



WBGU Secretariat

Reichpietschufer 60
10785 Berlin
Germany

Tel: +49 30 263948 12
Fax: +49 30 263948 50
Email: wbgu@wbgu.de
Internet: www.wbgu.de

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New report

Global transformation of energy systems is necessary and feasible

*How to ensure future energy security while protecting the climate
and eradicating energy poverty*

Berlin, 10 April 2003. Today, the German Advisory Council on Global Change (WBGU) submits to federal ministers Jürgen Trittin and Heidemarie Wiecek-Zeul and to the state secretary Uwe Thomas its new report "World in Transition: Towards Sustainable Energy Systems". The report underscores the urgent need to transform global energy systems so that the world's population has access to energy based on renewable sources. This is necessary to protect the global climate and to liberate 2.4 billion people in developing countries from energy poverty. Such an approach would also yield a peace dividend by reducing dependence upon regionally concentrated oil reserves. The scientists stress that such a transformation of energy systems is feasible and fundable if rapid and resolute action is taken in the coming two decades. To this end, they propose a roadmap for implementation.

Using energy more efficiently

The key precondition to turning energy systems towards sustainability is to convert and use energy more efficiently. Here the goal should be by 2050 to produce three times the goods and services with the same amount of energy worldwide. This requires, in particular, the establishment of international standards for fossil-fuelled power plants, and the promotion of combined heat and power production. For industrialized countries promising avenues are to launch ecological financial reforms and establish mandatory labelling for buildings, energy-intensive appliances and services.

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Substantial expansion of renewables

Promoting renewable resources is an essential element in this transformation. The share of renewables in global energy production should therefore be raised from 12.7 per cent today to 20 per cent by 2020, and finally to more than 50 per cent by 2050. Those types of renewables which can only be expanded to a limited extent (e.g. wind power, modern bioenergy) are in many cases already available at competitive prices today. In contrast, those technologies which can be expanded virtually without limit (e.g. photovoltaics, solar thermal power generation) are still comparatively expensive from the business management standpoint. Since the development of non-solar forms of renewable energy will reach its limits over the medium term it is essential to start now to comprehensively expand and promote solar energy.

Future Energy supply systems will require forward-looking investment in appropriate infrastructure. Priorities include improving the performance of grid control systems, enhancing load management, expanding rapidly dispatchable generating plants, extending networks to a global link and, over the long term, establishing an infrastructure for hydrogen storage and distribution.

Shaping the transition

The use of coal for energy production should be terminated within this century. Nuclear power should be phased out worldwide by 2050. Among other aspects of nuclear energy, illegal proliferation of nuclear material and the unresolved issue of final storage pose intolerable risks. For a transition period, intensified use of gas is advisable and storage of carbon in geological formations is presumably necessary.

Focussing North-South cooperation more strongly on sustainability

Overcoming energy poverty is key to improving living conditions in developing countries and achieving internationally agreed development goals. Indoor air pollution from the combustion of traditional biomass causes serious health risks. Some 1.6 million people are dying every year as a consequence – many more than the toll taken by malaria. Similarly, the pollution of ambient air, notably in the cities of many developing countries, has assumed extreme proportions in some instances.

To resolve these problems, international cooperation needs to focus more strongly upon sustainable development principles. In the view of the Council, an important measure in this context is to redirect assistance delivery by the World Bank and regional development banks in favour of renewable energy sources.

Exploiting all available funding opportunities

The transformation of energy systems can be financed – provided all available opportunities are exploited. In industrialized and transition countries, subsidies for fossil fuels and nuclear power need to be

removed completely by 2020. To this end, the Council recommends negotiating a Multilateral Energy Subsidies Agreement by 2008. At the same time private-sector investment in sustainable energies needs to be promoted. Official development assistance funding has to be increased substantially in order to support the poorest countries. As a supplementary measure, the Council recommends that OECD countries introduce user charges on international aviation from 2008 onwards.

Advancing research and development

To master the technological challenges, substantial research and development efforts will need to be undertaken. In industrialized countries, government expenditure on research into renewables should be increased at least ten-fold by 2020, through re-allocations from other areas. As a supporting measure, the Council recommends the creation of a World Energy Research Coordination Programme.

Maintaining the momentum of the World Conference for Renewable Energy in 2004

Turning energy systems towards sustainability on a global scale will require capable institutions. The existing global energy policy institutions should therefore be strengthened and expanded in a stepwise process. To establish a common platform for action, the Council recommends the adoption of a World Energy Charter. The World Conference for Renewable Energy proposed by the German federal government, which is to take place in 2004 in Bonn, provides an excellent opportunity to launch this process. Building on this foundation, the establishment of an International Sustainable Energy Agency warrants consideration by about 2010.

German Advisory Council on Global Change breaks new ground

The Council's new report makes an innovative contribution to the debate. It is the first time that the two objectives of "climate protection" and "eradicating energy poverty" are given equal weight. The one objective is a matter of keeping global warming within tolerable limits. This requires that industrialized countries reduce their CO₂ emissions by some 80 per cent by 2050. Owing to the major uncertainties associated with the behaviour of the global climate system, this is a minimum requirement. To meet the other objective, the entire population of the world should be given access to modern forms of energy by 2020. On this basis, the Council has elaborated an exemplary path for a global transformation of energy systems towards sustainability, and has drawn up a roadmap for implementation.