

## NEWS

## Are the IPCC scenarios 'unachievable'?

The Intergovernmental Panel on Climate Change (IPCC) has grossly underestimated the challenges of reducing and stabilizing greenhouse-gas emissions, according to an influential group of climate-policy experts.

The scenarios produced by the IPCC assume that very substantial technological advances — leading to greater energy efficiency and reduced carbon dioxide intensity — will happen spontaneously, without extra policy measures (see page 531).



**Bert Metz, co-chair of IPCC Working Group III**

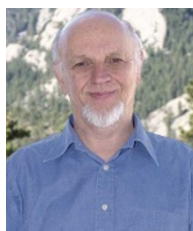
The claim that the IPCC has

underestimated the technological challenge of stabilization is unwarranted and must be rejected. The fact that technological change is already significantly included in the reference scenarios is clearly stated in our report and its Summary for Policymakers.

The embedded technological change in the reference scenarios included in the IPCC's Special Report on Emission Scenarios was based on historical information. The assumptions about the rate of technological change in these scenarios have been thoroughly

reviewed and are accepted by the community of technological-change experts. They confirm well-known facts about, for instance, the enormous improvements in computers over much shorter time-frames than expected. The assumptions also reflect that high economic growth normally goes hand in hand with high rates of technological change.

Fears that actual economic growth and energy use may develop in different ways than assumed in our scenarios are more justified. If so, it could be more difficult to reach low stabilization levels. The IPCC in 2006 initiated the development of new long-term scenarios. New scenarios will be developed over the coming years.



**Richard Tol, energy economist, Economic and Social Research Institute, Dublin**

This is a very valuable piece of education. Indisputably, in the IPCC's reference scenarios there is a lot of spontaneous technological progress going on already. Experts know this, but many people who write about climate change, or have to make policy decisions, don't.

Improving energy efficiency is not enough. Engineers could do it, but would need to work at least four times as hard to stabilize emissions.

The IPCC scenarios developed in 2000 don't match historical observations. For instance, nobody foresaw the rapid growth in recent

Roger Pielke, Tom Wigley and Christopher Green argue that this is a "dangerously optimistic" assumption. To show its effects, the trio offer a contrasting 'frozen-technology' scenario, which assumes that future energy needs are met with technology available at the baseline year. They say that this demonstrates a need for new energy technologies as much as four times greater than that which seems to be required looking at some IPCC scenarios. *Nature* gets some reactions.

years of China's economy, or the launch of the US\$2,500 people's car in India. There has also been less technological change in past decades than the scenarios would have us believe will happen in the future, and hence a downward bias in the cost of emission reductions. We need new scenarios — not just any, but scenarios that are in line with the real development of global energy systems.



**John Reilly, Massachusetts Institute of Technology Joint Program on the**

**Science and Policy of Global Change, Cambridge**

No question, these reference

## Carbon-trading market has uncertain future

The budding carbon-offsets market could already be on its last legs, industry representatives say, if the latest European proposals are agreed. European negotiators went into a United Nations climate meeting in Bangkok this week warning developing countries that they need to step up to the challenge of climate change if they are to see additional money flowing into clean-development projects.

The idea that developing nations should be able to increase emissions for a time to grow their economies and lift their citizens out of poverty is grounded in the current climate treaty. But there is increasing recognition that industrialized countries — responsible for most of the current greenhouse-gas emissions — cannot alone address climate issues, given the rapid rise of emissions in emerging economies.

The European Commission (EC) weighed in on the issue in January with a set of policy

proposals that would scale back the clean development mechanism (CDM), a programme under the Kyoto Protocol that allows businesses in rich countries to offset their emissions by funding clean-energy projects in developing countries. The proposals would essentially cap the CDM at current levels until 2020 if a new climate treaty is not agreed. Commission officials say that a moderate expansion would be allowed if an agreement is reached, although estimates vary as to the actual impact.

The recommendations are intended to boost emissions reductions at home in Europe, and at the same time give developing nations incentives to do more than sit back and watch the money flow in. Business interests say that the commission's proposals have thrown the entire carbon-offsets industry — valued at around US\$18 billion last year — into doubt. "The cap, as it is designed now, will not provide any

incentive for people to design new projects," says Michela Beltracchi, European policy coordinator for the International Emissions Trading Association, based in Geneva, Switzerland, which represents a range of business interests. "Effectively, the market will be killed."

How to help developing nations chart a cleaner path to industrialization is central to this week's climate talks, which mark the beginning of a two-year process of negotiating a follow-up agreement to the Kyoto Protocol, a course set at a previous meeting in Bali, Indonesia, in December 2007. Advocates of the CDM face a steady flow of criticism that the programme is not reducing emissions but merely transferring wealth to the developing world and, primarily, to China. Many of the emissions-reduction projects in the developing world that are registered as CDM projects would have gone ahead anyway, critics point out.



## SHOCKS MAKE PLANTS PRODUCE MORE CHEMICALS

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PUNCHSTOCK

scenarios are dated and underestimate the amount of warming that will occur without new climate policies.

We at MIT have argued for probabilistic projections, but the IPCC scenarios followed a storyline approach that they explicitly stated should not be interpreted in terms of likelihood. This subtlety is often lost when the scenarios are rolled out.

Clearly, emissions have grown much more rapidly than projected. In our business-as-usual projection, technological advances that improve efficiency are more than offset by growing demand, especially in developing nations. An accurate picture requires careful assessment of various economies rather than a broad-brush numerical exercise at the global level.



**Detlef van Vuuren, emission scenario developer, Netherlands Environmental Assessment Agency, Bilthoven**

Emission scenarios are built around historical observations. Energy efficiency has in the past improved without climate policy, and the same is very likely to happen in the future. Including unprompted technological change in the baseline is thus logical. It is not very helpful to discredit emission scenarios on the sole basis of their being at odds with the most recent economic trends in China. Chinese statistics are not always reliable. Moreover, the period in question is too short to signify a global trend-break. Rapid economic growth, in combination with the high price of oil, might spur long-term developments in renewable-energy technologies, for instance.



**Marty Hoffert, former chair of the Department of Applied Science, New York University**

This analysis is long overdue.

We're under a delusion that

we will solve the problem of climate change casually. But what we have — cap-and-trade systems and the like — is plainly insufficient. We need a massive engineering effort, the size of the Manhattan Project.



**Ottmar Edenhofer, IPCC Fourth Assessment Report lead author, Potsdam Institute of Climate Impact research, Germany**

The dramatic conclusions grossly overshoot the mark. It is wise to ask whether the IPCC's assumptions on spontaneous versus policy-induced technological change are sensible. But freezing technological change is a mere thought experiment. Given the past, a frozen-technology baseline is extremely unlikely.

Global energy efficiency and intensity have improved over the past 30 years. China in the first half of the decade is a special case owing to structural economic changes, although it is indeed worrying that neither carbon nor energy intensity in China has decreased since 2001.

It is a misapprehension that the costs of mitigating climate change will be much higher than assumed. Our studies show that the transformation towards a low-carbon energy system is possible if appropriate policy instruments are implemented. As the price of fossil energy increases, energy-efficiency gains are likely to materialize, even without extra policy measures.



**Robert Socolow, Carbon Mitigation Initiative, Princeton University, New Jersey**

The case for aggressive action to stabilize atmospheric CO<sub>2</sub>

concentrations at less than double pre-industrial values is far more robust than this commentary suggests. Politicians rightly associate such targets with deep cuts in annual CO<sub>2</sub> emissions in industrialized countries relative to today. The commentary seems to argue that the case for aggressive action is not strong unless the world in the absence of attention to carbon would emit far more CO<sub>2</sub> than the IPCC predicts.

The authors demonstrate remarkable self-confidence in dismissing the IPCC's consensus estimates of future carbon intensity. The premise of the IPCC's econometric models is that the past is a guide to the future. If I were constructing a revisionist case for very high future emissions, I would instead argue that the IPCC underestimates world economic growth.

Current attempts to mitigate climate change are based on evolutionary but unprecedented expansion of tested strategies, including renewables and nuclear power, CO<sub>2</sub> capture and storage, methane emissions reduction, and forest protection. No one can be certain these efforts will be sufficient. The revolutionary should be pursued in parallel with the evolutionary. It is foolhardy to undermine indispensable commitments to evolutionary measures.

To the authors, the IPCC report is a lullaby. To most of us, it's a bugle call.

**Quirin Schiermeier with additional reporting by Jeff Tollefson**

**See Editorial, page 503.**

"There are voices saying that maybe CDM is not as credible as it should be, and we need to take those concerns seriously," says Artur Runge-Metzger, who oversees climate issues at the EC. He says that Europe needs to spur new technologies now because simply paying for offsets elsewhere won't solve the problem.

Miles Austin, head of European regulatory affairs for carbon-offsets dealer EcoSecurities, Dublin, is sceptical that a threat to pull the plug on the CDM will have much of an effect on the climate talks. "The CDM could fold and China wouldn't even notice," Austin says. He points out that all the projects in China — home to roughly half of the CDM credits — represent less than 1% of the country's annual growth.

Business interests are working to preserve and expand the CDM programme as the commission proposal moves through the European Parliament this year. Austin is promoting one amendment that would leave the overall cap on European emissions in place while carving out a new space for international credits. He



says that the proposal would ensure that investments in new technologies are made at home while allowing the CDM market to expand.

The big question for the future is how international credits will be handled by the United States, where lobbying is under way to shape a market that could dwarf that of the European Union. The leading climate legislation in the Senate would limit international offsets to 15% of the overall market, but as the legislation is currently written, those credits would need to come from another market, such as the

European trading scheme. This has led critics to suggest that the US legislation would essentially allow other nations to 'launder' international credits with no oversight from the United States, thereby preventing the country from influencing an important international debate.

Mike Wara, who studies emissions markets at Stanford University in California, says that the CDM programme is in need of reform as a minimum, and might not be the right model to solve many problems. For instance, developers are currently pushing for CDM credits for hydroelectricity, wind power and, most recently, natural-gas-fired power plants in China, Wara says, but all these are part of a broader national strategy. "I think the jury is still out about whether CDM is the way to go," Wara says. "It starts to look like the CDM is kind of like a production subsidy. It's great for feedlots and it's great for landfills, but do we really want the entire Chinese energy sector in the CDM? Probably not."

**Jeff Tollefson**

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