An IEA *OPEN Energy Technology Bulletin*[1] Interview
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Getting the Energy World Back on Track

The IEA has just published *Energy Technology Perspectives 2008: Scenarios & Strategies to 2050 (ETP)*. The new ETP 2008 offers 643 pages of fresh insight on technology's vital role in addressing the world's increasingly complex energy challenges.

Senior Analyst Dolf Gielen heads the team of IEA energy analysts contributing to the series of *ETP* studies. The *OPEN Bulletin* asked Dr. Gielen about developments since the scenarios in the first edition of *ETP* in 2006, and about the key messages the new *ETP* 2008 carries.

Dolf Gielen, Head of the
IEA *Energy Technology Perspectives* Project

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What has changed since the first *Energy Technology Perspectives* came out in 2006?

Dolf Gielen
The energy policy environment world wide has evolved fast. Climate and energy-security questions are increasingly present in policy making processes. This has had direct consequences for our *Energy Technology Perspectives* analysis. For the first time, we have drawn up a scenario for reducing energy-related CO_2 emissions by as much as half, a direct consequence of the alarming *Fourth Assessment Report* from the Intergovernmental Panel on Climate Change (IPCC).

The financial markets have had an impact on our scenarios, too. The decline of the US dollar, and rapidly rising equipment and project costs, have pushed up the cost of the

[1] The IEA *OPEN Energy Technology Bulletin* is a free, web-based periodical newsletter published by the International Energy Agency (IEA).

energy transition that is needed. This is reflected in the *ETP 2008* "ACT Map" stabilisation scenario for curbing growth in CO_2 emissions enough to return them to today's levels by 2050. Here, we have raised the emissions-trading incentive needed from USD 25 per tonne of CO_2 (in *ETP* 2006) to USD 50/tonne CO_2 (in *ETP* 2008).

For the "BLUE" *ETP* scenario, where emissions are halved by 2050, we estimate that technology options with a cost of up to USD 200 per tonne of CO_2 saved will be needed. If technology progress is less than we expect, costs could even rise to USD 500/tonne CO_2.

On the positive side, the forecasts for economic growth have been raised. But a direct consequence is increased energy use and higher CO_2 emission projections, which makes halving emissions by 2050 more challenging.

The good news is that the cost to the global economy as a whole is affordable, even though marginal costs are high. Burden-sharing is an issue, however, and many non-financial technology transition barriers must also be tackled, like the not-in-my-backyard attitude to some power generation options, or likely scarcity of engineering and technical graduates.

From the early stages in the analysis, this year's *ETP* drew strong interest from governments, the private sector and technology experts. Everybody understands the importance of this work, which is part of the IEA programme supporting the G8 Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development. So we have had more workshops and exchanges of information to feed into the analysis. We have tried to maintain an open, transparent process. This is reflected in the number of expert reviewers listed in the book. I have personally made at least 150 presentations on *ETP* findings over the past two years. Wider involvement means much wider acceptance of the results.

The analysis in this new edition of *ETP* goes much deeper because it contains more scenarios and a completely new section discussing short- and medium-term policy and financing needs. The road maps for 17 key technologies are another innovation.

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What are the broad messages for energy technology policy?

Dolf Gielen

Put simply, an energy technology revolution is needed. Nothing less will have sufficient impact on CO_2 emissions. Where we need to go with the "BLUE" scenario by 2050 implies very deep emissions cuts indeed. All countries and all sectors will need to make significant efforts. Energy R&D must be expanded considerably. More ambitious,

targeted technology deployment programmes are necessary. Credible long-term CO_2 policies must be applied so that industry can make urgently needed investments in CO_2-free long-life capital equipment.

In the short term, higher efficiency in fossil-fuel power generation is a top priority. Fossil–fuel technology with CO_2 capture and storage (CCS) must play a much more important role in power generation, along with nuclear and renewables. On renewables, we see the major potential in hydro, solar and wind power. Once CO_2-free electricity is available, end-use power based on heat pumps, for instance, or battery-electric vehicles can contribute a lot.

Energy efficiency gains in the end-use sectors are a high immediate priority. Many technology options for this are already available today. The main challenge is to actually get these options into use. It is worrying that annual energy efficiency gains in OECD countries have declined sharply from their highs in the 1970s and '80s, even though efficiency policies have had such a high profile.

In the buildings sector, energy-efficiency improvements through renovation and retrofit are of crucial importance. If we want to avoid major costly early replacement of the existing building stock, it is vital to enhance energy efficiency in existing buildings without delay.

In the industry sector, CCS is increasingly seen as a key emissions abatement option that needs to be developed further. Interesting opportunities exist to enhance the efficiency of materials, or to switch to biomass feedstocks, but these, too, need to be developed further.

Finally, the transport sector poses the greatest challenge. Transport energy demand is projected to continue growing rapidly. A lot can be achieved through fuel efficiency gains, but biofuels, hydrogen and electricity are the only three CO_2-free energy carriers we know of today. Biofuels present challenges of their own, as everybody now realises. The development of second-generation biofuels is progressing, but slowly. Hydrogen fuel-cell vehicles, plug-in hybrids and battery electric vehicles are not yet commercially available, but they could play a big role.

It is important to note that half of all today's transport-sector fuel demand comes from trucks, ships and aeroplanes, whereas most of the focus in the climate debate is on cars. For the other three transport modes, it is much more challenging to find CO_2-free solutions, which we estimate could well come from biofuels. But hydrogen and/or electricity would need to become a viable option for cars.

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What is the key requirement to mobilise the technology responses?

Dolf Gielen

The cost of new technologies must be reduced through R&D and deployment. The wider a technology is deployed, the lower its cost will be. Equally important, CO_2 emissions must be given a value in financial terms.

Looking at the global challenges before us, it is clear that societies in the newly fast growing economies must be encouraged to adopt the latest technologies from the start, especially for power generation. All around the world, energy system planning processes need to be streamlined. Public acceptance of less popular options must be cultivated and difficult trade-offs are needed. It should be made clear to all stakeholders that an energy revolution is needed urgently, and that this presents not only a threat but also enormous economic opportunities.

I am confident that an energy transition is possible. The key challenge now is to get everybody on board.

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Thank you, Dr. Gielen, for answering our questions.

Dolf Gielen

The pleasure is mine.

OPEN Bulletin readers can learn more about ***Energy Technology Perspectives 2008: Scenarios & Strategies to 2050*** from the IEA website: http://www.iea.org/Textbase/techno/etp/index.asp.

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