Low-carbon future: We can afford to go green

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TACKLING climate change will cost consumers the earth. Those who campaign for a green revolution are out to destroy our western lifestyles. Such are the cries of opponents of emissions cuts, and their message has political clout: a number of surveys, including one by *New Scientist* in 2007, have found that the enthusiasm of voters for policies to alleviate climate change falls off as the price tag increases.

However, a new modelling exercise conducted exclusively for this magazine suggests that these fears are largely unfounded. It projects that radical cuts to the UK's emissions will cause barely noticeable increases in the price of food, drink and most other goods by 2050 (see the figures). Electricity and petrol costs will rise significantly, but with the right policies in place, say the modellers, this need not lead to big changes in our lifestyle.

"These results show that the global project to fight climate change is doable," says Alex Bowen, a climate policy expert at the London School of Economics. "It's not such a big ask as people are making out."

Although it is impossible to precisely predict prices four decades from now, the exercise is one of the most detailed examinations yet of the impact of climate change policies on UK consumers. It provides a useful rough guide to our economic future.

Though its results speak directly to the UK consumer, previous research has come to similar conclusions for the US. In June, one study found that if the US were to cut emissions by 50 per cent by 2050, prices of most consumer goods would increase by less than 5 per cent (*Energy Economics*, DOI: 10.1016/j.eneco.2009.06.016). The findings are also consistent with analyses by the Pew Center on Global Climate Change in Washington DC. "Even cutting emissions by 80 per cent over four decades has a very small effect on consumers in most areas," says Manik Roy of the Pew Center. "The challenge is now to convince consumers and policy-makers that this is the case."

The Intergovernmental Panel on Climate Change recommends that wealthy nations cut their emissions to between 80 and 95 per cent below 1990 levels by 2050 in order to avoid the worst effects of climate change. The UK government aims to reduce its contribution by 80 per cent and leaders of the other G8 nations have discussed following suit. To meet this goal, industries will have to slash fossil fuel consumption, and low-carbon power sources will have to massively expand. Companies will have to pay increasingly higher prices for the right to emit greenhouse gases.

How will this affect the average citizen's wallet? To gauge the impact of the 80 per cent target on the UK population, *New Scientist* approached Cambridge Econometrics, a consultancy known for its modelling of the European economy. The firm used historic economic data to predict the impact of emissions reductions on prices in over 40 categories of goods and services (see "How the model works"). It compared the impact of the 80 per cent cut with a baseline scenario in which the government takes no action other than the limited emissions

restrictions already in place as a result of the Kyoto protocol.

See the figures

Most of the price hikes are a consequence of rising energy costs, in part because coal and gas are replaced by more expensive low-carbon sources. The price of electricity is projected to be 15 per cent higher in 2050 compared with the baseline. In today's prices, that would add around £5 onto typical monthly household electricity bills. It will also result in higher prices elsewhere, as every industrial sector uses electricity.

But electricity and other forms of energy make up only a fraction of the price of most goods. Other factors - raw materials, labour and taxes - are far more important. The energy that goes into producing food, alcoholic drinks and tobacco, for example, makes up just 2 per cent of the consumer price. For motor vehicle purchases and hotel stays, the figure is 1 per cent. Only for energy-intensive industries does the contribution climb above 3 per cent: for example, energy's share of land and air travel costs is 6 and 7 per cent respectively.

As a result, most products cost just a few per cent more by 2050. At current prices, going low-carbon is forecast to add around 5 pence to the price of a loaf of bread or a pint of beer. The price of household appliances such as washing machines rises by a few pounds.

There is one major exception to the pattern. Airlines do not currently have a low-carbon alternative to jet fuel. Unless one is found, they will bear the full burden of carbon pricing, and average fares will rise by at least 140 per cent - raising the cost of a typical London to New York return trip from around £350 to £840.

Achieving the overall picture of low prices does require government action. The model forecasts that by 2050 natural gas and petrol will cost 160 per cent and 32 per cent more respectively. To avoid large price hikes in home heating and road transport while still hitting the 80 per cent target, the Cambridge researchers had to build two major policies into their analysis. They assumed that future governments will provide grants and other incentives to help switch all domestic heating and cooking to electricity, and invest in the infrastructure needed for electric cars to almost completely replace petroleum-fuelled vehicles.

Both policies have been discussed in recent UK government strategy documents, though the detail of how they would be implemented is still pending. Firm policies must follow if ambitious emissions cuts are going to be made, says Chris Thoung of Cambridge Econometrics.

So is tackling climate change going to be easier than expected, in terms of consumer costs? While the Cambridge Econometrics model is widely respected and regularly used by the UK government's climate change advisers, any attempt to forecast four decades ahead can be derailed by unforeseen events. That leads some economists to question the model's results.

For example, companies could relocate to countries with less stringent carbon regulations, points out Richard Tol of the Economic and Social Research Institute in Dublin, Ireland. Incomes in the UK would fall, making goods relatively more expensive. Tol also questions whether it is reasonable to use historical prices as a basis for projecting beyond 2020.

Mike Hulme, a climate policy expert at the University of East Anglia in Norwich, UK, says that social effects are also unpredictable. A repeat of the 2000 fuel price protests, when action by truckers forced the UK government to cut road fuel taxes, could scupper plans to persuade

consumers to switch to electric vehicles. Conversely, social effects could make cuts easier - for example, if the high emissions associated with flying stigmatise air travel among some groups, adds Hulme.

Despite this, the Cambridge Econometrics results, together with other recent studies, do provide a useful guide for governments, says Michael Grubb of the University of Cambridge. They suggest that the overall challenge is surmountable, even if many of the details will only become clear in years to come. "No one is asking policy-makers to have everything in place for the next 40 years," says Grubb. "But these results should reinforce the sense that this is a manageable problem."

The figures

- **1% on clothing:** A £500 men's suit will become £5 more expensive
- **2% on electronics:** A £1000 laptop would cost £20 more
- **1% on food:** The average UK household spends £50 a week on food. This increases by less than £1
- **15% on electricity:** A typical UK household spends £400 a year on electricity. This will jump by roughly £60
- **0% on communications:** UK phone bills will be essentially unaffected
- **140% on air travel:** A return flight from London to New York would jump from £350 to around £840
- **2% on tobacco:** Barring new taxes, the cost of a pack of 20 cigarettes will rise by roughly 10 pence
- **2% on alcohol:** The cost of a pint of beer will rise by about 6 pence by 2050
- **1% on cars:** A new Toyota Prius, currently about £20,000, will cost £240 more in a low-carbon 2050
- **2% on household goods:** The price of a washing machine will rise by a few pounds

See the full results (PDF, 43KB)

How the model works

The model is based on the idea that future emissions cuts will depend on the UK government restricting the amount of carbon that companies can emit. This already happens under the European Union's Emission Trading Scheme.

Companies that exceed a predefined cap must buy emissions allowances from firms that undershoot their target. Emissions can then be progressively cut by tightening these caps. The Cambridge Econometrics team assumed that firms not subject to these limits will have to pay a carbon tax, which will also be steadily increased.

As the cost of emitting carbon rises, so will the price of electricity from fossil-fuel power stations. Petroleum-fuelled vehicles and gas boilers will also become more expensive to run.

Technologies that use less carbon - including nuclear energy and small-scale systems that use the waste heat from power plants to run heating systems - will face smaller price increases. This leads to more investment in low-carbon technologies, which become more attractive as the cost of emitting carbon increases. Consumers will also use less of the goods and services that

become more expensive, such as air travel. These effects lead to a fall in emissions.

To calculate the impact on everyday prices, the model uses historical figures that reflect the effect that energy price changes have on the prices of different types of consumer goods.