

# THE ECONOMICS of climate change

In October Sir Nicholas Stern, head of the UK's Government Economic Service and former chief economist of the World Bank, published the *Stern Review on the Economics of Climate Change*. This was a comprehensive review, commissioned by chancellor of the exchequer Gordon Brown. **Ralf Martin** assesses the policy suggestions.

**S**ir Nicholas Stern's message is clear: natural scientists have gathered strong evidence that human-induced climate change is happening. Looking at the economics, Stern finds that early and strong action makes sense from a cost benefit perspective.

His suggestions on what to do focus firstly on market based schemes to internalise the costs of greenhouse gas pollution. Implicitly, through a carbon trading scheme or explicitly through a carbon tax, polluters should price the costs of climate change into their decisions to conduct polluting activities. While this is standard environmental economics, there is hope that the high profile of the *Stern Review* and the elaborate discussion on the concrete design of such a scheme provide a much needed political boost.

The second major policy suggestion concerns a dramatic increase in public spending on research into technologies and practices to mitigate pollution. This includes spending on the early deployment and piloting of new technologies. This recognises that our eventual adjustment to mitigate climate change will involve the development of a series of new technologies. While implicit or explicit carbon taxes might stimulate research to develop these technologies it is likely that this stimulus is insufficient because of a number of market failures. This is a point which was stressed in earlier policy analysis by LSE's Centre for Economic Performance (CEP). Importantly, as stressed by Stern, measures have to be in place ensuring that this extra money is spent wisely. This could involve, for example, an arms length approach where money is allocated by expert panels to a portfolio of most promising research projects.

Overall, Stern draws an optimistic picture. Strong action is needed and it is costly, but not so costly that it would be a major obstacle to prosperity. The report itself will be an important source of reference in the discussion to come.

It also raises a number of immediate questions, however.

Firstly, a key requirement for success will be strong internationally-agreed reduction targets which lead to significant increases in the price

of polluting activities. The experience of climate change negotiations so far makes it doubtful that strong targets can be agreed on and complied with. The carbon price that will eventually emerge is likely to be below optimal levels. This creates the risk of a final scheme that is simply a revenue transfer from polluters to the government, or whoever holds the pollution rights, without inducing significant behavioural changes which would reduce pollution. Among other things, such a scheme would be very unpopular.

Secondly, while increased spending on research and development (R&D) is certainly an important avenue, the report leaves open where the extra spending will be coming from.

At CEP, we have a suggestion which addresses both issues. Why not combine the two policy elements and design the internalisation scheme in a way that raises some revenue?

In the case of a carbon trading scheme, this can be achieved by auctioning the permits rather than allocating them for free. In the case of a tax, revenue accrues naturally. Rather than entering the general tax revenue this extra revenue should be earmarked to contribute to the suggested increase in public R&D spending. Because the tax levels required to raise a revenue stream that make a difference in R&D spending are likely to be much lower than those that induce behavioural changes, even a much watered down internalisation scheme has the potential to have a significant long term impact on climate change. For example, a comparatively low carbon tax in the US on CO<sub>2</sub> emissions from transportation of only five dollars, which would increase the average annual cost of running a vehicle by \$40, could raise a budget equal to the current world spending on energy R&D; that is, the suggested doubling of public R&D funds could be easily achieved by US car owners alone at a price which would hardly induce them to stop driving. Earmarking will also strengthen popular support.

A further issue concerns international variations in R&D spending. Stern rightly stresses the need to coordinate carbon targets internationally. However, to double R&D spending, international coordination to agree on spending targets might

equally be required to avoid free riding. This is underlined by the current huge variations in public energy related R&D spending across industrialised countries which ranges from US\$ 27 per person in Japan over 10 in the US to 1.2 in the UK.

Agreeing and committing to R&D spending targets might also be easier than agreeing on pollution targets. In the former governments know what they are bargaining for. With pollution targets the uncertainty over future costs is very high. ■



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LSE's Centre for Economic Performance (CEP) has accumulated a unique track record of research expertise on firm level productivity and innovation over recent years. Researchers from CEP's productivity group are putting together the biggest ever international database on firm-level energy consumption in order to examine variations in firm-level energy efficiency, understand the relationship between energy efficiency and economic performance and assess policies to improve industrial energy efficiency. First results are expected in March 2007.



IMAGE: SXC

To read the full review, see [www.sternreview.org.uk](http://www.sternreview.org.uk)



The first half of the Review focuses on the impacts and risks arising from uncontrolled climate change, and on the costs and opportunities associated with action to tackle it. The Review emphasises that economic models over timescales of centuries do not offer precise forecasts

— but they are an important way to illustrate the scale of effects we might see.

The Review finds that all countries will be affected by climate change, but it is the poorest countries that will suffer earliest and most. Unabated climate change risks raising average temperatures by over 5°C from pre-industrial levels. Such changes would transform the physical geography of our planet, as well as the human geography — how and where we live our lives.

The Review calculates that the dangers of unabated climate change would be equivalent to at least five per cent of GDP each year.

The Review goes on to consider more recent scientific evidence (for example, of the risks that greenhouse gases will be released naturally as the permafrost melts), the economic effects on human life and the environment, and approaches to modelling that ensure the impacts that affect poor people are weighted appropriately. Taking these together, the Review estimates that the dangers could be equivalent to 20 per cent of GDP or more.

In contrast, the costs of action to reduce greenhouse gas emissions to avoid the worst impacts of climate change can be limited to around one per cent of global GDP each year. People would pay a little more for carbon-intensive goods, but our economies could continue to grow strongly.

If we take no action to control emissions, each tonne of CO<sub>2</sub> that we emit now is causing damage worth at least \$85 — but these costs are not included when investors and consumers make decisions about how to spend their money. Emerging schemes that allow people to trade reductions in CO<sub>2</sub> have demonstrated that there are many opportunities to cut emissions for less than \$25 a tonne. In other words, reducing emissions will make us better off. According to one measure, the benefits over time of actions to shift the world onto a low-carbon path could be in the order of \$2.5 trillion each year.

The shift to a low-carbon economy will also bring huge opportunities. Markets for low-carbon technologies will be worth at least \$500bn, and perhaps much more, by 2050 if the world acts on the scale required.

The second half of the Review examines the national and international policy challenges of moving to a low-carbon global economy.

Stern (pictured) proposes that three elements of policy are required for an effective response.

The first is carbon pricing, through taxation, emissions trading or regulation, so that people are faced with the full social costs of their actions.

The second is technology policy, to drive the development and deployment at scale of a range of low-carbon and high-efficiency products. And the third is action to remove barriers to energy efficiency, and to inform, educate and persuade individuals about what they can do to respond to climate change. ■

## LSE and the environment

In May 2006 LSE joined Phase 2 of the Carbon Trust's Higher Education Carbon Management Programme. This sees the School working alongside the Carbon Trust, actively pursuing policies that will reduce our carbon emissions.



The Carbon Trust is an independent company, funded by central Government, that works with UK businesses and the public sector to cut

carbon emissions and develop commercial low carbon technologies.

See [www.carbontrust.co.uk](http://www.carbontrust.co.uk)

In addition, a Green Travel Plan is being developed and cycling spaces around campus have been increased, with a view to encouraging the use of cycling to the site.

School staff, with the support of students, have also conducted a Sustainability Audit, and are working on recycling, waste management and energy efficiency actions.

See [www.lse.ac.uk/collections/environment](http://www.lse.ac.uk/collections/environment)

## Alumni

- Germana Canzi (MSc Russian and Post-Soviet Studies 1997) was senior campaigner, energy and climate, for Friends of the Earth this year. In 2007 she will work on European climate policy and economics research for a variety of organisations.

- Jeevan Ganesan (BSc Accounting and Finance 1991) is a co-founder of Eurasia Environmental Fund, a Cayman registered fund administered by RBC Dexia, that invests in listed and unlisted environmental technologies companies in Europe, USA, Japan, India, China and others.

- The Environmental Initiatives Network (EIN) is the School's environmental alumni group, set up in 1995.