

A glimpse into the future

Ever wondered what effect our efforts to limit global warming to two degrees will have on the European economy and labour market by 2050? A new study by the Fraunhofer Institute for Systems and Innovation Research (ISI) provides some illuminating answers.

Words: Klaus Jacob, Fraunhofer-Gesellschaft



As demonstrated most recently by events in Copenhagen, international climate conferences are generally pretty tough affairs. But while politicians wrestle over reduction targets and percentage points, we tend to lose sight of the fact that a great deal of hard scientific research has gone into these figures. A veritable army of experts do the preliminary work for the negotiators, so that any potential agreements are not just words uttered in a vacuum.

The Fraunhofer Institute for Systems and Innovation Research ISI in Karlsruhe recently took the lead in producing a particularly intricate report on global change on behalf of the European Commission. In the report, entitled "ADAM two-degree scenario for Europe – policies and impacts", ISI researchers worked together with experts from a number of other institutes and countries to gaze far into the future – to the year 2050 – and find answers to questions such as 'What will Europe have to do in the interim to limit global warming to two degrees?' and 'What effects will our efforts to do this have on individual countries' economies and labour markets?'

Scientists and politicians are now agreed that the Earth's temperature must not be allowed to rise more than two degrees above pre-industrial levels if the effects on mankind are to be kept within tolerable limits. There is also a general consensus that, as the primary sources of greenhouse gases, the industrial nations must cut their emissions by a far greater amount than developing and emerging countries.

For them, there is talk of a reduction target of 80 per cent by 2050 compared with the base year of 1990, and the study produced by the ISI has proved that Europe is perfectly capable of achieving this without any detrimental effect on its economy.

80 per cent reduction in greenhouse gases by 2050

It was a long, hard slog before the 400-page report was ready – trying to forecast so far into the future is like trying to solve a complex equation with numerous unknowns. It was particularly difficult to amalgamate all the different models on which the study is based, because, as project manager Wolfgang Schade of the ISI explains: "We had to find an integrated modelling system for all 27 countries." Pre-existing models

dealt with individual sectors such as transport, energy supply or private households, but now, because they were seeking a more comprehensive outlook, all the various interdependencies had to be worked in. To give an example, converting from coal-based power to wind and solar power has the knock-on effect that less coal is transported, which in turn means less energy is required for transport.

The overall conclusion of the study is this: The 80 per cent reduction target is achievable. But massive efforts will be required, not only to expand the use of renewable energies, but also to save energy overall – a great deal is still being wasted. Schade says: "We can make savings in all sorts of ways, for example by ensuring buildings are better insulated, by improving material efficiencies, or by using electrical equipment that draws less power."

The study also makes it clear that polluters must pay for the harm they inflict on environment – a suitable price must be attached to carbon dioxide in order to increase the pressure to make changes. Incentives such as labels, norms and standards must be created for products with low CO₂ emissions, to accelerate their launch onto the market. And last but not least, politicians must invest significant sums of money in research, so that new, climate-friendly technologies can be developed and commercialised.

As things stand at present, the biggest CO₂ emitter is the energy sector, which is to blame for roughly half of all greenhouse gases. But this is also where the greatest potential for savings can be found – a colossal 90 per cent, in fact. In the study's two-degree scenario, coal would have to forfeit its central role among energy sources, while the renewable energies sector could expand to provide as much as 75 per cent of Europe's electricity within the next 40 years. Experts predict that wind power, in particular, will continue to experience substantial growth. If energy-saving measures also begin to take effect, Europe could not only stop expanding its highly-controversial nuclear power industry, but also do away with its current carbon capture and storage policy – and still achieve its climate targets.

Transportation also poses major problems. In future, this sector will take

over as the highest emitter of carbon dioxide – its share of greenhouse gas emissions in Europe is expected to increase from a quarter to approximately half. Yet even here, there are huge savings to be made. In absolute terms, current carbon dioxide emissions could be reduced by 62 per cent if more alternative drive concepts were adopted. But of course that presupposes researchers working on battery technology achieve a breakthrough soon.

In 40 years' time, almost a quarter of automobiles could be electrically powered. The study also finds that concerted efforts to protect the environment will have little detrimental effect on national economies. The expenditure needed to progress climate-friendly change will barely slow the growth of gross domestic product (GDP) – the net effect will be somewhere between 1.7 and 2.7 per cent over the next 40 years. In other words, during that timeframe, GDP will increase by approximately 83 instead of 85 per cent. To put these figures into perspective, the financial crisis pushed GDP down by four to six per cent in under two years. This slight economic braking effect is also easier to accept when we consider how much more it would cost our national economies to do nothing. "If that were the case, the consequences of climate change could slash GDP by as much as 20 per cent," says Schade, referring to studies conducted in 2007 by Sir Nicholas Stern, a professor at the London School of Economics. And certain countries even look set to benefit from the change – specifically Eastern European countries which have significant biomass potential, and also Denmark, Finland, Norway and Sweden.

Climate protection initiatives will not impact greatly on the labour market either. Depending on the exact scenario, changes in overall employment levels will fluctuate between a reduction of approximately 0.3 per cent and an increase of around 0.2 per cent. There



Europe's contribution to the global effort will undoubtedly help halt climate change

may well be a reorganisation of the market - energy suppliers are likely to reduce employee numbers, while agriculture will undoubtedly benefit as biomass becomes an increasingly important energy source. Even industry is likely to gain, because technological change generally requires considerable amounts of new machinery and equipment.

Of course, the Fraunhofer study is based on a number of assumptions, not all of which will prove well-founded, since the future is always full of surprises. The financial crisis certainly showed us that. Even in the technological sphere, we may see breakthroughs over the next 40 years that no-one can imagine right now. But one thing is certain: By embarking upon the necessary political path and retaining the flexibility to change course as required, Europe's contribution to the global effort will undoubtedly help halt climate change. ■

PES would like to thank Fraunhofer-Gesellschaft for providing this article. For more information, visit: www.fraunhofer.de