Roadmap for sustainable global energy supply

05 June 2012

DLR develops energy scenario on behalf of Greenpeace International

On 5 June 2012, Greenpeace International presented a fundamental step in the development of sustainable energy supply, in the form of its **'energy [r]evolution'** report. This global energy scenario, developed by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and its partners, shows ways in which renewable energy sources can guarantee secure, sustainable energy supplies by 2050. At the same time, emissions of environmentally harmful carbon dioxide can be drastically reduced. This is the fourth time that an **energy [r]evolution** report has been published.

Over 80 percent of primary energy from renewable sources

The energy scenario was developed under the leadership of the Systems Analysis and Technology Assessment Department at the DLR Institute of Technical Thermodynamics in Stuttgart. It describes development possibilities whereby humankind can gradually move away from fossil fuels and nuclear power by 2050, even as the global population continues to increase. According to the scenario, a total of over 80 percent of primary energy could come from sustainable sources by 2050, and over 40 percent by 2030. As this happens, the emission of energy-related carbon dioxide could be reduced from almost 28,000 million tonnes in 2009 to around 3080 million tonnes in 2050. Added to this are emissions from international aviation and maritime traffic, which will be somewhere in excess of 410 million tonnes in 2050, according to the scenario. A comparison scenario, based on the World Energy Outlook by the International Energy Agency (IEA), assumes an increase of 62 percent in the emission of carbon dioxide by 2050.

Improved data

Energy scenarios are not forecasts; rather, they indicate how energy consumption might develop under specified conditions. Compared to the **energy [r]evolution** report published in 2010, researchers in 2012 were able to access new data on the transport sector and the potential efficiency of industry and other consumers. "With the 2012 scenario, we were able to show that it will be possible to move away from the use of oil and gas resources, which is defined as a goal by Greenpeace, even faster than in our 2010 calculations," explains Thomas Pregger from the DLR Institute of Technical Thermodynamics, who was the project leader. Greenpeace wanted to use its own data in the scenario to show that secure energy production is possible without oil drilling in the Arctic or the exploitation of oil shale and shale gas. The calculations for the transport sector were performed by the DLR Institute of Vehicle Concepts. The University of Utrecht, Ludwig-Bölkow Systemtechnik in Munich and the University of Technology in Sydney also took part in the study.

Up to 94 percent of power from renewable energy sources

A significant expansion of the facilities for generating renewable power will gradually replace fossil fuels and nuclear power. Hence, in 2050, 94 percent of electrical power could come from renewable sources. Wind power, photovoltaics and geothermal energy alone could meet 60 percent of the global energy requirement.

In order to guarantee secure, sustainable energy supplies, the potential for greater efficiency and savings must continue to be exploited. The scenario assumes an increase of ten percent in primary energy requirement by 2020, based on economic growth and the increase in global

population. In the years after this, energy consumption and economic growth should decouple and consumption should gradually decrease to 2009 levels.

Positive effects for national economies

The researchers estimate the necessary global investment in new power plants to be an average of 1.26 trillion US dollars per annum. This is primarily expected be used for replacing old power stations in the Organisation for Economic Co-operation and Development (OECD) member countries and building new power plants in developing countries. The comparison scenario projects an annual expenditure of 555 billion US dollars. However, the additional investment costs for the **energy [r]evolution** scenario will be recovered more than twice over through savings in the cost of fossil fuels; because costs for fossil fuels are almost completely eliminated under the energy [r]evolution scenario, national economies can save 1.32 trillion US dollars per annum.

Good prospects for the labour market

More jobs will be created in the energy sector with the development of renewable energies as envisaged under the Greenpeace scenario than in the comparison scenario. In the **energy [r]evolution** scenario, the researchers estimate 23.3 million jobs in the energy sector in 2015; in the comparison scenario, it is 18.7 million. And in 2030, over 65 percent of people employed in the energy sector will be working on renewable energy, spread relatively evenly across the wind energy, photovoltaic, solar-thermal and biomass sectors.

The German summary of the report can be found here.

The full report in English can be found here.

About DLR

DLR, the German Aerospace Center, is the Federal Republic of Germany’s national research centre for aeronautics and space. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, DLR, in its capacity as Germany's Space Agency, is responsible for the planning and implementation of the national space programme.

Contacts

Dorothee Bürkle
German Aerospace Center (DLR)
Media Relations, Energy and Transport Research
Tel.: +49 2203 601-3492
Fax: +49 2203 601-3249
Dorothee.Buerkle@dlr.de

Dr.-Ing Thomas Pregger
German Aerospace Center (DLR)
DLR Institute of Technical Thermodynamics
Tel.: +49 711 6862-355
Fax: +49 711 6862-747
Thomas.Pregger@dlr.de

energy [r]evolution study presented

On 5 June 2012, Greenpeace International presented a fundamental step in the development of sustainable energy supply, in the form of its 'energy [r]evolution' study. The global energy scenario, developed by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and its partners, shows ways in which renewable energy sources can provide secure, sustainable energy supplies by 2050. At the same time, emissions of environmentally harmful carbon dioxide can be drastically reduced. This is the fourth time that an energy [r]evolution report has been published.

Credit: Greenpeace.

Over 80 percent of primary energy from renewable sources

According to the scenario, over 80 percent of primary energy could come from sustainable sources by 2050, and over 40 percent by 2030. The picture shows Fresnel collectors being used in a solar-thermal power plant. They use mirrors to focus solar radiation onto an absorber tube (brightly lit). A conventional generation process using the thermal energy collected in this way can then produce power.

Credit: Novatec Solar GmbH .

Contact details for image and video enquiries as well as information regarding DLR's terms of use can be found on the DLR portal imprint.