significant amount, that would either mean that the government would try to reduce the headline target under the Bill or it would require some radical increase in the ambition of policies to deliver the same headline percentage reduction figure, either of which we think would be an undesirable consequence.

***Ms Davis:*** It is important not to single out aviation as a moral scapegoat in this context. One of the things that tends to happen as a result of it being excluded is it is seen by some sides as untouchable and by other sides as the great bogey man. It is neither. It is an additional source of emissions. If we can demonstrate that we can make choices in other parts of our lives to reduce emissions and maintain a growing aviation sector, absolutely fine but at the moment we are not even making the effort to demonstrate that which I find a little bizarre.

***Dr Allott:*** The real bottom line for aviation is that it is currently planned to come into the EU Emissions Trading Scheme in 2011 which is not many years away, so why not include it in the UK's reporting straight away?

**Q177 Chairman:** What about shipping?

***Dr Allott:*** There is a very large discussion at the moment about including shipping in the EU ETS which would be a forum for resolving some of the accounting issues. There are wider processes going on here which very much lead into the inclusion of both sectors in the Bill.

[1] Footnote inserted for witness for clarification 01.05.2007: earlier we heard references to the Gold Standard for high quality projects, which we support strongly.

**Q178 Mr Hurd:** On the duty to report and adaptation to climate change in the Bill, one of the impacts of climate change policy in the UK is to help the UK adapt. What is your view on the differences it would make?

***Ms Davis:*** We have had conversations with the OCC and others about this. Their interpretation of this is somewhat stronger than ours was initially. They take the view that the requirement is not just a reporting requirement but a requirement to bring forward a programme of action. That is certainly what we would like. We will be looking to strengthen the language so that other people cannot interpret it in the way we did which was just as a reporting requirement. We have a particular perspective on this as the RSPB because we are facing a situation where wildlife is already under substantial threats from all kinds of other pressures and is now faced with an additional, potentially knock-out blow as a result of climate change. We have what we believe is a totally reasonable expectation that, since these are human impacts, we find the resources and put forward the policies to allow wildlife to adapt. We take the view that that is important in the UK, but we also are talking to colleagues within the Stop Climate Chaos Coalition who work in the development movement and who have passionate concerns about funding for adaptation internationally as well as funding for the UK. We would like to explore the possibility of including an obligation for the government to report on the efforts it is making in terms of global equity to address the impacts of our emissions on the world's poorest people.

**Chairman:** Thank you very much indeed for a very helpful session. We look forward to seeing you again in due course.

## Tuesday 1 May 2007

Members present:

Mr Tim Yeo, in the Chair

Mr Martin Caton
Colin Challen
Mr David Chaytor
Mark Lazarowicz
Dr Desmond Turner

---

**Memorandum submitted by Climate Change Capital (BS 13)**

### 1. Introduction to the Authors

Climate Change Capital (CCC) is a specialist investment banking group that occupies a distinctive position. With access to a substantial and flexible capital base, we focus on businesses created or affected by the convergence of laws and policies on energy and the environment. Our dedicated team of 90 professionals located in London, Washington, Madrid and Beijing are experts in the fields of renewable energy, clean technology, biofuels and emissions reductions markets.

Kate Hampton is responsible for Head of Policy at CCC. She is a Sherpa to the EU High Level Group on Competitiveness, Energy and Environment, advising the European Commission. She rejoined the company in January 2006 from a year's secondment as a Senior Policy Advisor to Defra for the UK's G8 and EU Presidencies where she worked on the future of international climate change policy. Before joining CCC, Kate was Head of the Climate Change Campaign for Friends of the Earth International. She is the former Convenor of the Green Globe Network, an expert advisory group funded by the Foreign and Commonwealth Office. She was a research associate at the Institute for Policy Studies in Washington DC and an EU policy consultant for Environmental Resources Management. Kate holds a BSc from the London School of Economics and a Masters in Public Policy from the Kennedy School of Government at Harvard University.

Dr Tony White, MBE is Climate Change Capital's Market Development Team. Tony has been involved in almost all aspects of the energy industry, ranging from renewable energy research through to strategy, finance, international development and policy. He has made major contributions to the evolution of the industry during this time. Having been the analyst for the UK Government's broker during the liberalisation and privatisation of the England and Wales electricity industry in 1990, he recognised the different role required of network companies serving competitive power markets. This led to the introduction of the Transmission services scheme in England and Wales and was the driving force behind the UK Government's recent review of distributed generation. During the period 1996 to 2003, he was the head of the pan European Utilities Equity Research team at Kleinwort Benson, then Citigroup. Under his leadership, the team became ranked as the "team of teams" in the Extel survey of equity research and was ranked top European utility team by "Institutional Investor". He has been at the forefront of understanding the impact of liberalisation on the generation sector, correctly forecasting the path of power prices in Europe and the USA. He is a non Executive Director of the New and Renewable Energy Centre at Blyth and a member of the Advisory Boards of the United Kingdom Energy Research Centre and the Energy Centre at Sussex University. He has a BA in Physics and D.Phil in Biophysics from Oxford University and an MBA in Finance from the City University Business School.

### 2. The Climate Change Bill

CCC welcomes the Government's proposed Climate Change Bill as representing a major step forward in efforts to create an economy-wide policy framework for delivering a low carbon economy. To date the UK's $CO_2$ budget has covered only part of the economy, and UK investors have had to rely on policy signals on the need to deliver emission reductions from UN and EU institutions that currently have not delivered certainty that carbon will have a value post-2012. While this is not surprising, since international negotiations can take time to reach a consensus, the lack of certainty over carbon prices post-2012 means investment in low carbon infrastructure both in the UK and in developing countries is being delayed.

While it is very likely that the UNFCCC's Conference of the Parties will agree on the form of a successor to Kyoto by 2009, implementation of a UK framework for delivering emission reductions with regularly updated carbon budgets and emission reduction targets will mitigate investment risk by providing certainty that, at least in the UK, a carbon price will exist post-2012 and for the foreseeable future. The lack of a sunset clause in the Bill is important. Investment decisions are taken based on returns made over 15–25-year periods. Long-term signals on the price carbon will enable investors to make informed decisions about whether to invest in high or low carbon infrastructure in line with carbon targets set by Government.

CCC believes the creation of a Committee on Climate Change to advise on the nature of targets and budgets and assess government policy and progress towards meeting those targets is a significant move forwards in terms of depoliticising the issue of climate change. One of the barriers to date concerning the development of effective climate change-mitigating policies has been the gap between what climate change science indicates needs to change in the UK (and global) economy and the policy decisions, which carry political risk of unpopularity, politicians are prepared to take to make these changes. The introduction of a Committee on Climate Change to provide independent advice on the interface between science and policy will, we hope, act to remove some of the political controversy surrounding the UK's approaches to reducing carbon emissions. In this way, Ministers—who will ultimately remain responsible for setting and meeting targets—will be provided with some "political cover" to make tough decisions on future policies.

Following on from this the proposal to include enabling powers to implement secondary legislation if required to meet carbon targets is a revolutionary new approach to climate change policy and one that will form a key pillar to the success of the proposed legislation in delivering the carbon targets. There is significant cross-party consensus on the need to tackle climate change and so we are hopeful that this key part of the Bill will be endorsed by the Scrutiny process. Without it, the potency of the Bill will be significantly weakened.

While in light of the findings of the Stern Review, the proposed carbon targets of 60% $CO_2$ emission reductions by 2050, and an intermediate target of at least 26% reductions by 2020 are disappointing, it should be recognised that the use of statutory domestic emission reduction targets represents new political territory and therefore establishing the Bill with these well-established targets in place is probably a pragmatic first step. There will be, however, a strong need to retain the proposed option for Government to review these targets (on the advice of the Committee on Climate) in line with new scientific or international policies justify it. This will provide a lever to introduce more stringent targets as required.

*March 2007*

---

*Witnesses:* **Ms Kate Hampton** and **Dr Tony White,** Climate Change Capital, gave evidence.

**Q179 Chairman:** Good morning and welcome back to the Committee. We are very grateful to you for coming in again; I know it is not all that long ago since we last had an exchange really but we much value your contributions. In your memo you welcomed the draft Climate Change Bill and the increased certainty which you hope may result from having long term targets enshrined into law. Could you just say in practical terms what difference you think that actually makes?

***Dr White:*** It makes investors a little bit more confident that Governments are going to have to do something quite dramatic in order to change and that always gives a bit of "Do I invest this money or not? It is a policy risk, yes, but actually they would have to do quite an about-turn to make them weaken it or to mean that the investment does not make a return". Looking forward, what would cause a government to do that, a complete change in our scientific understanding of climate change? When you say that, people are now thinking that it looks pretty unlikely. So this gives you a bit more confidence that the market framework is not going to change.

***Ms Hampton:*** Internationally what it does is to indicate the intent of the British Government in relation to other partners in emissions trading that we may wish to link to, because there is not just policy risk within the UK, there is policy risk for others who wish to link with us. So it gives greater visibility in terms of the predictability of our policymaking to others.

**Q180 Chairman:** Despite the fact that even within the Bill there is a certain amount of flexibility about banking and borrowing. The record on achieving targets has been a bit patchy in the past, but those reservations are mitigated at least by the enshrinement in law. Is that your view?

***Dr White:*** That is correct. Also, if you have some balancing mechanisms—we may talk about borrowing later—that help to give you a bit more price stability and people recognise that, then you are more confident that if something happens, the governments will not panic because it has already been taken into account. Markets are concerned about things happening that are not expected, governments panicking and then you just do not know what is going to happen.

**Q181 Chairman:** You have expressed some disappointment, which I certainly share, with the scale of the targets, particularly the long-term targets, in the Bill and—I am quoting other people—they are going to have to be tightened up. As there is this element of uncertainty about that, does that have a knock-on effect on investors about uncertainty or it is so far away that it does not really affect them?

***Ms Hampton:*** It is more about, the phrase we often use, "predictable fiddling". If everybody knows why and when governments are going to intervene, under what circumstances, using what criteria and what their levers are, that is quantifiable risk. Business does not need absolute certainty, it needs quantifiable risk and for a long-term target, it would be important to do as much fiddling as you think is necessary now, on the basis of evidence now, when the Bill goes through, but having a review mechanism that is transparent. The key point is that it is de-politicised and that is the

interesting innovation of the committee, that it is an attempt to de-politicise that process. That provides greater confidence.

**Q182 Chairman:** What about the question, still uncertain, of when shipping and aviation may come into the whole process?
***Dr White:*** To a certain extent that is the Get Out of Jail Free card. If I am looking at phase two of the EU ETS, yes, it looks likes it is short, it looks like the companies in Europe are going to have to do something about it in order to meet their targets, because even if they buy the maximum amount of flexible mechanism allowances from the developing world, that still will not be enough, they will still have to take some action. However, the weather can get really warm and maybe our emissions go down, so there is a possibility that the market could be long again. Well, if I am a government sitting there in 2009–10 and I can suddenly put in a load of demand, because that is how it will be taken by the market, that gives me, as an investor, some confidence that the Government have some levers to make sure that this emissions trading scheme works and gives the right price signals.
***Ms Hampton:*** The politics of it internationally are very, very fraught and the EU has to be applauded for its efforts to include it because there have been huge diplomatic pressures not to; in fact, a lot of the discussions at the moment around the trading infrastructure and how that all fits together have to do with the politics of a lot of countries wanting to keep aviation emissions well away from emissions trading. It is not an easy task and this is why it has been very slow.

**Q183 Chairman:** Just finally reverting to the targets issue, does the delay in introducing proper targets have any kind of effect on either the economics or the amount of effort we are going to have to make eventually to achieve those targets?
***Dr White:*** The delay does mean that the efforts later are going to have to be even greater which, as an investor, gives you a little bit of confidence in so much as the prices are likely to go up rather than down because of that. As someone living on the planet with children, et cetera, that does give me some cause for concern, but I can understand that this is what is needed to get people to sign and once everybody has signed on and seen that it is not the end of the economic world, that actually we can survive and do well, that is the time when you can ratchet.
***Ms Hampton:*** The issue really is that, if you do not have long-term visibility, people will only invest in short-term operational decisions and this is what we were saying last time we were here about the EU ETS. The lack of visibility was encouraging people to focus on very short-term measures and if you do not get the concurrent investment in the solutions post-2020 during 2010 to 2020 for instance you will have some carbon capture and storage in the next decade, but you are really going to be doing a lot of learning to deploy it at scale later and if you are not doing that concurrently with the energy efficiency and the renewables and the other things that you need to do now, by the time you get to 2020, you are short of options and it becomes very expensive.

**Q184 Dr Turner:** Your memo is pretty bullish about the prospects for the UNFCCC's Conference of Parties coming up with a successor to Kyoto by 2009. What gives you this confidence and what do you think it is going to look like?
***Ms Hampton:*** The progress that has been made in the US politically is a key driver and we should not forget that. It has also been a key driver in Europe actually. One of the reasons why the EU heads of government were willing to agree to the targets that they did had a lot to do with the fact that visibility is increasing in the US. Whether the US actually signs up to the treaty, actually ratifies it, is another matter, but it is pretty clear that they will be capping their emissions. A number of other countries, Canada, Japan and Australia, are essentially followers of what the US does. It is politically very difficult in those countries to move ahead without the US, although we will see in Canada with a change of government. This also puts a huge amount of pressure on China and Chinese policymakers know that, particularly as their emissions are likely to switch and overtake those of the US. They know that that is a watershed moment. They know that as soon as the US acts, that is also a watershed moment. The formal negotiations will continue to be very fraught. We are starting to see countries dig in because they know that the discussions have begun in earnest. It is pretty clear, and the carbon market is one of the drivers for that, that action has to be taken soon to keep continuity in the market and that is in everybody's interest. The debate is already starting about what the future of the carbon market will look like and what contributions emerging economies will provide to that.

**Q185 Dr Turner:** Do you think, even if we get agreement by 2009, that will be in sufficient time to get a small progression from Kyoto to post-Kyoto?
***Ms Hampton:*** By 2009 is absolutely fine, even very early 2010 might be possible. As soon as you get beyond that, it is not enough time for national ratification processes in a number of countries, so as you soon as you have entry-into-force criteria that becomes difficult. If it does go beyond the middle of 2010, then you will have to have a fix for the gap between the commitment periods.

**Q186 Dr Turner:** So that timing is critical then?
***Ms Hampton:*** Absolutely critical.

**Q187 Dr Turner:** Do you feel optimistic about that timetable being achieved?
***Ms Hampton:*** The US elections are the obvious thing that people think about, but, assuming that Congress engages internationally and ramps up that engagement, that is possible. The real problem pre-Kyoto was that Congress was not engaged and so they dug their heels in and refused to budge.

Congress now is of a more open mind. That does not necessarily mean that there are enough votes in the Senate to ratify an international treaty, but there certainly will be enough votes going forward for a cap and trade bill. It is a question of the level of ambition of that at this point, which will partly depend on the new leadership, partly depend on US public opinion and partly depend on signals from China and other places.

**Q188 Dr Turner:** I come to the proposed Committee on Climate Change. Obviously, you hope that it will help ministers to make tough decisions on future policies. We have also heard concerns that there are issues which the committee would expect to be taken into account, which are set out in the Bill, which run counter to this. How do you think it will actually work out in practice and how do you think the committee ought to be set up and run? Who should be on it?
***Ms Hampton:*** The key issue is really de-politicisation. Climate change policy: let us talk about improvement from the status quo and then talk about the optimal. Any improvement from the status quo is good because at present you tend to have industry and environment ministries around the world—and let us see this in the context of the UK being a model for broader policymaking and there is a trend there—arguing a lot about climate change policy and industry and energy ministries tend not to include climate change objectives in their decision making and business does not trust those decision makers always to put what they see as short-term energy security concerns first. So you have to have a head of government to move those negotiations along, as we have seen through the ETS process. The Climate Change Committee, by de-politicising the process, by giving ministers the political space to say on an independent evaluation of the scientific evidence and the economic issues we think is the best way forward. Until now that has not existed. If you think about the impact that the Stern report has had, we are talking about a series of mini-Sterns, focused on the UK's policymaking specifically, which will give those decision makers some political space. It is not a panacea. You still have to have willingness of the ministers to accept those judgments, but it is better to have a process of independent evaluation going forward than none.

**Q189 Dr Turner:** That is well and fine. If it going to be effective and if people are going to take it seriously, then it has to have the right expertise, it has to have the right level of independence and authority. How do you think we are going to achieve that in its membership? The selection is going to be critical, is it not?
***Ms Hampton:*** The selection will be critical but there is no shortage of climate expertise in the UK, in fact there is probably more here than in any country in the world so I am not worried about a shortage of expertise. The process of selection will be key and that has to have a broad level of political support because if the appointees are not seen to have a broad level of political support then that makes the committee vulnerable to political risk if there is a change of government.
***Dr White:*** There is another point. You would expect the people on this committee to have some influence with the Government about, in the old words, setting national allocation plans, but the thing is that the UK cannot do it by itself, it has to be done in the European context and hopefully, touch wood, in the signing of Kyoto process or Houston process or whatever you want to call it, so you are looking for these individuals also to be able to argue the case extremely well at an international level not just UK. That is going to have to be very, very important.

**Q190 Dr Turner:** If the committee comes up with judgments and recommendations which are a bit tough to carry out and a bit politically uncomfortable for the Government of the day, how confident are you that the Government will actually follow the recommendations?
***Ms Hampton:*** One would hope that they are setting up this Bill to do exactly that; you cannot second guess those intentions at this stage. Given the level of societal consensus that is bringing about this kind of policy shift in the UK, it is actually going to be quite difficult to back-track and you could not introduce this kind of legislation in a country where there is still an awful lot of criticism over action on climate change or there was no societal consensus or there were still grave concerns about competitiveness and other things. The level of societal desire for this kind of legislation makes it more robust and it would only be possible in places where that does exist. If you do not believe that exists or you think that could unravel, then it is vulnerable, but I do not feel that will unravel in the UK.
***Dr White:*** Having a committee such as this also helps Government because there have been various things thrown at the European Commission by various Member States saying that it is a really tough national allocation plan which is done by Brussels, not them. I am not sure to what extent that could also be done by the Government at the time saying that these are really tough things, but this is what the Climate Change Committee has said and these are independent people, the best in the country that we could find, so we will have to do it.

**Q191 Dr Turner:** A lot of people have compared the Committee on Climate Change with the Bank of England's Monetary Policy Committee. Do you think this is a valid comparison? Are there any lessons to be learned from the way in which MPC operates?
***Dr White:*** That is something we certainly put to Stern almost a year ago now. There are some parallels there because at the moment the Government manage the inflation using interest rates and it has given this responsibility effectively to the MPC. People would not have given it to the MPC unless people already had confidence in the

MPC that they could do it properly. What we shall be looking for mainly over time is for that kind of confidence to be given to this committee but it is going to have to earn it, there is no question at all about that. There is a lot of similarity but it ends, I am afraid, at Dover, because it is not going to be enough for our committee to set things properly, it is going to have to be done in a European and a global context.

**Q192 Dr Turner:** One part of the MPC's relationship with Government of course, is that the Government set the framework for inflation and the Chancellor says it has to be within given bounds. Obviously you could substitute emissions for inflation, so the Government are still going to have an input into this committee; so the committee's recommendations are in a sense going to be pre-conditioned by the Government's expectations as set out in statutory targets, et cetera, are they not?
***Dr White:*** Yes, the Government will say they want to move to this level in emissions over this period and you have to write a letter if our emissions exceed that over a five-year average period, or something. It is very, very similar. The Government will say that this is the kind of level of emissions reductions they want from the United Kingdom and you give us recommendations to get there.

**Q193 Dr Turner:** Quite. The committee is going to have to make the recommendations to the Government about what has to be done to achieve those levels.
***Dr White:*** And if the Government decide not to do that, then it is transparent for everyone to see.

**Q194 Dr Turner:** They have to write a letter to the committee then.
***Dr White:*** Effectively; yes.

**Q195 Chairman:** Notwithstanding your point about this ending at Dover, which I fully understand, do you share the sense that I have, talking both to Americans and to people working in the EU, that we are in the lead in many ways intellectually here about how the policy-making process should be evolving and therefore quite a lot rides on the success of something like this Committee?
***Ms Hampton:*** I agree with that absolutely and within the EU we are seeing the beginning of this trend because people are starting to talk about more independent institutions, independent from Member State politics, independent from the Commission. So on issues such as verification and monitoring of data, release of data, you need more independent institutions and this may be the way with auctioning and so on. It is inevitable that once you have accepted the goals, the more independent the institutions, the more reliable they are seen to be by the market. Yes, everybody is watching this experiment and certainly, if you look at the way the US has created some of the institutions around its emissions trading scheme, the transparency and regular reporting and levers for adjustment are absolutely central to their way of doing it. If this works, people will sign up to it in some countries, not all, but there is a real chance that within the EU in particular the traded sector will be carved out of national policy making and put in a place that, over long periods, people can rely on.

**Q196 Mark Lazarowicz:** In a number of our recent inquiries, we have heard concerns raised as to the robustness of projects under the Clean Development Mechanism. What is your assessment of the progress which has been made to try to ensure that such emissions credits are soundly based?
***Ms Hampton:*** There are two things here. There is the issue of self-correction of the CDM executive board, which does work. For instance, when they realised that there was an awful lot of HFC-23 out there, they decided no new plant would become eligible, so no plants built or switching to this technology after 2004 are eligible; there is a process of self-correction. Beyond that, the politics of post-2012 will be a lot more progressive than people think they will because a lot of developed countries will require action of emerging economies which basically means a shifting of baselines. It is quite difficult to explain unless you are a CDM geek. At the moment CDM pays the whole difference between business-as-usual and the reduction, so essentially the industrialised country player is paying for the whole environmental benefit. As we go forward, people are talking more about sectoral mechanisms with one-way soft targets, which means that developing countries commit to a certain level of action through policy or through sectoral benchmarks, which means that they are contributing to some of that difference and they only get carbon finance for over-achievement. What you are talking about is super-additionality as opposed to just the whole difference between business-as-usual and sometimes you get tonnes anyway because there is always a margin of error. If you push the bar lower, then that means that you are going to achieve better environmental outcomes and you are going to be supportive of developing country policy. If the post-2012 negotiations do not have something like that in them, then I would say that that is a major failure of the post-2012 negotiations but those sorts of mechanisms are now starting to come out of the discussions. A number of countries are thinking about piloting these sorts of things. CDM will still be around; project-based CDM will be around for countries that do not have the data-gathering capacity or the regulatory capacity to do more ambitious things but we would certainly expect more ambitious sectoral programmes of other countries. The level of supplementarity should partially depend on the level of ambition of carbon finance globally but you cannot deny the success of CDM in this; it really has unleashed private sector ingenuity, going out to find tonnes that people did not know existed and actually proving that it is a lot cheaper than people thought. Without that carbon signal, that would not have happened and without CDM, those, even

the HFC-23, et cetera, would be vented to the atmosphere. So the key thing is to keep the system evolving rather than just expanding the status quo and if we can do that then I would not have any fears about inclusion.

***Dr White:*** Is part of your question, if you do not mind me asking, that there has been some bad press, to say the least, about some of these things, which is certainly the case? Part of the problem has been that with HFC-23 you spend a few million pounds or dollars on a plant in China and all of a sudden the value of those emission reductions is worth hundreds of millions in the European Trading Scheme. The way it is reported is unfortunate. We know that the emissions reductions have been done because under the new UNFCCC the verification and certification process is really quite stringent. However, what is often missed out there is that there are two things to the CDM: one is emissions reduction and the other one is sustainable development. Because of this, because of the way the Chinese have operated things, a lot of money stays in China and is used as the Chinese want. One of their major problems is social imbalance and they are trying to improve the living conditions of people in China, which I have great sympathy for. We have had the bad press because it has been so cheap to do and so people have made a profit, but also the Chinese Government have made a lot of money out of it.

***Ms Hampton:*** They taxed it; 65% of the revenue of HFC-23 is taken in by the Chinese Exchequer.

***Dr White:*** The other point I would make is that that low-hanging fruit has almost gone now and then if you want to do CDM in these developing countries you are going to have to do things which mitigate carbon dioxide itself and for that you need longer periods, longer visibility and so the economics become more akin to those in the developed world.

**Q197 Mark Lazarowicz:** You will recognise, I am sure, one of the fears expressed is that if there is a big increase of projects under the CDM, then of course that will flood the emissions market and reduce prices in the EU and therefore of course reduce pressure for change within the EU and the UK. Do you think that fear then is not justified or what is your opinion on that suggestion?

***Ms Hampton:*** We have to think very carefully about the signalling associated with things like the Climate Change Bill and the ETS review which is coming up at the end of the year. Rather than seeing them as internal policymaking, we should see them as opportunities to signal to the rest of the world what we think is an acceptable level of contribution to climate change problems. The Climate Change Bill and the ETS review are perhaps the biggest moments for us, because they are our biggest bargaining chips. It is "We are willing to finance decarbonisation in your countries, but we have to set out what the conditions are going to be to allow those credits in". It is a major strategic opportunity here and if that is used wisely, then we should not worry about it, but if the debate is too internally focused, then we should be concerned.

***Dr White:*** I take your point very much about how the market works. You get a whole load of projects and then the price collapses; in normal commodity markets we get this kind of price response. The difference here is that for phase three of the EU ETS all we know at the moment is what the carbon reductions are going to be across the whole of Europe. We do not know how much of that is being visited on the trading sector, so that is one negotiating hand that our Government has going to Bali. The second one is how many allowances coming in from the developing world will be tradable in this market. Part of the beauty of having a climate change committee which will have its European counterparts is that maybe how much can be coming in is part of the thing which can be adjusted in your five years. If there is an awful lot, then as long as you give signalling to the developing world, that makes it a lot better than all of a sudden seeing their prospects collapsing, the prices collapsing and not having the investment going into the country. These are mechanisms for trying to stabilise this new market that we have because it is not a normal commodity market with peaks and troughs.

***Ms Hampton:*** And you can have qualitative as well as quantitative restrictions on the kinds of things that you import. If the market is working well, then you should be as open as possible, but if you are concerned that the negotiations have not gone quite as you would have liked, then you do have the opportunity to be more restrictive.

**Q198 Mark Lazarowicz:** Is that not another argument for having fairly strict limits on how far internationally-purchased emissions credits can contribute to meeting our own domestic targets on the Climate Change Bill, firstly because it would stop the effects of the market which you talked about, but also deal with the concern that effectively we get away from making any changes to our economy and our behaviour because we bought it all on the international market. Is that not an argument for quite stringent limitations, which certainly quite a few of the NGOs have called for?

***Ms Hampton:*** But if you take the example, for instance, of the massive rural/urban migration occurring in India and China, which is unprecedented in history and will never occur again, we have one chance to build cleaner infrastructure, to support clean urban planning, to encourage mass transits instead of building of roads, to build clean buildings, close to zero carbon buildings. We have one chance at that because we all know that retrofit is more expensive. If money is sent through well-designed mechanisms towards that kind of effort, I do not really mind whether that slows down retrofit here, because that is a one-chance opportunity that the whole world should be contributing to. Of course, we will have our own

objectives and that will be part of the deal; the key thing is the quality of the investments you are doing overseas.

***Dr White:*** As an economist, which I am not, but if I were an economist I would be saying, this is a global problem, I want it done at the cheapest possible place, therefore if it is 100% done in the developing world then that is fine. As someone who wants to see a stable market develop, I can see why there may be a need for some restrictions early on but maybe they will disappear in time. I certainly take your point that you do not want the market price collapsing because you have underestimated the number of these allowances that will be coming through. There will be a balance to be struck, I am not the person to do it but hopefully this Committee will do it with its European colleagues.

**Q199 Colin Challen:** I did not quite follow the part of your answer where you were dealing with this concept of super-additionality. It seems to me that if the clean development mechanism is there to help developing countries go down a green path, a clean path of development, we can see that at the moment Africa is more or less, apart from South Africa, excluded altogether because nobody sees any additionality to be gained even at a low level of expectation, so how will the super-additionality concept benefit countries which do not have even basic infrastructure where you can actually avoid carbon emissions growth? I am not sure I quite see whether there is going to be any benefit for Africa.

***Ms Hampton:*** When I talk about super-additionality, I talk about it in the context of the major emerging economies. You would still need a project-based mechanism for Africa particularly and even with that, you need a lot more effort taken to improve the distribution of benefits there. A lot more needs to be done, both in terms of assisting in capacity building, around general investment environments but also climate specific. The designated national authorities for instance are very poorly resourced in Africa. The local business communities are not as well educated about CDM as they are in China, so they might not be identifying opportunities that exist. The nature of the projects also in Africa is different; they do not have large chemical plant in sub-Saharan Africa so they cannot benefit from the industrial gases. What can they benefit from? Well they can benefit from energy efficiency certainly, from some kind of fuel switching, from agro-forestry and those kinds of assets are the sorts of things that are going to start happening now the cheaper larger abundant reductions are being used up. We are going to start to move to a place where the costs of carbon are more attractive to do investments in Africa and that is starting now. If an African country wanted to do a sectoral mechanism, then they should not be stopped, they should be encouraged, but for now, given the capacity to gather data and enforce and so on, it is more likely that Africa will continue to work in the area of project-based CDM, at least for the coming years.

**Q200 Colin Challen:** The Bill contains a section at the end which deals with the potential to introduce new emissions trading mechanisms, which you have described as a revolutionary new approach, even though it is only enabling the revolution at this stage. What do you see as the great features of that in the Bill? Why do you welcome it so much?

***Dr White:*** Things can happen a little bit faster and it is only possible because there is cross-party support for the climate change issue; the fact that it could be faster. It is not completely wide-ranging, it is only trading mechanisms and that is a good way to start to see how much more discretion can be given in this area to accelerate the way in which we reduce emissions.

**Q201 Colin Challen:** Perhaps the reason why we do not have the fully-fledged version in the Bill is because you do not think the political realities as they are at the moment will support anything more radical.

***Dr White:*** I am not sure we know enough at the moment to do it more radically at this stage. We do not know enough now. Could we have a domestic cap and trade scheme put in now? Could we do it? We do not know enough.

**Q202 Colin Challen:** How do you think these enabling measures will survive the scrutiny process?

***Dr White:*** Well all I will say is that I am not an MP and I would ask you that. How do you think it will get through? There would have to be a certain number of safeguards that would have to be offered about the kind of timing, the ability to discuss, but, to be honest, I was just interested in the fact that this is something that can make new legislation come through maybe a bit faster, where there is consensus on the agreement that actually something needs to be done in this area.

**Q203 Colin Challen:** Which you do not really see as being there at the moment in society, not necessarily just between the political parties.

***Dr White:*** In the last six months we have seen a big change in society actually in terms of what society is willing to do. I just heard the other day that when B&Q put its wind turbines up for sale, they had nine million hits on their website. Centrica sent a survey to all of its customers and got a 15% return; people had to answer 17 questions and they sent it back. This would not have happened two years ago. There is definitely a sea change.

***Ms Hampton:*** The point about leadership is key. Experiment and leadership have to occur in the places where there is a societal willingness to do that and if not the UK, then who is going to test out these mechanisms. Frankly, there is the broad political support, there is support from business and if the UK does not do it, then I cannot see many other countries stepping into the fray. There are other countries that will move quickly, if it is a success in the UK, places like Germany and others, but the UK is really where the leadership challenge lies. It is no longer about saying we will reduce X% in 2050: it is about actually planning a

route to get there. We are only just off the starting blocks really in terms of leadership and this is a real opportunity to show that.

**Q204 Colin Challen:** Do you think we should do more to streamline the system? We have so many different schemes in operation and the enabling powers anticipate perhaps more schemes being introduced. Would it not be far better for the investment community if they could just have a very much more streamlined system that does not add all these bureaucratic complications and confusion in the market?

***Dr White:*** In the heart you obviously say yes, but the problem with that is that certain mechanisms will work in some markets but not in other markets. Some places are expected to regulate non-compliance and the like and in other places a trading scheme could work. What would be interesting is that the Committee establishes what kind of price of carbon is embedded in the various measures that are adopted. If you look at the renewable obligation, in carbon terms it is really quite expensive. If you look at bio-fuels, it would be the same as well. Okay, there are other reasons why we would want to do it, security of supply reasons, but for the carbon element, we should try and go to some embedded price that goes across the whole economy, building standards, that kind of thing.

**Q205 Colin Challen:** The potential for introducing personal carbon allowances, which this Bill certainly paves the way for, does raise the question of whether the burden should be dealt with downstream with the consumer or upstream, as much of it is at the moment, with power generators and cement manufacturers and other major industrials. Do you think there is going to be a danger there of duplication? How is that going to be sorted out if we start asking the consumer to trade carbon? When you buy electricity for example, who pays?

***Dr White:*** There is a real case there that just the administrative costs of doing something like that would be really quite high in my view. What I am hoping is that we are going to move to a different model of energy supply. What I have always thought should be happening is that instead of the people just generating electricity and selling gas and customers just using it, we change that business model. The kind of way I see it changing is instead of selling energy, et cetera, you would be selling lighting and comfort and warmth. In which case, if you could do that, then the energy companies would have an incentive to invest in their customers' facilities such that they could still make more profit despite selling fewer units of energy. To me that is absolutely key. The way that works—and you do not have to look that far back—is that when Edison started in the nineteenth century, he did not sell electricity, he sold lighting. He gave light bulbs to his customers and charged them according to the number of light bulbs. When that was happening it was in his interests to generate his electricity as efficiently as possible and make his light bulbs as efficient as possible. Once it changed so he was then selling units of electricity, the whole business model changed and he wanted to sell as many light bulbs which were as inefficient as possible and the model falls down. If we can move to a position where the energy companies, instead of building their next power station or developing their next gas field or getting another cargo in of LNG, actually invest in giving someone a new boiler before it needs replacing and it is a much more efficient one, maybe installing solar panels, maybe doing solar/thermal or wind turbines or what have you such that they can make a return on the investment in their customer's location, rather than a return on the bit of kit they built somewhere else, that, to my mind, is probably a more effective way. The companies themselves would still be penalised according to the amount of carbon that they emit at their manufacturing place.

***Ms Hampton:*** Energy efficiency and energy demand are the issues that we really have not dealt with effectively, not just in the UK but everywhere and yet everybody says it is the most important wedge, it is the easiest thing to do for climate. However, without trading mechanisms in some of the consuming sectors, it is quite difficult to see how you would incentivise the companies that can provide the services that do that for people to make a buck. Without those incentives it is quite difficult to see how we will get that energy efficiency because even if economically it makes sense, commercially there is nobody interested in it.

***Dr White:*** You could move to personal carbon allowances, but that would be a very, very difficult thing to do. In the meantime there are lots of other things we could do as I have just described which would get us an awful long way down the road.

**Q206 Mr Caton:** Could we move on to the economic impacts of mitigation? Stern said that even limiting the total cost of mitigation to 1% of GDP by 2050 will mean price rises and economic upheavals in the meantime. That message has not been perhaps as widely disseminated as some of the other messages that came out of Stern. Are we being honest enough about the fact that there will be economic losers as well as winners in carbon mitigation?

***Ms Hampton:*** We are not necessarily being honest enough, but the important thing is, coming back to the point that Tony was making about services, that it is not about having energy at the lowest cost, it is about having energy at the right price and the services that come from paying the right price for energy. If you have a rounded debate, traditionally because the green movement has been under attack from all sides, particularly when it comes to the economic cost of doing things, it has tended to be too defensive and now we are entering into a phase where we can have a much more informed debate about what the right price for energy is and how that encourages people to think about services rather than just energy. Then of course there will be some sectors of society that will suffer as a consequence, but that should be dealt with through social policy not through climate change policy.

***Dr White:*** I remember the quotation, but Stern's major point was that we do not really have a choice. If we do not do anything, it is more expensive than doing something and yes, there will be those upheavals. My view has always been that, first of all, we have had a massive carbon tax in the last few years where the price of oil went from $20 up to $70 dollars a barrel, but we have managed to keep going. What Government can do though is effectively give long enough price signals or frameworks so that people can invest to mitigate the costs of mitigating carbon dioxide as best as possible. Given that we would not choose to have a world that suffers from excess carbon dioxide, we are getting that way, therefore what is the most effective way of tackling it, so that life can go on?

**Q207 Mr Caton:** The Regulatory Impact Assessment with the draft bill says that the carbon intensive sectors of the economy are likely to contract. Does that mean we are going to lose manufacturing jobs?
***Ms Hampton:*** This has been looked at a lot in the context of the EU high level group on competitiveness, energy and environment that I have been involved in and a lot of that industrial restructuring is occurring for reasons other than climate policy. There are a few sectors which are particularly vulnerable to carbon pricing: aluminium is one; cement plants, but only on the edges of Europe. So in the south of Spain, where they could move to North Africa for instance, they are vulnerable but not cement as a whole. It is a very complex picture. In addition to that, a lot of our efforts will benefit from the scale associated with clean technologies being deployed in China for instance: very large market; can deploy at scale; could do PV cells probably cheaper than we could. It goes both ways: there are benefits and costs and, again, it is an issue of making sure that any adjustment process that is necessary or is likely to happen anyway is mitigated within the context of the appropriate policy. If you have a global system where the energy intensive sectors, for instance, will be the target of sectoral mechanisms—this is the discussion that is happening in the business community around competitiveness at the moment—if there are sectoral benchmarks which apply globally and you only benefit from carbon finance, if you overachieve that is going to start mitigating some of those impacts. So again, if you design the international regime to take account of those things, then those risks will be somewhat smaller. It is very easy to lay industrial restructuring at the door of climate policy when actually it is the effects of exchange rates and labour costs and raw materials and transportation which are actually much more significant except for some particular sectors.

**Q208 Mr Caton:** Is there anything we should be doing in those sectors, to try to protect those industries, or is there anything we can do?
***Ms Hampton:*** The key thing is to make sure that action on climate change is occurring with as much of a level playing field globally as possible. That is probably the best protection that companies get to compete in a fair international environment and by engaging major developing economies such as China and India, through carbon finance and assisting them in transforming their energy-intensive sectors, we will be levelling the playing fields. Understanding the international negotiation dynamics associated with carbon finance will support our industry not just the international climate change effort. So far, because the EU has been alone in what it has been doing, it has been very easy to challenge it on competitiveness grounds; as the efforts become more widespread, then there will be more room for levelling the playing fields.

**Q209 Chairman:** Is there anything else that we have not talked about which you think is relevant to what we are trying to do?
***Ms Hampton:*** Transparency is key. In how this Committee operates, what advice it provides and how the decision-making process occurs, transparency is absolutely essential and that will give confidence to the market.
**Chairman:** Several of us are serving on the pre-legislation scrutiny committee as well, so there is an overlap between the EAC and that and I hope we shall be exploring exactly that point in due course. Thank you very much for coming in again; it is much appreciated on our part.

---

*Witness:* **Professor Paul Ekins,** Head of Environmental Group, Policy Studies Institute, gave evidence.

**Q210 Chairman:** Welcome back. It is very good of you to come to talk to us again. I wonder perhaps whether you might start by giving your overall reaction to the draft Climate Change Bill, whether you think it is ambitious enough in its scope and so on.
***Professor Ekins:*** It is potentially an historic bill. It does not of course do much in itself to reduce carbon emissions; there are no policies in there. What it does is establish the statutory obligation to reduce those emissions and provide the various mechanisms whereby that obligation can be properly monitored. What that might do is take the climate change issue beyond the normal football field of political debate to a higher level football field of political debate in the sense that all parties in Parliament will need, if they disagree with carbon-reducing policies, to propose other carbon-reducing policies in their place. The option of simply saying "We don't want to reduce carbon", unless you are going to repeal that Bill, will not exist and that is potentially a very, very important development.

**Q211 Chairman:** Were there any omissions, things you would have liked to have seen in the Bill that are not there?

***Professor Ekins:*** There are perhaps two areas: one is the scale of the reporting. At the moment, the scale of the reporting is rather limited to Parliament and it would be missing a trick if the whole issue of public awareness was not included in that scale of reporting. That seems to me to be the really key area.

**Q212 Chairman:** I am going to divert for a moment, because it is the first time we have talked to you since the Stern review was published. What was your general view of Stern?
***Professor Ekins:*** It did an enormous service to everybody by framing the economic issues in a way that they are often not framed. I was very impressed by the way in which firstly he starts with the science and the concerns of scientists with potentially catastrophic impact. That is why we are worried about climate change, because of potentially catastrophic impacts. If it were everything just getting gradually warmer, over two degrees in 50 years, that would not be the issue. It is the potentially catastrophic impact. I have seen so many economic analyses that simply do not recognise that point and yet that is the point that is driving the political concern and that is concerning the scientists. Chapter two of the Stern report is about the ethics of climate change which again you often find is not very well mentioned in economic analyses: the fact that there will be losers and the fact that the losers are likely to be the poorest people on the planet, whereas the people who will have benefited from the activities that cause climate change are the richest people on the planet. This is a fundamental ethical issue which needs to be factored into the way in which you think about the costs of climate change. Of course Stern then does that by coming up with this range of GDP costs from damage of 5 to 20% whereby that 20% is supposed to capture some of the catastrophic impact issues and the fact that there are ethical issues and there are weightings to be applied to take account of those ethical issues. Of course, those numbers in my view are largely picked out of the air because we do not even know what all the potential outcomes are from climate change; we are much less able to put an economic cost on them. It was one of the first serious economic studies that I saw that gave what I considered to be adequate weight to those key issues and then evaluated the economics in the light of those key issues.

**Q213 Chairman:** Well that is a pretty favourable verdict, which I incidentally entirely share, though I am much less expert on it. Do you think, in the light of that, that Government's response so far has really been adequate?
***Professor Ekins:*** No is my honest answer to that. I find it hard really to explain to myself why, for example, the Treasury, which commissioned the report from its Chief Economist, has had two signal opportunities since the publication of that report, both the Pre-Budget Report, when the Stern review was published, and indeed the Budget in 2007, to show the world just how seriously it was taking it. While some welcome measures were announced in both reports, to someone who is an avid follower of both Pre-Budget Reports and Budgets, they were much more a continuation of business-as-usual, rather than something that said "Hang on boys, we've had a wake-up call, we've pedalled the wake-up call round the world where it has had a huge, completely unprecedented impact and we are going to show that we are taking it seriously at home". I am not a politician, but I kind of feel that the public would have resonated to something much more ambitious at that time and the fact that it was not forthcoming was a great opportunity lost.

**Q214 Colin Challen:** The Stern report suggested that the developed world should take emissions cuts of between 60 and 80% and the Government defended their decision to put in the Bill a 60% target on the grounds that falls within the range suggested by Stern. What do you make of that?
***Professor Ekins:*** It is obviously at the bottom end of the range and the science of the last few years has increasingly shown that 60% is very much at the bottom end of the range, if we want to avoid dangerous anthropogenic climate change. The Bill of course does allow targets to be changed in the light of scientific experience and it may be that it will be easier to get the Bill into statute at the 60% level and then increase the target, if that seems to be even more justified by the science than it currently is. It may be that it will be easier to do it like that than to put an 80% target in from the beginning.

**Q215 Colin Challen:** Do you think it might be easier perhaps not to have a stated figure as the target but to have the transparent formula on which it is based in the Bill so that you do not have to wait for a significant change and what the significant change in the science is that will change the target is not defined? Do you think it would be better to have a formula in the Bill so that it could change as and when required?
***Professor Ekins:*** Of course there are lots of uncertainties in the science and there are going to be lots of uncertainties in the science and it is highly desirable that there is an actual target in the Bill so that the people who are investing in low carbon technologies know what they are aiming for in terms of carbon emissions. You will remember that the 60% comes from the energy report of the Royal Commission on Environmental Pollution published in 2000. I am currently a member of that body and our view probably is that the science has changed and that if we were writing the report now, we would be thinking quite hard as to whether the target should be higher. We have not had that discussion, so in a sense I am speaking a bit out of turn, but that certainly is an issue. Our thinking behind that was to keep the atmospheric concentrations at 550 in order to keep the temperature increase to below two degrees centigrade above pre-industrial levels. Now, my understanding of the science is that it may well be that 550 will not do that any more and it is clearly the average temperature increase and everything that flows from that that is the key effect. It might be as well to put in the Bill something like "This is the objective of this 60% target" and if the science

suggests that actually 550 is not low enough and that that therefore means the two degrees will be significantly exceeded, then Government have a statutory obligation to revisit that target in order to think about emissions trajectories that are more likely to keep the effects in check.

**Q216 Colin Challen:** I take your point about political expediency, although I understand that the Conservatives have argued for a higher target, 80% I think. Do you not think that allowing the political expediency to have such an influence on the Bill and this target-setting process perhaps fatally flaws the Bill in terms of the science and what the Government's stated objective is, which is to keep the temperature increase within two degrees rise?
***Professor Ekins:*** Firstly, the science is a little uncertain and therefore the 60% is within the relevant range albeit right at the bottom of it, but the Bill is not fatally flawed because the target can be changed and it explicitly can be changed within the Bill should the political consensus around that be established. To be honest, from this perspective in 2007, whether it is 60 of 80% is much less important than establishing a credible interim target which will start us reducing carbon emissions rather than increasing them from now. That seems to me to be the really key issue which we ought to be focusing on. Once we have started that process and people have started to make money out of low carbon technologies and people have managed to adjust their lifestyles so that they make less use of carbon in their lifestyles, then we will be in a much better position to start thinking about adjusting the targets downwards, if the science seems to suggest that. Right at the beginning of this process, 60% is a pretty reasonable shot to be aiming at and it is pretty ambitious.

**Q217 Colin Challen:** Do you think that that figure should include offsetting, buying our way out through offsetting elsewhere in the world? Should that not be an additional part to it? If we agree that 60% is already a low level of achievement and you can lower it even further domestically by buying credits from elsewhere, do you think that is really morally correct or indeed sustainable in any other respect?
***Professor Ekins:*** That is a very problematic issue. We can understand how this offsetting business got into Kyoto and everything, a quite justifiable desire to reduce the costs, but what is becoming apparent to me is that despite the best efforts to make CDM et cetera rigorous and robust and to result in real carbon reductions, these are always carbon reductions against a hypothetical baseline and just the fact that you do a carbon reducing project that produces fewer emissions here than would otherwise have been emitted does not mean that the capital is not going to go off somewhere else and increase carbon emissions somewhere else. There is a real danger with these offsetting mechanisms that we could find ourselves in a position where all countries look round and say "Well, we're reducing emissions very well because we're buying all these offsets and stuff" but globally emissions keep rising. That is a real danger, which is a long way of saying that the offsetting mechanism needs to be very, very sparingly employed in developed countries' targets and the great majority of them should be through domestic action, so that a rich economy like ours can show that it is possible to maintain civilised life and have low carbon emissions which, at the moment, is the hypothesis that needs to be proved. We do not need to prove that if you change a very inefficient coal-fired power station to a less inefficient coal-fired power station, you produce fewer emissions. That is something we know. What we know we have to find is the way of living civilised lives with low carbon emissions and that should be the objective that is pursued by the Bill.

**Q218 Colin Challen:** Last week we heard from the RSPB and WWF that they thought we should have a higher target and they were talking about 80% and that would more accurately reflect our responsibility as a developed nation but would also help drive investment in low carbon technologies elsewhere in the developing world. What would you say to that argument that we do need to have a higher target, if we are really serious about driving that kind of development elsewhere?
***Professor Ekins:*** At the risk of repeating myself, a 60% is pretty tight. If people thought we were serious about hitting a 60% target, and at the moment we have had targets that we were not serious about hitting and therefore we have not hit them, if people thought we were serious about it then 60% would drive it. Eighty per cent would probably drive it more. The only difficulty with 80% is that in my view you would need to bring the interim targets up to make it a credible trajectory and at that point you are starting really to push the policy envelope as to what is politically feasible. Again, I am not a politician. If Parliament were to decide that 80% was the right way to go, then that would be absolutely splendid.

**Q219 Colin Challen:** It is this trajectory issue which is of crucial importance. If we do delay making a change to what we already accept as being a low target, at the bottom end of expectations, and which I personally believe the science no longer supports as sustainable, if we change it in five years' time, that means we have five years fewer to achieve a higher target, so for a whole variety of reasons it would seem to be imperative that we get it right from the start. If we do make that change later on, how do you think we could make the transition? How could we change the trajectory?
***Professor Ekins:*** One of the aspects of Stern with which I am in most agreement is his insistence that we have to start now and that if we delay, it will end up more expensive. Of course, if we delay and we have to hit a higher target, then it will end up more expensive still. You and I are definitely at one on the need for immediate urgent action and that, to me, was the one headline message of Stern that I would want to take home.

**Q220 Dr Turner:** Surely the 60% target only means anything in terms of world total $CO_2$ emissions. Then, by definition, some countries are going to have to achieve more than 60% if the world is going to achieve 60% and the onus clearly has to be on the large-scale industrial emitters such as ourselves. So there is a very practical reason for wanting a higher target for the UK than 60%. Would you agree?
***Professor Ekins:*** My sense is that the 60% target is a target for the UK which is consistent with a global emissions trajectory that will not breach these concentrations, but it is not calling for a 60% reduction in global emissions from a 1990 base. The calculation is based on the perception that if developed countries were to reduce by 60% and developing countries were to increase their emissions but by less than is currently forecast, then we would get on this trajectory but that 60% is not intended to be a global emissions target. If it were, then you are absolutely right that developed countries would have to reduce their emissions by much more than 60% to allow for the inevitable emissions' growth in developing countries which we can see taking place every day.

**Q221 Dr Turner:** $CO_2$ emissions do not recognise national boundaries, do they?
***Professor Ekins:*** Indeed they do not.

**Q222 Mark Lazarowicz:** We are still going to have the Committee on Climate Change and we have the Office of Climate Change and there are various other focuses for government activity such as the Interdepartmental Analysts Group. What do you think should be the respective roles and responsibilities of the committee, the office and these other agencies and committees and the like?
***Professor Ekins:*** The innovative aspect of the committee is that it is an independent body and it will therefore be able to draw its conclusions on the basis of best information from science, social science, and it will be able to make recommendations which have that kind of authority. I suppose the comparison that one hears most often in this context is the Monetary Policy Committee. There were lots of bodies in Treasury concerned with interest rates and monetary policy and there still are bodies in Treasury concerned with things like that, but making the Bank of England independent and setting up the Monetary Policy Committee in order to look at those issues independently was perceived to remove the political pressure to play with those instruments in a way that was socially undesirable and that has been broadly a successful experiment. The Committee on Climate Change will have a similar kind of role now. No-one is proposing and I certainly would not propose that the policy recommendations of the committee were mandatory for Government in the way that the Monetary Policy Committee recommendation on the interest rate is mandatory, it actually takes the decision, because the policies on climate change are much too far-reaching and because it is right that there should be political accountability for them. Therefore, you will still have both the Interdepartmental Analysts Group and the Office of Climate Change having to consider the Committee on Climate Change policy recommendations and having their own take and bringing in the politics, which is obviously introduces an important set of issues, but the Committee on Climate Change will not have those constraints. I can imagine that the departmental bodies will still have plenty of work to do, but one of their key tasks will be to evaluate the recommendations of the Committee on Climate Change and if they decide that they do not want to go along with those recommendations, then they will have to propose something else and that comes back to what I said right at the start about the importance of this Bill: they will not simply be able to say "No, I don't like that" because there will be a slug of carbon which these policies are scheduled to take out from emissions and they will have to find some other way of doing that.

**Q223 Mark Lazarowicz:** The regulatory impact assessment of the Bill suggests that the Committee on Climate Change would need staffing numbers around 15 to 20 to support it in its work. Is that the kind of size of support that the committee would require to allow it to carry out its duties with sufficient independent expertise and with a budget, which as a result would be in the region of £2 million for that kind of level of staffing?
***Professor Ekins:*** That level of staffing sounds fairly reasonable, provided they are high quality people who have the necessary technical expertise because a lot of this stuff is pretty technical. You need to have people who are on top of engineering technologies, on top of the science of climate change, on top of the various social sciences that are used to evaluate the policies. I am slightly worried that the budget would not be large enough to support the level of outside research that will be necessary to make the policy recommendations properly grounded. I am not expert in what Government spends on external research, but it would be very interesting for example to see how much it had spent on external support for the Energy White Paper process that has been going on now for a couple of years and to see whether that was in any way perceived to be adequate and would cover the range of issues that the Committee on Climate Change would be expected to cover.

**Q224 Mark Lazarowicz:** Do you have any thoughts on the kind of make-up of membership of the Committee on Climate Change and also as to how far Parliament should perhaps be involved in the selection of members or the scrutiny of the appointment process of members of the committee?
***Professor Ekins:*** One of the questions in the consultation paper is "Do I think it should be predominantly a technical committee?". My answer to that question is unequivocally yes. It needs to be very much an expert committee that is focused on the full range of issues that are relevant to climate change and, having said that, that means that it will need quite a range of social as well as technical expertise because there will be lots of social issues

that it will need to consider, apart from fuel poverty, as well as the other kind of scientific and engineering and technology type issues which are also going to be absolutely critical. The previous evidence which I heard the end of, for example, commented on why everybody says energy efficiency is such a good thing, but it is so difficult to achieve the kinds of 20% cost-effective absolute reductions that everybody says exist in the energy efficiency field. I am convinced that is partly an economic issue that energy has been cheap and people are used to it being cheap and they take time to react, but it is also partly a social issue. It is partly to do with the structures of society that make energy invisible, that do not make it a matter for comment and discussion, and how to change those kinds of social norms will be a very important set of issues around the kinds of recommendations that the Committee on Climate Change will make and that again comes back to this issue of reporting. If it just produces a dry technical report on emissions trajectories and the like—and it has certainly to do that and it has to do that well—but it also has to think more broadly and report more broadly about the kinds of lifestyles, ways of life, behaviours which are producing these emissions in the first place and give some support to the political measures that will then be necessary in order to start changing those things.

**Q225 Mark Lazarowicz:** On that point, you made reference earlier on to the Monetary Policy Committee and drew a distinction as to how this committee, the Committee on Climate Change, would operate as compared to the MPC. Another body with whom you might want to draw comparisons might be the Sustainable Development Commission which was set up obviously at the start of the current Government, perhaps to have a kind of role which one might imagine the Committee on Climate Change has in terms of public engagement and so on. What lessons do you think we could draw from the experience of the degree to which the Sustainable Development Commission has been able to influence government policy?

***Professor Ekins:*** The key difference is that the Committee on Climate Change will be reporting against challenging targets that have to be met by statute. The Sustainable Development Commission has only ever been an advisory body. It has covered a very wide range of subjects, but there has been no obligation on anybody to take any notice of it apart from the usual kinds of political pressures and tensions that arise when an authoritative body writes reports of a certain kind. The fact that the Committee on Climate Change will be reporting on the way in which Government have met quite specific targets and will be proposing ways in which, if there has been a shortfall, this can be remedied, and the fact that we must expect that for the first few years at least extra policies, perhaps politically unwelcome policies will need to be taken into account such as energy taxation, will give it much more bite.

**Q226 Dr Turner:** Stern was also greatly concerned about the social cost of carbon. There is some confusion about what Stern is actually saying because it is argued that Stern has endorsed a social cost of carbon which is three times higher than the main value of £70 a tonne of carbon that the Government currently refer to. We had a little difference with the Financial Secretary of the Treasury earlier because he asserts that Stern's value relates to global costs and is therefore inappropriate for the UK, but on the other hand the Government also recognise that the effects of a tonne of carbon are the same wherever it is emitted. What is your view on the social cost of carbon?

***Professor Ekins:*** How long do we have? This is, in my view, one of the most complicated subjects in the whole area of environmental valuation. You will know that Defra and the Treasury had a joint process and commissioned a couple of learned papers on the subject which are on Defra's website and the Treasury's website. I was a peer reviewer of those papers so I was quite closely involved in it and I tried really to understand what was going on. Eventually I came to the conclusion that the social cost of carbon is, from an economist's point of view, a very elegant concept and quite a useful theoretical concept because it stresses that whatever action one takes on climate change, it should, in some sense, be proportional to the sorts of damages that you are seeking to avoid. However, I came to the conclusion that all attempts to put a number, actually to arrive at a figure within which you could locate the social cost of carbon, were so fraught and uncertain as to be effectively useless as an instrument of policy. The main scientific report that the Treasury commissioned said that the social cost of carbon, looking at the literature, could be anything between £1 per tonne and £1,000 per tonne and accepted that even that was not a maximum cost. Anything that varies by three orders of magnitude and has a level of uncertainty of that level seems to me to be of little use as a policy check. Where are we going against this? There are in fact lots of technical reasons why the social cost of carbon is so uncertain, one of the most difficult of which is that of course you can only calculate it once you have determined the carbon trajectory that you are on, because the cost of a tonne of carbon emitted today, which is what the social cost of carbon purports to be, the damage cost, the damage that that tonne of carbon will cause, depends on how much carbon is emitted in the future. If this was the last tonne of carbon that we were emitting and we were somehow to cut to zero emissions of carbon dioxide hereafter, that tonne would contribute to ongoing climate change and it would have a positive cost, there would be a positive damage cost there. However, if that tonne were followed by N further gigatonnes in the future, then runaway climate change would take place and this tonne today would have a very different cost. That is one of the reasons why you are getting this difference of three orders of magnitude. You have to agree the trajectory of climate change before you can calculate the social cost of carbon. As we know, the trajectory of climate change is one of the most uncertain things

in the lexicon, quite apart from what the effects of any given trajectory of climate change are likely to be. One goes off into the uncertainties of climate change, the possibilities of catastrophic effects, et cetera. I have come to the conclusion that it simply is not helpful to try to put a particular number on that rather elegant theoretical concept.

**Q227 Dr Turner:** In a sense that is a view which was reflected last week by the Office of Climate Change which is giving us the government policy view on Stern and they were talking in terms of relating the social cost to the level of stabilisation in the atmosphere. Surely it can be an instrument of policy because, if we push the cost of carbon to business up sufficiently then it will drive business in a low carbon direction. Do you not think that there is a value in putting numbers on it and that we can use these numbers to change practice in business?
***Professor Ekins:*** This is one of the major confusions around this whole social cost of carbon issue and it is a confusion which is present, I am afraid, in the Stern report as well and is certainly present in the two papers that were commissioned by Defra and the Treasury because that was one of my main criticisms. The social cost of carbon is a damage cost. It is the cost of a tonne of carbon emitted today in terms of the damage, climate change damages, that it causes. The cost that you have just referred to is the mitigation or abatement cost, the cost that firms and people have to undertake in order to emit less carbon. These two concepts are totally distinct. They are quite different concepts economically. The ideal, in economic terms, is to equate them in such a way that the social cost of carbon is equal to the marginal abatement costs because you then arrive at the socially optimal amount of climate change. Because you would like the marginal damage and mitigation costs to be equal to produce a socially optimal state, and because the social cost of carbon is so difficult to calculate in itself, you get assumptions that the marginal abatement cost on what Stern calls a sensible trajectory will be roughly the same as the social cost of carbon. However, the whole point of thinking about the social cost of carbon is to allow you to determine what a sensible trajectory of carbon emissions might be. You have a real circularity of argument there which does not help. In my view, it is very important to think in terms of abatement costs because abatement costs are real resources which are committed in order to reduce carbon emissions and we want to keep abatement costs to a minimum through sensible policy and we want to take the low-hanging fruit first and we want to stimulate innovation and technological change, so that abatement costs come down. None of that has anything at all to do with the social cost of carbon, except that in so far as you are successful with your abatement policy and you reduce carbon emissions, that will reduce the social cost of carbon because you will move to a lower trajectory of carbon emissions, you will cause less damage out in the future and that will result in a lower social cost of carbon, but, as I have said, I do not believe that you can meaningfully calculate it.

**Chairman:** That is a helpful distinction.

**Q228 Mr Chaytor:** May I ask about the concepts of banking and borrowing? Is this a helpful provision in the Bill and does it really make any difference? Would it not happen anyway?
***Professor Ekins:*** It is absolutely critical that banking at least is allowed. Banking and borrowing are rather different in this field. Banking is critically important in order to give confidence in the carbon market, so that people will reduce emissions now, they will take early action, they will go for it right up to the limit of economic feasibility or economic viability, in the knowledge that if they save more carbon than they think they are going to, they will be able to offset those emissions against these very tough targets that are coming in the future. That is a very, very important incentive. Borrowing is much more difficult because we know that the natural instinct of practically everybody is going to say "Let's not do it today, let's do it tomorrow and then we can borrow against the future". Of course, if too many people borrow against the future, the future becomes unachievable. A very good example of that, in my view, was the way that the United States approached the Kyoto Protocol. All the analyses that I know suggest that if the United States started taking abatement action in 1997, the year that the Kyoto Protocol was signed, the costs of achieving its Kyoto Targets would have been of the kind that Stern suggests, perhaps 1% of GDP or whatever. By waiting until 2004–05, which is when a lot of the analyses started, obviously the cost of achieving those emission reductions once the emissions had grown enormously between 1997 and 2004 and you only had six years, all you could do would be to shut down a large part of the generating plant of the United States in order to achieve that, which of course is enormously costly. Had they been borrowing against that Kyoto Target from 1997, the target would simply have gone out of the window, as indeed it did because it was perceived to be too expensive. Banking is crucial and I would have 100% banking for as long as people need to bank. Borrowing would need to be very, very restrictive, if indeed you allow it at all. To borrow, people would have to show that they have very, very good reasons for thinking that their emissions in the future, which will be governed by lower targets, will enable them to pay back, will be low enough to enable them to pay back those borrowings.

**Q229 Mr Chaytor:** Given the emphasis Stern places on early action, realistically are we going to be in a position to bank anything, given we do not have the policies yet in place to achieve the early cuts needed?
***Professor Ekins:*** If we were going to have very ambitious early targets, then we might not be in a place to bank, but it is nevertheless very important for that facility to exist because there will be some people who have overlooked very significant carbon reductions or there will be technological breakthroughs or innovations and I believe that those need to reap the carbon benefits of doing that so that people try harder to achieve them.

**Q230 Mr Chaytor:** In terms of borrowing is the 1% limit realistic?
***Professor Ekins:*** That should be an absolute maximum because 1% of quite a large number is quite a large number. It is like being credit-worthy: you would really need to be able to persuade people of your carbon credit-worthiness. Perhaps the committee would be a suitable scrutiny body in this respect, and this would reinforce the parallels with the Monetary Policy Committee. The committee would have to be persuaded that a borrowing today was really against the right kind of investment strategy that would allow those carbon reductions to be made in the future in addition to the carbon reductions which a reducing target is going to imply anyway.

**Q231 Mr Chaytor:** Earlier, you talked about the importance of parliamentary accountability. Do you think the banking and borrowing provisions should be subject to parliamentary approval and not just the approval of the committee? The analogy with the MPC being that every year we have a Finance Bill.
***Professor Ekins:*** Yes, that seems to me almost to be a relatively technical matter. Once the Bill was passed and the banking and borrowing facilities were agreed and put into place with the necessary caveats, I would have thought that was something that the Committee could take upon itself, obviously with Parliament's approval, because it is precisely that kind of issue which can play havoc with the politics, but it is a technical issue, it should be something that can be technically decided, perhaps like the interest rate and perhaps that could be a role for the Committee on Climate Change by itself.

**Q232 Mr Chaytor:** Finally may I ask about the permissive powers for developing new trading schemes? Where do you think it would be most effective to introduce new emissions trading schemes, which sectors of the economy?
***Professor Ekins:*** The proposals that we have are for the energy performance commitment, which extends well into the business and public sectors what we have currently got for the EU emissions trading scheme, and the proposals to include aviation and perhaps aluminium in that in the future—these are the low-hanging fruit as far as emissions trading schemes are concerned, in the sense that you are talking about significant organisations that will develop carbon management expertise. Once you are getting to much smaller organisations or even to individuals, individual motorists or individual householders at home when they are using their energy, then it becomes much more difficult, not just administratively, but in terms of understanding the market. Markets are complicated things and at the moment, there are lots of people who do not have a clue what carbon is or how it is emitted or anything. To create a trading scheme at that level is like creating a new kind of money: lots of people do not understand old kind of money terribly well and this is a new kind of money which would need its new smart card or whatever it was and people would need to understand all the ways in which carbon entered into their consumption. Ultimately that is very desirable. It is very desirable that we become carbon aware to that extent and so I see nothing wrong with it as a long-term objective. In the interim we would do much better to rely on the other economic instrument which is the price mechanism and I was a great supporter of fuel duty escalators, for example, because that transmitted a very clear signal year on year to motorists that petrol was going to be more expensive. Were one to introduce a trading scheme right upstream from the moment the carbon entered the economy, in other words the trading was essentially among the big energy utilities, then they would have to buy carbon permits and, especially if the permits were auctioned, which I would recommend, that price mechanism would then filter through. I am aware that the price mechanism is not a panacea and that not everybody takes notice of prices, especially energy prices which are historically very low. People are going to become more aware of energy prices; they are becoming more aware of them. They are going to become more aware of climate change and I suspect that that would certainly be an administratively much easier way of proceeding and would have a similar effect to introducing what would be quite a difficult scheme of personal carbon allowances or even bringing road transport into the EU emissions trading scheme. I have been wondering, because it is the Government's proposal to bring road transport into the emissions trading scheme, who would have those permits. Would it be the individual drivers or would it be the oil companies that put the petrol on the forecourt? If it is the individual drivers, then it is an extraordinary innovation from the emissions trading scheme which will move from rather few very large organisations to millions of motorists. If it is the petrol companies upstream, then you are very much in the second model that I was talking about because they will have to buy the carbon and that will then be transmitted down through the price mechanism, so that is where the motorists will feel that carbon reduction mechanism.

**Q233 Mr Chaytor:** When trading becomes deeply embedded into the structure of the economy, would there still be a future for the climate change levy or do you envisage trading taking over all of those functions?
***Professor Ekins:*** Interestingly, the European Commission organised a conference, Taxation for Sustainable Development, just recently in Brussels and they asked me to address that precise question, not in terms of the climate change levy, but in terms of energy taxation more widely; when trading becomes "it", do we need energy taxes? The first thing I would say is that if emissions permits were 100% auctioned, then the answer is no, then we definitely do not need taxes. However, as we know, emission permits are not 100% auctioned and it is likely to be some time before they are and the trading scheme is not universal and it is going to be some time before it is. Under those two circumstances, then energy taxation still has a very important role.

One extra role that it has, quite apart from reaching parts of the energy-consuming system that the emissions trading scheme does not reach, is that it effectively puts a floor on the price of carbon and that is a very important issue for investors in low carbon technology. The price of carbon with the emissions trading scheme has been terribly volatile. It has gone all over the place between €3 and €30 a tonne over the last 18 months alone and we can expect it to be some time before it settles down because there are so many uncertainties, international uncertainties, national allocation plan uncertainties, as to what the amount of carbon available is going to be. If you were to have a credible minimum carbon tax, what that would do is put an effective price on the floor of the permits, because everyone would have to pay that amount for carbon, and then the price of the permits themselves would be reduced by that amount so the permits themselves would be cheaper and obviously if the carbon tax were set at the level of the permit price, then the permits would effectively be free, which is how they were handed to the companies in the first place, but they would all pay the tax and the people who had invested in low carbon technologies would get that minimum return based on the tax. There are lots of very interesting and quite technical issues to do with the interaction between taxation and trading, but until we get to the stage where all carbon consumers are covered by a trading scheme that is issued through a process of auction, then there is going to be scope for a tax.

**Q234 Colin Challen:** Just looking at the pricing mechanism and concentrating on road transport, since the fuel protests in 2000 emissions from road transport have risen, despite the extra efficiencies in actual car efficiencies and so on and the price of fuel has also gone up well beyond where it was in 2000. How much do you have to add onto the price of something to make a deterrent or to reduce the use of that fuel?

***Professor Ekins:*** Firstly, I am not sure—I do not have the numbers in front of me, but one could obviously check this—that it is correct to say that the price of fuel is more now than it was in 2000 in real terms because although the price of oil has gone up substantially, that is a very small part of the price of road fuel. It is only about 20% of the price of fuel, the rest is tax and the tax has been largely frozen in real terms since 2000 so the tax effectively has fallen over that time. The price of fuel is probably rather lower at the pumps than it was at the time of the fuel duty protests. Working out the effectiveness of something like a tax like the fuel duty escalator is very difficult because you can only do it by saying "What would energy consumption have been, if the tax had not existed?". Then of course you get into economic modelling and economic models are notoriously difficult, they are complicated, they are difficult to understand, they may be wrong, they are uncertain, it is very hard to know what is going on. I think the *ex post* evaluation of the fuel duty escalator which the Treasury has done is pretty robust. It does show that the fuel duty escalator reduced fuel consumption substantially below what had been projected and I do remember that early in the 1990s, before the fuel duty escalator came in, when we were thinking about projections of emissions from road transport, they were projected to be very much higher by the end of the decade, that is by 2000, than they in fact turned out to be. Emissions from transport during the 1990s stayed largely constant. There were several factors that will have fed into that, but I believe the road fuel duty escalator was certainly one of them. Since 2000 emissions have grown from transport quite substantially and, again, I believe that the effective freezing of road fuel duty from that date certainly has had a role to play in that; again there will be other factors. While with all the usual caveats about this being uncertain territory because you are evaluating against a hypothetical baseline, the evidence we have about the effectiveness of the price mechanism in the transport sector is rather persuasive and economists are generally agreed that the long-term effect of a price signal, especially a consistent price signal, is much greater than a short-term effect because it influences people's purchase decisions, what kind of car they are going to buy as well as car makers' design decisions about how fuel efficient they are going to make their cars. I am generally persuaded about the effectiveness of prices, especially in the road transport sector, on the evidence that we have since the fuel duty escalator was introduced.

**Chairman:** Thank you very much, that is very helpful indeed and comprehensive. We are grateful to you for coming in.

---

## Memorandum submitted by Dr John Rhys

### Personal Details

Most of my career has been spent in energy policy and energy sector reform, in the UK and in EU countries, and also working as an adviser with the World Bank and other bodies in Eastern Europe, Africa, India and China. I was for many years Chief Economist at The Electricity Council, responsible for energy policy work, forecasting and the industry's consumer research programme. Before becoming Managing Director of NERA UK Economic Consulting I developed its energy consultancy, leading work on electricity privatisation (including nuclear) in the UK, as well as energy sector reform, competition policy and state aids issues in both the UK and Europe. I have therefore had continuous exposure to many of the energy policy and forecasting issues now exercising the Committee. I am now, *inter alia,* a Visiting Fellow with the Energy Group at Sussex University, and a member of the British Institute of Energy Economics (BIEE) Climate Change Policy Group.

KEY POINTS

— Targets should retain focus on the key objective—the control of the level of global cumulative emissions; annual emissions in particular years such as 2020 or 2050 are useful landmarks but are ultimately only secondary or intermediate targets.

— Official forecasts sometimes do not appear to have the benefit of detailed end use analysis. This is essential to monitoring many aspects of policy, particularly those that depend on influencing consumer behaviour; a comprehensive research programme to remedy this could be established for a comparatively modest cost.

— Emission statistics highlight the fundamental importance of the electricity sector, not only as the largest current source of $CO_2$ emissions, but because of its potential future "carbon-free" contribution in buildings and transport; a successful long term strategy demands an essentially carbon-free power sector.

— Cost effectiveness; a significant economic issue in the Stern analysis suggests Stern might have attached an even higher social cost to current $CO_2$ emissions.

— There are some limitations to the use of cost effectiveness analysis, including the danger of inconsistency between public policy and private sector decisions; a corollary is that the value of carbon should feed through to the supply chain and into consumer prices.

— Short term incremental measures provide important but limited reductions in emissions. Ambitious longer term targets imply systemic change both in supply and in demand; this attaches key importance to more urgency in long term plans.

— For the longer term, annual forecasts are likely to be significantly less important than the monitoring of actions against a credible pathway for each sector, with long lead times involved. Monitoring arrangements need to reflect this.

— Competitiveness issues have been exaggerated, given the relatively small emissions from industrial fossil fuel use and the small or indirect impacts on competitiveness from policy initiatives in the key sectors.

FORECASTING AND TARGETS

A first requirement of $CO_2$ targets is that they should align with the objective. This is to minimise cumulative emissions, not to achieve a particular level by a given date. Targets such as 60% or 80% reductions in annual emissions by 2050 may be useful indicators of what is required but they should not obscure the primary objective, reinforced by Stern, of keeping cumulative emissions within "safe" limits.

This distinction is important for two practical reasons. First, the shape of the path from the baseline to a given 2050 annual emission level has a very large impact on cumulative emissions over 43 years. To illustrate the point, a 60% reduction over 45 years requires a 2% pa reduction. However a 3.5% pa reduction for 20 years followed by a 1% pa reduction for 25 years yields the same annual emissions after 45 years, but a cumulative emissions total that is lower by the equivalent of nine years emissions at the end of the period, loosely speaking "gaining" an additional nine years of time.[1]

Second, the undeniable primacy of cumulative emissions implies that a rational approach to the design of an international regime and associated market mechanisms is also likely to be based on cumulative emissions from a baseline, with carryover of emission rights/savings between time periods, not on rigid annual numbers. Aligning national targets consistently with the shape and structure of future international regimes, including the ETS, will be essential.

Larger early reductions, if they can be achieved and sustained, are disproportionately beneficial in reducing cumulative emissions, and hence in delaying adverse climate impacts and/or easing the pace of transition to low carbon in later periods. This is one of the factors behind the recent call by a group of UK energy economists for a greater urgency in UK climate change policy.[2]

*Question 1. Government approach to forecasting.*The Government's forecasting methods may be the best that is available for a high level view of energy trends. However, there are issues in forecasting and monitoring targets, which are difficult to address without significant improvements to the knowledge base. This is particularly the case with "aspirational" targets or forecasts of non-specific "efficiency" gains.

Medium and long term forecasts normally fall down either because key economic assumptions prove to be wrong, for example on GDP growth or relative fuel prices, or because of new trends and relationships, including technical change. In a policy context this creates the risk of not very useful debates around the "counterfactual", a hypothetical "what might have happened but for . . .", rather than the policies themselves.

[1] Likewise a back-end loaded reduction path adds a similar and substantial amount to cumulative emissions.
[2] BIEE Climate Change Policy Group. *Bringing Urgency Into UK Climate Change Policy*. December 2006.

The real priority has to be the effectiveness of policy and the achievement of targets. Monitoring short term targets should be about evaluating the effects of particular initiatives and policies. This requires more attention to the detail and understanding of exactly how energy is used in particular sectors. Some aspects are relatively easy, such as modelling how changes in relative fuel prices for gas and coal impact on the carbon emissions from a given capital stock of electricity generation. By contrast it is much harder to assess the factors impacting on household use of electricity and gas.

I am not aware for example of any regular publication of estimates of how much energy is used by households for major sources of consumption such as space and water heating, cooking, refrigeration, lighting and other uses, let alone any monitoring of trends. One consequence of this may be exaggerated estimates of the carbon savings available from apparently trivial behavioural changes, for example in charging cell-phones. More seriously it makes it more difficult to assess accurately the impact of more significant changes, such as low energy lighting, or the impact of the housing stock on consumption for domestic heating. The less well founded any original savings estimates are in concrete assumptions about physical parameters, the more unreliable any monitoring will become.

An incidental but unfortunate by-product of the energy sector privatisations was the fragmentation and abandonment of the consumer research programmes carried out by the nationalised fuel industries. I would therefore recommend re-establishment of a comprehensive programme of load[3] and market research monitoring the nature of gas and electricity usage by consumers, and perhaps enhancing programmes aimed at better understanding of the dynamics of fuel use in the transport sector. Such a programme would be a relatively inexpensive form of "hard-edged", quantified social research and could provide important inputs to policy formation across the board. Carried out on an annual basis it could provide considerable assistance in monitoring the effectiveness of policies to promote fuel efficiency, and give an early indication of, for example, the rebound effects that occur if extra efficiency is absorbed in extra consumption.

*Question 2. Independent check, uncertainty and inclusion of international aviation.* The BIEE Climate Change Policy Group proposed[4] that "there should be an early and rigorous independent check on the feasibility of $CO_2$ savings to 2020 projected to result from the enhanced 'climate change programme' of the July 2006 Energy Review". Given the very limited real progress over two decades (as opposed to fortuitous reductions unrelated to carbon policy, notably the "dash for gas" or UK de-industrialisation), we need to be much more confident that this aspiration is achievable. Such an independent review might be commissioned by the new Carbon Committee.

Uncertainty should be set in the wider context of evaluating how targets are to be achieved. The correct response to uncertainty is emphasis on target achievement, not on hypothetical evaluations of excuses and counterfactuals.

International aviation and shipping are critical to a successful global outcome. Their exclusion reduces the credibility of other achievements. Hence they clearly need to be monitored, but as a distinct and separate component of the overall task, a component in which progress to international agreement will be a key factor.

*Question 3. Projections to 2020 and 2050.* While alternative forecasts and scenarios for the longer term development of the energy sector can be instructive, the view of the BIEE group has been that the emphasis needs to shift to focus on the pathways required to achieve the overall target, and the policies that need to be put in place to implement them. The task of monitoring progress then becomes that of monitoring progress for a number of sectors, of which by far the most significant are electricity, buildings and transport, to ensure that the required changes are happening, and that the relevant infrastructure, market and regulatory arrangements are in place to support progress to sector targets.

To illustrate the point, I believe the arithmetic of current emissions makes it very clear that UK carbon targets can only be met if the electricity sector becomes virtually carbon free. If the position can be reached by (say) 2020 that no new generating capacity is being constructed other than renewables, nuclear or fossil with full carbon capture, then the range of possible outcomes for electricity demand in 2050, while still important, becomes much less relevant to carbon policy per se. If the sector is by then intrinsically carbon free, higher or lower levels of demand in 2050 may still have investment implications, but will be accommodated mainly by market-led adjustments to construction programmes.

## Social Cost of Carbon, Cost Effectiveness, Approach to Policy

*Question 4.* For the purposes of policy discussion we need to distinguish carefully between the incremental social cost, the incremental costs of mitigation, and the "market price" of carbon under particular sets of emission control arrangements, all of which are important measures. Stern makes it

[3] For electricity, load research is based on sample recordings of load on individual circuits or appliances.
[4] BIEE Climate Change Policy Group. *Bringing Urgency Into UK Climate Change Policy*. December 2006.

clear that the social cost of carbon emissions is very high, and has indicated a current value of around \$85/tonne of $CO_2$. However, Stern also makes it clear that in many sectors the cost of mitigation is well below this cost.

There is an important point on the social cost of carbon where the generally sound Stern analysis may be flawed. The Stern report suggests that the social cost of $CO_2$ emissions rises over time because damage increases as the ppm limit is approached. I believe this is misleading. Evaluation of the economic cost of current emissions must reflect a central feature of the physical models of climate, namely the identification of the *cumulative* concentration of gases as the main driver of climate change and hence of negative economic consequences. If an incremental tonne of carbon emitted today results in an incremental tonne of carbon in 2050, then its future impact after 2050 is essentially the same as a tonne emitted in that year.[5] It follows that its total social cost impact will be greater by the extent to which it has already contributed to a higher concentration.[6] If this argument is correct, then \$85/tonne might be a significant understatement of the cost of current emissions.

As a very broad policy instrument, it would appear right for the government to recognise a high social cost of carbon, as part of the rational underpinning for a number of necessary policies both short term and long term, and for choices between options and sectors. However, there are a number of caveats attaching that should inhibit uncritical use of the approach:

(a) Regular review of carbon valuation will be needed as both the science and the economic analysis is developed. A more pessimistic outlook emanating from the science is likely to translate into higher valuations of social cost. Technical advance by contrast could reduce mitigation costs and market valuations of carbon.

(b) Consistency should obtain between public policy and private economic decisions. In principle both should be based on the same valuation of carbon. Inconsistencies will arise if a high value of carbon is put into public policy making, but not into the price that consumers pay for fuel. It may for example be cost effective to subsidise a consumer to insulate a large heated garage or a heated but unoccupied second home, when the same householder, if forced to bear the cost of carbon directly in fuel prices, would choose a cheaper and more effective solution.

(c) A corollary of the above is the general principle that an appropriate value of carbon should be allowed to feed through into consumer prices and into supply chains, so that consumers can make genuine economic choices informed by the high real cost of carbon. Potential hardship resulting for particular fuel-dependent sections of the community can and should be addressed through other policies.

(d) Other aspects of policy choice are involved. Policy needs to be set in a context that compares relative costs of mitigation, particularly where these are in competition for the same market. Policy has to be assessed not only on cost effectiveness but also on consistency with overall delivery of carbon targets. For example a policy built around a new technology that cut by 25% the carbon emissions from fossil fired power generation might appear cost effective with a high valuation of $CO_2$. But it would not be consistent with a $CO_2$-free power sector; if the latter were a pre-requisite of achieving the overall target, then the technology would not pass muster as a long term solution.

*Questions 5, 6. Approach to Policy.* The government needs to move quickly to put more emphasis on the policy measures that will be needed to achieve the longer term targets. We need to recognise that relatively "easy" short term measures, which include some "low hanging fruit", can only deliver a small part of the total reduction that will be required. Longer term measures that require major systemic and infrastructure changes, or major investments, should be given at least as much urgency, and will deliver much more of the ultimate reductions required.

A sectoral approach should focus on electricity, transport and buildings.[7]

## The Main Sources of UK Carbon Emissions

An estimate of current UK carbon emissions can be constructed from official fuel use data, using conventional assumptions of each fuel's $CO_2$ content, to show how sectoral policies and targets might be framed and prioritised. Excluding emissions within the oil and gas industries themselves, an admittedly imperfect but reasonable approximation, based on 2004 data, is the following:

| | |
|---|---|
| power generation (for final use in all sectors) | 34%* |
| transport (mainly road but including rapidly growing aviation) | 33%** |
| domestic use of fossil fuels, mainly gas | 17% |

[5] A possible partial counter argument to this might apply if the extra emission were to increase the re-absorption rate; however with limited re-absorption or positive feedbacks it is perhaps more likely that an incremental tonne of carbon emission results in more than one incremental tonne in 50 years time.

[6] The comparison ignores time discounting in the context of this particular argument.

[7] Note that, if we exclude its share of electricity, industry is of less significance.

| | |
|---|---|
| general industrial use of fossil fuels (excluding energy industries) | 12% |
| other, including commercial and public sector | 4% |
| | 100% |

* NB this excludes power already taken from nuclear and renewables.

** Aviation is often excluded from aggregate numbers for UK.

Given the absence of proven near term alternatives in transport, and the inertia inherent in the building stock, this indicates very strongly that even a 60% reduction target implies that electricity has to be carbon free, and underscores the hugh importance of getting electricity right. Electricity would constitute an even bigger share but for the 20% of generation that is already carbon free (some renewables but mainly bigger share but for the 20% of generation that is already carbon free (some renewables but mainly nuclear). Its future importance is accentuated by its potential role to substitute in transport (electric vehicles or as a primary source of hydrogen), and to replace direct use of oil or gas in heating buildings.

Electricity is also significant because international experience shows that the capital stock could be turned over within comparatively short timescales, of one or two decades, to be virtually carbon free. The French experience (admittedly easy and very cost-effective policy initiatives to reduce uncertainty, such as a policy commitment or a floor price for $CO_2$, could lead to significant increases in $CO_2$ reducing investment.

More generally the BIEE group concluded[8] that the need for urgency in policy making requires that the government should demonstrate a singleness of purpose, at the earliest opportunity, by emphasising the importance of carbon targets within a "joined up government" approach. Wherever possible, policies to meet other objectives (eg fiscal, housing and other policies) should be consistent with and should not obstruct $CO_2$ reduction. Where other policies do run counter to $CO_2$ reduction, it should be made explicit that additional countervailing measures will be needed.

## Accountability Targets and Reporting

*Questions 7, 8.* The BIEE group[9] argued that there is a strong case for aligning the main sectoral targets with government departments and introducing ministerial responsibility for them. Annual cumulative emissions should be monitored and any excess over the target path should be justified and addressed convincingly in the evolution of policy.

It is important that reporting and monitoring should be viewed not only in terms of the annual reduction of emissions against the required trend, but also in terms of progress with measures necessary to secure sustainable momentum in future years. The use of an independent agency to monitor whether policies of individual ministries deliver on an annual basis, and also on mid-term targets, is attractive. Separating design and implementation from monitoring could increase the credibility of the monitoring agency and thus improve the monitoring and enforcement of targets.

The composition of the Carbon Committee should not be based on special interest groups, as this would weaken its independence and its credibility. It is important that it should include a substantial body of scientific, engineering and economic expertise to provide a good practical understanding of the many complex issues with which it will have to engage.

## Competitiveness Issues

*Question 9*. I believe that, in the context of measures by the UK to combat emissions, the significance of competitiveness, as an issue inhibiting unilateral action, has been greatly exaggerated. First, an analysis of the sources of emissions makes it clear that direct industrial use of fossil fuels (other than for power generation) is quite a small part of the total, so targeting industry is not a first priority. Second, the measures necessary to contain emissions in the most important sectors, electricity,[10] housing and transport, will mostly have only small and indirect effects on industry costs, and in terms of competitiveness are dwarfed by the much more direct and overarching effects of exchange rate movements. Third, those fuel intensive industries which are subject to international competition account for only a small percentage of GDP. In this context it is useful to distinguish intra-EU and extra-EU competition. UK power costs for industry are already higher[11] than in much of the EU. In shaping the EU ETS we should certainly aim to prevent economic distortions that merely "export" emissions to countries outside the EU with lower energy efficiencies, but this is best done either by limited "ring fencing" for the few industries concerned, or by pursuing wider international agreement.

[8] BIEE Climate Change Policy Group. *Bringing Urgency Into UK Climate Change Policy.* December 2006.

[9] *Ibid.*

[10] In the case of electricity, it may also be noted that French electricity for industry, already essentially carbon-free, has been very competitively priced.

[11] Arguably just part of an exchange rate issue.

SETTING SHORT TERM TARGETS

*Question 10.* Targets should be framed to reflect emphasis on the longer term objective of cumulative emissions; they should have a sectoral element to reflect individual ministerial responsibilities, be realistic on short term achievements and be capable of being monitored in fairly concrete terms; they should cover not only $CO_2$ emissions but also progress with the fundamental longer term systemic aspects of policy.

*March 2007*

*Witnesses:* **Mr Mike Parker,** Chair and **Dr John Rhys,** British Institute of Energy Economics Climate Change Policy Group, gave evidence.

**Q235 Chairman:** Good morning and welcome. You would have heard most of the previous exchanges; we will cover some of the same ground but not entirely. I wondered to begin with whether you would just like to take us through the main arguments of the Climate Change Group paper that you produced?

***Mr Parker:*** The starting point was that we were looking at the landscape outside and seeing that the scientific consensus was moving further towards being more certain of the scale of risks involved in climate change; and also we were very conscious of the fact that the underlying mechanism is one of cumulative irreversibility; if we do not do anything every year which goes by the problem becomes worse. So there is an inbuilt imperative to take the thing seriously in terms of urgency. The second was that if one then looked closer to home, we are absolutely convinced that the exemplary value of a strong policy within the UK is vital internationally as well as within the UK, that notwithstanding the fact that we are only 2% of world emissions, our potential contribution to a sustainable world order on this matter is a good deal higher than 2%; it is very high indeed, therefore that must be protected and nurtured. Yet one looks at the UK situation over the last 10 years and we have not reduced $CO_2$ at all, notwithstanding the enormous amount of work and analyses and energy reviews and so on and so forth that have taken place and notwithstanding the fact of the splendid work done by the Royal Commission. Here we have a situation where, some 10 years after the Royal Commission did their calculations in, there is now serious doubt as to whether the target which they put forward of 60% reduction in UK $CO_2$ emissions by 2050 is in fact still valid because of the fact that we have made no progress over the last 10 years. Those were our starting points. It seemed to us that there was a very good case indeed for examining the ways in which urgency as a particular factor can be incorporated in the conduct of policy, that ways in which we think about it all the time actually affect the way we do things. We have set out in our paper some of the things that one does not need, in view of the time, to go over in detail, but there are one or two things in particular we would want to emphasise. We did not know about the Climate Change Bill when we wrote this paper of course. The first essential precondition is that Government should appear to be single-minded in its pursuit of these very, very difficult demanding tasks. In other words, when they say it is the most important thing around, they should act as though it is the most important thing around. When one gets involved in discussions of this, people say "Ah, therefore you mean that energy security is not important". We do not mean that. "You mean that equitable distribution of fuel costs is not important". We do not believe that either. We did try to find a form of words, which we set out in paragraph 6(i) of our paper, where we said, in the context of joined-up government "Wherever possible, policies to meet other objectives (eg security, competitiveness and income distribution) should be consistent with and should not obstruct $CO_2$ reduction" and that is the way round it should be done. That of course also helps you to look for synergies, look for countervailing measures which can be taken. The emphasis all of the time is whether public policy assists us to meet our carbon objective or not. We thought that was an important observation to make and it is of general application. Perhaps the most important thing is that we thought that having said all these things, one has really got to ask whether there is any particular way in which we could address these matters which would have the effect of addressing urgency directly, bearing in mind that everything takes a long time to do; not everything, but a great deal certainly of major technological change and system changes take a long time to do. If you look historically, people talk about 30, 40, 50 years in circumstances where there are enormous financial incentives to make these transitions. That is not so straightforward in this case. There is an enormous amount of inertia in the system whereby incremental changes introduced by the Government are swallowed up by underlying trends and so on. It did seem to us to be highly desirable to take this thing apart and think about it in terms of timescales, in terms of time all the time, how one can progress the momentum forward. We made this suggestion of a time-critical pathway to be developed by government departments for the three main sectors of electricity, transport and the building stock. There is a little bit of overlap between these three things, but they can nevertheless be reasonably well defined and talked about independently and the process here should be to think through very clearly and analytically how much more we can get out of incremental marginal improvements to existing capital stock and the existing systems and over what timescale that is likely to taper away and to what extent therefore is the timing of the need to be reliant upon new technologies and new systems. That is the first constituent part. The second is to look at all the options that are available to move in a low carbon direction at a reasonable pace thereafter and to see to what extent they have different lead times or different barriers to progress, and the time it would take to remove those barriers, and in this way to identify, using the analogy of the critical path which is used very usefully managerially to order the

conduct of large projects, civil engineering projects, maybe the Olympic Games for all I know, so that you get to the end in time; to take that analogy and see whether it can be applied to the conduct of climate change policy and using the word time-critical to keep emphasising what the main constituent interest is and to get descriptions by Government for the three main sectors not only of what the main decisions, the key decisions are that have to be taken, the main things that have to be done and not only the order in which they all have to be done, but also the timing of them, if we want to arrive where we want to arrive at. This brings out the other very desirable part of this way of thinking about things which is that working back from the answer is a very, very useful thing to do for this particular kind of problem which we have. It is an extremely long one. It embraces the timescale of many ministers and quite a few parliaments and that is one of the virtues of the draft Climate Change Bill, that it does look over a reasonable period of time in that respect. Working back from the answer is a very powerful way of concentrating minds as to what has to be done so we have the answer. In the case of electricity, for example, we have suggested that, bearing in mind the likelihood that we shall have eventually, in the not too distant future, to be thinking in terms of the 80% rather than the 60%, that will involve, if we are to do it over the whole of the UK, a virtually carbon-free electricity system by 2050—take a deep breath at that point—how do you get from here to there and what is the timing of the key decisions in that process, bearing in mind that we only have this limited time to do it? The importance of this idea of a time-critical pathway, which you can give other names to of course, is that it could provide real motive power to the operation of the arrangements envisaged at the time of the Climate Change Bill. We have not, as a group, yet formalised our response to the Bill, but it does seem to us that it would be a pity if it were purely an arrangement to arrive at carbon budgets and to regulate the carbon budgets without there being an input to all the detailed policies and measures that are required to get from A to B. Another point which we have put a lot of emphasis on, if one is looking at the monitoring accountability process, whether it arises from the Climate Change Bill or otherwise, is that the nature of the problem is such that it is not going to be enough to be concentrating on why last year's target is awry, what we can do to get next year's target back on course. This is the short-term thing. The accountability required really does fall into two broad component parts. The first is monitoring the delivery of short-term measures such as the Government have already identified in the climate change programme and so on, which will no doubt be enhanced by the White Paper when it comes out; the monitoring of that is how delivery is proceeding, whether delivery is being made possible and so on. That is one constituent part. The other constituent part is how you are laying the foundations for the longer term things that have to be done. There needs to be monitoring and there needs to be accountability on the effectiveness of the foundation laying for the longer-term transitions that will be required and it does seem to us that it is not possible to do this in an effective way unless one has thought through in detail something like the time-critical paths for the main sectors. These are our main points.

**Q236 Mr Caton:** You mentioned the Energy White Paper, which is due shortly. The Government seem to be relying on measures in that to meet their targets for 2020 of between 26 and 32% reduction in carbon emissions. What do you want to see in the White Paper and what criteria will you use to assess it?
***Mr Parker:*** I do not know what is going to be in the White Paper of course, but we brought out one or two things in our paper which we thought were unsatisfactory pieces of unfinished business in the last Energy Review Paper and we would want to see those covered in the forthcoming one. These were, if you recall, that the long-term study they were doing on the relative case for centralised or decentralised electricity—remember a study has been going on for some time—needs to be resolved sooner rather than later. Since this will have a very considerable impact upon how one thinks about whether there should be a reliance on carbon capture and storage, new nuclear power or whether there can be a system of decentralised electricity consisting wholly of renewables, or a hybrid mixture of these and centralised power plants and so on and so forth, that seems to me to be an extremely important one which they have got to make progress with. Others are that we have not yet seen any formal discussion of the extent to which the overall fiscal regime and the EU and UK competition rules assist or impede low carbon policies. That seems to me to be a missing plank in the armoury we have to consider these matters. Finally, you mentioned that the climate change programme enhanced by the last energy review more or less gets us to where we want to be in 2020, if it is delivered, but there was a great uprising of scepticism when these numbers came out. One would want to see a great deal of explanation as to why people think that this can be done. This brings us very much into the territory that Paul Ekins was talking about a few moments ago, but it does seem to me that the credibility of the enhanced climate change programme is very, very important indeed at this stage of the game. Those would be the things that we would look for.

**Q237 Dr Turner:** You have called for more research on how customers actually use electricity. Can you describe what you mean by that in greater detail and what the benefits would be?
***Dr Rhys:*** I was thinking of what used to be done within the old nationalised industry structure where we had very comprehensive load market research programmes. We had a very clear idea of both the ownership of different kinds of appliances, different kinds of boilers no doubt within the gas industry and of their average consumptions. A lot of those programmes disappeared more or less completely at the time of privatisation and the setting up of the

new energy companies. I would not by any means claim that those programmes were ideally suited to current purposes, but from my own experience of running that programme within the electricity industry, it is very clear to me that you could, for a comparatively modest cost, set up a programme which would tell you much, much more about, for example, the stock of domestic boilers, how old they were, the stock of aged and inefficient appliances, the amount of energy that was used for lighting and so on and so forth. My view is that provides a basis for the monitoring of policy which is currently absent because all we seem to have is very aggregated figures for the total of residential consumption, the total of industrial consumption and so on.

**Q238 Dr Turner:** If you actually had this information, which you do not, on consumer demand habits, how do you think it could be used to inform government policy and actions of electricity companies in reducing the overall demand for electricity?

***Dr Rhys:*** For example, I know simply from reading the paper every day that a lot of people place a great deal of weight on low energy lighting. I have not seen any recent estimates of what percentage of electricity consumption actually goes into lighting; I believe it is about 10%, I believe it is important but 10% is the limit of what you can achieve. Suppose though that you discover, as I discovered recently to my chagrin since I have just disposed of a 35-year-old freezer, that it was accounting for about 40% of my electricity consumption and I have now decommissioned it and cut my own emissions by a huge amount. I have no idea what the total national stock of such aged monsters is, but it would be quite easy, I would have thought, to put in quite a cheap policy to encourage people to get rid of them, but I do not have the information to say whether that is a big saver or not and certainly the whole of the domestic sector is full of little questions like that. What are the potential gains from moving to condensing boilers for example? One would need to know precisely what the stock of aged versus new boilers was.

**Q239 Dr Turner:** Of course, this sort of research on social patterns of consumption is not the only casualty of privatisation, because what was once a very large R&D budget, in the days of the CEGB for instance, disappeared virtually completely under the private utilities. Do you think that this is affecting their whole behaviour because they are just not focused on long-term issues and climate change considerations but simply short-term cost efficiency measures? What can we do to substitute for this sort of effort that used to exist before privatisation?

***Dr Rhys:*** To be fair to the energy companies, I suspect that what you are saying is probably absolutely right in relation to some of the supply activities but my impression is that if you take the totality of the oil companies, the big generators and so on, they are very, very conscious of what is happening on climate change issues and it is strongly in their interest not only to be aware of those things but to try to anticipate trends. I should be very surprised if they, in the long run, do refrain from the appropriate levels of research. There are a few other issues associated with the privatised framework that perhaps deserve a little bit of comment. One is the whole framework of regulation. Regulation, Ofgem and so on, has objectives which are essentially concentrated on competition on the one hand and protection of the consumer, reduction of consumer prices, on the other. Those are very laudable things to be doing but they are sometimes going to be in conflict with carbon reduction initiatives and it is very, very difficult for a regulatory authority to have multiple objectives. The other criticism I would have is that, if I look at the supplier market in gas and electricity, personally I do not find it terribly transparent in terms of the prices and tariffs that different companies are ready to charge me.

**Q240 Dr Turner:** I was personally very unpopular with government whips during the Energy Act for attempting to give Ofgem different responsibilities, in particular what could best be described as a climate change responsibility which it now has to a degree in that it has an obligation to sustainability but how effectively do you think it is discharging that and how effective is Ofgem being, for instance in its current recognised remit of consumer protection, given the massive windfall profits that generators made during the first round of the ETS? The benefits of which, to the best of my knowledge, have not been passed on to customers.

***Dr Rhys:*** Of course the generators are not regulated directly as to pricing because they are deemed to be part of the competitive market and suppliers will purchase from them and pass the costs through. It is a commonplace among merchant bankers that when you start on something like this, it is very difficult to avoid generating windfall profits for clever operators and there are many clever operators out there. The more general issue is that it is actually very difficult to change the culture of regulation, particularly when you have primary objectives that are focused on consumer protection, competition and so on. That is a much harder issue to tackle. It is going to be very difficult for Ofgem to consent to break with its own tradition.

**Q241 Mark Lazarowicz:** In your memo, you argue that concerns over the impacts of carbon reductions on the competitiveness of the UK economy have been exaggerated. Would you like to expand a little more on that statement?

***Dr Rhys:*** First of all let me say that I agree in principle with the general argument of principle that it is important that UK industry should not be disadvantaged relatively and that is particularly important, if the outcome were to be a transfer of industrial activity away to countries which may actually be less carbon efficient than we are. It is also possible to exaggerate the likely scale of carbon measures in the context of competitiveness for a number of reasons. One is that, first of all, the

relevant $CO_2$-intensive industries are a very small part of overall GDP. Secondly, we are talking very largely in the context of EU trading as to the actual measures which are involved so there is going to be very little interim EU impact and I would expect extra EU impact to be dealt with at an EU level. As far as most industries are concerned, energy costs are really quite a small part of the total and the overall effect of competitiveness, even if you are talking about energy taxes, is essentially going to be dwarfed by the much broader impact of exchange rate issues which of course impact not only energy costs but all domestic costs including wages. Then I guess finally, in terms of the sectors that we have identified as being the key ones to focus on, electricity, buildings and transport rather than industrial processes *per se*, if necessary, if one did see serious competitive disadvantages which were also going to be energy inefficient, then they could if necessary be dealt with by appropriate derogations. That is my general perspective.

**Q242 Mark Lazarowicz:** To what extent do you think the UK will actually benefit from a greater investment in low-carbon technologies? Are there opportunities for us both domestically and internationally?

***Dr Rhys:*** In a dynamic sense yes. Our feeling is that by being at the forefront of what is going to become a worldwide trend, we do have the opportunity to benefit very substantially. That is separate from what I might call the short-term, very obvious impact of price or taxation changes.

**Chairman:** Thank you very much for coming in. We have absorbed both what you have written and what you have said in the last half hour or so. We are very grateful to you.

## Tuesday 8 May 2007

Members present:

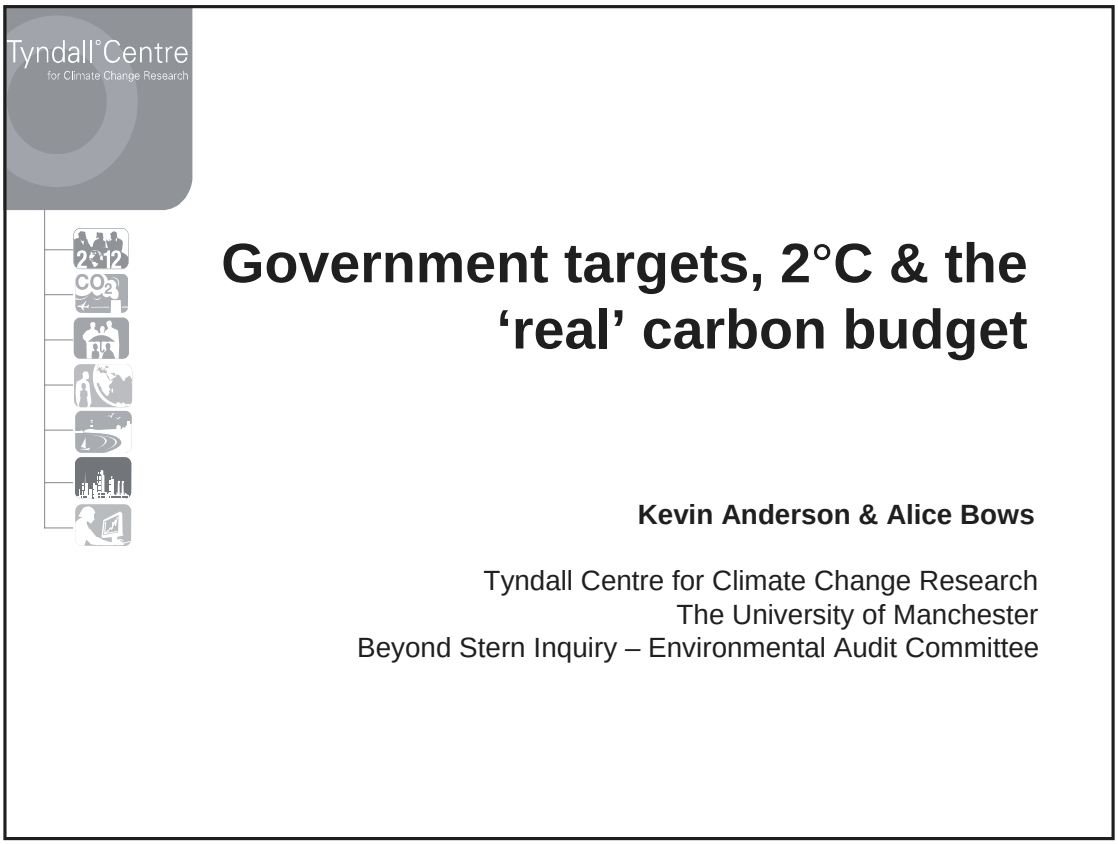
Colin Challen
Mr David Chaytor
David Howarth
Mr Nick Hurd
Mark Pritchard

In the absence of the Chairman, Mr Chaytor took the Chair

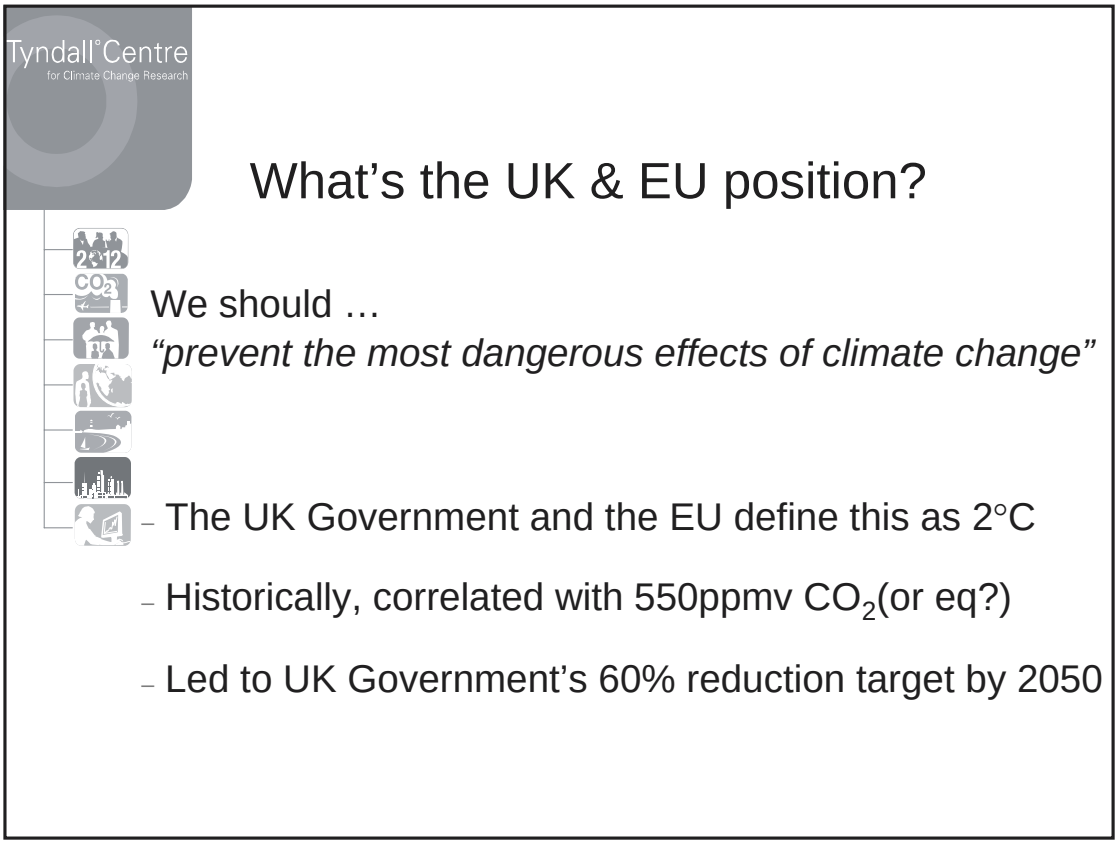
---

PRESENTATION GIVEN BY THE TYNDALL CENTRE FOR CLIMATE CHANGE RESEARCH

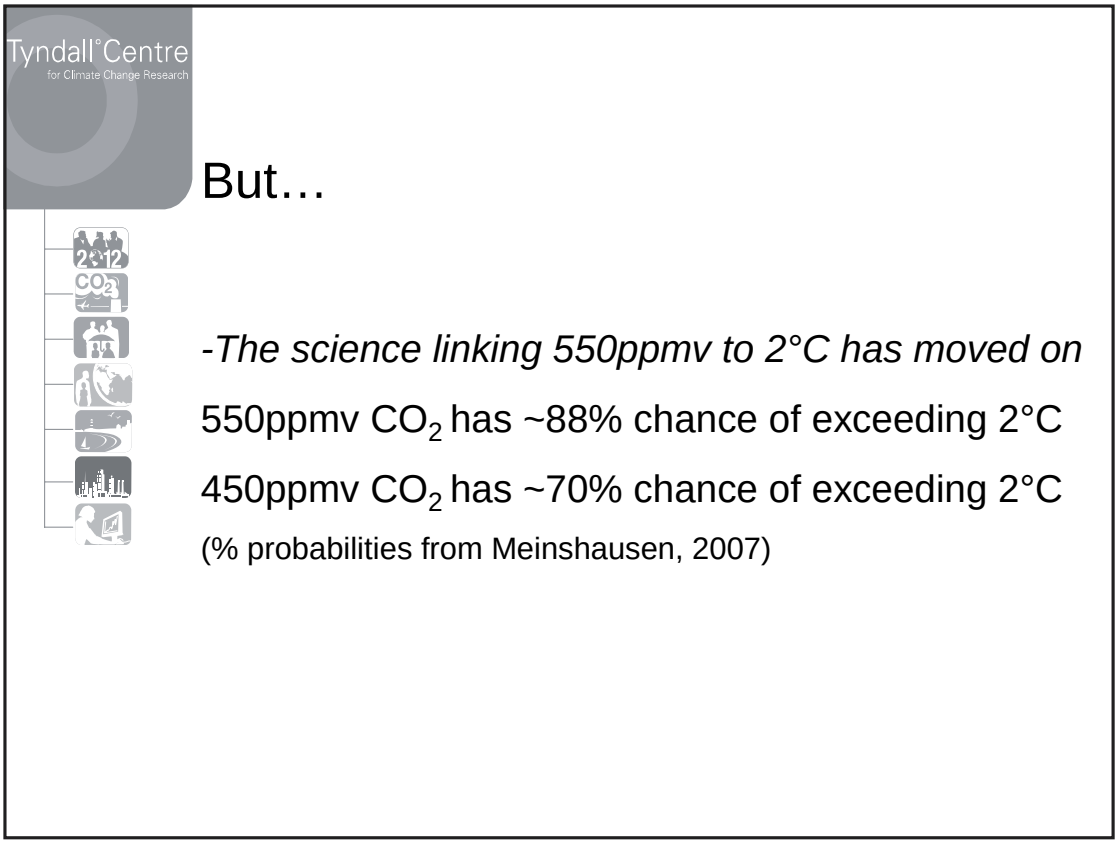
*Slide 1*



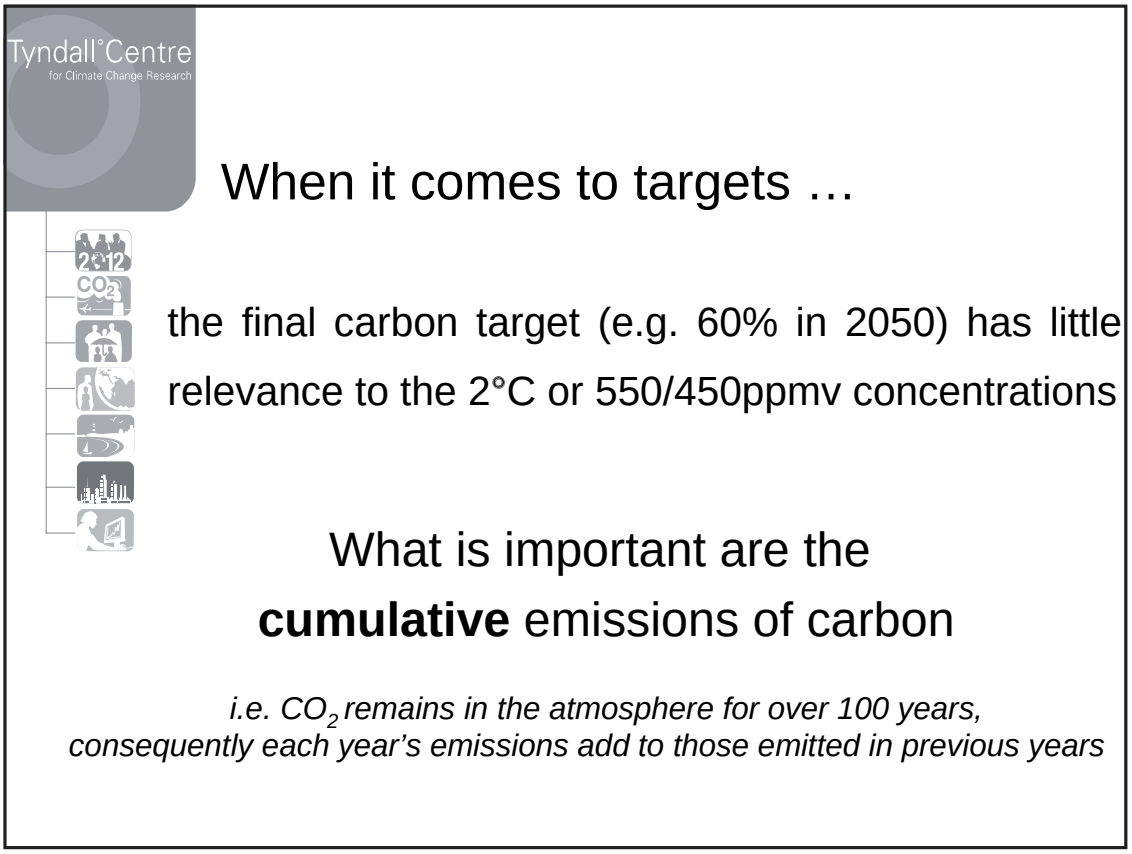
*Slide 2*



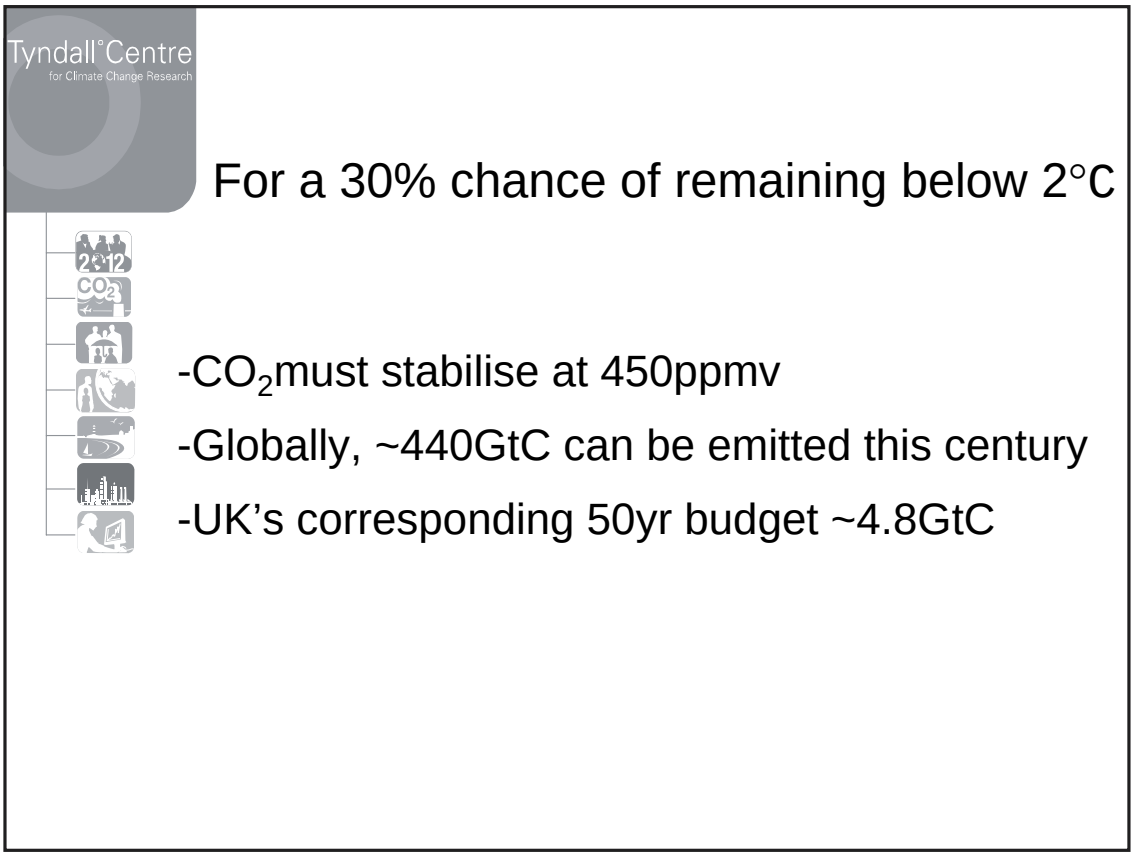

*Slide 3*



*Slide 4*




*Slide 5*

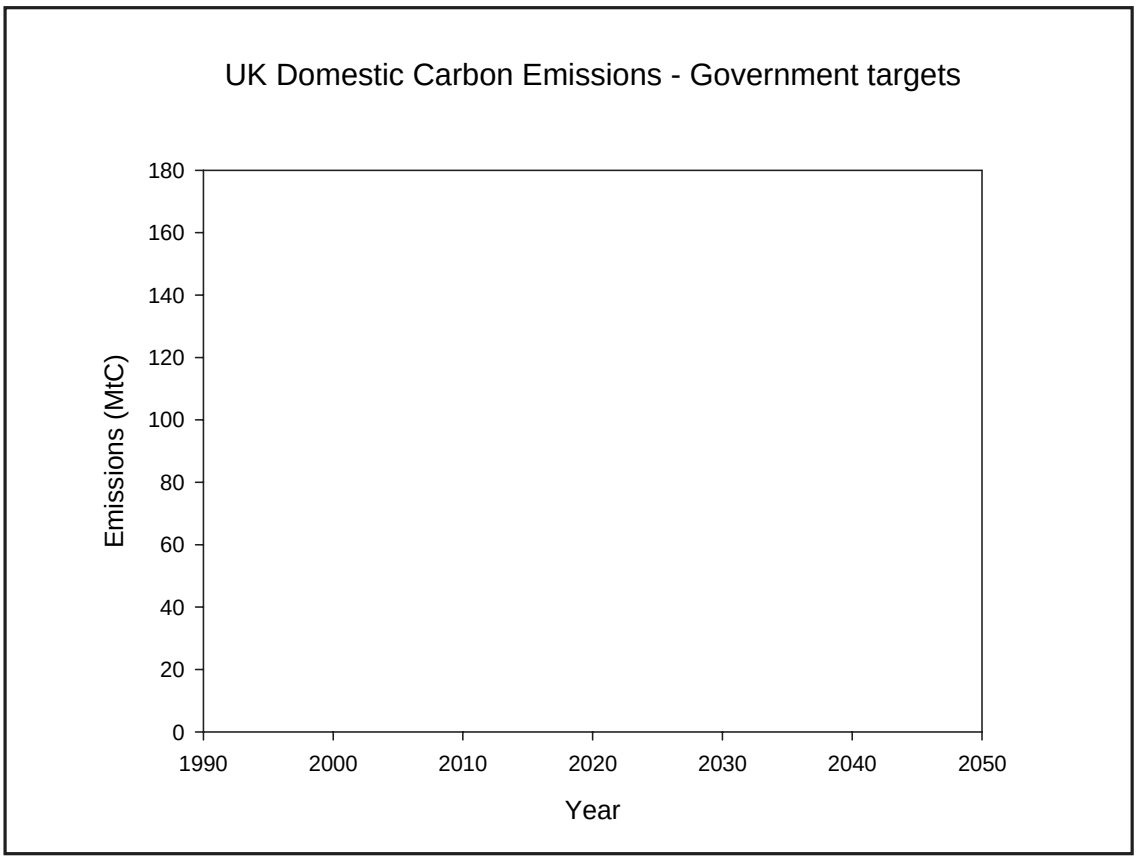


*Slide 6*

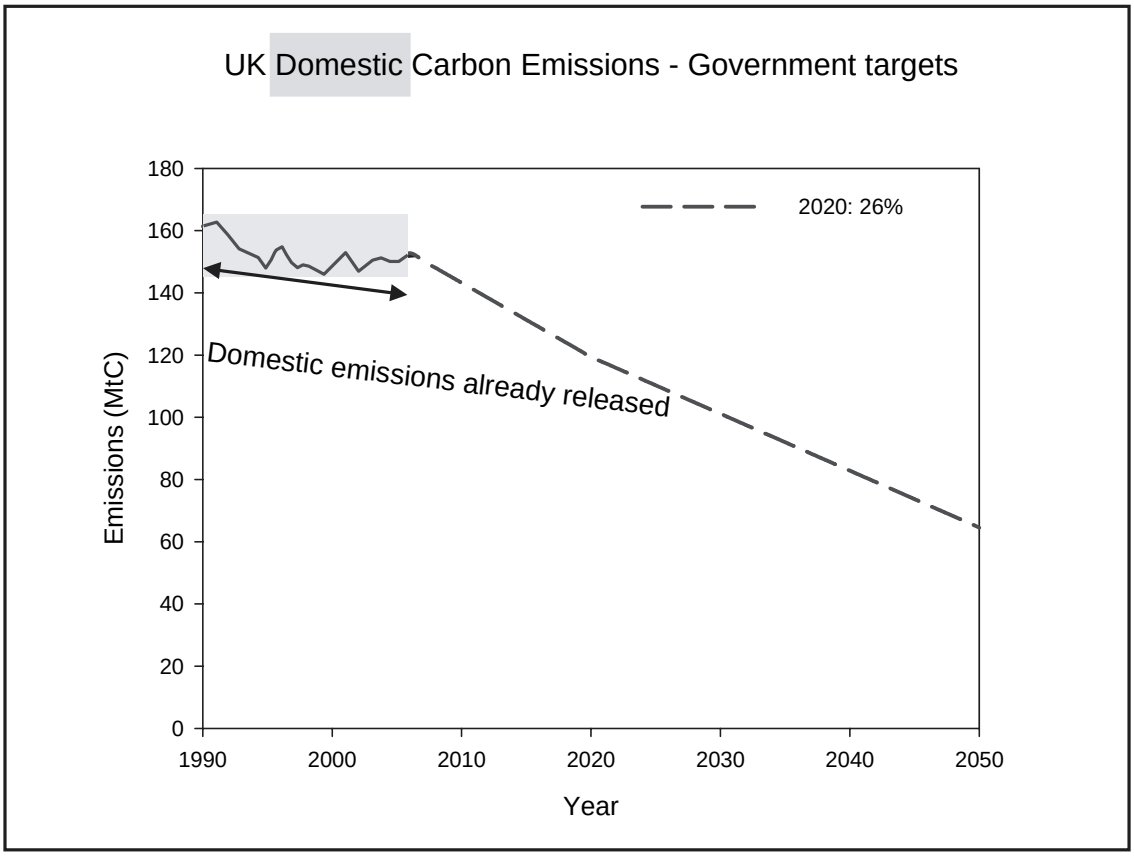
Tyndall Centre
for Climate Change Research

So, what does the draft Climate Change Bill imply in relation to cumulative emissions?

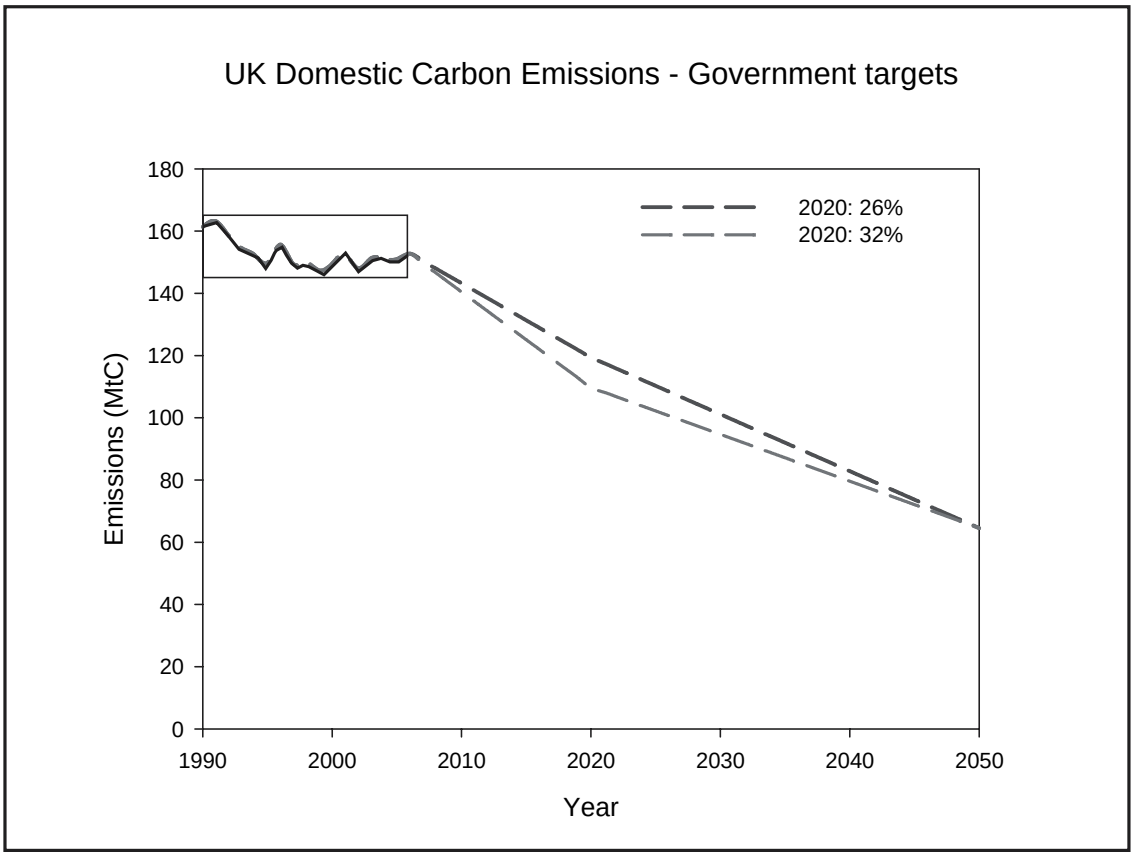
*Slide 7*



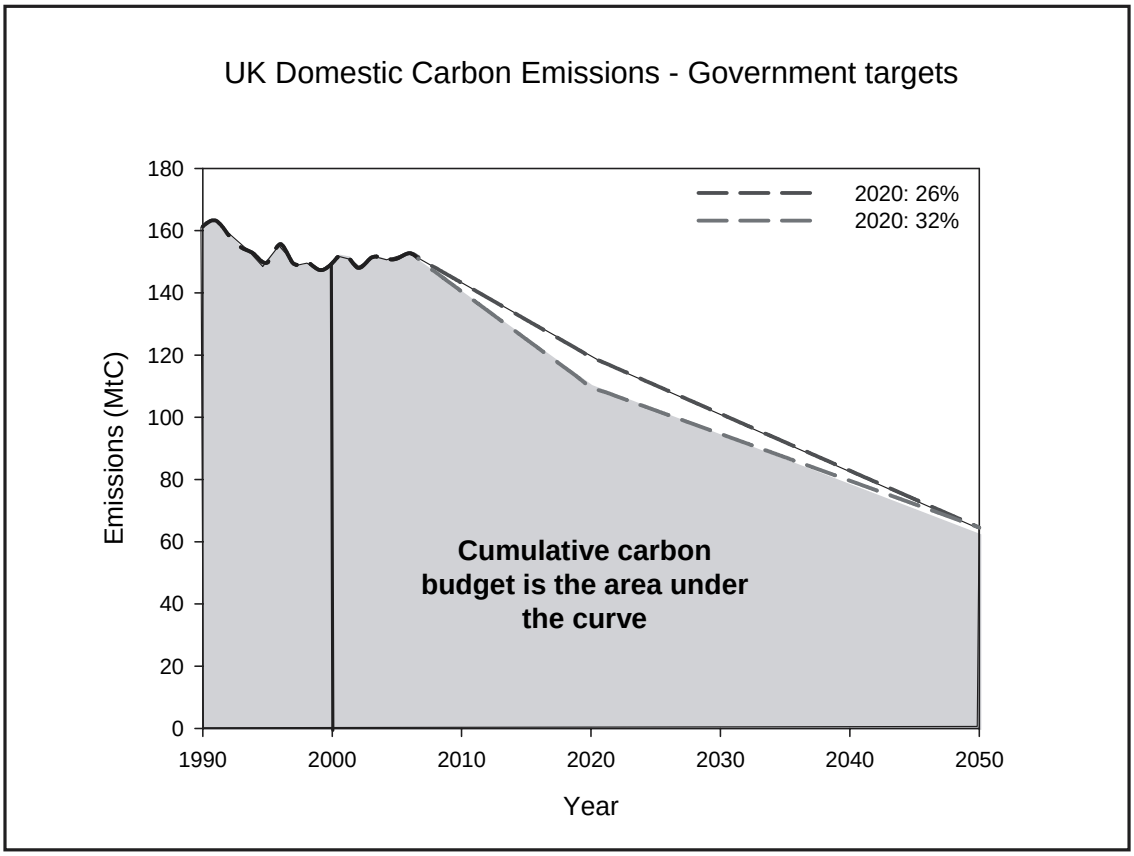
*Slide 8*



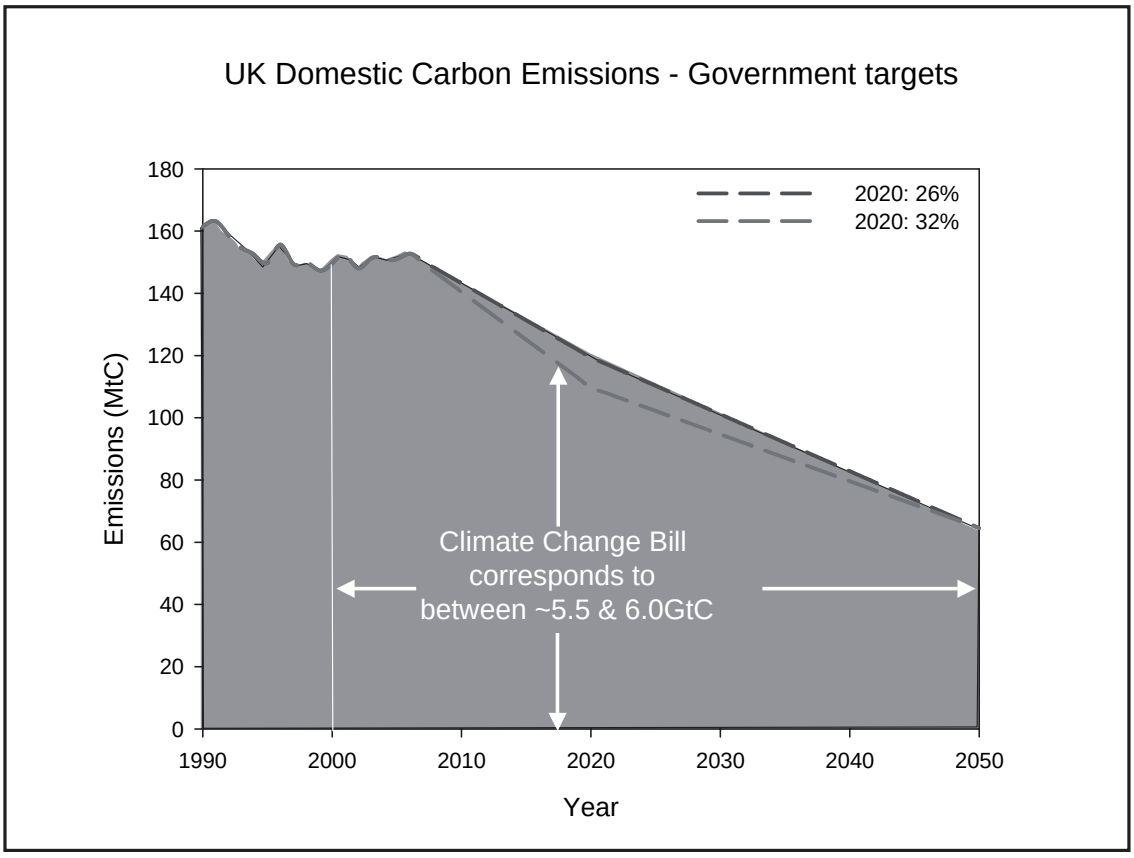

*Slide 9*



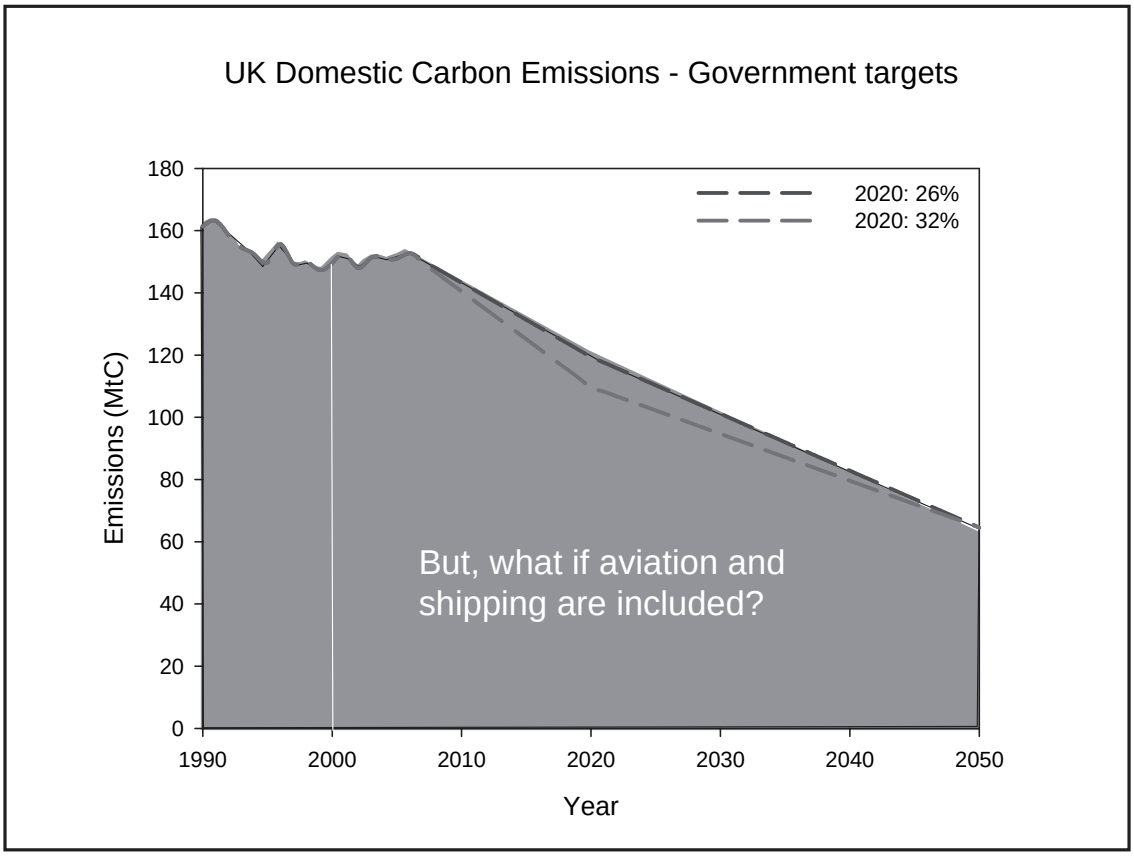
*Slide 10*



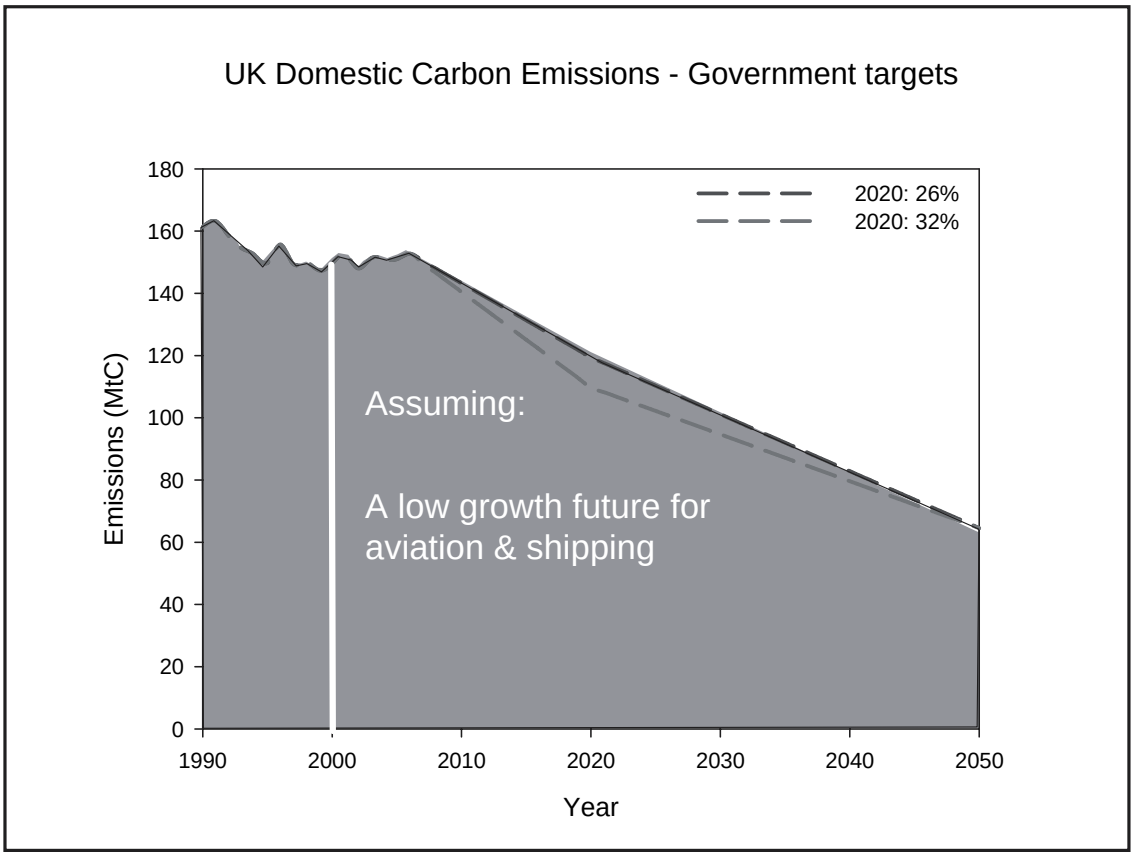

*Slide 11*



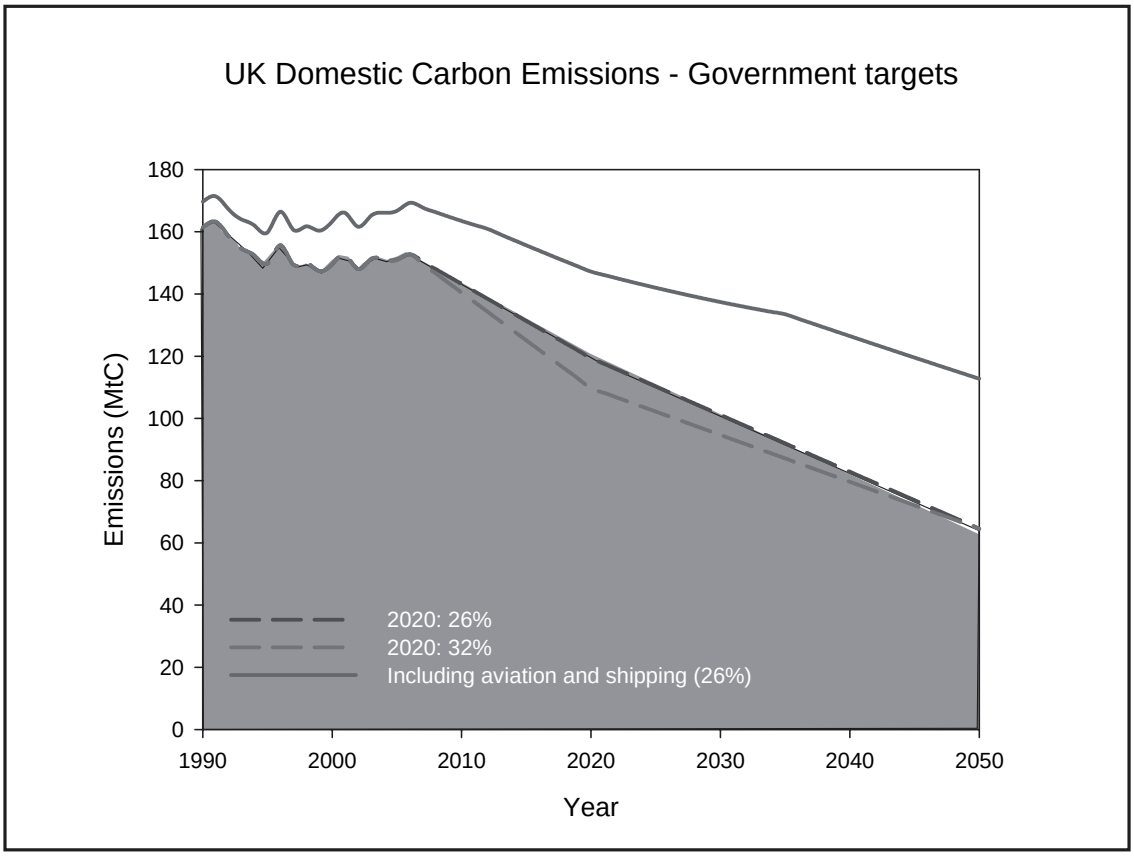
*Slide 12*



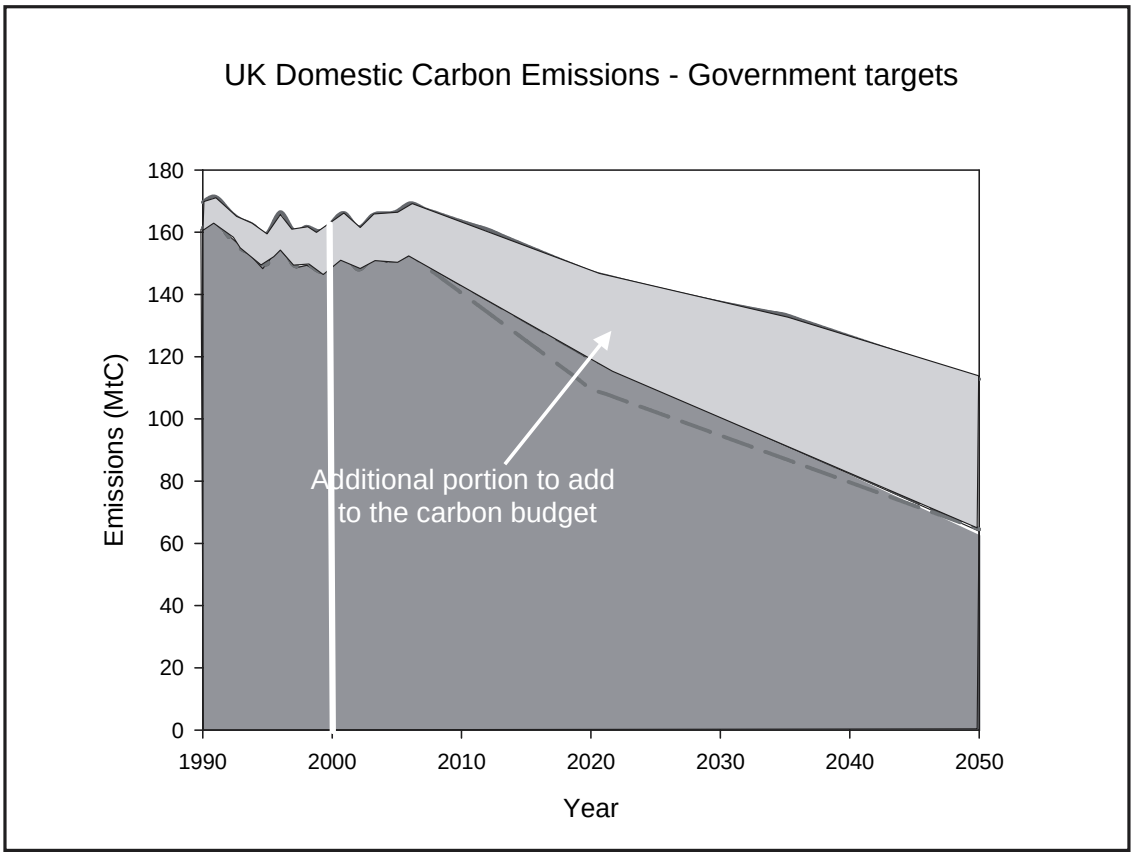

*Slide 13*



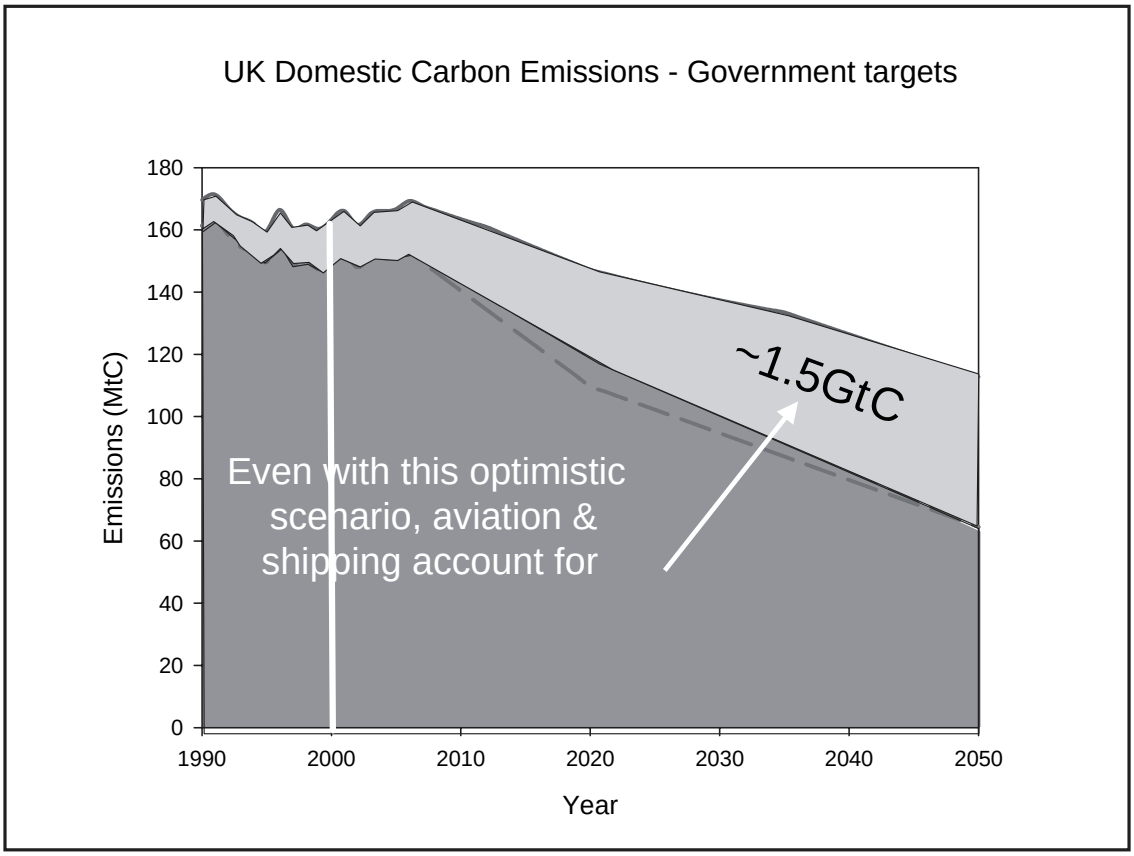
*Slide 14*



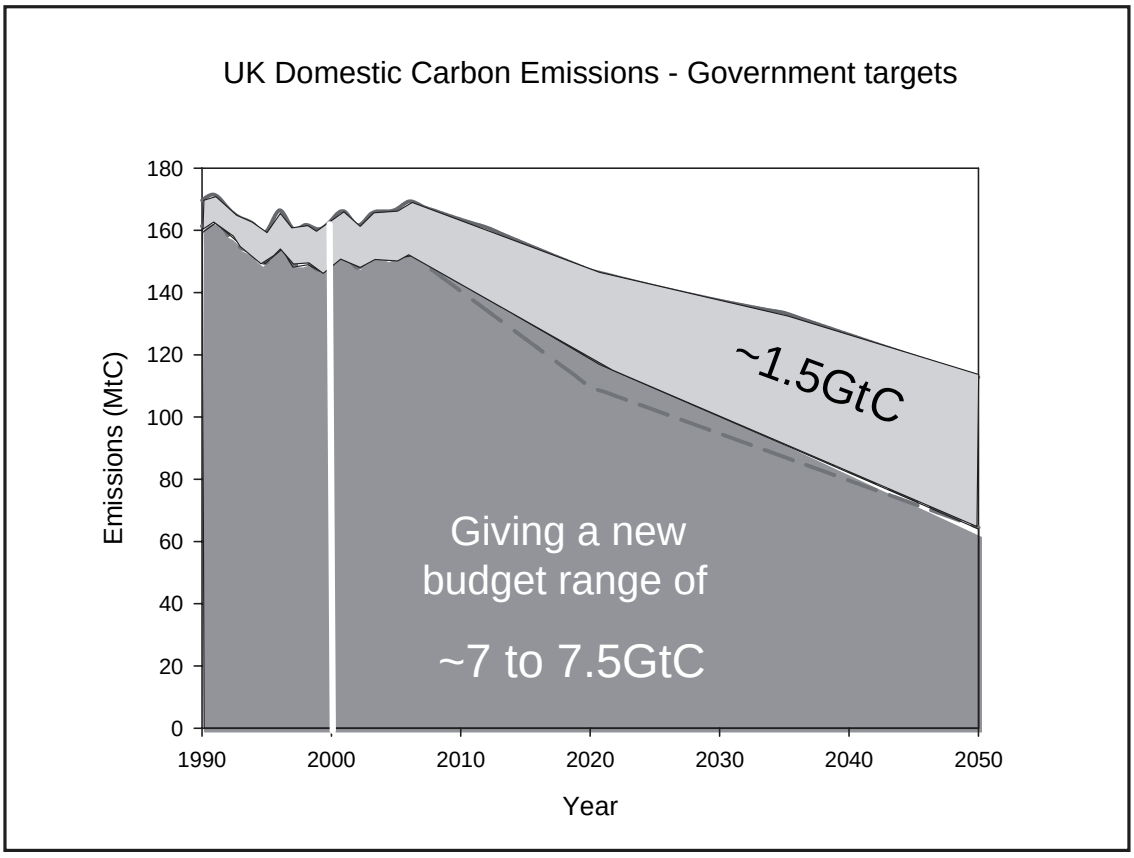

*Slide 15*



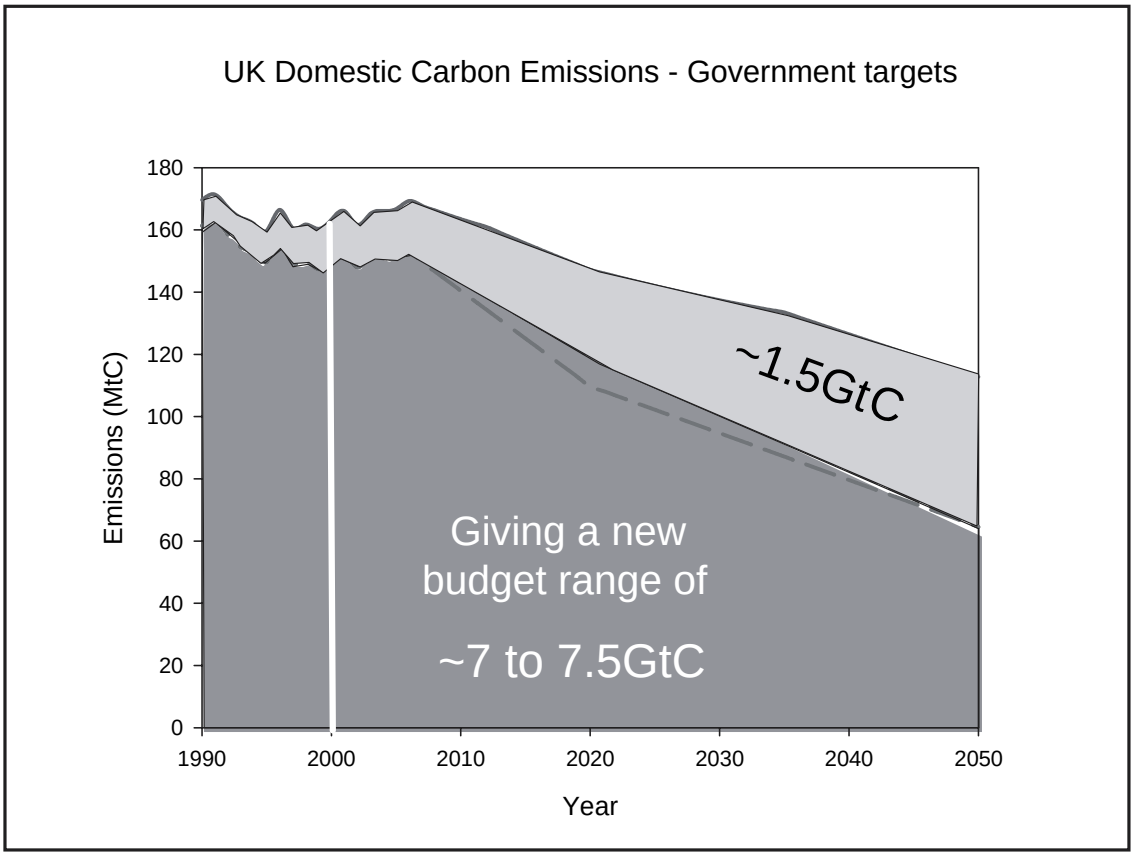
*Slide 16*



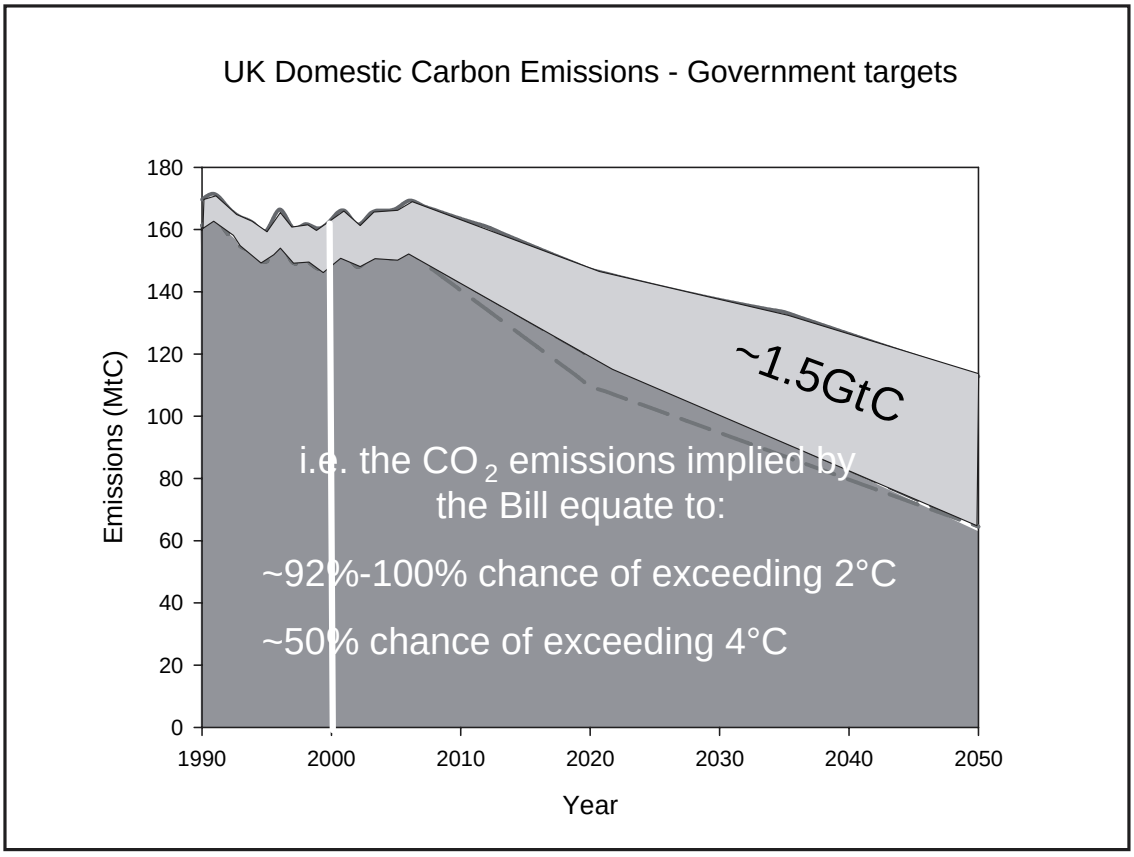

*Slide 17*



*Slide 18*




*Slide 19*



*Slide 20*

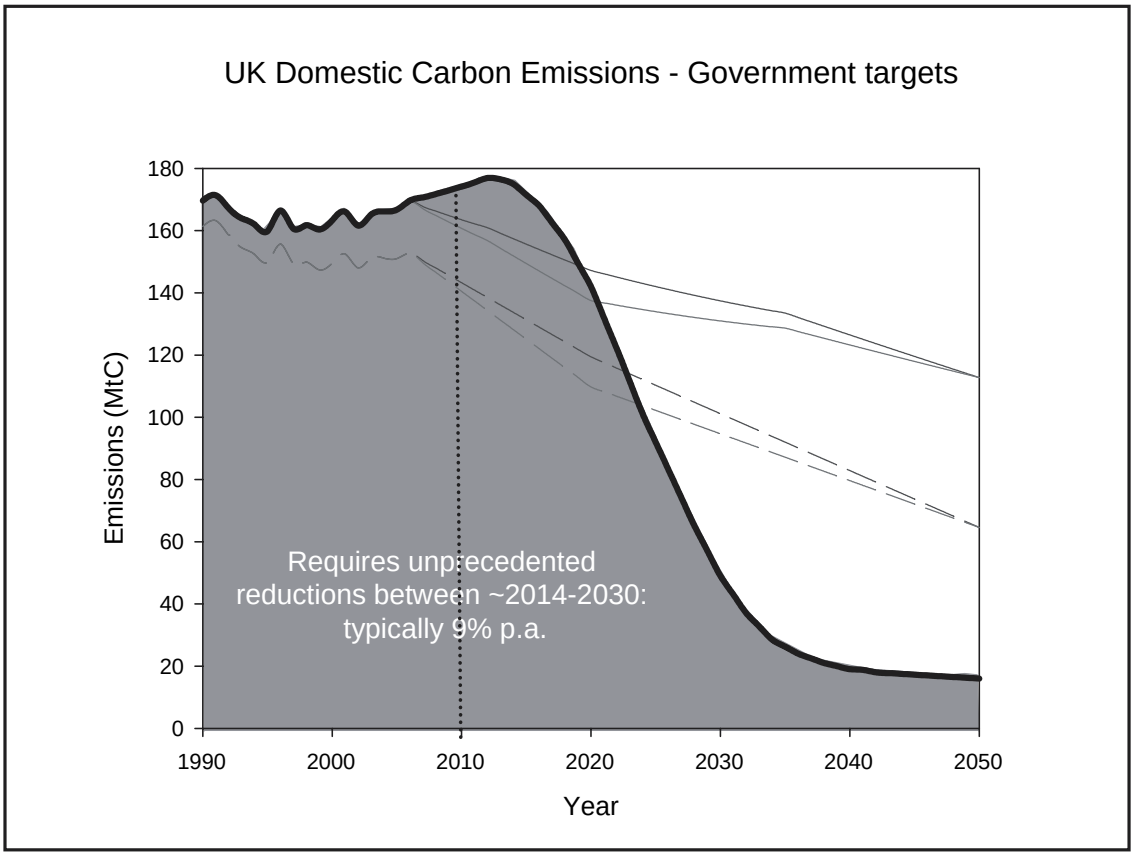
So, what would a 450ppmv budget look like?

*Slide 21*

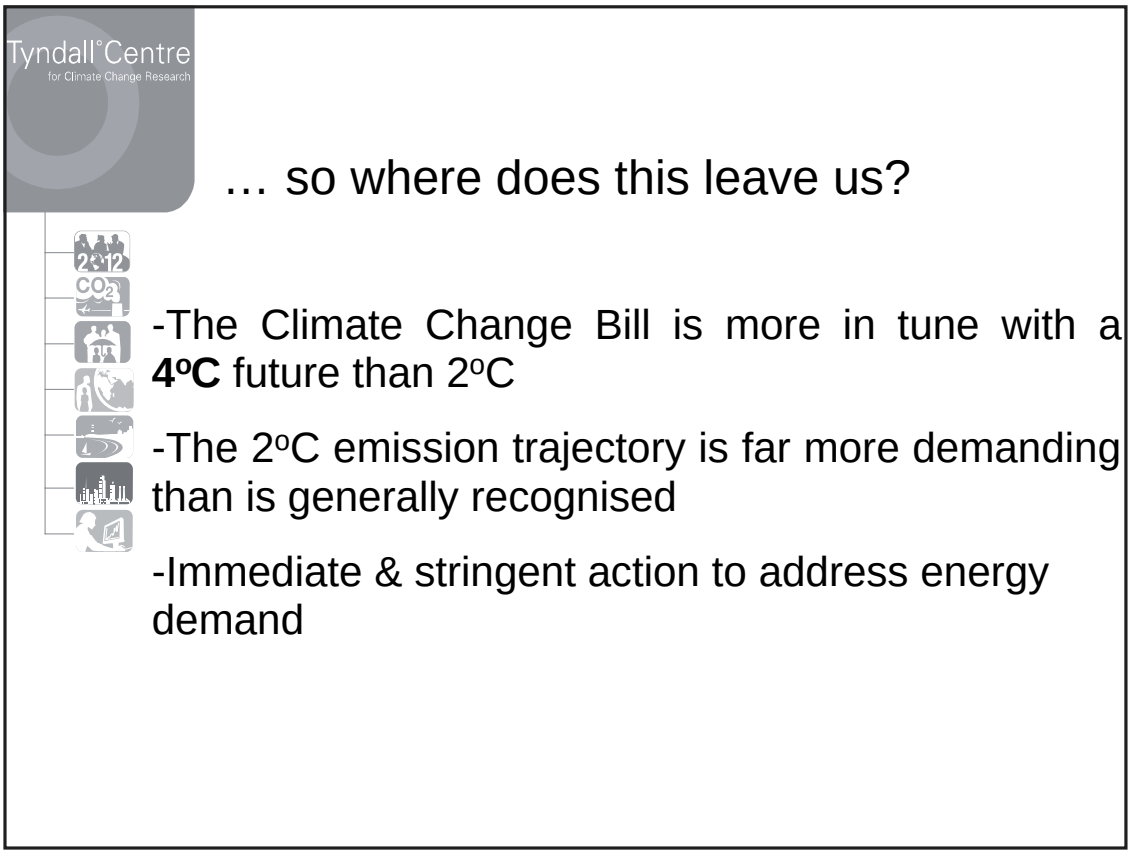
Assuming:

1) All domestic sectors stabilise emissions between now and 2012
2) Aviation & shipping grow at 2% less than current until 2012
3) We stay within a budget of 4.8GtC for 2000-2050

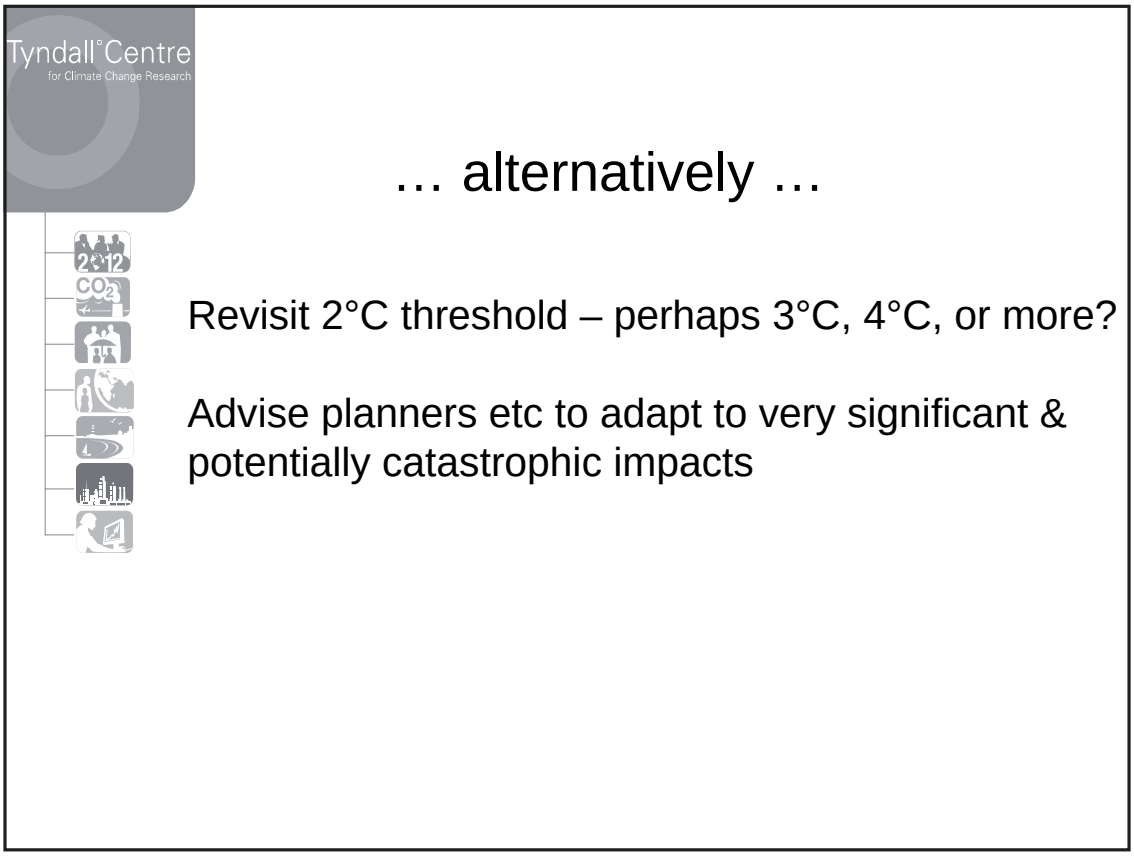
*Slide 22*




*Slide 23*



*Slide 24*




*Witnesses:* **Dr Kevin Anderson** and **Dr Alice Bows,** Tyndall Centre for Climate Change Research, University of Manchester, gave evidence.

**Q243 Mr Chaytor:** Good morning, Dr Anderson and Dr Bows. Welcome to the Environmental Audit Select Committee and to this, our fourth and final evidence session in our inquiry entitled "Beyond Stern", and we are looking at the forecasting, monitoring and cost-effectiveness of climate change policy. I understand you have your PowerPoint presentation all ready to go, so we would like to invite you to go through your presentation and particularly to tell us your response to the draft Climate Change Bill. I gather it is going to take 10 minutes or so.
***Dr Bows:*** Yes.

**Q244 Mr Chaytor:** So, Alice, you are in charge of the presentation?
***Dr Bows:*** I am in charge of it, yes.
***Dr Anderson:*** Have you all seen a copy of the briefing?

**Q245 Mr Chaytor:** We have all had a briefing and we all have a copy of the slides and I have a special copy of the latest update of the slides.
***Dr Bows:*** [Slide 1] The title is "Government targets, 2°C & the 'real' carbon budget", and this is work that Kevin and I have been doing at the Tyndall Centre at the University of Manchester and, as you have seen, there is a briefing note that we have on our website that compiles the information that this presentation gives a summary of. [Slide 2] Just as a starter, what is the UK's and the EU's position on climate change? Well, in various policy documents and so on we agree that we should prevent the most dangerous effects of climate change and the UK Government and the EU have defined this as not exceeding a 2°C temperature increase above pre-industrial levels. Historically, this was correlated with 550 parts per million $CO_2$ concentration, so the atmospheric concentration of carbon dioxide in the atmosphere, and it says "or equivalent?" there as a question because it seems to be quite confusing in some policy documents as to whether it is all greenhouse gases or whether it is just $CO_2$, but broadly the 2°C was correlated with 550. Then, following the Royal Commission on Environmental Pollution's Report, the UK Government adopted a 60% carbon reduction target by 2050 based on this 550 parts per million $CO_2$ concentration and this was using an apportionment regime in order to split up the global carbon budget into the different nations and then to work out what each nation would have to do if they wanted to stay within this 550 level and the 2°C threshold. [Slide 3] The science linking 550 to 2°C has since moved on. Much of that work was carried out pre-2003 and it is now 2007. The 550 $CO_2$ concentration is now linked with broadly an 88% chance of exceeding 2°C and these probabilities are approximate, but they are based on the work by Meinshausen which was presented

at the Defra conference in Exeter. Now, 450 $CO_2$ alone, and this is not including the other greenhouse gases, has around a 70% chance of exceeding 2°C, so still quite a significant chance of exceeding 2°C. [Slide 4] The problem is that, when it comes to targets, the final carbon target, for example, the 60% reduction by 2050, has little relevance to the 2°C or the 550 or 450 concentration because what is important are the key relative emissions. Because carbon dioxide lasts in the atmosphere for around 100 years, it matters what we released last year and the previous year and the previous year to that and, for the previous 99 years, it all adds up, so, in other words, what we cannot do is continue along the current trajectory of growing emissions and then reducing them by 60% in 2049 because that is not going to bring about our 2°C or 450 or 550 target, whatever it is we are aiming for, because it is the cumulative emissions that are important. [Slide 5] Therefore, for a 30% chance of remaining below 2°C, this corresponds with a stabilising at 450 $CO_2$ and then, using work that was done at the Hadley Centre and using the Hadley Centre model, it has been worked out that this allows us to emit around 440 billion tonnes of carbon this century globally, so that is the amount we can emit globally for a 450 level for a 30% chance of not going above the 2°C. Then, if we use the same apportionment regime that the Government used originally to come up with its 60% target, we can work out what the UK's corresponding 50-year budget is and, according to the Hadley Centre model work, it gives us a UK budget of around 4.8 billion tonnes of carbon or gigatonnes of carbon, so that gives us an idea of how much we have got to spend in terms of carbon over the next 50 years. [Slide 6] What does the draft Climate Change Bill imply in relation to cumulative emissions rather than the percentage reductions? With this graph here, [Slide 7] on the left-hand side we have the carbon emissions and along the bottom the time from 1990 up to 2050, so some of the past and then some of the future. This [Slide 8] is a profile of the domestic emissions, so that means not including international aviation and international shipping, and the solid line there represents the emissions that have already been recorded, some of which have been submitted to the UNFCC and then from this date onwards, that is projected out to the future. At 2020, this particular blue profile is based on the 26% target because, as in the Climate Change Bill, there are two targets, 26% and 32%, and then joining the dots to the 60% target in 2050, so that is what the Climate Change Bill proposes. If, on the other hand, you take the 32% target in 2020, [Slide 9] it does not make a huge amount of difference; the profile is quite similar, but you just have this small gap in 2020. If we go back to the importance of cumulative emissions, what we see in a graph like this [Slide 10] is that the cumulative carbon budget is the area under the curve, so the shaded region and, if we look at the 50-year budget from 2000 to 2050 and we add up all the emissions that are under this curve for the two proposals by the Government for 2020, this corresponds to about 5.5 to 6.0 billion tonnes of carbon budget in that 50-year period [Slide 11]. I would just remind you that the 450 level was more like 4.8, so this is significantly above that. But what if aviation and shipping are included? [Slide 12] Those emissions are just for household, industry, land, transport, et cetera, but, if we now look at aviation and shipping as well, first of all, we need to make some assumptions about what they are doing in the future. [Slide 13] Currently, aviation has been growing very rapidly, but what we are assuming here, we are being quite optimistic in assuming a low-growth future and the actual numbers are in the documentation in the Climate Change Bill briefing note, and shipping is some 2% up to 2012 and then 1% out into the future in terms of their level of growth in emissions. If we add that to our graph [Slide 14], first of all, you will see that the line at the top is at a higher starting point because now you are including aviation and shipping and then again up to 2006, and these are already recorded on government websites and in statistics. Then you have the profile that it does decline because it is following the Climate Change Bill targets, but also now including aviation and shipping, so it does not decline as rapidly, which is why the gap here is smaller than the gap at the end because of this extra growth. Essentially, what you have now is an additional portion to add to your carbon budget and you can also see that this is not an insignificant additional portion. [Slide 15] Even with this optimistic scenario, aviation and shipping are accounting for about 1.5 billion tonnes of carbon [Slide 16], so our original budget from the Climate Change Bill was between 5.5 and 6.0, so you can see that this is quite a significant proportion of that that we are missing out. This gives us a new budget range for the total area under the curve now for that 50-year period from 2000 of around 7.0 to 7.5 billion tonnes of carbon [Slide 17], and these are broad ranges which is why there is the squiggly line in there because obviously there is a degree of uncertainty, but certainly they are significantly higher than the Climate Change Bill is suggesting. [Slide 18] Broadly, this corresponds with a 600 to 750 parts to million $CO_2$ and that is $CO_2$ alone, not including the other greenhouse gases, and that is again using the same apportionment regime, but going back up to the global target, to global emissions, cumulative emissions and then to see what $CO_2$ level that corresponds with. [Slide 19] In other words, the $CO_2$ emissions implied by the Climate Change Bill equate to a 92 to 100% chance of exceeding the 2°C target and a 50% chance of exceeding 4°C, so clearly the Climate Change Bill is off track if we are going to try and aim for 2°C, but what we need to think about is what sort of emission profile or cumulative emissions do we need to think about if we are going to aim for 2°C and what does that look like. [Slide 20] If we look at the 450 level, which still only gives us a 30% chance of not exceeding 2°C, but which seems a reasonable level to consider, what does that budget look like? Again, we have to make some assumptions. [Slide

21] We have seen between 2005 and 2006 our emissions actually increase due to a move to coal from gas, so, despite the fact that we do have some policies in place to address the climate change issue, we are not seeing rapid reductions or even reductions in emissions at the moment, so what we assume is that all the domestic sector, which includes transport, industry, agriculture, et cetera, that on aggregate they manage to stabilise emissions between now and 2012, and then, if we assume that aviation and shipping grow at some 2% less than current rates until 2012 and then after that we are not making any assumptions at all, we are just saying that we have to stay within our carbon budget of 4.8 billion tonnes of carbon over that 50-year period, this is the kind of trajectory that we end up having to follow. [Slide 22] Again, the beginning part is of the emissions that have already been released, including aviation and shipping, and if I put this near 2010, the rise in emissions is due to the fact that, although we have got stable emissions from all the domestic sectors, we do have aviation and shipping continuing to grow and this does have an impact on the overall profile. Due to the inertia in the system, there is not a lot that we can do; we cannot do a lot to change this trajectory up to 2010 over the next couple of years due to the emissions and the policies that are currently in place. Then, basically what we have to do is make sure that this area under the curve remains within budget and, to do so, we have to make rapid reductions from around 2014 to 2030 of typically 9%, and there is not a great deal we can do, if we want to go for 2°C, about this trajectory in that, if we wanted to make this less difficult, so we wanted to reduce the 9% per year sort of rate, then we would have already had to have put stringent policies in place or done something pretty radical in this period, and really it is not going to make a huge amount of difference because, if you just want to cut off a small portion of the cumulative budget there, it will not make a huge difference to your trajectory. If you try to push it the other way, obviously you make it more steep, so that would probably be even more difficult and more challenging, but you can see that this is an extremely challenging picture if we want to go for the 2°C or give ourselves a 30% chance of going for 2°C. [Slide 23] Where does this leave us? Well, the Climate Change Bill is more in tune with a 4°C-target future than the 2°C and the 2°C emission trajectory is far more demanding than is generally recognised and, particularly when we include aviation and shipping, it really does change the picture because we are already at a very high level of emissions now and we are basically spending the budget far too rapidly and action should have been taken some years ago. Immediate and stringent action is required to address energy demand. Energy demand is something that can make a difference to carbon emissions in the shorter term, so "immediate" does mean in the next six months, year, couple of years, so we are not talking five or 10 years into the future, but this is very urgent as a matter of policy. [Slide 24] Alternatively, we need to revise the 2°C threshold and perhaps aim for three, four or more degrees and then we need to advise those people who are planning infrastructure that is going to be there for the next 50 to 100 years, we need to let them know that they need to adapt to very significant and potentially catastrophic impacts.

**Q246 Mr Chaytor:** Thank you very much indeed. That was extremely interesting. You are at the apocalyptic end of the climate change spectrum, are you not? Has the Tyndall Centre's views changed at all since the publication of your report last year, *Living Within a Carbon Budget*?
***Dr Anderson:*** I would probably take some exception to the first comment; I do not think we are at the extreme end. All we simply do—

**Q247 Mr Chaytor:** You are predicting.
***Dr Anderson:*** No, we are not, no. We are certainly not predicting. All we do is 'what ifs'. If we choose not to act, as we have chosen not to act in the past, these are the sorts of implications that government science, the Hadley Centre and so forth, tends to suggest. The problem with the analysis that has been done is that it is incredibly optimistic and it assumes that the words of the policies will be translated into reality so that the Climate Change Programme will have worked. Basically, anybody who read the Climate Change Programme knew that it would not achieve the reductions that were written into it, so, if you do your analysis on the basis that it will not work, you come up with different results and, if you do the analysis on the basis of what the Government's stats are telling you, you come up with something like we have produced here. This is not about predictions or forecasts, it is simply using 'what ifs' and we have assumed here quite optimistic 'what ifs' about aviation and shipping, so I think this is just an account of bringing together government science and this is what the answers to those questions are, and I include the IPCC in here as well. Whether this has changed the overall Tyndall view, certainly our briefing note and our other work has been viewed by Mike Hulme, the Executive Director of the Tyndall Centre, and he is fully aware of what we are doing and supportive of it. He has raised some questions about some of the work and we have modified and adjusted in accordance with his comments and other people's comments, so all of this work is essentially peer-reviewed within the Tyndall Centre and actually by some of our colleagues outside as well, but I would stress that we are not at the extreme end and we are simply putting together the data that the Government has and the uncomfortable message that comes out is a product of basic analysis, not of our forecasts or predictions.

**Q248 Mr Chaytor:** But does the analysis you are giving today vary from that which you included in your report last year, *Living Within a Carbon Budget*, or is it broadly the same?

***Dr Bows:*** I think it is broadly in keeping with that at the moment. There are some new results coming out from the IPCC that look at a full range of cumulative values for a 450 future and the work that we used is within that range, so, although we might extend the range somewhat in our next piece of work, this work has not actually taken the carbon budget point much further at all.

**Q249 Mr Chaytor:** You referred to the assumptions about aviation and shipping and your assumption is for low growth in the future of aviation. Does the Chief Executive of Ryanair know this? Why did you opt for the low growth assumption?
***Dr Bows:*** Because aviation is quite a significant proportion of emissions already and is growing quite rapidly, then, if you assume very high growth, sometimes people will say, "You're being ridiculous about what you're assuming there. The aviation industry is not going to grow so high", but what we have done is we have used emissions growth that is not that dissimilar, a couple of per cent lower than today, for the next few years and then we reduce it to a much lower level and that is assuming that something like the Emissions Trading Scheme has a significant impact on the aviation sector, but again this is just a 'what if?'. Clearly we could do a 'What if the aviation sector grows at very high rates?' and then the picture would be more bleak.
***Dr Anderson:*** The assumption is here that groups like this Select Committee, the Government and the EU are genuinely concerned about climate change and, if the Government is genuinely concerned, it will have to bring in new policies to bring about these sorts of lower growth rates in aviation and shipping that we have anticipated here, so we are assuming that the Government will bring in policies to do that. At the moment, there is nothing there that seems particularly significant to drive us in that direction.

**Q250 Mark Pritchard:** Whilst there is consensus on the concern, we know that previously putting a levy on air tickets has not reduced air travel, and I note the differential of 2% up to 2012 and then 1% beyond that for aviation and shipping growth in your presentation. Given that the global population is continuing to grow and that population needs to be fed and it needs to buy consumables and durables, for example, from China, is it not likely that shipping and aviation will continue to grow for those reasons alone, and we can learn from history that that continues to be the case, but also because of their own predictions and, if anything, they would want to predict down rather than predict up for obvious reasons, and they are actually saying that they are going to see huge growth, far more than you are predicting? I just wonder whether, rather than being slightly alarmist or apocalyptic, you are actually being slightly timid on this particular point.
***Dr Bows:*** There are two different assumptions. For aviation, the emissions growth assumptions are higher than those for shipping. For shipping, one of the big problems with shipping is that there is not a lot of data around to work out what actually has been going on, so it is very difficult to work out the emissions from international bunker fuels basically, so we are assuming something like 2% growth in emissions, but that does not necessarily mean that the sector is growing at 2%, but that is also incorporating some sort of fuel efficiency improvements as well, so you are not necessarily saying that the sector is only growing at 2% in terms of the goods carried and the tonne kilometres, but you are saying that the emissions growth is that because the ships are getting somewhat more efficient year on year, so there is that involved as well. On the aviation side, the emission growth rates we used out to 2012 are closer to 5 to 6%, so they are not dissimilar to some of the figures that some of the aviation industry are using themselves, and then we reduce it down to 3% after that—

**Q251 Mark Pritchard:** Sorry, down to 3%?
***Dr Anderson:*** Down to 3% after 2012 and then 1% from 2035, so there are sort of three stages. Again, that has to incorporate fuel efficiency improvements and air traffic management improvements, so it is not just about the passenger kilometres, but it also incorporates the fuel efficiency improvements to give you the overall $CO_2$ change year on year.

**Q252 Mark Pritchard:** Coming back to shipping then, given that shipping is growing and there is a shortage of cargo ships at this very moment around the world because of the demand, I take your point about legislation kicking in, advances in technology, cleaner fuel, et cetera, but adding in all those multiple factors, your benchmark is still an assumption on a figure which you have just stated that you have not been able to find out, and that is basically shipping as we know it today, so I just wonder whether that is a safe figure for us.
***Dr Bows:*** All the growth rates are estimates; that is the way that they are. The thing with the international bunker fuels is that we can broadly assume that they are relatively closely related to GDP growth, so the method that we used to work out how they were changing in the UK, we looked at the amount of tonnage coming in and out of the UK and also at our GDP growth and we looked at the total global marine bunker fuels, so we have a method for doing it, but we are just saying that that is a preliminary estimate at the moment without anything better.
***Dr Anderson:*** There are a couple of things. Firstly, in relation to shipping, there are a lot of opportunities for improving efficiency. The engines themselves are highly efficient, far more efficient than almost any other internal combustion engines, but you are not constrained by weight, so this is more a medium- to long-term option, but you can do a lot on ships that you cannot do on planes. The trick at the moment is to get an electric plane to leave the runway because it would be too heavy, but you can use hydrogen and you can use electricity on ships, so you do not have the weight

constraint on ships, and indeed you could go back to some sort of wind or renewable system, and there are serious shipping companies that are looking at other options out there. The other thing of course is management opportunities, and this is not an immediate shipping example, but one that Andrew Simms of the New Economics Foundation always points out, that last year we exported half a million tonnes of gingerbread men to Germany and the Germans exported half a million tonnes of gingerbread men to the UK. Now, there are lots of management opportunities where you can stop that sort of activity, so what we are suggesting here is that again, if climate change is that serious, we should actually try to address some of these issues and we will devise legislation that will force companies one way or another to become more efficient in their transport modes. That might simply include price of course because at the moment transport is so cheap, fuel is so cheap for transport that we can afford to ship things up and down without paying much regard to the cost.

**Q253 Mark Pritchard:** Then a final point, and it is not a flippant point or I hope it is not seen as a flippant point, but I raised it a few weeks ago in the Chamber, that one of the best ways to deal with climate change in the short term urgently and immediately—two of the words you have used—is actually to create a new generation of what I call 'patriotic purchasers'. These are people who buy British not only because it is good for manufacturing and makes them feel good themselves, but actually it is the quickest way for them to save all those gas-guzzling ships or aircraft coming over from China bringing in products that they could buy perhaps 10% more expensively here in the UK, but overall the net gain is one for the environment and for their pocket in the medium to long term.

***Dr Anderson:*** I would agree completely, but the legislation would be difficult there because of WTO Rules. We import New Zealand lamb when we have plenty of lamb on the west coast of Scotland, so why are we doing that?

**Q254 Mark Pritchard:** Is that why you think the WTO and also our own trading arrangements with Europe need to be looked at, or trading legislation which has been looked at globally, in the context of what, we all agree, is an urgent need?

***Dr Anderson:*** I agree there is urgent need to look at these trading rules, and there is still some precedent for change, at least, to some extent. We can place tariffs or restrictions on goods which we consider to be dangerous: we can stop the Chinese, if the Chinese are making such things, exporting lead-painted soldiers to the UK or toys with spikes in them. If we consider climate change to be dangerous, and "dangerous" is a word which is often applied to climate change, then are there ways of tweaking the WTO Rules to say that "dangerous" also includes things which have a high carbon footprint? We use "dangerous" elsewhere in the WTO to change the rules, so perhaps we could use it for climate change.

**Mr Chaytor:** We can come back a little later to the question of policy prescriptions, but I would like to continue on the analysis of your presentation. Maybe I could bring Colin in at this point on the question of the 'correlation trail'.

**Q255 Colin Challen:** The Channel 4 programme, *The Great Global Warming Swindle*, brought us the remarkable insight that, if you tweak a model, you will get different results, and it laboured that point to a certain extent. To what extent in the way that you have correlated the trail, if you like, to this Bill can we rely on the models and the correlations that they make? There are enormous variabilities and probabilities depending on your assumptions, so, if we are to tackle climate change by taking very serious mitigation measures which might damage the economy, how much confidence can we put in the science and the enormous range that it offers?

***Dr Anderson:*** I think it would be fair to say that within our briefing note we actually have quite wide ranges in there and that does broadly incorporate a lot of the model variations, not all of them, but it does incorporate a lot of them. The simple answer that comes out of this is that you have a choice between a very dangerous future and an extremely dangerous future and that covers your range, so you take your pick between those, but whichever of those futures you are looking to try to avoid, it requires very dramatic policy, so I think the range within the models, even when you bring together the various models that are out there, it stills gives us a very clear policy signal, so there are scientific uncertainties and I think there is a policy certainty. It does not say exactly what the shape of those policies needs to be, but the required outcomes of those policies are fairly clear. The science is sufficiently robust to give us very clear signals that we need to be acting urgently.

**Q256 Colin Challen:** How important is it to obtain an increase of 2°C? It seems to be a magic figure, but what exactly does that mean?

***Dr Anderson:*** Well, around this table, probably we can get by with 2°C if we do not mind immigration, and certain people do mind immigration. If you had to live in some of the parts of the southern Pacific and you were poor, you would have no global voice on any political scale, and 2°C is extremely dangerous for you and it is probably already killing some of your friends, relatives and so forth, so it depends where you live. 2°C is extremely dangerous if you are poor and in the southern hemisphere, but 2°C is possibly liveable in the northern hemisphere, but the instability repercussions, who knows what they would be. We are not sure what they are. There are arguments that we are already starting to see military tension occurring as a consequence of food issues, drought issues, water issues and so forth which are at least being exacerbated at least by climate change. What the implications of those will be, it is difficult to say,

but perhaps, rather than try and test to see what they would be, we should try to avoid them to some extent through mitigation. So the 2°C, I would say, is a lot more robust than it initially was, and I think initially it was almost plucked out of the air, and I am probably going to get slated by certain people for saying that, but it did not seem to have a very robust scientific background, although I think since then people have looked at it and it is something that we could probably just about achieve if we really acted rapidly, and it is probably something that we could just about live with if we had to. Unfortunately, our analysis at this level and indeed some of our recent work of the global numbers has tended to suggest that we are not going to be anywhere near 2°C and we should not keep focusing only on 2°C. Coming back to Alice's final point, if the science is saying, "Look, we're going to go well above 2°C", we need to let people know because, if we are going to build along the Thames or elsewhere, we need to let those people know to build to 3 or 4°C and what those implications will be. Almost all the analysis of impacts is for 2°C, but why is that?

**Q257 Mr Hurd:** What relation should we make between 2°C and the risk of climate tipping points which current carbon sinks have the potential to turn into, sources of carbon? How important is 2°C as a threshold in terms of that risk profile? Secondly, was I right in getting the impression from the latest IPCC reports that they were not placing a great deal of emphasis on 2°C and in fact they seemed to be saying that in practical terms we need to be thinking of around 2.4 or 2.5 as a practical target? I get the impression that they were placing such a heavy emphasis on 2°C or am I wrong in that impression?

***Dr Anderson:*** I think the tipping point issue is probably where we have got the highest level of scientific uncertainty. There are certainly quite big disagreements, as there are in a lot of areas of science, as to quite where these tipping points are, when they will occur and what temperatures they relate to. However, having said that, again the policy perspective is that, even if the science cannot tell you exactly whether it is 2°C or 2.1°C that provides the tipping point, the world is an uncertain place and we can do something about that by making sure that we keep the temperature as low possible. The lower your temperature, the less the risk of tipping points. The risks of those tipping points are still quite difficult to assess, but the implications, if they are right, are so dire that you would think it is really worth taking quite significant action now. It is playing with fire. If you say, "Hey, the tipping points might not occur at 2.3 or 3 or 3.5°C", if they do occur, we are in a very difficult position globally, so we need to avoid those tipping points, but I would say that the tipping point issue is where a lot of scientific uncertainty remains. It does appear that people are starting now in the IPCC looking at above 2°C, but I would say that even at 2.4 or 2.5, and this is a personal view and one which Alice may not share, there is almost a ridiculous optimism about what we can actually try to achieve. People say that our starting to tackle climate change through the Climate Change Bill is a great move forward, but, from our analysis here, it is still pointing us towards 4°C and this is far better than most countries are talking about, but at least we are talking about it. What it is pointing towards are futures that we are not prepared to accept. Arnold Schwarzenegger talked about an 80% reduction in California in their emissions by 2050, but that means that in 2050 the Californians' emissions per capita will be the same as ours are today. That is not anywhere near enough reduction. We seem to be having our heads in the sand about the actual scale of the emissions that are occurring and somehow hope that policies that are not even in place or are not even decided as to what they might be are going to bring about significant changes. It is all about cumulative emissions and our emissions are very high now, so we have to do something urgently to bring those emissions down, and I think that we are underplaying the scale of the problem, significantly underplaying it.

**Q258 Colin Challen:** Does that tend towards the vision of the future which is so apocalyptic and unstoppable actually that we ought perhaps to adapt to it rather than try to mitigate it because we are already committed to a 1.5 point temperature increase? Given the upheaval that mitigation policies could cause, perhaps they might have severe impacts too which might also displace huge populations and so on or create even more poverty. What do you say to that argument which I think perhaps will emerge more and more, that actually we need to think more about adaptation than mitigation?

***Dr Anderson:*** We need to think more about adaptation. We do not need to think less about mitigation, we need to think more about mitigation and a lot, lot more about adaptation. We clearly, as you say, are locked into a system of a lot of changes and it appears to me that we are not going to get anywhere near 2°C. I really hope we can and, if we really were concerned about it and the rest of the world was like the people sat round here, then probably we would do something about it, but unfortunately they are not, so we are not going to make significant actions to bring it down to 2°C, but we still must try to keep the temperature as low as possible. We have to really drive forward the mitigation agenda while being honest about what temperatures we are pointing towards to let those people know for reasons of adaptation. The problem with just going down the adaptation route is that a lot of the implications will be very difficult to judge, for example, human migration is likely to be completely unplanned. At least with the mitigation route, you would rather hope you could plan that a little bit more than you could the response of countries to droughts that you could not adequately predict, so I rather hope we can do more planning with the mitigation. We definitely need to get a better balance between mitigation and

adaptation; we do not currently do enough adaptation or we do not incorporate enough into policy.

**Q259 Colin Challen:** Why do you think the Government are so reluctant to acknowledge the argument that 60% is far too low?
***Dr Anderson:*** I think the Government need a lot of credit here. I genuinely do think there is a real concern about climate change. The Government is made up of political people, but the political implications of grasping that nettle are very, very significant. You need major agreement in the past of what has occurred in the UK amongst all of your major political players for very dramatic action or you are going to have political sniping to try and get your party above another in bringing about change, so we need to have some sort of consensus, a bit like perhaps we have seen in Northern Ireland, and this seems to be emerging with climate change. If we get that consensus, perhaps governments can act, whichever government might be in, without the risk of isolating their voting base. If I were in a position of significant power, I would find it very difficult to know how to balance the fact that I want to remain in power and do good things with trying to bring about the climate change changes that are necessary.

**Q260 Colin Challen:** I certainly would agree that the Government is trying to show some leadership on it, but leadership in the wrong direction is no leadership at all. Certainly there is an argument which is practical politics and, if you talk about 60%, it is a figure that everybody is familiar with and has appeared in previous reports, like the RCEP Report, but I note that the Bill says it can only be changed after significant evidence is brought forth scientifically that merits that change. Have you any thoughts about what might in these circumstances constitute a significant change in the science when we already believe that it is the policy which is lagging the science?
***Dr Anderson:*** Well, I think actually within this briefing note we finished on that point, if I remember, the way we wrote it, but it is already there. The scientific evidence is there, that 60%, it is a nice idea and helps us to sleep a little bit at night, but it has very little to do with climate change, so we need to go well beyond the 60%. Here, we are talking about at least 70% by 2030, but of course it is not the percentage change that really matters, as Alice pointed out, but the cumulative emissions, but the evidence is there, so the Climate Change Bill is already out of date in that sense because the evidence already says that actually the targets included within the Climate Change Bill do not fit with the science.

**Q261 Mr Hurd:** Can I explore with you a little that key correlation between the global stabilisation range and a national allocation. In your paper, you talk about how the Royal Commission, which effectively drove the original 60% target, had applied some methodology there for the contraction and convergence principles, but this is not very well known and it is not very well disclosed and it has not been subjected to a great deal of scrutiny, and the feeling was that that 60% target was slightly picked out of the air. Can you expand a little bit on the underlying methodology that takes us from 450 parts to million to 60, 70, 80%?
***Dr Anderson:*** This is actually essential to the argument we are making here in that a lot of the discussion is about bringing global estimates or global budgets down to national levels. There are obviously different ways you can apportion, say, if you have got a global cake and you have got to hand that out to all of the countries and there are different ways you can do that. My simple argument is that if we'd done it in 1990 there would have been a lot more different ways to cut the cake. Broadly, across the globe we said that we could not be bothered to act about climate change up until 2007 and there is no indication that we will act in the next few years. The options for how we cut that cake have become less and less, so there were originally a lot more apportionment regimes, allocation regimes that we could have applied in 1990 and now there are a lot less. Contraction and convergence broadly says, and I do not know if they use any of this language in any of their literature, but it broadly says that those that emit have got to reduce. Now, it is an almost undeniable logic that those that emit have actually got to reduce their emissions. There are not a lot of options around, so you might be able to tweak the approach that the RCEP used, the contraction and convergence approach, but broadly it is requiring the big emitters to reduce their emissions per capita, and it also has within that assumptions about population, significantly by about 2050, whilst other parts of the world that are not emitting very much at the moment are allowed to increase theirs to some extent, so by 2050 there will be equal per capita emissions around the globe. There have been a lot of discussions around whether there are ways that you could cut the cake to help the UK or the US or someone else, but we are the emitters.

**Q262 Mr Hurd:** So, just to be clear, in effect the Government has adopted contraction and convergence without telling anybody because it is a clear target?
***Dr Anderson:*** Yes, we have written that before. The Energy White Paper 2003, although it does not expressly endorse contraction and convergence, it adopts the figure taken from the RCEP and the RCEP are very explicit in that they used contraction and convergence. The argument I am making here is that, although you might have different names for it, whatever other method of cutting the cake there is, those options have been severely constrained. Whatever we have, it looks something like the apportionment route within contraction and convergence if you want to get the $CO_2$ concentrations down to, say, 450 or 550—

**Q263 Mr Hurd:** But do you think, in the context of what we are looking at in trying to have a more robust process to drive policy-making, that it is time that we revisit that key correlation which is based on assumptions made in the Royal Commission Report in 2000 which does not seem to be part of the debate at all? Our perspective is driven by this 60% figure and there is no discussion about what actually underpins that figure.
***Dr Anderson:*** No, there is not. We have actually recently submitted a paper which is out for review at the moment, looking actually at the contraction and convergence approach and the associated model, but there is very little discussion on it as an approach, and I think it is something where there needs to be. The 2003 Energy White Paper fudged the issue. The Climate Change Bill and the future Energy White Paper needs to be really explicit and unambiguous about how it comes up with the targets and so forth that it has within it, so yes, we definitely need to revisit that, but I think we would caution that there are not options, there are not lovely options out there that we can try and discover which can allow us to get away without making significant reductions; they do not exist, in my personal view.

**Q264 Colin Challen:** On that point, have you come across any evidence to suggest that the Government has discovered some other apportionment approach since it is so reluctant to endorse the contraction and convergence model? Have you come across any evidence to suggest it has found something as an alternative?
***Dr Anderson:*** You will probably know far more than we do, but there was a brief discussion in the press a little while ago that they might have decided to go down this technology route, a bit like Bush, that hey, if we can have these carbon-efficient technologies, that will solve the problem, but from a climate change specialist perspective, we have to have something a bit more robust than that. I think flirting with that technology route has now gone and I think we are back to the idea of targets, of temperatures and of percentage reductions, not yet sufficiently related to cumulative emissions, but that is the big message, I think, for us, that everything has to be based on cumulative emissions and that is what really matters.

**Q265 Mr Hurd:** Do you think the Government gets that because you have been banging on about this for quite a while now?
***Dr Anderson:*** Probably yes, but again each time you accept another bit, the logic becomes a lot harder to argue against actually doing something, so, if you accept cumulative emissions, cumulative emissions lead you very clearly to say that you have got to act very, very rapidly. Forget your voluntary agreements and all those other nice, easy things to introduce; we are talking about stringent action. Once you accept the cumulative emissions approach, it constrains what it is you can actually do and I think that is difficult for any politician to grasp.

**Q266 Mr Hurd:** When you talk about these global stabilisation concentrations, and you have used a figure of 450 which I think is just $CO_2$?
***Dr Bows:*** Yes.

**Q267 Mr Hurd:** What is your underlying assumption about where we are now because the argument from the Sterns of this world is that it is very desirable, stabilisation thresholds, but in practical terms we are at 425 or whatever it is and, therefore, it is not practical, so that is why we are getting this slippage in terms of ambition, but what is your underlying assumption in terms of actually where we are now in terms of concentrations of $CO_2$ and $CO_2$ equivalents?
***Dr Anderson:*** Well, the equivalent, as Stern said, is about 425 and $CO_2$ is about 380, so all the probability has been incorporated in here. What we have done is, although we have done the analysis for $CO_2$, we make an assumption when we relate that as a temperature and ppm and so forth, we put that $CO_2$ equivalent and we use a broad rule of thumb for doing that.
***Dr Bows:*** That has been one of the reasons why we have not looked at 450 $CO_2$ equivalent because that would then be 400 $CO_2$ which is not very far away, so we are looking at a stabilisation level that we think is attainable with stringent action and I think the 400 level is virtually impossible.

**Q268 Mr Hurd:** There is an argument that we should discount the sort of cooling effects, which Stern does not do at all, as I understand it, but there are cooling effects which we ought to take into account so that the real figure, the 425, is actually closer to 370.
***Dr Anderson:*** There are other issues and additional warmings that are not incorporated. We heard this recently actually just last year when someone was pointing out, "Well, what about the vapour trails then?" There are other large uncertainties out there on both sides and, as those uncertainties gain more scientific certainty, they can be incorporated into the analysis. At the moment, I think it would be unreasonable to say that we should incorporate these cooling agents without at least incorporating the warming ones, and I would say that we should not incorporate either of those two because they are too uncertain to incorporate into the model and they do not seem to significantly adjust the message. They will tweak the message so that it goes from a very dangerous future to an extremely dangerous future, but they are all the same policy message.

**Q269 Mark Pritchard:** I want briefly to ask what sort of projections have been made with regard to new coal plants, for example, and the industrialisation of previous agro-economies. Indonesia, for example, I think this week is opening a new coal plant and we are seeing them open every month in China and we are seeing in different parts of Asia industrialisation of more countries. That is likely to continue and I just wonder what projections have been made of that.

***Dr Anderson:*** That is very true. In our analysis here, we just look at what the $CO_2$ concentrations would have to be globally and then relate that to the UK, and other countries have to deal with their own emissions within the subsequent apportionment regime, but it is completely true that coal is the generation option of choice. The Chinese produce as many coal stations each year as we have in the UK in total now. Having said that, we have to recognise that China in particular and India indeed, who also have a lot of coal stations, burn really very low-quality coal, from what we understand, although both of those countries have a really developed technical base and scientific understanding of a lot of issues and they are very well educated technically and scientifically. Also, parts of their governments, like parts of our Government, are wedded to the issue of climate change, but there is not joined-up thinking across all of them, so I think we have to be careful in assuming that they will not also be able to drive forward the carbon capture and storage agenda. That is not something that is necessarily being driven by the West and we need to work very closely with people like the Chinese and the Indians to ensure that their coal stations are either capture-ready and encourage them as much as possible to do that or indeed preferably have carbon capture and storage incorporated as they are building them, although I would also go a lot further and say that what we should be looking at is what it is they want their energy for and whether we can do something about that, the efficiency side of these countries. At the moment, they are just building new stations that we got through our industrial revolution process and we know the stages of that process and perhaps we should be encouraging them to think about more efficiency and joined-up thinking.

**Q270 David Howarth** Going back to the Bill and just carrying on from what Nick Hurd was talking about, the Bill itself sets targets only for $CO_2$ and it does not seem to include anything about $CO_2$ equivalent, but then, when international trading credits come in, suddenly they appear. First of all, is it sensible, given what you have said about how much difference it makes, for the Bill simply to deal in terms of $CO_2$ and to ignore the other gases in terms of targets? Secondly, what do you make of the place of internationally traded carbon credits in the Bill? Is that a sensible way forward? The Government's policy, and this is not in the Bill, but it implies that it is the Government's policy, is to meet its targets as much as possible using internationally traded credits. What is your view of that?

***Dr Anderson:*** My view of the Climate Change Bill is that it is the Climate Change Bill and, therefore, it has to incorporate $CO_2$ equivalents and it cannot ignore that. It is the Climate Change Bill and it relates to temperature and temperature relates to climate change and, therefore, we have to incorporate these other gases. There seems almost an inescapable logic in that. The other one about the trading, and this again is a personal view and not one that necessarily everyone would hold, but I am highly sceptical of any method that is like international offsetting and, as far as I am concerned, personal offsetting is buying indulgencies and I do not see it as any different from that. We know that we have to reduce our carbon emissions if we are going to try to achieve any sort of level of reasonable stabilisation. What we do not know, if we encourage people elsewhere in the world to have more efficient behaviour, is what the rebound effects will be. What implications does that actually have for those economies? If they work within a carbon cap, that is fine, so we can trade within the new ETS because we have a cap, but these other countries do not have a cap. An example I will use here and it is an example I have pulled out time and time again, and I think the Co-op Bank are doing this actually, is that people who are flying to Jamaica with the Co-op providing travel agency then Co-op are providing energy-efficient lightbulbs to Jamaican hotels, so the hoteliers have to use less energy, therefore, to light their hotels. The energy in Jamaica is extremely expensive electricity, it is all basically oil based, so they save a huge amount on their lighting bills, so every year they might be able to fly back to visit their relatives in the UK. Now, I do not know what the implications of that are, nor does anyone else. No one knows what those rebound implications are. The hotel down the street from them thinks, "Oh, that other hotel up there is actually getting brighter" because the other hotel might be putting more lightbulbs in to make it look even brighter than it did before, which is a lot of what the Coke machines have recently done, they have doubled their output of lighting in their machines to make them brighter than the opposition, so you can imagine a hotel doing that. Then the hotel down the road says, "Well, if their hotel is a lot brighter, we'd better do that with ours". These repercussions, these rebound effects occur over months and years and, unless you have a cap on total emissions, you do not know what the implications of that will be, so this idea that somehow we can improve efficiency elsewhere and that will reduce emissions, I would say there is no evidence for that at all. We are fully aware in the academic community about the rebound effect and that it is very difficult ever to predict, so, unless those other countries have a cap on their total emissions, and then I have no problem with trading backwards and forwards, then the trading approach should not be a way of us getting out of making significant cuts in the UK itself. That is the view I hold and not necessarily a lot of other people.

**Q271 David Howarth** Would your response be the same to the argument that there is an international aid element to these kinds of transactions that you are talking about and it is helping to develop other countries? Obviously there is a problem about locking ourselves into a high carbon future if we do not do it ourselves, but, following almost the

same logic as in contraction and convergence, you accept contraction and convergence because that is a model of justice rather than an economic model, and one of the advantages offered for trading is a similar sort of justice argument, so what is your response?

***Dr Anderson:*** I have no problems with the justice argument and I have no problems with sustainability issues. You can do it for all those good reasons, but do not claim any carbon credits for it, so, if you really want to help these people, help them, but do not say that it offsets some of our emissions. To be honest about it, if we really are genuinely interested in helping them, do that anyway and increase the aid budget, but do not offset it against your carbon emissions.

**Q272 Mark Pritchard:** Coming back to aviation and shipping, I had a question down here of what difference will their inclusion be within UK targets, and I think you have already answered that, but I do not know if we can go back to the cumulative impact. Did you say 1.5 billion tonnes of carbon?

***Dr Bows:*** Yes.

**Q273 Mark Pritchard:** So that is UK aviation and shipping, is it?

***Dr Anderson:*** That is UK aviation and shipping with a fairly low growth future.

**Q274 Mark Pritchard:** As we discussed earlier?

***Dr Anderson:*** Yes.

**Q275 Mark Pritchard:** So globally, and again you are only UK, I know, but do you have any sort of ballpark figure on that because that is significant?

***Dr Bows:*** In the UK at the moment aviation accounts for about 6% of our emissions, whereas in Europe it is more like 4% and globally it is more like 2 to 3%. Here in the UK we do have a bigger aviation industry and, therefore, it is a bigger proportion of our emissions and then, when you add shipping to that as well, as an island nation, we have a reasonable amount of shipping emissions, more than are recorded at the moment, and in terms of bunker fuels, that is the memo that is submitted to the UNSCCC, if you compare the Netherlands and the UK, you will see why they are so different. The Netherlands have about 12 times the amount that we have just because it is a thoroughfare and a lot of ships fill up there and, therefore, it is recorded that their emissions are much higher. This proportion of the total cumulative amount is very high and I would imagine that globally it would be lower, but it will still be significant. We have not done the actual figures.

***Dr Anderson:*** No, but as to the growth rates of some countries, for China a few years ago, and I do not know what it was for the last year or so, but it still had 24% annual growth in aviation and it was constrained by the number of pilots they could train, so clearly some other countries are looking to very rapidly increase their aviation sectors and hence their emissions, but of course, as Alice pointed out, from a very low base. The UK is a very flying-dominated or travel-dominated society and it is the same with cars, we travel a lot in our cars as well.

**Q276 Mark Pritchard:** How does that fit in with, firstly, manufacturers? Consumers, flyers, are being asked to play their part and rightly so, but what about manufacturers? I think, from memory, that the new Boeing 787 is claimed to be 16% more fuel efficient through the use of certain polycarbons and metals and so on on the aircraft compared to the Airbus A380. Do you think manufacturers of aircraft have a part to play? I know that is an easy question for you, but what sort of part and how big a part, do you think, and what sort of dialogue? I have had a bit of injury time on this Committee recently, but there does not seem to be a huge amount of public dialogue with shipping companies, but there is with aviation, so that is a sort of back-to-front question, if you like, so, firstly, manufacturers and, secondly, do we need to see more dialogue—another easy one for you—on shipping?

***Dr Bows:*** From the manufacturers' point of view, we interviewed manufacturers a few years ago and the sort of response was that there was not a great consideration of the issue other than for fuel efficiency reasons because the cost of fuel was going up. One person commented that, without any incentive, why should they do more and anything different from what they are already doing. They already managed, between them, to produce an improvement in efficiency of about 1% a year, so there were no additional incentives to make that any higher or quicker. We have spoken to manufacturers again more recently and there is quite a different attitude in the aviation industry, that they seem to be now accepting that they do have a part to play and I think before it was more, "Other sectors are going to be able to play their part and we don't have a part to play", so that attitude has changed. I do think that the manufacturers could play quite a significant role to speed up the technological innovation, but the problem in the aviation sector is always this very long time-lag in purchasing a new aircraft and then the fleet improvement because aircraft last for 20 to 30 years, so they do have a role to play because we need to be doing everything that we possibly can and they might be able to push the fuel efficiency improvements higher than they are at the moment, but they are not going to suddenly be able to make their aircraft incredibly more efficient, given that the whole fleet has a number of different aircraft that are still going to be in the pipeline and are going to be lasting for 20–30 years. The Airbus A380 is going to be being manufactured for another 20 years and that is not going to change significantly in terms of fuel efficiency now for those years.

**Q277 Mark Pritchard:** Yes, exactly, and then there is the whole issue of multi-site manufacturing given that British Aerospace are multi-siting. Just as an

aside, one airline, I understand, repainted its livery on all of its aircraft fleet recently, I will not mention which one, and went from silver to white and they have become more fuel efficient as a result because white paint is not as heavy as silver paint apparently, so there we are. Again, what is the offset from that? You probably have to clean the aircraft more often and use more electricity, I do not know.

***Dr Anderson:*** It is worth pointing out the growth rates, that the improvements in technology, even the really quite high levels of improvement that could be made if you really forced the industry are dwarfed by the sort of growth rates that we are seeing at the moment, so the growth rates, the number of people who want to fly and the number of countries they want to fly in completely dwarfs any technical improvement that we can possibly envisage.

**Q278 David Howarth:** Just on this in fact, I would just be interested in the apportionment of international aviation and shipping that has been done for this slide because in the Bill international aviation and shipping is not included, but there is a power to include it later. One of the reasons given by the Government for not including it is allegedly that there is no internationally agreed way of apportioning. You have obviously done it, so I was just wondering how you did it.

***Dr Anderson:*** So have the Government. The Government have been a bit cheeky there, to be honest, particularly on aviation. The Government have been involved in the EU negotiations about this and there is just a broad acceptance, a gentleperson's agreement that you apportion on a 50-50 basis, so they could easily have done that and that is what we did here, we assumed the 50-50 basis. Now, the EU apparently, in the latest draft legislation for 2012, is not going to do that, it is actually going to incorporate all of the emissions. It is almost like a naming and shaming of the US and we will take on board the US emissions because they cannot be bothered, but everyone recognises that that is a short-term driving force and it will be 50-50 in the future.

**Q279 Mark Pritchard:** The other argument is, "There are no policy instruments at present to deal with this, so why should we put it in at all?"

***Dr Anderson:*** The clear policy instrument is: do not build new airports.

**Q280 Mark Pritchard:** Yes, quite.

***Dr Anderson:*** There is a whole array of policy instruments out there.

**Q281 Mark Pritchard:** You mentioned, I think, at 10.57am that the Climate Change Bill is already out of date, and that is quite a dramatic statement and, being agent provocateur for a moment unusually, I just wondered what does that message send out of what the British Government are trying to do and what the cross-party consensus is trying to do. You say you will do your best and that is better than nothing or what? Is there another message, given that the Climate Change Bill is already out of date, or are you saying, as you were saying earlier, that we need to go back to perhaps the invisible benchmark from which all this began?

***Dr Anderson:*** Yes, I think so. Of course it is a draft Climate Change Bill, so the comment saying that it is out of date relates to you having an opportunity to put it into date. If the Bill was already there, we might, though I cannot imagine we would change our language, yes, we would still say it is out of date. But certainly with the draft Climate Change Bill, we made this contribution as quickly as we reasonably could because we felt it was important to flag up what we felt were the inadequacies of the Bill so that in this draft process we could at least make our small contribution to the real Bill being something worthwhile and valuable that the UK can be rightly proud of, and I think it has that opportunity still.

**Q282 Mark Pritchard:** On a specific last point, we recently heard from BA about a research paper by Forster et al which cast some doubt on the practice of multiplying $CO_2$ emissions of aviation by a number such as 2.7, which you apparently agreed with—which must have been a surprise to British Airways as much as anybody else. I just wondered whether you might want to comment on that.

***Dr Bows:*** The problem with these multipliers is that you are trying to compare things that are not like for like, comparing a contrail that lasts for some few minutes over one part of France with global $CO_2$ emissions is not something that we think you could ever mathematically put together and come up with an answer that is going to help policy. The problem is that when you put in a multiplier your policy implication might be to fly lower to get rid of the contrail, because that seems to have more of an impact, but then you are increasing the $CO_2$ and then you have a problem that is with you for another 100 years. The paper was good in that it points out that it is not necessarily appropriate, it is particularly not appropriate for taking it out into the future because it is a measure of historical impact, and then to say that you can predict and multiply everything by 2.7 up to 50 years into the future, those different emissions are going to have different impacts as time goes on and that is what that paper points out, that the $CO_2$ becomes more and more important because it lasts for a long time. It just draws attention to the fact that for policy purposes they are trying to produce a multiplier that is helpful and actually it is not helpful at all, but it is necessary to look at these other emissions because they do have an impact but you cannot just bundle them altogether.

***Dr Anderson:*** It is important to bear in mind that science cannot always be reduced to convenient management tools, and this is a very good example where we are being forced in a sense to say what does this mean, how do you compare them? You cannot compare them. How do people compare things in their own lives? There are lots of things that you cannot bring together; you cannot make

easy comparisons between your feelings for your wife and your feelings for your children, you cannot relate them in some nice scale. The same thing here, these are simply incomparable issues. British Airways might like us to say that but we have to say what we think as scientists, regardless of whether Friends of the Earth like it or British Airways like it. Whilst we do not agree with the multiplier you cannot ignore these other issues; they are absolutely essential and need to be thought about right throughout the process, so you may have to have a whole host of additional flanking instruments that might help you try to deal with these other sets of issues. The idea of trying to combine the two in a way that will help you come up with convenient policy perspectives is extremely dangerous, we have to recognise that there are very different issues.

**Q283 Mark Pritchard:** Finally, there is one or two of us in the House who have tabled questions on scramjet technology, which might have higher emissions but you get to your destination far quicker. Do you think we should be looking at far more innovative technologies rather than stopping people flying?

***Dr Anderson:*** It is difficult one. That is a typical example—hey, you can get to Australia even quicker so now you can go Christmas shopping in Sidney rather than just in Barcelona. What the environment sees is the total emissions, it does not see the emissions of one particular flight so if you change the amount that people fly then no, but those things have to be thought about in advance.

***Dr Bows:*** The other important point is that it is not stopping people flying, it is stopping the growth and it is the growth that is the problem. Obviously there are some people who are flying an awful lot more than others and perhaps there are some inequities there as well, but it is slowing down the rate of growth, not stopping people going on holiday next year.

***Dr Anderson:*** If the growth rates in the industry roughly matched their efficiency improvements there would be no net increase in $CO_2$ emissions from aviation. From our analysis at the moment, that would be very good, we would be really pleased if we could see that, and that lets the industry expand. Hey, if they can come up with 4% improvement year on year they can have 4% expansion—they will not be able to do that, but you let the industry decide that. So efficiency and expansion should be the same.

**Mr Chaytor:** In our last few minutes I want us to focus on some of the practical policy issues with one or two quick questions. Nick, first of all on the Committee on Climate Change.

**Q284 Mr Hurd:** The Committee on Climate Change: if you were in charge of this committee what powers would you give it and who would you have sitting on it?

***Dr Anderson:*** It would have to establish a really clear correlation between what it wanted to see or what it was given as its remit—a bit like with the banking where you have a certain percentage inflation rate to aim for—so it would have perhaps 2°C and the apportionment rules it was expected to apply and then it would just use a complete scientific approach using accumulative emissions and everything else. It should have that really clearly laid out and then I personally think—and I do not know if Alice agrees with this—it should not be just an advisory committee, it should have powers to change things in the same way that we can do in terms of monetary policy, so it can change tax rates or whatever sets of instruments that the Government says are appropriate for dealing with the issue, the adjustment of those sets of instruments is taken out of the political realm and is left with this committee. I do not think therefore that it should be an advisory committee, it should be a committee with actual powers to adjust things in accordance with very clear policy goals, this correlation trail that goes right the way up to whatever it is, 2°C or 3°C or whatever we seem to be aiming for, with probabilities and uncertainties in there, and it should of course have to readjust and revisit the science as that changes, as it inevitably will do. Who should be on it? It has to be people who will be as independent and honest and direct as is possible, people who are not trying to slide up any particular pole, who are just there to be deciding on what it is that is necessary and prepared to be unpopular—unpopular with the Government and probably unpopular with the population and industry as well, so you are not going to be very much liked if you are on this committee.

***Dr Bows:*** People who have an understanding of each of the sectors that are emitting would be useful on the committee so that there is somebody there who actually has some insights into what the aviation sector is doing, what the shipping sector is doing, is it on track? If you have five year cumulative budgets in year 3, can that person tell you something about the fact that that particular sector is not doing very well or is doing better or whatever it is, so people who know about the sector is quite important.

***Dr Anderson:*** But not political people. The political framework should be set for the committee, it should not have to try to incorporate politics into how it comes up with its solutions or its responses, those responses should be ones that should be set up: the committee is allowed to do this and that is what its powers are. It is really important that we remove it from politics, which is to some extent what we have done with the Bank of England, so there is a precedent there.

**Q285 Colin Challen:** This committee should be appointed then to that particular new function, but we are all benign dictators. Your report *Living within a Carbon Budget* said that the Government's reporting of carbon emissions is both partial and not sufficiently up to date. How do you account for these deficiencies, where do they lie and how exactly should the Government improve its monitoring of carbon emissions.

***Dr Bows:*** Being partial is due to the fact that they have not got aviation and shipping in there. The shipping emission issue is actually quite a big problem, but nobody seems to have reliable data so the UK Government should show some leadership. What we need is freight tonne kilometre data and then the fuel consumption per freight tonne kilometre for different types of ship. That sort of data does not exist at the moment, you cannot find out how far the ships are going, you just can find out the amount of tonnage that is imported and exported, so that is the comment from the aviation and shipping point of view. I understand that the aviation methodology that they choose, that NETCEN and AEA Technology produce for the Government, is updated quite regularly and has been updated quite recently. There is a new paper that we have just reviewed that has a look at this measurement and actually it is quite a good methodology for the aviation emissions so that is quite satisfactory.

**Q286 Colin Challen:** Are we moving to a situation where we will not have repeats of the European-wide problem of incorrect allocations under the NAPs where more generous allocations were made than were actually necessary. Are we moving away from that situation and, if we are, how quickly can we expect future NAPs to be spot-on accurate accounts of where we are or where we should be?
***Dr Anderson:*** We should expect it as, again, a matter of urgency. If the EU claims it is aiming at 2ºC as it repeatedly claims, then there is no practical reason why the NAPs cannot be appropriate, although the NAPs should have been more reasonable from the beginning as far as I can see. There is no practical reason why the NAPs cannot be appropriate, and they have not been, and countries have been deliberately playing a game of poker it seems to me in trying to get their allocations through.

**Q287 Colin Challen:** On this point it sometimes occurs to me as a lay person that industry, particularly smaller companies, will come along and say this is a very difficult and complex process assessing our carbon emissions. Practically, how difficult is it to assess carbon emission content in products and services?
***Dr Anderson:*** It is fairly straightforward for their energy use, so if they happen to be a manufacturing company making something there might be some process emissions and they are generally well understood, but if it is a company that is respraying motorbikes or something then we just look at its electricity bill and its gas bill and that will give you its principal emissions.
***Dr Bows:*** The biggest uncertainty or confusion comes over where you draw the boundary, so if you are using some sort of freight transport, for example, should it be the freight company that accounts for the emissions or should it be you? Our understanding is that those sorts of things can be negotiated and they are not a problem of accounting, they are more just a problem of who is responsible for what kind of things. The actual calculations are perfectly reasonable to do.
***Dr Anderson:*** Lots of companies out there can help now, there are lots of consultancy organisations out there, so if the company does not want to get involved it can use the consultancy, and also on top of that of course there is lots of Government advice on these things. The Carbon Trust should perhaps be helping SMEs and so forth in collating that sort of data and giving some guidance on how to do it and possibly some free assistance in actually doing it.

**Q288 Mr Chaytor:** Finally, can I come back to the question of specific policy prescriptions for the future? In the next few weeks we will have the publication of the new Energy White Paper; does your analysis lead to an endorsement of the idea that a resurgence of nuclear is the only way of reaching the savage reduction in emissions that you are calling for?
***Dr Anderson:*** I wrote a piece which is still available on the BBC website which lays out my personal view on this. If you go into Google and type "Anderson and fruit"—because I called it "low-hanging fruit"—it will come up with the piece. Broadly, that lays out the point that roughly 3.6% of our final energy consumption comes from nuclear, 3.6%. That 3.6% is broadly going to be decommissioned by 2020 with the exception of Sizewell, which is about 1.3 gigawatts, so pretty much all of that is going to disappear by 2020, but that is only 3.6%. We can easily replace that with energy efficiency and so forth, if we felt that was appropriate, we could improve efficiency elsewhere on appliance standards and so forth. Nuclear is simply not, in my view, a prerequisite of a low carbon future, but that does not mean to say that nuclear is not a viable option to help us move in the right direction so I am fairly ambivalent about nuclear. If you have a few pounds to spend you do not spend it on nuclear, you do not spend it on wind turbines, you do not spend it on gas turbines, you spend it on energy efficiency, so I am not particularly opposed to nuclear or opposed to offshore wind turbines or whatever it happens to be, but if you have only got a few pounds to spend you do not spend it on supply, you spend it on demand. If you are then looking towards a medium to long term future—and some of our scenarios have actually shown this as one of the options—if you are looking to try and move away from a transport system that is dominated by carbon-based fuels you might be able to look at things like nuclear that can help us produce hydrogen. It is a low carbon producer of hydrogen; it is a very expensive capital cost to actually build these things but because you want to run them on base load, you want to run them continually at the same load, you do not want to be fluctuating their loads, so when people do not require electricity at night you could use the nuclear stations running at full load to generate hydrogen. That is not a short to medium term it is more a medium to long term

policy, and that is an option. We are not saying it is one you should go down or not, the simple message is that it is not a prerequisite of a low carbon society but it could be something that could help in the medium to long term. The Government issue in terms of replacement rates has almost nothing to do with $CO_2$, it is a red herring; they might have other reasons for going for nuclear.

**Q289 Mr Chaytor:** In the short term where the real pressure is to make deep reductions and in terms of demand management, what are the three most effective policies that would achieve big reductions in domestic energy efficiency and industrial/commercial energy efficiency? What would you argue for to be in the Energy White Paper in those respects?
***Dr Anderson:*** We may have different views on this but my first one would be a moratorium on airport expansion, and I think that would dwarf most other things you could actually do. After that I would like to see very stringent minimum efficiency standards applied across the board, so no more A, B, C, D and E, none of that nonsense—why are we selling Es and Ds, everything should be A.

**Q290 Mr Chaytor:** We are talking about white goods and appliances.
***Dr Anderson:*** White goods and appliances but I would take it to cars as well. You can have a four-wheel drive car, you can have a six-wheel drive car, I do not care as long as it does 50 miles per gallon and every year we will improve that by three miles per gallon, so you have a minimum efficiency standard, not 130 grammes of carbon per kilometre, nothing like that because that is only an average for the fleet they are selling, they still can sell four-wheels drives and sports cars. You can sell four-wheel drives and sports cars but they have to meet 50 miles per gallon and that standard will be improved at, say, 3% year on year, a very clear marker for the manufacturers. They can do that already. Very clear transport standards, therefore: a moratorium on airport expansion and I would say efficiency standards for white goods. You may have different ones.

**Q291 Mr Chaytor:** You can have three each.
***Dr Anderson:*** Obviously the built environment as well, but it is easy to exaggerate what you can do in the built environment because it is very slow in changing, new houses and so forth, they are a very small proportion of the total.

**Q292 Mr Chaytor:** Thank you very much indeed, that was extremely interesting. Thank you for your presentation and your submission. Our report is due to be published early in June we hope, but we would also like to hear from you about your future programme of work as well, so please do send us future submissions, regardless of whether we are doing a specific inquiry into climate change.
***Dr Anderson:*** Thank you very much.

# Written evidence

**Memorandum submitted by British Energy Submission**

## 1. Environmental Audit Committee Inquiry: Beyond Stern: forecasting, cost-effectiveness and climate change

1. British Energy welcomes the opportunity to comment on the EAC's Inquiry into forecasting and cost-effectiveness in the context of climate change policy. These are key issues in enabling long-term effective mitigation of climate change and have significant implications for all sectors of the economy.

2. British Energy is the UKs largest electricity generator. We own and operate the country's eight most modern nuclear power stations, one coal-fired power station, four small gas plants and we also hope to develop two large wind generation projects. Our fleet of nuclear stations make the largest single contribution to tackling climate change in the UK. Carbon emissions from our coal plant are subject to the constraints of the EU Emissions Trading scheme.

3. We have been engaged fully in the climate change policy debate and have responded to many significant consultations and inquiries recently, including the Stern Review,[1] Energy Review[2] and the EAC's inquiry into nuclear, renewables and Climate Change.[3] Our Submissions to these can be found on our website (www.british-energy.com).

### Summary Key Points

*On forecasting*

4. Emissions projections play an increasingly influential role in Government policy, and any errors in projections may therefore have serious economic consequences for industry and consumers.

5. Government should increase its capability to undertake expert analysis in-house and be a very well informed customer for external work.

6. More interaction between Government experts and industry stakeholders would enable better access to the latter's significant resources of expertise and research.

7. Projections could be made more fit for purpose by subjecting input parameters to comprehensive sensitivity analysis.

*On cost-effectiveness*

8. Distinction should be made between proven technologies and those at an earlier stage of development as benefits anticipated from the latter are less certain.

9. Delivering technologies capable of decarbonising the economy will require Government commitment to policy instruments over long timescales to provide the necessary investor confidence.

10. A cost of carbon at the low end of the range suggested by Stern would incentivise new nuclear over new CCGT implying that a carbon price capable of stimulating new nuclear is justifiable on cost effectiveness grounds.

11. We welcome the Committee on Climate Change's analytical and advisory role particularly in support of the proposed five-yearly carbon budgets. However, independent carbon budget setting may have provided additional benefits.

12. Interim targets before 2050 provide policy focus but there is a risk of stimulating investments which could "lock in" emissions in the longer term. Short-term targets need to be consistent with longer term aspirations.

---

[1] Submission by British Energy to the *Stern Review on the Economics of Climate Change*, March 2006, http://www.british-energy.co.uk/documents/Stern_Review_Final.pdf

[2] Submission by British Energy to the *Energy Review: Our Energy Challenge*, April 2006, http://www.british-energy.co.uk/documents/Energy_Review_Final_2006.pdf

[3] Submission by British Energy to the *EAC Inquiry: Keeping the Lights on; Nuclear, Renewables and Climate Change*, January 2006, http://www.britishenergy.co.uk/documents/British_Energy_submission_to_EAC_Inquiry.pdf

## Detailed Responses to Questions

*Forecasting*

— In the light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?

13. Forecasting is an important part of the target-setting process insofar as it has a clear role in establishing the additional effort required to meet the chosen objective and should inform any necessary policy development. In this respect, projections provide a "reality-check" that a target is achievable by highlighting the scale of change required.

14. The NAO's emissions projections paper highlights how headline projections against the UK's 2010 $CO_2$ reduction target have changed. In practice, there are a number of reasons why forecasting can go wrong: the number and accuracy of assumptions (both exogenous and endogenous) that are factored into the modelling are defining.

15. One way in which future targets could be made more "fit for purpose" would be to ensure a comprehensive sensitivity analysis into uncertain input parameters and modelling interactions eg fuel prices and their effect on economic growth.

— In developing its approach, how should the Government deal with the following issues:

whether there can be a greater role for independent assurance.

16. We would welcome Government making greater use of independent assurance that is robust and comprehensive. However, we believe the first priority should be for Government to develop sufficient internal expertise and capacity to enable it to do more analysis in-house and to enhance its well informed customer status in the context of assessing work commissioned externally. Strengthening in this way would be helpful in allaying any perception of vulnerability to "biased" or unsubstantiated content in work presented by external organisations.

17. In recent years the use of emissions projections has evolved considerably and in the process their significance has grown and become far-reaching. Projections now form the basis for Government policy instruments and therefore any errors in projections may have serious economic consequences both for industry and consumers. Therefore all reasonable steps should be taken to ensure projections are founded on robust assumptions, with uncertainties kept to a minimum.

18. In addition we would recommend more extensive interaction between Government experts and the stakeholder community, particularly industry which has considerable resources of relevant expertise and research.

how the Government should respond to the unavoidable uncertainties in forecasting.

19. There may be certain circumstances such as a detailed analysis of growth in a particular sector, where substantial uncertainties are unavoidable, and where independent peer review of significant work could provide greater reassurance that assumptions are realistic.

20. We would expect that Government would minimise uncertainties in forecasting by taking cognisance of existing work and undertaking extensive evidence gathering. In addition, wherever possible, it would be helpful to place emphasis on empirical evidence such as field trials. A recent example of this is the work undertaken for the Carbon Trust investigating issues associated with the deployment of small scale CHP.

21. There should be a clear, acknowledged distinction between technologies which are proven and those which are at an earlier stage of development. Benefits anticipated from the latter are subject to greater uncertainty and as such these technologies carry a greater inherent risk of failure. A good understanding of learning curves and their underlying drivers is essential to support the development of new or emerging technologies.

22. There should be more frequent periodic updates of forecasts in order to improve the accuracy of models. This could be assisted by bringing in new empirical data for the purpose of updating assumptions.

whether or not future domestic targets and forecasts should include international aviation and shipping?

23. Aviation and shipping are not covered by the Kyoto Protocol at present, however, subsequent agreements should include both. If this is the case, there would be merit in establishing long-term targets for these sectors. In the case of aviation, the sector will be constrained under the EU ETS and this is perhaps the best mechanism through which a target might be set. However, aspirations for the EU must take account of the impacts on competitiveness in the wider markets.

24. In addition to the above, there will need to be action to reduce the emissions from surface transport. The large number of small mobile sources arguably makes the sector unsuitable for inclusion in the EUETS, in which case alternative policy options would be required.

— As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?

25. Delivering the technologies needed to decarbonise the economy and meet Government targets will require long term investment decisions. It is therefore important to recognise that without Government commitment to instruments over long timescales, the necessary investor confidence will not be achievable.

26. Projections to 2020 and beyond will need to be revised and updated periodically to take account of improving data. Government should be prepared to respond to these updated projections without undermining existing investments.

27. Longer-term projections require more extensive use of sensitivity analysis because of their greater inherent uncertainty.

28. In setting targets there is an inherent tension between Government delivering a strong signal and setting realistically achievable targets for carbon abatement. Long-term projections will have an important role in achieving this balance.

## Cost-effectiveness Analysis

*Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

29. The Stern Review has demonstrated that the social cost of carbon could be significant, but also that it is subject to considerable uncertainty. In a report commissioned by British Energy to support the company's Submission to the Stern Review,[1] AEA Technology reviewed the evidence available on the social cost of carbon, and concluded the following:[4]

— The costs of climate change are potentially significant, and the impacts will fall disproportionately on the poorest nations.

— There is no consensus on the costs of climate change, with current estimates of the social cost of carbon spanning at least three orders of magnitude, from 0 to over 1,000 £/tC.

— The range in values represents uncertainty not only about the "true" value of impacts that are covered by the models, but also uncertainty about impacts that have not yet been quantified and valued. Decision variables such as the discount rate and equity weighting are also extremely important.

— The current research studies do not cover all the impact categories of climate change, and most researchers consider the possibility of negative surprises to be more likely than positive ones.

30. With these conclusions in mind we do not believe that policy appraisal (or indeed policy formation) should be judged against a single value for the social cost of carbon. Rather, the range of estimated values should be used as a guide for the level of effort that can be justified.

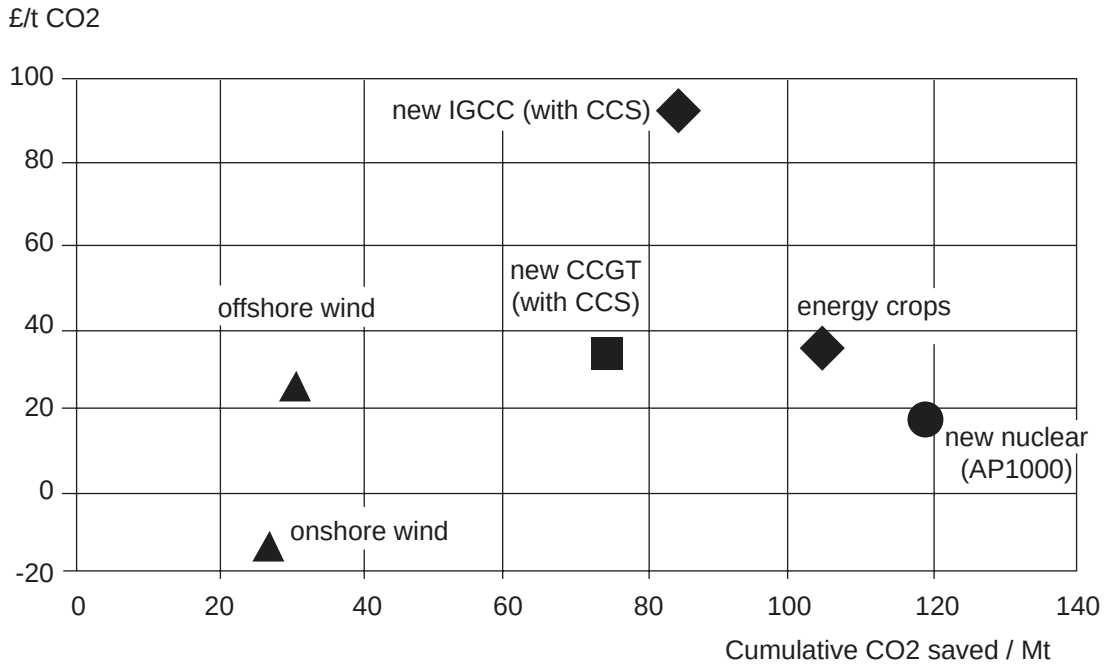
31. Concerning the electricity sector, in our Submission to the Stern Review[1] we estimated, based on DTI technology costs, the cost of carbon required to incentivise new low carbon generating capacity in preference to new CCGT. Figure 1 below shows the level of incentive required (y-axis) against the cumulative emissions savings per GW of capacity over the life of a new plant (x-axis).

32. The chart shows that onshore wind does not require any carbon price signal to incentivise it in preference new CCGT. This is because the DTI cost for wind (£24.7/MWh) is lower than the new CCGT cost (£30/MWh) assumed in the present analysis.

33. It is important to note that the costs presented here cover generation costs, and not the costs to the consumer. The costs to the consumer will be influenced by the structure of the market, including the effects of any incentive mechanisms such as the Renewables Obligation.

[4] AEAT *The economics of climate change*, December 2005, http://www.british-energy.com/documents/AEAT_Report_—Stern_v9.doc

**Figure 1 - UK abatement cost***




*Notes:* ** compared to new gas fired power station and over operating life of plant: normalised to 1000 MW capacity.*
*DTI costs for new plant except CCGT = £30/MWh and CCGT (CCS) = £43.4/MWh.*

34. Figure 1 shows that a cost of carbon in the region of £18/t$CO_2$ would be required to incentivise new nuclear build in preference to new CCGT plant. This corresponds to a carbon cost of £66/tC—which is at the low end of the range suggested by the Stern Review (£60–200/tC)—implying that a carbon price necessary to stimulate new nuclear build can be justified on cost effectiveness grounds.

35. In addition, it should be noted that a new nuclear project would deliver the greatest $CO_2$ saving per GW of installed capacity. This reflects the high load factors and relatively long lifetimes for the technology compared with the other options.

*Has the Government's approach to evaluating cost effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

36. Evaluating cost-effectiveness is the right way to assess existing and new policy options. If this approach were undermined or diluted there would be an increased risk of the UK becoming locked into policies which place an unjustifiably costly burden on the economy.

37. The cost-effectiveness of policy measures should be assessed recognising the full carbon benefits over the lifetime of the policy. Many investments, such as those in power generation, have long lifetimes and require a policy framework that extends over this timescale, or at the very least the payback period for the investments. A short-term policy horizon would be detrimental to investments in these large projects.

38. Another factor that must be considered when assessing the cost effectiveness of policy measures is the extent to which the technology being supported is established, or emerging. Established technologies offer greater certainty about both the costs and benefits, whereas the performance of emerging technologies is inherently less certain. A focus on more established technologies would therefore reduce both the risk to the economy and the attainment of environmental objectives.

*The NAO briefing has also raised a number of other issues (see below). In the light of such concerns, how should the Government improve its approach to the use of cost-effectiveness evaluation?*

— the failure to explore sufficiently different scales of policy intervention;

39. In order to achieve the Government's target for a 60% reduction in greenhouse gases by 2050 all sectors of the economy will need to make cuts in their emissions. This will ultimately require a range of policy instruments suited to each sector, but in the short to medium-term policy development must recognise that reductions in some sectors will be easier than in others.

40. We support the NAO's view that for policy development CEA is reviewed alongside forecasts of each policy's total potential to reduce emissions. The electricity sector emits a large proportion of the country's $CO_2$ emissions and has rightly been the focus of policy effort so far. If the sector is to deliver further improvements, longer-term targets will be required.

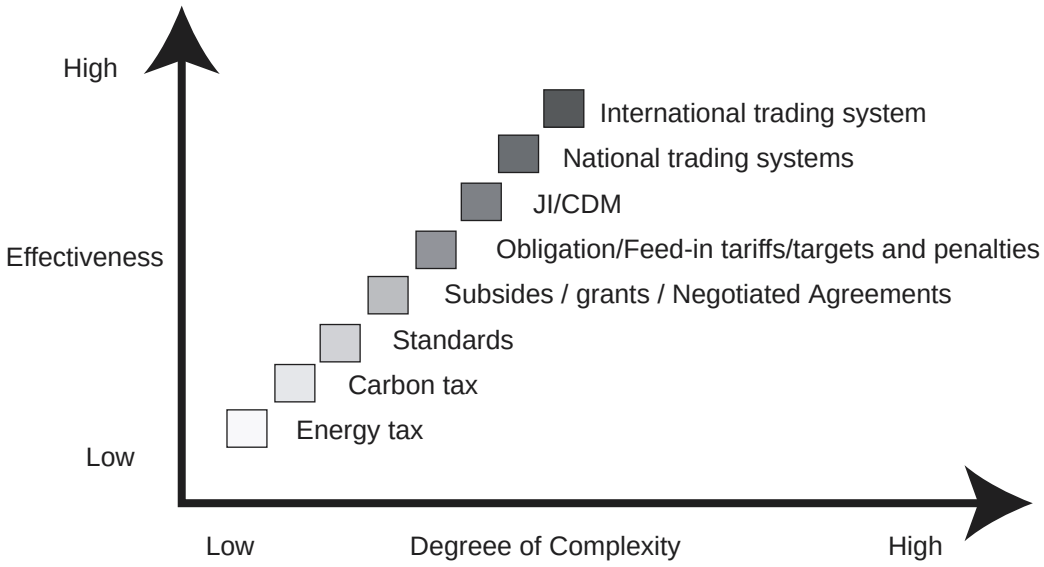
— the balance between expanding existing measures and introducing new ones;

41. The extent to which the policy framework can be responsive will depend on the investment timescales for low carbon technologies. For example, in power generation the investment timescales are long, and regulatory certainty is important in minimising the risks to investors in low carbon projects.

42. In the climate change area the policy landscape is becoming increasingly complex, with new initiatives overlapping with existing ones. It is important that a simple framework is adopted, possibly with measures tailored to specific sectors. For the power sector the EU Emissions Trading Scheme appears the best way to incentivise low carbon investment, however, it requires long-term reduction targets.

— the range of policy options considered and the criteria for appraising them;

**Figure 2 - A spectrum of policy instruments**




43. Figure 2 above illustrates that there is a range of policy options available to incentivise low carbon technologies and cut emissions. At one end of the spectrum are instruments which are not complex but may be of limited effectiveness, such as an energy tax, which does not provide any assurance of a desired environmental outcome. By contrast, emissions trading schemes can guarantee an environmental outcome, but are often more complex both to participate in and administer. In terms of instruments, what suits one sector may not suit another, so in practice we would expect Government to make use of a range of instruments.

— the timing and scope of future cost-effectiveness evaluations

44. The NAO paper states that one of the limitations of cost-effectiveness analysis is that the £ per tonne calculation results in an indicator which does not reflect the potential scale or timing of a policy effect, in other words the total amount of carbon saved or when carbon reductions could be made. We would agree with the NAO conclusion that whilst cost effectiveness analysis can be used to rank policies, this ranking will change over time and therefore it would be sensible to review cost-effectiveness periodically.

## Accountability, Targets, and Reporting

*What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

45. A rigorous framework for monitoring and reporting national emissions already exists, through the National Atmospheric Emissions Inventory, which will be used to assess compliance with the Kyoto Protocol. We do not believe that any changes are required to this regime.

46. With respect to specific policy measures, however, there is a need for monitoring and reporting to be aligned with the scope of coverage of the policy, so that its effectiveness is transparent.

*What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee? In particular, how should the Carbon Committee be constituted, and what should be its powers and remit?*

47. The Report of the Interdepartmental Analysts Group in February 2002, which fed into the PIU Energy Review at that time, highlighted the issues of uncertainty in projections and the need for cost-effectiveness analysis in developing policy. The DTI—in its current form—may be best placed to continue this function, and therefore there must be clear terms of reference distinguishing the roles of the IAG and the Office of Climate Change (OCC) to avoid confusion over responsibilities.

48. The DTI's Projections Advisory Group provided an important Government/Industry forum for the development of National Allocation Plan projections for Phase 2 of the EU Emissions Trading Scheme. We believe this was a valuable exercise in providing expert industry input to the DTI's process of developing projections. It should continue in support of further projections development.

49. Government intends that the OCC will work across Government to provide a shared resource for analysis and development of climate change policy and strategy. We support the Government's intention to build up a resource of expertise to support policy development in the climate change area.

50. However, the above intention implies that the OCC will provide a supporting role for existing departments, and will not itself develop policy. With this in mind it is important that the roles and responsibilities of the OCC are made clear. During the early months of its operation this has not been the case.

51. In the recent draft Climate Change Bill the Government clarified the responsibilities of the proposed Carbon Committee. It will have an analytical and advisory role, in particular in support of setting and achieving the proposed five-yearly carbon budgets.

52. We support the creation of the Carbon Committee to perform these functions. However, there may have been additional benefit in delegating the role of setting carbon budgets to an independent body.

53. Regarding constitution of the Carbon Committee, the areas of expertise proposed in the consultation on the draft Climate Change Bill look reasonable. It might also be desirable for the committee to be comprised of independent technical experts from a range of backgrounds, rather than representatives of stakeholder groups, to avoid any suggestion of bias.

*The Government wishes to "ensure that the [Carbon] Committee's advice is transparent, equitable and mindful of sectoral and competitiveness impacts, including the need to secure energy supplies at competitive prices". What use should the Carbon Committee make of cost-effectiveness analysis and what difficulties might it face in doing so?*

54. It will be difficult for the Committee to assess quantitatively the cost effectiveness of measures in a way that takes into account the need for energy security and competitiveness. This is because it is difficult to quantify the risks in each area in a way that enables them to be compared directly. However, in spite of these uncertainties, cost-effectiveness analysis should be used to the best of the existing knowledge.

*What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

55. Interim targets before 2050 (ie 2020, 2030 and 2040) are important if they are to be used as the basis for shorter term policy measures. However, it must be recognised that the investments made on the basis of these could "lock in" emissions for a much longer period, for example in the electricity sector where asset lifetimes can be in excess of 40 years. The short term targets must therefore be set at levels that enable the longer term aspirations to be achieved.

*March 2007*

---

**Joint memorandum submitted by the Department for Environment, Food and Rural Affairs (Defra) and the Department for Trade and Industry (DTI)**

INTRODUCTION

1. The UK Government has a commitment under the Kyoto Protocol, to reduce emissions of greenhouse gases to 12.5% below base-year levels[5] by 2008–12; and a domestic target to reduce carbon dioxide emissions to 20% below 1990 levels by 2010. The Government also has a longer term goal, set out in the draft Climate Change Bill, to reduce carbon dioxide emissions through international and domestic action by 26–32% by 2020 and 60% by 2050.

[5] The base year is 1990 for carbon dioxide, methane and nitrous oxide and 1995 for the fluorinated compounds.

2. In 2004, the Government launched the review of the UK Climate Change Programme. The review looked at how existing policies were performing and the range of policies that could be put in place in future, to move us closer to our 2010 $CO_2$ reduction target; over 70 possible new policies were appraised during the course of this work.

3. The revised Climate Change Programme was published in March 2006 and set out a package of policies and measures which, it was estimated, could reduce carbon dioxide emissions to between 15–18% and greenhouse gas emissions to between 23–25% below 1990 levels by 2010. After the announcement of the EU ETS Phase II cap,[6] estimated emissions reductions were 16.2% for carbon dioxide and 23.6% for greenhouse gases, below 1990 levels by 2010.

4. The "*Review of the Economics of Climate Change*", led by Sir Nicholas Stern and published in October 2006,[7] set out the economic case for action on climate change, and concluded that the cost of inaction would be far higher, in the future, than the cost of tackling climate change now. It estimated that climate change impacts could cost between 5 and 20% of world GDP per capita, each year; in contrast, policies to avoid or reduce these problems might cost just one per cent of GDP each year.

5. The draft Climate Change Bill, which was published for pre-legislative scrutiny and public consultation earlier this month, will provide a legal framework to manage future emissions, and form a fundamental part of the UK's strategy to address the issues raised by the Stern Review. *The Climate Change Strategic Framework*,[8] published by Defra alongside the Bill, sets out the broader context for the Bill, highlighting some key announcements coming up in the forthcoming weeks and months which will be central to the Government's strategy for tackling climate change—in particular the Energy White Paper, the Waste Strategy and the Planning White Paper. And it gives the broader international context, where the UK will continue to press for action through the EU, the G8 and the UNFCCC[9]—recognising that only collective action can ultimately solve this unique global challenge.

6. In summary, the Bill will:

- Make challenging carbon dioxide reduction targets for 2020 and 2050 legally binding;
- Introduce a system of "carbon budgeting" capping emissions over five-year periods—with three budgets set ahead to help businesses plan and invest with increased confidence;
- Create a new independent body to advise on the setting of carbon budgets and to report on progress;
- Contain enabling powers to make future policies to control emissions quicker and easier to introduce; and
- Introduce a new system of Government reporting to Parliament including on climate change adaptation policies.

## Response to the Points Raised by the Inquiry

7. The rest of the memorandum addresses the questions set out in the Committee's call for evidence for this inquiry.

## Forecasting

Q1. *In the light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?*

8. The Government considers that the current approach to projecting emissions is appropriate. The NAO report was a comprehensive review of the emissions projections process and rightly acknowledged the complexity and inherent uncertainty in making forecasts. The report acknowledged that the UK models are subject to expert review and other quality assurance processes and that the UK's approach to projections received a largely positive assessment in 2003 from a team acting on behalf of the UNFCCC (footnote 4). The 2007 UNFCCC Review of the UK's Fourth National Communication (which covers the 2006 Climate Change Programme) commended the UK for coherent and consistent reporting.[10]

9. The modelling process has always been one of continuing development, reflecting the evolving UK energy market, and a framework is in place to further develop and improve it—for example, the potential to include a carbon price to reflect the EU Emissions Trading Scheme (EU ETS). The DTI's energy model is currently being reviewed by independent consultants and improvements will be taken forward in line with

[6] http://www.defra.gov.uk/news/2006/060629a.htm
[7] http://www.hmtreasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm
[8] http://www.defra.gov.uk/corporate/consult/climatechange-bill/index.htm
[9] United Nations Framework Convention on Climate Change.
[10] See http://unfccc.int/resource/docs/2007/idr/gbr04.pdf

recommendations this year. The expert panel, the Projections Advisory Group,[11] will continue and be strengthened; and the already transparent process for determining the key assumptions will be further developed.

Q2. *In developing its approach, how should the Government deal with the following issues*

— whether there can be a greater role for independent assurance;

10. The projections are currently subject to independent quality assurance in a number of ways. The Projections Advisory Group meets approximately every six months[12] and *ad-hoc* expert panels, such as the one that was set up to advise on the projections consultation during the Phase II National Allocation Plan[13] will continue to play a role. This independent panel provided expert energy, industrial and economic modelling knowledge to the process of assessing the responses to the emissions projections consultation in August 2006.[14] The projections sub-group of the Interdepartmental Analysts Group (IAG) also reviews the projections results and provides advice.

11. The projections and assumptions are published on the DTI website and are widely available to the public, experts, academics and interest groups. Fossil fuel price assumptions were published for comment in October 2006. There is also now wider interest in the projections. The allocation of allowances based on the projections, through the EU Emissions Trading Scheme, has widened interest in the projections and increased the scrutiny by a larger number of organisations. The proposed new independent body (the Committee on Climate Change) to advise on the setting of carbon budgets and to report on progress will, once set up, provide independent scrutiny of the projections and modelling process.

— how the Government should respond to the unavoidable uncertainties in forecasting; and

12. Uncertainty in the projections is due to a number of factors. However, a framework exists for analysing this uncertainty. The uncertainty analysis covers key drivers (fossil fuel price and GDP), model parameter uncertainty and uncertainty about the overall effect of policies. These component uncertainties are combined together and the overall effect assessed by probabilistic simulation (often called Monte Carlo analysis). This systematic approach was introduced at the time of the UK's Third National Communication to the United Nations Framework Convention on Climate Change.

13. The recent volatility in wholesale fuel prices, and the impact the relative price of gas and coal fuel has on the amount of coal used in producing electricity, have tended to impact greatly on emissions. To address this uncertainty, a range of prices is assumed in projections and these assumptions are regularly subject to consultation. More is already being done to understand the impact of policy uncertainty, with the intention to provide emissions projections based on a range of policy savings.

— whether or not future domestic targets and forecasts should include international aviation and shipping?

14. There is currently no international agreement on how to allocate international aviation or shipping emissions to national inventories. We are required to report these emissions separately as a memo item, but not to include them in the national total. The UK is active in lobbying for support within the international community for including international aviation in a post-2012 regime under the Kyoto Protocol. Provision has been made, in the draft Climate Change Bill, for the Secretary of State to amend the baseline and target to include international aviation and shipping emissions should international agreement be reached. In advance of any agreement, the European Commission has published, in December 2006, a proposal to include aviation in the EU Emissions Trading Scheme (EU ETS) and the UK will continue to work closely with the Commission and Member States to make prompt progress with negotiations. The UK will also continue to research technological improvements and work closely with the industry to make emissions savings through operational changes.

15. The UK is continuing to press for progress on tackling maritime's climate change impacts and specifically an international emissions trading scheme for the maritime sector via the International Maritime Organisation (IMO). In the meantime, the UK will continue to explore appropriate measures to tackle these emissions, including improved technology, better operator practices and other economic instruments.

[11] Projections Advisory Group comprises 10 external experts, with a wide range of experience in modelling, together with the DTI modelling team and representatives from other government departments (Defra, DfT and HMT). The group meets at intervals to discuss and offer advice on assumptions and other modelling issues, and consider emerging results. For details see: www.dti.gov.uk/energy/environment/projections/pag/index.html

[12] The last PAG meeting was in October 2006 and the next meeting is planned for March 2007.

[13] Comprising Professor Michael Grubb, Professor Lester Hunt –SEEC University of Surrey, Dr Gareth Davis—OXERA, Dr Michael Wagner—IPA, Keith Allott—WWF, and other Government experts.

[14] In February 2006 the Government launched a consultation on the latest UK energy and $CO_2$ emissions projections and detailed emissions projections covered by the EUETS. Ref: http://www.dti.gov.uk/files/file32287.pdf

Q3. *As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?*

16. The further the projection horizon the greater the uncertainty. The projection to 2020 is based on the same sophisticated modelling analysis as the 2010 projection, though the range of uncertainty is inevitably greater in 2020 because of the greater uncertainties associated with forecasts of the key assumptions (fossil fuel prices and economic growth) over a longer time horizon, and because the effect of modelling uncertainties also increases. These effects apply to all approaches and are revealed by the approach to uncertainty analysis outlined in paragraph 12.

17. Projections to 2050 are necessarily more speculative because the potential for change is greater. The current projections to 2050 use a scenario-based approach for the period after 2020. The scenario descriptions allow a wider range of potential change not limited to historical trends. The scenario-based approach is widely used in longer term forecasting. The Government uses the scenarios developed by the Foresight Programme.[15]

18. Scenarios describe a wide spectrum of self consistent outcomes, in this case to 2050. This approach was used in the Interdepartmental Analysts Group's work in looking at *Long-term Reductions in Greenhouse Gas Emissions*[16] informing the Government's response to the Royal Commission on Environmental Pollution's report on the long-term challenges for UK energy and environmental policy posed by climate change. The scenario approach also informed the Energy White Paper 2003.

19. The current long-term scenarios are being further developed for the Energy White Paper that will be published soon and are more sophisticated than those developed for the Energy White Paper 2003. These incorporate the impact of all environmental measures since 2000.

20. Long-term scenarios enable ideas about the future to be tested rather than provide predictions of future technological or behavioural developments. Understanding of the longer term future is gained by complementing the scenario approach with more detailed analysis of various aspects of future technologies. The Government is currently looking to define more closely the pathway to 2050, drawing together emissions reduction trajectories proposed in the Stern Review, through MARKAL modelling work on the technology choices over time, and assessing the policy framework to deliver emissions reductions in the long term.

21. The proposed Committee on Climate Change will consider how to achieve emission reductions as cost-effectively as possible. It will advise on what it believes to be the optimum abatement pathway which is consistent with meeting the 2020 and 2050 legislative targets and the UK's international obligations, taking account of a wide range of factors as set out in Clause 5 of the draft Climate Change Bill. Given its proposed statutory duties, we expect the Committee on Climate Change to bring a strong additional focus to analytical work on longer-term projections to 2050, working with Government analysts, but independently accountable as a non-departmental public body reporting annually to Parliament.

## Cost-effectiveness Analysis

Q4. *Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

22. The Government guidance on the social cost of carbon, for use in policy appraisal where an impact on greenhouse gas emissions is anticipated, gives a central estimate of £70 per tonne of carbon (year 2000 value) within the range £35/tC to £140/tC, with each of these rising by £1/tC per year in real terms. The use of this range incorporates an idea of the risk and uncertainty surrounding monetising climate change damage impacts and as such the Government considers the social cost of carbon appropriate for use in future policy appraisal.

23. As part of the policy appraisal process, analysts estimate the costs and benefits associated with the policy in terms of carbon, valuing this using the social cost of carbon. Particular attention is paid to whether the overall balance of costs and benefits is sensitive to the full range of illustrative values, ie whether valuing carbon benefits at the lower or higher boundary switches the net balance of costs and benefits of the policy under consideration.

[15] Launched in 1993, the UK's Foresight programme is led by the Government's Chief Scientific Advisor and aims to ensure closer interaction between scientists, industry and government in order to identify future opportunities and threats for science, engineering and technology. See http://www.foresight.gov.uk/. The Foresight scenarios originally developed in co-operation with the Science and Technology Policy Research Unit, University of Sussex, were adapted for use in long-term emissions projections. They are closely aligned to the Intergovernmental Panel on Climate Change's Special Report on Emissions Scenarios. How these scenarios were applied in emissions projections is illustrated in the report in footnote 12, Annex B. This approach was further developed to inform the Energy Review 2006 and was based on recent revisions to these Foresight Scenarios illustrated in:

[16] Long-term Reductions in Greenhouse Gas Emissions in the UK.

24. The Stern Review made estimates of the social cost of carbon, taking into account more recent scientific information on the probability of high temperature rises due to climate change, as well as a specific approach to discounting. The Review then derived two types of social cost of carbon. The first, $\$85/tCO_2$, or £194/tC using long-run market rates, reflected a business-as-usual emissions pathway, and is also a year 2000 value. And intuitively, damage costs from climate change will be higher if we do little to tackle it. Hence, the second estimate Stern produced, was a social cost of carbon on a pathway to tackle climate change—which, if the world took action to stabilise greenhouse gas emissions at 550ppm $CO_2e$ would be $\$30/tCO_2$ ( ~£68/tC), or $\$25/tCO_2$ ( ~£57/tC ) if stabilising at 450ppm $CO_2e$.

25. The original 2003 Government Economic Service guidance said the social cost of carbon would be reviewed periodically. Since the publication of Defra-sponsored research, and of the Stern Review, the Government maintains these plans to review its social cost of carbon estimates. However, it is important to note that Stern's estimates do fall within the current range of values for the social cost of carbon that are used for policy appraisal in Government.

Q5. *Has the government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

26. The focus of the 2006 Climate Change Programme (CCP) is on the domestic target to reduce carbon dioxide emissions to 20% below 1990 levels by 2010 and the legally binding Kyoto commitment to reduce emissions of greenhouse gases by 12.5% below base year levels by 2008–12. The analysis for CCP 2006 considered cost-effectiveness over the lifetime of the policy measures, as any other timeframe may have favoured policies that were cost-effective in the short-run, but less cost-effective over their lifetime. This provided the most balanced view of the relative cost-effectiveness of measures that were agreed as part of the Programme, and estimated relative to the projections then available.

27. The longer term assessment is provided by ongoing policy development and review, including the Energy Review—published just after the CCP 2006—which looked at polices that might be introduced beyond 2010. The forthcoming Energy White Paper will include a package of measures for delivering carbon savings in the medium to long-term, with an emphasis on reducing emissions to 26–32% below 1990 levels by 2020 as a milestone towards the Government long-term target of reducing $CO_2$ emissions by 60% by 2050—both of which will become binding statutory targets under the Climate Change Bill.

Q6. *The NAO briefing has also raised a number of other issues, including*

— the failure to explore sufficiently different scales of policy intervention;

28. As explained in the response to the preceding question, the focus of the Climate Change Programme Review (CCPR) was on policies that could feasibly be introduced in order to meet the 2010 goal and the Kyoto commitment. This timeframe determined the scale of policy intervention. Longer term policies were, and remain under, consideration via the Energy Review and Energy White Paper process. Within this context, the CCPR did consider policies and scales of intervention beyond those finally included in the programme and the reasons for the decisions made are set out in the *Synthesis of Climate Change Appraisals Report* published by Defra in January 2007 (see footnote 13).

— the balance between expanding existing measures and introducing new ones;

29. Policy development must take into account existing policy measures, existing and forthcoming EU legislation, industry expectations (and ability to comply), and transaction costs. This tends to favour incremental interventions in the short to medium term and implies that more radical interventions should be made over longer time horizons. This explains the comparatively more weight given, in the CCPR, to expanding existing measures relative to introducing new ones. Paragraphs 26 and 27 above explain the basis for making longer term policy choices. Having said that, consideration could be given to policies that promise to be efficient and effective as well as revising policy interventions that have turned out to be flawed. The key point is that policies ought to be assessed on the basis of cost-benefit and cost-effectiveness analysis.

30. The NAO report on cost-effectiveness (pp 24–25: paragraphs 55–60) noted that most existing policies were considered to be cost-effective and most of the potential new policies appraised were thought to be cost-ineffective.[17]

— the range of policy options considered and the criteria for appraising them; and

31. The criteria for analysis during the CCPR followed the guidelines, *Greenhouse Gas Policy Evaluation and Appraisal in Government Departments*,[18] which detail cost-effectiveness analysis as well as ranking policies.

[17] The report further noted that the finding was consistent with evidence found in other European countries.
[18] http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/greengas-policyevaluation.pdf

32. The range of policies considered during the review is set out in two summary reports, *Synthesis of Climate Change Policy Evaluations*,[19] dealing with reassessment of existing policies, and *Synthesis of Climate Change Policy Appraisals*[20]—summarising the appraisal of new policy options that were submitted to peer review during CCPR. These reports summarise the analytical background and findings on most of the policy options that were considered during the review.

33. Some of the policies considered for the Climate Change Programme and mentioned in the NAO report, such as linking stamp duty to energy efficiency in homes and exempting nuclear energy and large scale hydro power from the Climate Change Levy, were considered by HM Treasury as part of the Budget process and are not included in the summary reports. Some of the other ideas were not within the timeframe of the analysis—eg the proposal to establish a supply network of hydrogen fuel stations would not have been completed by 2010—and were therefore not included in the summary report.

— the timing and scope of future cost-effectiveness evaluations.

34. The timing of future cost-effectiveness evaluations will be closely related to the functions of the new Committee on Climate Change proposed in the draft Climate Change Bill. In advising the Secretary of State on the level of five-year carbon budgets covering the periods 2008–12, 2013–17 and 2018–22, evaluating the cost effectiveness of different abatement pathways will be integral to its analysis, as required under Clause 5 of the draft Bill. Its advice on the 2008–22 period must be given no later than 1 September 2008.

— In the light of such concerns, how should the Government improve its approach to the use of cost-effectiveness evaluation?

35. The UK's use of cost effectiveness analysis is, in international terms, already extensive and the NAO have observed in their report that "analysis was carried out on a more consistent basis than that which supported the original climate change programme in 2000". The Energy Review and Energy White Paper process are using the approach to cost-effectiveness analysis and the technical guidance developed in the CCPR. The technical guidance will be continuously updated, eg to take account of latest advice and ensure consistency in evaluation across Government Departments, and, where possible, better integrate the short-to-medium term and long-term analysis. We expect the budget-setting process introduced with the Climate Change Bill to make this easier to achieve.

## Accountability, Targets And Reporting

Q7. *What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

36. UK emission of carbon dioxide and other greenhouse gases are estimated annually and reported to the European Union and the United Nations Framework Convention on Climate Change (UNFCCC). Under the UNFCCC, the inventory is subject to annual review by a team of international experts and the UK is required to respond to any issues raised. Transparency is one of the key criteria against which the inventory is assessed. The inventory shows progress towards commitments and it is this process that guarantees international acceptance of the estimates it contains.

37. The Interdepartmental Analysts Group (IAG) monitors progress with emissions reductions achieved from individual measures included in the Climate Change Programme and reports to a cross-departmental Board of senior officials (Climate Change Programme Board) on a quarterly basis. This reporting includes detailed monitoring information by measure, together with the most recent information on trends in emissions.

38. In future, this monitoring information will be collated and published as part of the annual report that the Government is now required to submit to Parliament under section 2 of the Climate Change and Sustainable Energy Act 2006.

39. The Government believes that these accountability arrangements can be strengthened further, and has made a number of proposals in the draft Climate Change Bill. The Bill proposes that the independent Committee on Climate Change will report, annually to Parliament (by 30 June), its views on the nation's progress towards meeting the carbon budgets and the 2050 (and 2020) targets. The Government in turn will be required to respond publicly to the Committee's reports in a similar way it responds to the recommendations of Parliamentary Select Committees (by 15th October each year).

[19] http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/synthesisccpolicy-evaluations.pdf
[20] http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/synthesisccpolicy-appraisals.pdf

Q8. *What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee? In particular, how should the Carbon Committee be constituted, and what should be its powers and remit?*

40. The Interdepartmental Analysts Group is a cross-departmental group—extended to include the Environment Agency, the Carbon Trust and the Energy Saving Trust—that currently provides cross-cutting analytical support to the Climate Change Programme Board. It provides support in reviewing analytical requirements feeding into the different policy workstreams; identifies cross-cutting requirements and draws links between analytical work conducted in different areas and provides peer review between departments. It is responsible for the ongoing monitoring of the measures in the Climate Change Programme as described in paragraph 36.

41. The Office of Climate Change (OCC) is a cross-Departmental climate change strategy and co-ordination unit. It is a shared resource for all Ministers, providing analysis and advice on climate change. It has focused so far on scoping out what further work needs to be carried out to continue progress with our domestic and international targets. It aims to find where it can add value to cross-Governmental work and uses a consensus-building approach at every stage in such diverse areas as: identifying priorities, policy/strategy development and cross-Government advocacy. The Government is currently reviewing, through the OCC, the governance arrangements with respect to climate change and energy strategy.

42. The Climate Change Bill, published on 13 March, includes proposals for setting up a Committee on Climate Change to "help manage the transition to a low carbon economy and advise Government on how to reduce emissions over time and across the economy". As noted above, it proposes that the Committee, as well as reporting on progress, would advise on the optimum emissions reduction pathway to 2050, the level of carbon budgets and related issues—including the level of effort from sectors whose emissions are capped under trading schemes and all other sectors. The Bill is, at the time of writing, available for public consultation. In the light of responses to that consultation and the outcome of pre-legislative scrutiny, the Government will consider further the remit and role of the Committee.

43. It is necessary for the Committee to be able to review the monitoring data provided by the Government, and should therefore be constituted to be able to do this. This will require scientific, technological and economic expertise as applied to monitoring greenhouse gas emissions and the effects of policies. The Committee will be represented on the Steering Committee of the UK Greenhouse Gas Inventory System, which meets twice a year.

Q9. *The Government wishes to "ensure that the [Carbon] Committee's advice is transparent, equitable and mindful of sectoral and competitiveness impacts, including the need to secure energy supplies at competitive prices" [see Note 3].*[1] What use should the Carbon Committee make of cost-effectiveness analysis and what difficulties might it face in doing so?

44. The Committee will decide what use it wants to make of cost-effectiveness analysis (CEA) but we would expect them to want to use it to consider the relative potential for reducing emissions from different sectors of the economy, in advising on setting carbon budgets as required by the draft Climate Change Bill.

45. CEA inevitably entails uncertainties about discount rates, hidden costs, local environmental externalities, emergence of new technologies, future technological costs and induced technological change. International competitiveness will be also be affected by the extent and level of ambition of future climate change agreements. All these uncertainties represent challenges in applying CEA. In advising the Government of future budgets, we expect the Committee would want to use CEA in conjunction with other information, including an assessment of distributional effects (including the effect on fuel poverty), assessment of physical externalities where these cannot be quantified for integration in the CEA and assessment of long term economic opportunities as well as negative impact on competitiveness.

Q10. *What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

46. The draft Climate Change Bill sets out a new system of "carbon budgets" that caps emissions over successive five year periods, set from 2008 to 2050 and beyond. Budgets will be set at least three periods ahead, so that there is clarity about the UK's medium-term trajectory for 15 years ahead. The carbon budgets must be set such that levels of emissions are consistent with a reduction of between 26 and 32% by 2020 and 60% by 2050; and consistent with the UKs international obligations. These primary targets (set out on the face of the Bill) can only be amended in the light of significant changes in international law or policy, or significant developments in climate science, and would require approval from both Houses of Parliament

47. The Committee on Climate Change in advising on, and the Government in setting, the appropriate level of carbon budgets will need to take account of the economic opportunities available to achieve emission reductions (domestically and through investment overseas), recognising that the optimum pathway needs to take account of the longer term. A full range of factors to be considered in setting the trajectory are set out in Clause 5 of the draft Climate Change Bill.

48. There is currently a short-term milestone/target to reduce emissions to 26–32% below 1990 levels by 2020. The draft Climate Change Bill proposes a system of carbon budgets—capping emissions over five-year periods with three budgets set ahead by Government beginning in 2008—which will progressively lead towards achieving the 2020 milestone and the 2050 target.

*March 2007*

---

**Memorandum submitted by Friends of the Earth**

INTRODUCTION

Friends of the Earth welcomes the publication of the draft Climate Change Bill, and the announcement of a period of pre-legislative scrutiny. We have long argued and campaigned for a legal framework to manage and reduce UK carbon dioxide emissions. We have further argued that the aim of such a framework should be to limit UK emissions the fair share of the total emissions the global community can afford without causing warming of more than two degrees Celsius.

We welcome the draft Bill because it would make the principle of a legal framework for carbon emissions a reality. However, the ambition of the Bill (in terms of the reductions in carbon dioxide it currently requires) is far short of the two degrees Celsius test set out above (see section 1 of the response below). This is compounded by the fact that important sources of carbon are not included in the targets that are set—those from the UK's share of international aviation and shipping (see Section 2).

We also do not yet believe that the framework contained in the draft Bill is yet sufficiently robust to give enough confidence that even the targets it does contain will be met (see Section 3 below).

Finally we have concerns at the reliance in the Bill on trading of carbon. We fully recognise the very real difficulty for the Government in this that is caused by the UK being ahead of many other countries. Were all countries to have a legally binding budget as proposed for the UK in this Bill, trading could help. But with the lack of "caps" in many countries, the inadequacy of caps in others (ie the EU ETS so far) and the existence of so-called "hot-air" in a third tranche mean great care is required before credits from such schemes should be allowed to replace cuts in UK emissions (see section 4).

1. *Scale of cuts required by the Bill*

1.1 The Bill would require cuts in carbon dioxide emissions of between 26–32% by 2020 and 60% by 2050, based on 1990 levels.[21] Effectively therefore, the Bill simply gives legal force, and provides a management framework for existing Government targets, rather than establishing new ones. It is therefore worth reminding ourselves of the origins of these targets.

1.2 The target for a 60% cut by 2050 became Government policy (and indeed became supported as policy by other parties) after it was recommended by the Royal Commission on Environmental Pollution in their twentysecond Report *Energy—The Changing Climate* which was published in June 2000. A key recommendation of that report was:

> *"The government should now adopt a strategy which puts the UK on a path to reducing carbon dioxide emissions by some 60% from current levels by about 2050. This would be in line with a global agreement based on contraction and convergence which set an upper limit for the carbon dioxide concentration in the atmosphere of some 550 ppmv and a convergence date of 2050"*

1.3 At the time, stabilisation of atmospheric concentrations of carbon dioxide at 550 parts per million by volume (ppmv) was seen as broadly in line with existing EU policy of limiting the temperature rise to no more than a two degree Celsius increase above pre-industrial levels. With the benefit of further studies and advances in scientific understanding, it no longer is.

1.4 Indeed, the Governments climate policy, as set out in "Climate Change—The UK's programme 2006" says:

> *"in the mid-1990s the EU proposed that the aim should be to limit global temperature rise to no more than 2°C to avoid dangerous climate change . . . At that time, it was thought that this equated to atmospheric carbon dioxide levels below approximately 550 ppm. The more recent work of the IPCC suggests that a limit closer to 450 ppm or even lower, might be more appropriate to meet a 2°C stabilisation limit."*

1.5 The Tyndall Centre has recently published a briefing note on the Bill. The researchers have estimated that the targets imply atmospheric concentrations upwards of 600 ppm, and maybe in excess of 750 ppm, contributing to a world warmer by four or five degrees.[22] Such a level of warming would be catastrophic.

---

[21] The "carbon budget" actually means average emissions for the five years around these points would be at these levels, rather than this being precisely the emissions cuts in those years.

[22] Tyndall Briefing Note 17, March 2007. A response to the Draft Climate Change Bill's carbon.

1.6 Therefore the whole basis for including a target for a 60% cut by 2050 is—and has been accepted by the Government to be—out of date. We do not therefore believe this target should be included in the Bill.

1.7 We acknowledge there are powers to amend this target in the light of *"significant developments . . . in scientific knowledge about climate change"*.[23] The principle of allowing the target to be altered to reflect our scientific understanding is of course the correct one. But this wording requires further developments in understanding after the passing of the Bill, so the current scientific view that the 60% target and the 550 ppmv concentration it implies are insufficient to prevent dangerous climate change may not be considered a new development.

1.8 Friends of the Earth therefore recommends that the targets on the face of the Bill should reflect current scientific opinion of the cuts necessary to keep the UK within its "fair share" of global emissions compatible with keeping temperature rise below two degrees Celsius. This means at least an 80% cut by 2050.

1.9 The Bill should further require that the target is based on the latest understanding of the science of climate change.

2. *Inclusion of international aviation and shipping*

2.1 The Bill specifically excludes emissions from international aviation and shipping in Section 15. It does, however, grant powers to the Secretary of State to make regulations defining how such emissions can be included at a future point, if there is a change in international reporting practice.

2.2 The UK's share of international aviation and shipping emissions could add around 10% to the UK's total carbon emissions. Analysis by the Tyndall Centre has found that in 2004, when the Government reported emissions at 150 MtC on the basis of excluding these emissions, the UKs share of international aviation would have added a further nine MtC and international shipping, a further five MtC.[24] Since 2004 emissions from these sectors are likely to have grown significantly faster than other sectors.

2.3 Clearly the ultimate goal should be to arrive at a common, international agreement on how emissions from international aviation and shipping are to be allocated, so that all emissions are accounted for. However, the fact that reaching such international agreement is providing a difficult and lengthy process is no excuse for simply ignoring emissions from international aviation and shipping. Indeed a "carbon management system" that simply leaves these emissions out is a rather like a calorie-controlled diet that opts to exclude calories from chocolate.

2.4 It is also important to recognise that while different proposals for the allocation of these emissions to countries have been put forward for discussion, the Government already have a methodology which they use to report these emissions as a "memo item" (ie not included in the targets) under the Kyoto protocol.[25] At the very least, this existing methodology should be used as a "stop-gap" to ensure Government programmes from the very first carbon budget period cover all areas of emissions, and do not have an apparent "blind spot" to international aviation and shipping.

3. *Robustness of carbon management framework*

3.1. Friends of the Earth has now been calling for a legal framework for managing carbon emissions for several years. It has long been our view that despite carbon dioxide targets appearing with great regularity in manifestos and policy papers, they have not been taken anywhere near seriously enough. When doubts have raised about whether Government's were on track to meet targets, they have been largely ignored by Ministers simply restating the targets. As the *Guardian* noted in a leader in December 2004:

> *"the Government has invested so much of its credibility in attempting to keep to its golden rules of finance, even though the sky is hardly going to fall if the exchequer ends up a billion or two short. In comparison, global warming and climate change are infinitely more serious. Yet for public finances the rules are made of gold, while for the environment, rules crumble to dust."*

3.2 The introduction of the Bill is a serious and much needed step towards rectifying this, and Friends of the Earth welcomes this. But to be fully robust and effective, the Bill needs to ensure its structure helps to overcome some of the major barriers to Government's acting on climate change.

3.3 High on the list of these barriers is the long-term nature of the climate change problem. For a start, climate change require a Government to act now to bring benefits (or avoid problems) at a point long after it has left office. And to make matters worse, no Government will be able to be the "one who stopped climate change"—it requires Government after Government to keep up the effort.

[23] Section 1(4)(a) of the Draft Bill.
[24] Living within a carbon budget, p 18, Tyndall Centre, Manchester, www.foe.co.uk/resource/reports/living_carbon_budget.pdf
[25] Latest figures are available here: www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm

3.4 The Bill must therefore ensure that every Government is held to account, and cannot pass the buck to a future Government—or blame a previous one. There is a very real danger that as drafted—with five year budget periods that will almost inevitably overlap with two Parliaments—the Bill will fail to do this. Even the very first proposed budget period will take in two Parliaments: the period will run from January 2008 to January 2012—an election in May 2010 would fall almost precisely in the middle of this period.

3.5 It is far from impossible to imagine a situation where a Government approaching an election might duck some tricky decisions, or opt for tax cuts rather than investment in necessary low-carbon infrastructure or technology. The temptation to do this when approaching a difficult election—or even one they believe difficult to win—would be even stronger. After all, in such cases the blame for missing the budget would actually taken by the successor Government. But the successor Government may feel it can get away with using the flexibility in the Bill to amend the budget, while blaming the previous Government who did too little to get on track for the budget that every wanted to see met. Everyone blames each other—but crucially our carbon emissions are not cut as required.

3.6 Friends of the Earth's original proposal for annual targets was intended to prevent this buck-passing. Since our proposal, much nonsense has been said about annual targets—including ridiculous claims such as they would lead to the closure of airports if our emissions were off track. To our knowledge no person or organisation has ever proposed such rigid targets, other than people who have been arguing against annual targets. However, the argument does (albeit crudely) highlight the challenge of allowing some flexibility to take account of short-term fluctuations in weather, relative fuel costs, etc with a firm steer that keeps Governments on track.

3.7 The proposed five year budget system allows the flexibility, but the buck-passing loophole means it fails to provide the firm steer. It has been argued that the Committee on Climate Change will do this through annual reports on progress, which of course to an extent it will. But unless a Government is clear about its intentions in any year, it is hard for the Committee to fully scrutinise progress. The Committee may assume that meeting the budget implies a linear fall across the period, and report on that basis—Government policies may be aimed at making greater cuts at the start (or end) of the period.

3.8 Friends of the Earth believes that every Government responsible for a part of a budget period will best be held to account if they have stated clearly what they intend emissions to be in each year. The Committee can then judge progress against what was planned. The Committee can, if appropriate, take account of inclement weather, or price shocks, in reaching its assessment. But the basis of the assessment should be whether it matches up to what Ministers were trying to achieve.

4. *The Bill and international trading*

4.1 The Bill allows a very heavy emphasis on trading in carbon as a mechanism to deliver the most cost effective way to reduce carbon emissions—based on the principle that a tonne of carbon emitted has the same effect whether emitted in Birmingham or Bangalore.

4.2 The difficulty is that while this principle is true of carbon emitted, it is much harder to be certain that a tonne saved in the UK is actually equivalent to a tonne saved elsewhere in the world. This depends on a multiplicity of factors—such as assessment of whether that tonne would have been (at least partially) saved anyway, whether it measured as a reduction on current emissions, or from a projection of future demand. It is a problem that bedevils carbon offsetting schemes as well as trading schemes.

4.3 We are therefore concerned that the Bill should not allow the total freedom to trade carbon credits to meet carbon budgets until the frameworks that such trading takes place within are sufficiently robust to be moving us on the correct trajectory to the carbon cuts we need to see. Until that time we believe serious consideration should be given to restricting the use of trading as a mechanism to meet the budgets, perhaps by:

- Setting a strict limit for the amount of effort to be made to meet budgets domestically, and the amount that can be "bought in".
- Operating a kind of "exchange rate" where independent assessment judges a tonne of carbon saved domestically to be equivalent to, say, just half a tonne under a trading scheme. In such cases, credits for two tonnes would be needed to have the same effect on the budget.
- Restricting trading to only robust schemes.

4.4 We will be working to further develop ideas to solve this problem.

*March 2007*

**Memorandum submitted by the Institution of Mechanical Engineers**

## Introduction

The Institution of Mechanical Engineers (IMechE) is a professional body representing over 78,000 engineers in the UK and overseas. The Institution's membership is involved in all aspects of energy conversion, supply and use. They operate in the automotive, rail and aerospace industries, in construction and building services, in renewable energy, fossil-fuel derived power generation and nuclear power, and in the over-arching field of sustainable development.

As a Learned Society, IMechE's role is to be a source of considered, balanced, impartial information and advice. The Institution welcomes the EAC's focus on this important issue and thanks the Committee for the opportunity to submit evidence.

## Forecasting

1. *In the light of the issues raised by the NAO briefing on emissions projections, is the Government's current approach to forecasting "fit for purpose"? If not, what steps should it take to ensure that future forecasts are robust?*

IMechE welcomes the recent improvements made to the emissions projections system and believes it is, in so far as is necessary, fit for purpose. The Institution would urge emphasis to be placed on believes that emphasis must be firmly on taking actions to cut emissions, not devoting inordinate resources to making projections, which will never be wholly accurate.

2. *In developing its approach, how should the Government deal with the following issues:*

(a) *whether there can be a greater role for independent assurance.*

The NAO can already provide this, although the lack of proper appraisal of fiscal policy measures is a serious failing of the current system.

(b) *how the Government should respond to the unavoidable uncertainties in forecasting*

As noted, uncertainties in forecasting are unavoidable. As such, IMechE believes that establishing the conservative/worst case assumptions and acting accordingly is appropriate. Relatively speaking, cutting carbon by more than 60% by 2050 is much better than getting a forecast wrong.

(c) *and whether or not future domestic targets and forecasts should include international aviation and shipping?*

IMechE supports the inclusion of aviation and shipping. The Institution also believes that it would also be beneficial to measure the overall carbon impact of UK activities, including carbon generated overseas to satisfy UK consumer demand.

3. *As projections against the 2020 and 2050 targets are less well developed than those for 2010 but are becoming increasingly important, what improvements are needed in their production and use?*

IMechE would argue that no substantial changes are likely to be cost effective. As noted above, modelling and forecasting carries inevitable uncertainties and therefore resources would be more cost-effectively expended in other areas.

## Cost-effectiveness Analysis

4. *Given the uncertainties associated with the social cost of carbon, is it an appropriate basis for future policy appraisal? What should the Government's policy on its use now be, particularly in the significant increase in its value which Stern recommends?*

Establishing exact social costs is inherently problematic, particularly because a number of negative externalities are difficult to measure. However, authoritative work on the subject clearly establishes that the figure is far higher than the market currently provides for, ie significant market failure is occurring (Stern establishes the figure of £200 per tonne).

IMechE would therefore argue that the Government must urgently seek to increase the cost of carbon provided for by the market, regardless of whether the exact social cost can be pinpointed.

It is worth emphasising that achieving the "target" of 60% reductions by 2050 must be viewed as the *minimum* necessary, and therefore uncertainties about the exact social cost of carbon should not diminish the importance of accomplishing this.

5. *Has the government's approach to evaluating cost-effectiveness in the context of the Climate Change Programme Review been too short-term in focussing on the 2010 target? Has this adversely affected the assessment of new policy ideas which might only be more cost-effective in the long-term?*

The Institution believes that a focus on 2010 is short-termist, particularly bearing in mind the considerable progress needed, as mentioned above. Moreover, IMechE would agree that this short-term approach has inhibited the development and assessment of other policy initiatives that might only be cost-effective over the longer-term.

6. *The NAO briefing has also raised a number of other issues, including:*

(a) *The failure to explore sufficiently different scales of policy intervention*

This is a serious and unjustifiable failing. IMechE would urge further exploration in this area.

(b) *The balance between expanding existing measures and introducing new ones.*

Existing measures should be expanded if they're effective, otherwise new ones should quickly replace them.

(c) *The range of policy options considered and the criteria for appraising them.*

IMechE believes that there is room for more "out-of-box" thinking and creativity in policy options, although the Institution recognises that that these can be difficult to evaluate. Thorough examination of policy options is valuable, particularly in order to ensure that they not rejected for ill-thought through, short-term or knee-jerk reasons (eg stamp duty rebates for domestic energy efficiency measures).

(d) *The timing and scope of future cost-effectiveness evaluations.*

IMechE would suggest that scope should embrace the three pillars of sustainable development, ie not just economic cost-effectiveness but also social and environmental costs and benefits.

*In the light of such concerns, how should the Government improve its approach to the use of cost-effectiveness evaluation?*

As discussed above.

## Accountability, Targets, and Reporting

7. *What additional reporting and monitoring arrangements are required to support the aim of a transparent framework for emissions reduction?*

8. *What should be the roles and responsibilities of the Interdepartmental Analysts Group, the newly created Office of Climate Change, and the proposed Carbon Committee? In particular, how should the Carbon Committee be constituted, and what should be its powers and remit?*

The battle to reduce carbon emissions is every bit as important to the UK as its battle to control inflation. The mechanism used to achieve low and stable inflation may well prove a useful model to achieve steady, sustainable reductions in carbon emissions. With this approach, the "Carbon Committee" would be the climate change equivalent to the Bank of England's Monetary Policy Committee. With powers to set the cost of carbon (akin to the MPC's setting of interest rates), the Carbon Committee would be an expert group, independent of Government, tasked with achieving, say, a 2% year on year reduction in overall carbon emissions.

The role of the IAG and Office of Climate Change would be to ensure that the "cost of carbon" set by the committee translates quickly through to encourage sustainable carbon reduction measures in all sectors of the economy.

9. *The Government wishes to "ensure that the [Carbon] Committee's advice is transparent, equitable and mindful of sectoral and competitiveness impacts, including the need to secure energy supplies at competitive prices" [see Note 3]. What use should the Carbon Committee make of cost-effectiveness analysis and what difficulties might it face in doing so?*

The principles of sustainable development should be fully integrated into cost effectiveness analysis and a (relatively high) social cost of carbon should be used to encourage a wide range of measures, on the demand and supply sides.

10. *What approach should the Government take towards setting short-term targets as a means of ensuring progress towards its long-term goal of a 60% reduction in carbon emissions?*

IMechE believes year on year targets would be useful.

The 60% reduction by 2050 target is roughly equivalent to a 2% year on year reduction. Weather fluctuations may mean that the target should be averaged over, say, a three year period. The longevity of $CO_2$ in the atmosphere means that it is far better to cut emissions rapidly soon, so it may well be sensible to set the annual equivalent target at, say, 3% initially. Gearing policies initially toward a high year on year decline would also be valuable should something unforeseen occur (eg the target is not achieved)—in this case, at least there's remains a good chance that the overall long-term trend rate of 2% per annum will been achieved.

*March 2007*

---

**Memorandum submitted by Natural England**

## 1. Introduction

1.1 Natural England is a new organisation that was established under the Natural Environment and Rural Communities Act 2006. We are a non-departmental public body formed by bringing together English Nature and parts of the Rural Development Service and the Countryside Agency.

1.2 Natural England's purpose is to ensure that England's unique natural environment—its flora and fauna, land and seascapes, geology and soils—is conserved, enhanced, and managed for the benefit of present and future generations, thereby contributing to sustainable development.

## 2. Executive Summary

2.1 The UK Climate Change Programme 2006 (UKCCP06) is too short-term in its approach to delivering emissions reductions. A more long-term focus will be needed to deliver a future statutory 60% reduction target.

2.2 An example of the potential contribution that longer-term mitigation options can make is the role farmers can play as "carbon managers".

## 3. Natural England and Climate Change

3.1 Formulating effective responses to climate change, its causes and its effects, is a strategic priority for Natural England. Annex 1 outlines the scope of our climate change policy.

## 4. Response to Inquiry Issues

4.1 Natural England's response addresses **Issue 5** cited in the Call for Evidence.

4.2 In our view, the majority of policies in the UKCCP06 are short-term and designed with the primary aim of delivering the 2010 target. This has meant that longer-term measures, which might only become cost-effective after 2020, have generally been neglected.

4.3 We agree that cost-effectiveness should be a consideration when assessing policy options to deliver emissions reductions, but that this assessment should be made over a longer time period in relation to the 2050 target.

4.4 Farmers and land managers can potentially make an important contribution to climate change mitigation in the medium to long-term by:

- Maintaining, restoring and creating natural carbon sinks (such as peatlands and woodlands) which remove ("sequester") and store carbon from the atmosphere.
- Reducing the loss of carbon from soils to the atmosphere and water courses.

4.5 There is growing evidence that a significant amount of carbon is being lost from UK soils. It appears that soils with high carbon content, such as peat, are loosing carbon at the fastest rates. This is concerning, as the UK's peatlands store around three billion tonnes of carbon and so keep an important reservoir of carbon out of the atmosphere.

4.6 Some estimates suggest that the continued degradation of peat in the English uplands could result in some 380,000 tonnes of carbon being lost per annum, equivalent to around 2% of the UK's Kyoto commitment. The scale of carbon loss is in part due to unsustainable land management practices, such as drainage, over-burning and intensive grazing.

4.7 If all of the upland peats in England were in a good ecological condition then they could instead sequester up to 40,000 tonnes of carbon per annum, by locking up carbon in the natural accumulation of peat.

4.8 However, emissions reductions from carbon management practices generally take time to be realised. Peatland restoration programmes and management changes such as blocking drainage channels ("grips") and reducing the intensity of burning and grazing can, in the short to medium term, arrest the loss of soil carbon. However, if the peat has been damaged it will inevitably take time for natural functions to be re-established and for the peat to resume sequestration. To improve the evidence base in this area, Natural England is currently funding research in various locations in the uplands to quantify the carbon implications of peatland restoration schemes and changes to management practices.

4.9 A wide range of mitigation measures will be required to stabilise atmospheric concentrations of greenhouse gases. The Government should not limit the available options through too narrow an approach to assessing cost-effectiveness. A key test should be that there is a high level of certainty that a mitigation measure will make a significant contribution to reducing atmospheric concentrations of greenhouse gases over the next few decades.

4.10 In our view, sustainable land management practices can improve the ability of the natural environment to provide essential goods and services, including climate regulation by sequestering and storing carbon. This contribution has the potential to be significant, especially when it is assessed over a long timeframe.

**Annex 1**

## SCOPE OF NATURAL ENGLAND'S CLIMATE CHANGE POLICY

1. The scope of Natural England's policy on climate change is focused on two areas:

   — developing and implementing adaptation strategies that will help the natural environment to be able to withstand the impacts of unavoidable climate change; and

   — contributing to the mitigation of greenhouse gas pollution through land management practices and Natural England's own operations.

2. Natural England will seek to be a recognised leader in climate change adaptation and a major contributor to mitigation.

3. Natural England's focus on adaptation will be to increase the resilience, therefore reducing the vulnerability, of the natural environment to unavoidable climate change based on the following key principles:

   — continuing to conserve existing biodiversity, particularly on protected sites;

   — adopting a landscape-scale approach to conservation management in which protected sites are the building blocks;

   — reducing habitat fragmentation by increasing landscape connectivity and building resilient natural systems, so that wildlife is more able to withstand changing climatic conditions; and

   — demonstrating what adaptation for wildlife looks like and how it can be delivered through exemplar projects and actions.

4. Natural England's mitigation work will seek to enhance the role of the natural environment in helping to reduce greenhouse gas pollution and will focus on three areas:

   — supporting, through planning processes, increased investment in clean energy technologies using a risk based approach which balances any short term impacts on the natural environment with the long term imperative to reduce the threat of dangerous climate change;

   — identifying and promoting the contribution that land managers can make as "carbon managers", by enhancing the ability of the natural environment to remove (sequester) greenhouse gas pollution from the atmosphere and store it in "carbon sinks"; and

   — leading by example through the target to halve Natural England's own greenhouse gas pollution by 2010 through our choices about energy use, transport and carbon off-sets.

5. Natural England will play a leading role in marshalling the evidence on the potential impacts of climate change on the natural environment in order to continue to build the case for action. Work to develop Natural England's science and evidence base will also be increasingly focused on developing on-the-ground strategies and action to improve the resilience of landscapes, ecosystems and species.

*March 2007*

**Memorandum submitted by the Society of Motor Manufacturers and Traders Ltd (SMMT)**

The Society of Motor Manufacturers and Traders Ltd (SMMT) is the leading trade association for the UK automotive industry, providing expert advice and information to its members as well as to external organisations. It represents some 600 member companies ranging from vehicle manufacturers, component and material suppliers to power train providers and design engineers. The motor industry is a crucial sector of the UK economy, generating a manufacturing turnover of £45 billion, contributing well over 10% of the UKs total exports and supporting over 200,000 direct jobs.

SMMT welcomes the opportunity to contribute to the EAC inquiry on how to reduce carbon emissions in light of the conclusions of the Stern Review. The automotive industry has been at the forefront of developing technology to reduce carbon emissions and the Committee will be aware that the SMMT works closely with the Department for Transport, DEFRA, the DTI and other bodies and stakeholders to reduce the impact of UK road transport on emissions.

The following comments focus on four key areas: the implications of the Stern Review for policy-making, the role and cost of technology, innovation and low carbon road transport, and market transformation concepts.

## 1. Executive Summary

1.1 Climate change is global in nature and has the potential to affect all stakeholders. The automotive industry has adopted a progressive attitude to climate change and has made real technological changes to reduce the environmental impact of its products. However, these impacts have been set against a regulatory environment that cannot always accommodate the reduction of tailpipe $CO_2$ and a trend of increasing surface transport use.

1.2 Collaborative working is important to mitigate the impact of climate change. Carbon reduction cannot be achieved through technology alone and requires demand-led measures as well as robust technology. Innovation in road transport will play a significant part in this.

1.3 Fiscal measures need to give appropriate direction and certainty to our sector, both in terms of consumer behaviour and for R&D investment in future technologies. Market transformation however, requires a balanced approach on the demand side as well as supply.

## 2. The Implications of the Stern Review for Policy-making

2.1 The Stern Review was clear in its objective and comprehensive in its approach to establish key principles for action on climate change. The automotive industry recognises the contribution of road transport to $CO_2$ emissions, but has been committed to reducing emissions both to further the sustainability of manufacturing and in the development of technological improvements in new vehicles.

2.2 The road transport sector accounts for nearly 23% of man-made $CO_2$. Transport is the only sector where emissions are increasing in relative terms. In industry, emissions are decreasing and in households, they remain stable.[26]

2.3 Stern advocates many policies/tools to develop a holistic climate change strategy. Fiscal policy, fuel duty, company car tax, carbon trading and vehicle excise duty all impact on road transport. The recognition of collaborative, market-based approaches, so-called "market transformation" to reduce the impact of climate change is welcome. Technological solutions alone cannot prevent climate change from causing catastrophic effects.

2.4 Market transformation has long been advocated by the automotive industry, originally through the Voluntary Commitment, agreed on an industry-wide, pan-European basis in 1998.[27] This consists of three areas working together to reduce $CO_2$ emissions from cars. They are: infrastructure measures (fiscal/transport), consumer (better information/eco-driving) and technology (the automotive industry). Technology has been at the forefront and the other measures have taken place at a slower rate. From the consumer information perspective, the UK Government is ahead of other EU Member States. A new colour-coded environment label for all new cars began appearing in UK car showrooms from July 2005, with most vehicle manufacturers having adopted the new label from 1 September 2005. The label is a very important part of the drive to better consumer education, and it mirrors labels available for white goods, with which consumers are already familiar. In addition, the DfT (Department for Transport) has recently launched a website entitled "Act on $CO_2$". The website is intended to educate consumers on driving and maintaining a vehicle to reduce $CO_2$ tailpipe emissions.[28].

[26] SMMT; The UK Automotive Sector towards sustainability: production consumption and disposal, seventh industry report, p 19.

[27] ACEA, the European Automotive Association, agreed Voluntary Commitments to reduce $CO_2$ from tailpipe emissions to 140g/km by 2008. JAMA/KAMA (Japanese and Korean automotive associations) finalised their agreements in 1999, and are to achieve 140g/km by 2009

[28] ixhttp://www.dft.gov.uk/ActOnCO2/

2.5 The UK Government also advocates a strong policy on carbon trading and pricing.[29] However, this has not been replicated at a European market level to ensure that dynamic cost-effective technology is brought to market. Fiscal measures have also been developed by the UK, one of 11 Member States to have targeted surface transport in this way. However, much more needs to be done.

2.6 The implications of Stern for policy-makers both within governments and industry, should focus on a burden-sharing exercise that is equitable, cost-effective, secure and sustainable.

## 3. Technology: Its Role and Cost

3.1 The automotive industry has a progressive attitude towards the introduction of new technology (see Appendix 1). It is one of the most heavily regulated industries both internationally (EU and UN) and nationally. $CO_2$ has been a principle focus of industry self-regulation since the introduction of the Voluntary Commitment. The contribution of improved new car fuel economy to overall $CO_2$ reduction has been considerable. Over the past decade, manufacturers have maintained an unbroken trend of $CO_2$ emissions reductions through the deployment of a wide range of technologies. Overall this translates into $CO_2$ savings of over 20Mt in 2004 across the EU[30] and cumulative savings over the period of the commitments of as much as 100Mt so far. This has lead to a 12% reduction in tailpipe emissions since 1997.[31]

3.2 According to Stern, abatement in transport is expensive in the short term because "low carbon technologies tend to be expensive and the welfare costs of reducing demand for travel are high" and therefore it is likely to be "among the last sectors to bring its emissions down below current levels."[32] A crucial part to reducing carbon emissions from cars is the consumer. In 2005, 18% of new cars purchased gave emissions of under 140g/km (the highest percentage since records began) and 3.3% of new vehicles purchased were in VED bands A and B. Change is happening amongst consumers, albeit slowly, and not at a fast enough rate to effect the kind of change needed to reduce $CO_2$ to the scale that policy-makers want. Further technological progress has been hampered by regulation, quasi-regulation and market trends outside the control of the industry. These have contributed to add weight to the vehicles, impacting average $CO_2$ emissions during the Voluntary Commitment period. Such measures have counteracted $CO_2$ reduction by 27%.[33]

3.3 This strongly emphasises the need for a balanced approach between safety, $CO_2$ emissions and alternative fuels. This supports the Integrated Approach, where other measures such as low carbon fuels and changing driver behaviours offer carbon reduction at lower costs.

### *Fuel technology*

3.4 The automotive sector needs long-term effective policies from fiscal authorities to support new technology. Long-term does not mean between three and five years, but up to 15 years, or the average length of a product cycle. In the case of fuels, careful consideration needs to be given to fuel duty strategy to support uptake and infrastructure development.

3.5 The future for alternative fuels must be carefully monitored. The RTFO is a key process in enabling less use of conventional fuels and aiding the pathway to low carbon alternatives. Biofuels, including E85 certified under the initiative must be related to fuel quality standards, meeting "fit for purpose" parameters. Fuel incentives whether given through the fuel duty rebate or certificates must be referenced on current and future European and UK fuel quality standards. Actions by Government must be co-ordinated to ensure consistent and durable signals on fuel quality are in place now to support government's targets for biofuel use in the UK over the years to 2010. As biodiesel has assumed a central role in the government's expectations for fuel substitution and environmental policy, it is important that the rebate for biofuel is pitched at an attractive rate. Development of a secure, sustainable UK supply must be encouraged if take-up availability is to develop adequately. A long-term policy will help the automotive industry to invest in alternatives to fossil fuels.

[29] At the most recent Environment Council (19 February), the UK was the only Member State to consider trading to reduce $CO_2$ tailpipe emissions.

[30] ACEA's $CO_2$ Briefing, November 2006.

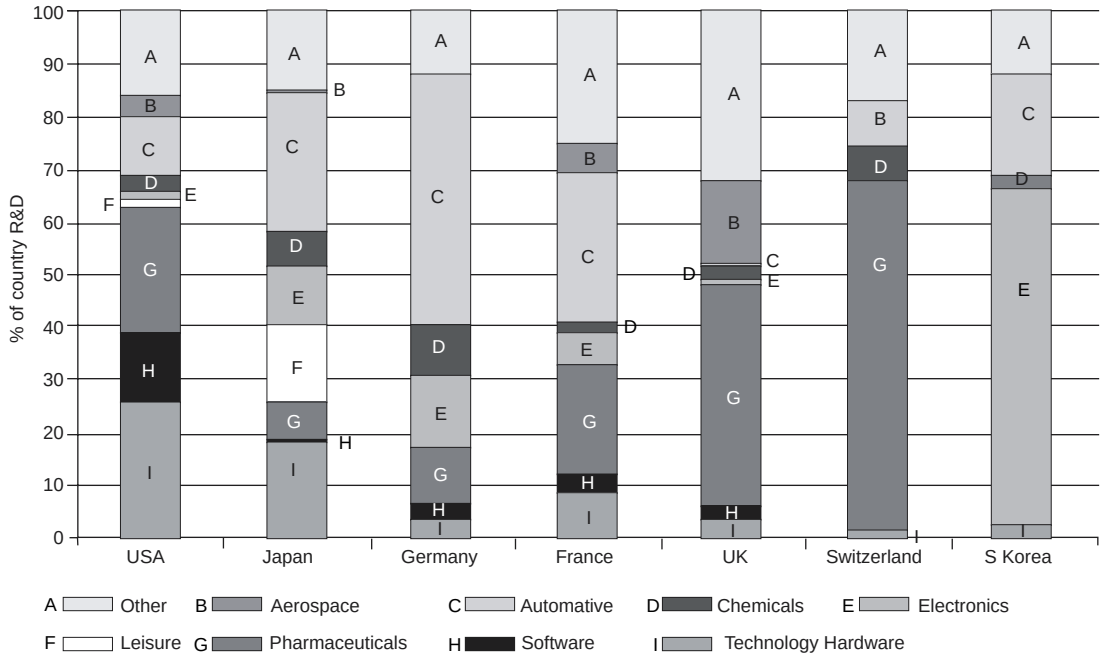
[31] SMMT, UK New Car Registrations by $CO_2$ Performance: Report on the 2005 market, April 2006.

[32] The Stern Review's Annex 7c on the Transport sector: (http://www.hmtreasury.gov.uk/media/3DD/5D/Transport_annex.pdf)

[33] SMMT, UK New Car Registrations by $CO_2$ Performance: Report on the 2005 market, April 2006.

## 4. Innovation and Low-carbon Road Transport

**Figure ES5**
**The top 7 countries with their Global 1250 companies' proportions of R&D in the top 8 sectors**




4.1 Stern recognises the need to foster technology and innovation in road transport. However, the DTI 2006 R&D scoreboard[34] above illustrates that despite substantial activity, R&D spending in automotive in the UK lags behind our industrial competitors. For the UK to benefit from climate change opportunities and to help the sector achieve reductions in average costs, greater, firmer long-term funding in the sector is required.

4.2 Vehicle manufacturers and systems suppliers have been working on intelligent mobility solutions for many years and bearing the cost of this. The result of much of this work was on display at the International ITS Congress and exhibition held in London in October 2006.[35] Manufacturers have been assisted at UK and EU level in this endeavour through various R&D support initiatives. The automotive sector is grateful for the support it has received through the various national and European R&D programmes. But so far the market for these systems has to a large degree demonstrated that more work needs to be done if the potential benefits of ITS on congestion and traffic management are to be realised, as well as further development of low-carbon technologies.

4.3 In summary Stern suggests that "deployment for low-emission technologies should increase two to five times globally."[36] Innovation to support new road transport technologies therefore needs to rise significantly to support a UK low carbon transport network in the future. On the R&D side, large firms with little or no profit are still unable to obtain credits for their R&D work. By allowing these companies to offset against National Insurance contributions (a key cost in R&D activity) a boost would be given to value of the credit for businesses where financial circumstances may be under some strain.

4.4 It is evident that greater opportunities for investment in the road transport sector should exist. The tax-take from motoring related receipts will be almost £30 billion in 2007 while the total spend on all transport activities will be £15 billion. Transport innovation policies must place more emphasis on roads. All stakeholders see that roads and road transport will remain the mode of choice for most private and commercial journeys for the foreseeable future. Road transport will continue to give a major contribution to the economy. The economic significance of an efficient and effectively managed road infrastructure means that investment and better management should become a priority. Revenue from, for example, speed enforcement cameras, could be reinvested in roads and road users. Investment in new information technology and innovatively applied to the road infrastructure also has a key role to play in better use and road management. Further fundamental and concrete efforts need to be made in the area of intelligent road and traffic management in order to improve traffic flow. In particular more should be done on:

[34] ixhttp://www.innovation.gov.uk/rd_scoreboard/

[35] ITS World Congress; www.itsworldcongress.com/its_1024/home/index.cfm

[36] Stern Review, p 34: http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

— Real-time traffic and travel information—easily accessible information about the road work so decisions can be made before the journey.

— Traffic light synchronization.

— Automatic traffic incident detection.

— Parking management (such as work-placed parking levy).

— Automatic traffic direction instructions.

## 5. Market Transformation Concepts

5.1 To bring low carbon technology to market Stern recognises the need for both technology pull and demand push. This is illustrated in the figure below (Stern Report figure 16.1 p 349).

5.2 Our sector is global and very varied in nature. Manufacturing, distribution and service businesses, whether branches of global parents or firms that are still UK-owned need favourable market and business-specific conditions to be sustainably profitable. Most take their competitive cues from global suppliers, markets and costs, most especially labour costs. The competition is stiff, especially from lower-cost producers in (re)emerging economies. Our domestic economy too poses many challenges for automotive businesses as they have to compete with other sectors for investment, skills and finance and face particular regulatory costs on environmental, energy, employment and pension regulations. For manufacturing and most especially small to medium-sized component suppliers this is a particular concern as they are faced with a multiple cost squeeze. Adaptation here often implies diversification, relocation, downsizing, joint-venture and or counter-trade opportunities and still the pressure on costs is relentless. For those with no high value-added, niche or innovation opportunities the rationale for doing business in the UK may be precarious. However, the UK's strength lies in its diversity of ownership and variety of models produced here. Innovation strategy needs to build on and support these at all levels of the market transformation model. The automotive sector, in its progress toward low carbon, continues to develop a range of technologies. As Stern illustrates, there are a number of important elements to achieve market transformation, the automotive sector would in particular point to:

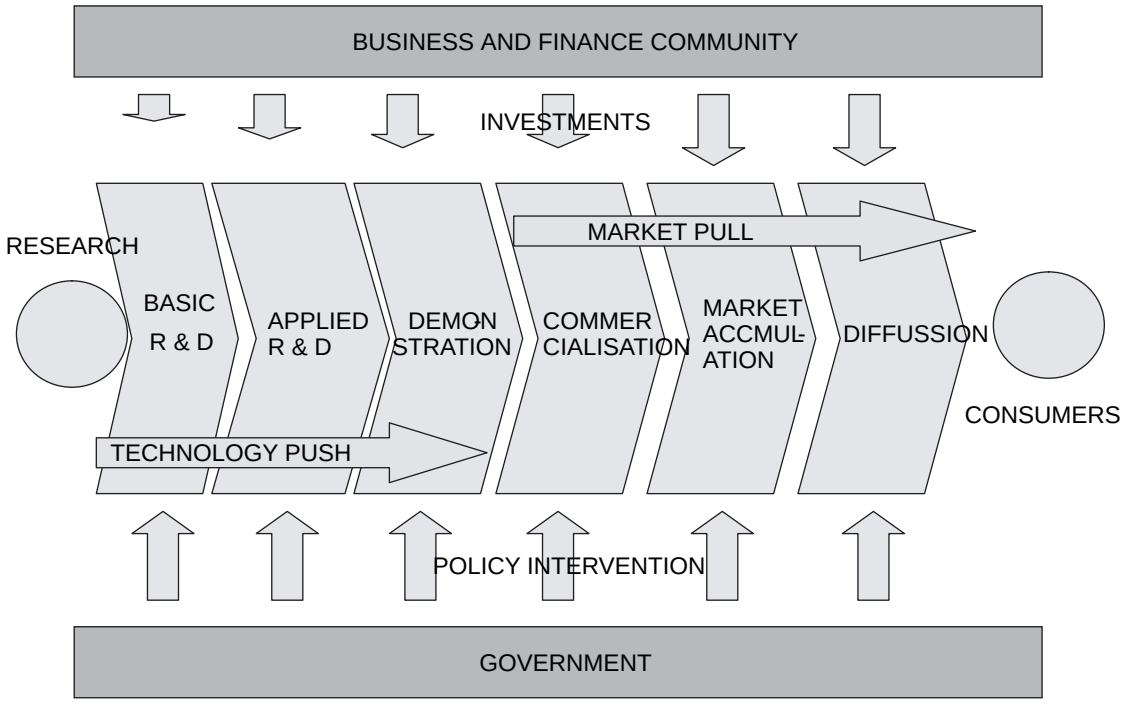
— The need for a co-ordinated, seamless support of the development of low carbon technology from Research and Development through to consumers.

— Recognises the role of the investment community in supporting the process.

— The role that demonstration projects play in bridging the so-called "valley of death" between applied research and development and commercialisation.

— The need for government support to instigate market pull toward diffusion of technology.

*The main steps in the innovation chain (Grubb 2004)*



## 6. Conclusion

6.1 The Stern Review's concept of "market transformation" and ways to effect change at all levels of society broadly agrees with the progressive views of the automotive industry. Climate change is a cross-cutting issue, and tackling its effects must be viewed in this way by the UK Government. There is currently a plethora of government initiatives proposed and under way to tackle the effects of climate change—the UK Government must be mindful that the policies must work together, be effectively communicated and avoid unintended consequences (eg: the risk of double-counting of carbon in trading schemes).

6.2 The automotive industry acknowledges its key role in reducing $CO_2$ emissions from surface transport. It has made considerable technological advances in this area and is committed to continue to progress. However, there is a need for collaborative working from stakeholders, better education, more appropriately-targeted fiscal measures and more focus on the burden-sharing implications of climate change.

## APPENDIX 1

### Technology

| *Introduction Year* | *New $CO_2$ Efficient Technology* |
|---|---|
| 1995–96 | Direct-injection diesel engines. |
| 1997–2000 | New generation of advanced diesels, notably incorporating commonrail technology:<br>— Automated Manual Transmission;<br>— Gasoline direct injection (GDI) engine models launched. |
| 2001 | Two-step variable valve timing:<br>— Valve train with roller finger followers (lower friction);<br>— Fully variable valve lift and timing;<br>— Variable length Intake Manifold;<br>— Second generation diesel common rail injection (high pressure);<br>— Exhaust gas turbochargers with variable nozzle geometry turbine;<br>— Application of advanced diesel technology to smaller engines, and consequently to small cars;<br>— Six-speed automatic gearbox;<br>— New generation of bio-fuelled vehicles. |
| 2002 | Fully variable valve lift and timing technology combined with GDI:<br>— Variable length intake manifold on small gasoline engines;<br>— Fast warm-up cooling system;<br>— Torque converter lock-up for first gear on automatic transmissions;<br>— Low-viscosity/friction oil across model-range;<br>— Friction optimised rear-axle differential;<br>— Engine covering/under body panelling for vehicle aerodynamic improvement. |
| 2003 | Double clutch/Direct Shifting gearbox:<br>— Seven-speed fuel-economy optimised automatic transmissions;<br>— Common rail injection system with 1600 bar;<br>— Unit injector of 2050 bar;<br>— Energy management control systems, including load levelling, to reduce engine idle speed;<br>— Electro-hydraulic power assisted steering system;<br>— Fully electric power assisted steering. |
| 2004 | New generation turbocharged small displacement diesel enginesintroduced:<br>— Variable Twin Turbo technology on diesel engines;<br>— Piezo-injection systems on diesel engines;<br>— Stop-start with regenerative braking;<br>— Second generation friction optimised rear-axle gearbox;<br>— Torque converter lock-up for first gear on automatic transmissions across model-range;<br>— High efficiency alternator;<br>— Regulated electrical fuel pump. |
| 2005 | Second generation Valvetronic (fully variable valve lift and timing system):<br>— Twin-charger technology for gasoline vehicle combined with downsizing of combustion engine;<br>— Roll-out of LED technology for high volume segments with benefits concerning electric energy consumption; |

| *Introduction Year* | *New $CO_2$ Efficient Technology* |
|---|---|
| | — Hydro-high-pressure forming for high strength structures with weight advantages;<br>— Advanced cooling system with electric water pump;<br>— Electronically controlled oil pump;<br>— Third generation common rail injection system. |

*March 2007*

---

**Memorandum submitted by the Strategic Aviation Special Interest Group of the Local Government Association**

INTRODUCTION

1. SASIG has a mandate from its national membership of 60 local authorities to promote sustainability in the development of aviation in the UK.

2. SASIG has an interest in the second question identified by the Committee, particularly the third bullet which reads:

— Whether or not future domestic targets and forecasts should include international aviation and shipping?

3. The SASIG answer is YES.

JUSTIFICATION

4. In 2003 the Government published a White Paper known as "The Future of Air Transport". It predicted that the number of passengers at all UK airports would grow from around 180 million passengers per annum in 1998 to between 400 and 600 by 2030. By 2005 there were 228 million passengers, with the percentage rate of growth in six out of the last eight years exceeding the forecasts.

5. In December 2006 the Department for Transport published a Progress Report on the Air Transport White Paper. It summarises the White Paper as having rejected a "predict and provide" approach in favour of one in which aviation pays its environmental costs whilst at the same time bringing real economic and social benefits to people and the UK. The general message from the Government was that much has been achieved, the passenger forecasts to 2030 are robust and almost everything is going well.

6. On that basis there must be every expectation that passenger numbers will more than double by 2030.

7. Aviation is a rapidly growing sector and its contribution to climate change has been predicted to grow[37] despite any fuel efficiencies gained from improved engine technology. It is equally a difficult sector to control. In effect it is not controlled, and the number of passengers and the number of aircraft movements has grown annually by about 5% to meet passenger demand. This may not be wrong or bad, it is merely a statement of fact.

8. There are no Government policies in the Aviation White Paper that promise to limit that growth in the number of passengers. Again this may not be wrong or bad, it is merely a statement of fact.

9. At the same time as encouraging growth because it is said to have huge economic benefits, the Government has identified many initiatives in the Progress Report that are claimed to help limit the environmental, particularly the emissions, effects of aviation. Three initiatives in particular—but there are several others—illustrate the lack of real, meaningful progress:

— *Inclusion of aviation in the EU emissions trading scheme (ETS).* Whilst this is welcome in theory it is not likely to have been implemented until 2011 at the earliest and at present there is no promise that the levels set can be treated as "targets" that will reduce over time and reduce fuel consumption below today's levels.

— *Doubling Air Passenger Duty.* This is claimed by the Chancellor of the Exchequer to reduce demand and hence reduce carbon emissions. But that claim is likely to have been made by modelling its impacts on passenger forecasts. The model is sensitive to price and will have shown a slightly lower growth rate but the real question is "Is the passenger sensitive to a small rise in the overall cost of that journey?" The Chancellor claimed that 70% of passengers would only pay an extra £5. Common sense suggests that those passengers may merely grumble and fly.

[37] The International Panel on Climate Change (IPCC) has estimated that aviation accounted for 3.5% of man's contribution to global warming in 1992 and that aviation emissions could grow to 4–15% by 2050.

— *Welcome the aviation industry's "Sustainable Aviation" initiative.* The industry deserves credit for achieving a consensus on a range of initiatives and for publishing its own Progress Report at the end of last year. The real problem is that the targets set for emissions are not quantified in a way that will guarantee to drive down total emissions. One of the main commitments in "Sustainable Aviation" is for a 50% improvement in fuel efficiency per seat kilometre and an 80% reduction in $NO_x$ emissions for new aircraft in 2020 relative to 2000. These may be stretching targets but even if every new aircraft that rolls off the production line in 2020 achieves those targets, all aircraft produced earlier will still be flying in 2040 or 2050. By that time anyway, there could be so many more passenger kilometres being flown that the total emissions can only exceed the current level. That is why the IPCC has forecast a growth in emissions. Another commitment is to ensure common reporting of $CO_2$ emissions and fleet fuel efficiency. Again, a good scheme but just collecting this information does not ensure a reduction of $CO_2$ emissions and fuel use.

10. The problem with all these initiatives is that there are no targets to aim for. In addition to targets being set, effective incentives for compliance are essential.

## Suggested Solutions

11. *EU Emissions Trading Scheme.* There must be a clear message sent to Ministers (and to the Civil Servants who are at the negotiating table) that the arrangements should ensure that emissions are actually reduced, not that carbon permits are easily bought so that emissions stay constant. The challenge to the industry must be to continue to grow to satisfy consumer demand but, at the same time, to introduce rapidly more fuel-efficient aircraft and better technologies.

12. *APD.* There must be an assurance that the increase in APD is allocated for environmental mitigation. One way would be to establish an arms-length organisation to allocate all or some of the funds in a similar manner to the way the Aggregates Levy and the Landfill Tax are spent. The public hate the adverse effects of minerals production and landfill sites yet need these services. In the same way the public hate the adverse effects of the aviation industry, yet we are all flying more and more. An Aviation Environment Fund to allocate the increased APD for mitigation and research could help solve some of the problems.

13. *Aircraft Efficiency.* The industry needs to be encouraged to set targets for fuel use, which are annually lower than the current level of use and they need to be required to report on their success or failure, with effective penalties for non-compliance.

## Conclusion

14. Targets need to be tough; they need to be realistic; and they need to carry a penalty for failure.

Note: The Strategic Aviation Special Interest Group of the Local Government Association is a group of 60 local authorities from across England with an interest in the strategic planning of aviation provision in the UK. It is a forum for authorities to share views and solutions, to provide responses to important consultation reports and to advise the Local Government Association (LGA) and Central Government.

*March 2007*

Printed in the United Kingdom by The Stationery Office Limited
7/2007 366535 19585