

## Launch Presentation, 30<sup>th</sup> October 2006

[SLIDE 1: *Logo*]

### **I INTRODUCTION**

- Thank you Chancellor and Prime Minister for the opportunity and for all the support. Thank you to all the many departments across Whitehall for their tremendous collaboration. And especially to the team who have worked so hard on this Review. We have also benefited from discussions with the private sector, NGOs and academics in this country and the many countries we visited around the world.
  
- Thank you to Martin Rees, the Royal Society, the Hadley Centre and all the scientists from whom we have learned during our work. The science has been our starting point. It shapes the economics. The science tells us that greenhouse gas emissions are an externality; in other words, our emissions affect the lives of others. When people do not pay for the consequences of their actions we have market failure. This is the greatest market failure the world has seen. It is an externality that goes beyond those of ordinary congestion or pollution, although many of the same economic principles apply for its analysis. This externality is different in 4 key ways that shape the whole policy story of a rational response. It is: global; long term; involves risks and uncertainties; and potentially involves major and irreversible change.

- Correspondingly the economic analysis and the policies must be: international, how countries work together; long-term, our actions now cast their shadow far into the future; have the economics of risk at its core; and go beyond the marginal changes which are the usual daily fare of economists.
- There are 2 halves of the Review
  - (i) the first examines: impacts, risks, costs and targets
  - (ii) the second, policies,
- Our tasks were to bring analysis and evidence to the table to take forward understanding, promote action, shape policy.
- This is as fascinating a subject as I have encountered. We have to muster all the economics we can bring to bear. We offer here just a brief introduction to the analysis of the Review.

## **II IMPACTS, COSTS, TARGETS**

*[SLIDE 2: Demonstrates the link between global mean temperatures and the impacts of climate change]*

- We begin by looking at the relation between temperature and impacts, and then we will examine the link between greenhouse gases and temperature.

- Each link involves risks and uncertainties. The slide shows that the impacts cover many dimensions. The risks intensify as temperature rises. Many of the risks are transmitted through water; floods, droughts, storms, sea level rises.
- We now know that business-as-usual involves very high risks; it is likely to imply a rise of 4-5°C or more above pre-industrial levels within the next 100 or 150 years. This is way outside human experience. At high levels of warming, less is known about how the climate will respond – very large events might happen. The last Ice Age was 5C below where we are today – such differences are transformational. Redrawing physical geography would redraw human geography; where we live, and how we can live our lives.
- Further, the impacts are inequitable: poor countries will be hit hardest and earliest, when it is the rich countries responsible for  $\frac{3}{4}$  of greenhouse gases currently in the atmosphere.

[SLIDE 3: *Shows the commitment to warming from stabilising at different levels of greenhouse gases*]

- What is the link between greenhouse gases and temperature?
- First, we must recognise the lags in these processes. Our emissions are a flow each year and accumulate in the atmosphere building up stocks over time. We are currently adding around 2.5 ppm of greenhouse gases a year in CO<sub>2</sub> equivalent and the current stock of all greenhouse gases, in CO<sub>2</sub> equivalent is around 430ppm. And these stocks affect temperatures with a lag. For example, we are already committed to at least  $\frac{1}{2}$ °C more in the next few decades from emissions we have already made.

- The slide shows eventual temperature increases corresponding to different levels of stabilised stocks. Red lines show ranges corresponding to two studies IPCC(2001) and Hadley (2004) which have formed the basis of our risk analysis. Grey bars give the range of existing studies. We have been fairly cautious. Some more recent studies show a bigger range at the upper end.
- And there is uncertainty in linking temperature change to amounts of greenhouse gases in the atmosphere. However, it is clear that as the levels of greenhouse gases rise, the ranges shift to the right, i.e. to higher temperatures. At the upper end of the ranges, the climate is entering very dangerous territory. Thus the risk analysis must include the possibility of very powerful effects.
- 450ppm means around a 50:50 chance of keeping global increases below 2°C above pre-industrial. At this level, it is unlikely that increases will exceed 3°C. At 550ppm, there is around a 50:50 chance of keeping increases below 3°C, but it is unlikely that increases would exceed 4°C. 550ppm is risky, but far less risky than business-as-usual: continuing on the current path until the end of this century gives at least a 50:50 chance of an eventual temperature rise above 5°C.
- Given where we are (as I noted 430ppm and adding 2.5ppm per year and rising); given the obvious dangers of going over 550ppm, this strongly suggests that we should aim somewhere between 450 and 550ppm CO<sub>2</sub>e.

[SLIDE 4: *The Scale of the Challenge*]

Thus we ask in our Review what paths of emissions would lead us to stabilise in this range and what would be the cost?

- Business as usual will give us 550 within 30 – 35 years and by the end of the century beyond 850ppm: this is off the scale shown in the previous slide.
- What is involved in stabilising? The slide shows the paths of flows of emissions which are required in gigatonnes of CO<sub>2</sub>e per annum.
  - 450ppm is already nearly out of reach. 450ppm means peaking in the next 5 years or so and dropping fast.
  - 550ppm means peaking in the next 10 – 20 years and falling by between 1 and 3% per year.
- It is clear that stabilising at 550ppm or below involves strong action. For example, the power sector around the world will have to be at least 60% de-carbonised by 2050 and with a bigger proportion de-carbonised in rich countries. But such stabilisation is feasible. If action is delayed by 20 or more years the ability to stabilise at or below 550ppm could slip away, or the costs would rise sharply.
- We have seen the dangers; we have seen what is involved in terms of reducing emissions to stabilise between 450 and 550ppm. Can we quantify these dangers and costs?
- What are the costs of doing nothing? We have to try to model the dangerous risks we have been discussing. We have to look out over 100-200 years when the big effects of our actions over the

next 50 years will come through. When we do this in a way that averages across risks, time, and countries, we calculate that the damages from business-as-usual would be equivalent to at least 5 and up to 20% of consumption a year, depending on the types of risks and effects included. The first effects of climate change are already evident, but it is still some time before impacts and risks on this scale will appear. But given the lags, action to head off these risks is urgent.

- What are the costs and benefits of taking action? The costs of removing most of that risk, getting to 550 or below, are around 1% of GDP per year. The cost could be above or below 1% depending on policies, technological progress and ambitions but would be in this region. This is equivalent to paying on average 1% more for what we buy - the price rise for carbon-intensive goods would be higher and for low carbon-intensive goods would be lower – it is like a one-off increase by 1% in the price level. That is manageable; we can grow and be green.
- We can go further than this. There will be new opportunities; new markets worth \$100s bn p.a. Economically speaking, mitigation is a very good deal. Business-as-usual, on the other hand, will eventually derail growth.

### **III POLICY**

[Slide 5 *Global Emissions by Sector*]

- We must start by recognising that emissions come from every economic activity and every country. The global breakdown is presented in the slide. Action is necessary across all sectors if the required reductions are to be achieved. Different activities and sectors may require different policies. On the other hand there are some clear and broad principles.

- There are three strands to policy: all are required.

First, we must establish a carbon price via tax, trade and regulation – without this price there is no incentive to decarbonise.

Second, we must promote technology: through research and development. Further, private sector investors need confidence that there will be markets for their products: that is why deployment policy also makes sense.

And third we must deal with market failure; for example problems in property and capital markets inhibit investments for energy-efficiency. Further, the sticks and carrots of incentives, rightly emphasised by we economists, need to be supported by information. And still further, greater understanding of the issues can itself change the behaviour of individuals and firms.

- Much of the detail of how these strands of policy will work has some subtlety. I will give two examples on pricing
  - (a) The economics of risk says the dangers of over-shooting imply the need for a clear long-term quantitative goal, which drives the emissions path into a fairly narrow corridor.

(b) The economics of cost requires flexibility as to how, where and when we reduce emissions whilst staying in that corridor.

- Second example, trading means there is a difference between what emissions reduction you fund and what you do yourself. Buying abroad may get you more mitigation for your money and the process can provide financial flows into developing countries thereby promoting their action.
  
- And all policy should be clear and credible to support long-term investment decisions. It is governments that set frameworks but for the most part the private sector that makes the investments.

#### **IV INTERNATIONAL**

[SLIDE 6: *Potential Emissions Markets from Power and Industrial Sectors*]

- We must be very clear that this is an international problem and action must be multilateral. Any one country is only part of the problem. The UK is just 2% of the emissions. But the behaviour of each country will determine whether the collective response is sustained and effective. Further, it will be far easier to take policy forward in one country if other countries move together.
  
- Any particular country will employ a range of policies. These policies would normally include both taxes and standards and regulation. But let me say a little more about trading.

- Emissions trading is a powerful way of establishing cooperation across borders. The Emissions Trading Scheme (ETS) is leading the way. Beyond 2012 (i.e. third phase) there is an opportunity for it to be ambitious, long-term, and open to trade with other countries and regions.
  
- If the current range of activities in the EU ETS applied to trading with the top twenty emitters, markets would increase five-fold, as the slide shows. The yellow area in the bottom left hand corner shows the emissions currently covered under the EU ETS. The lighter shade of orange shows what could be covered if other countries were to become involved in this type of trading. And the range of activities covered could itself be expanded. With international trade and common prices we can get more reduction for a given cost.
  
- Technology: Research and development in the energy sector has halved since the early 1980s. That trend must be reversed, and ideas must be shared. We need larger cross-border markets for low carbon technologies to drive deployment and bring down costs.
  
- Trees: deforestation, as we saw, is responsible for more emissions than the transport sector and there are opportunities to reduce emissions strongly and cost effectively, if the countries where the trees stand are given strong support internationally.

- Working internationally we can build on the experience of the United Nations Framework Convention on Climate Change, creating frameworks for markets and incentives. Without incentives private investment and flows of international finance of the required magnitude will not happen. The WB and IFIs are exploring how to scale up flows for the future and will be able to expand their activities
  
- And we must bring in all the major players, particularly the USA, China, India. I have lived and worked in all 3 countries over the last 3 or 4 decades and in the last 2 or 3 years have seen remarkable changes of opinion (e.g. both of China and India have their 11th 5 year plans starting this year; and these plans have strong ambitions on energy efficiency). Persuasion and promotion of international action involves bringing evidence and creating frameworks that are inclusive.
  
- Managing a transition to a low carbon economy cuts across most areas of activity. And multi-lateralism is crucial to success. Thus it cannot be left only to energy and environment ministers. This is about managing an international economic transition. Heads of government and finance ministers have to be at the heart of the story. The G8 as we saw in Gleneagles last year, can play a strong role.

## **V ADAPTATION**

- Finally, before I close let me emphasise the importance of adaptation. Much climate change is already on the way. It cannot

be ignored. All countries have to adapt. The UK is leading the way through its Climate Impacts Programme. Much of adaptation is the building of resilience and flexibility, in other words sustainable development itself is the best adaptation for poor countries. Better information and crops that withstand heat, drought and floods can and should be developed internationally. Adaptation will cost poor countries \$10 bns p.a. more for the necessary infrastructure alone. We must do all in our power, difficult though that is, to ensure delivery on the ODA commitments of Monterrey 2002, and the EU, and the Gleneagles summit of the G8 last year.

[SLIDE 7 *Adaptation: Scaling up Overseas Aid*]

- As the slide shows the trend of ODA is upwards. Meeting the commitment to reach 0.7% of GDP by 2015 (as for the EU) could support both current development ambitions and requirements for adaptation. It is vital that these resources are produced.

## **VI CONCLUSIONS**

- I have been able to sketch only the main lines of our analyses. We leave you to enjoy the 600 pages. Whilst there is much more we need to understand, both in science and economics, we know enough now to be clear about the magnitude of the risks, the time-scale for action and how to act effectively. That is why I am optimistic having done this Review that we have the time and the knowledge to act. But only if we act internationally, strongly and urgently.