



Three-quarters of world's energy supply could be renewable by 2050

Renewable technologies could supply 77 per cent of the world demand for energy by 2050, according to a report recently published by the IPCC. However, strong and flexible national and international policies are needed to stimulate investment and encourage accelerated use of renewable energy. The most pessimistic scenarios see the renewables share remaining almost static until mid-century.

Renewable energy sources are part of a range of options that can be used to lower greenhouse gas (GHG) emissions caused by burning fossil fuels. The report looked at 164 scenarios of future energy supplies and six renewable energy technologies in the potential energy mix: bioenergy, direct solar energy, geothermal energy, hydropower, ocean energy and wind energy. All renewable sources are capable of producing electricity, heating, cooling and gaseous or liquid fuels with varying effectiveness.

In recent years, there has been increasing use of renewable energy: in 2008-2009, 140 GW (gigawatts) of 300 GW of new, global electricity-generating capacities came from renewable energy sources, such as wind and solar. In 2008, renewable energy accounted for 12.9 per cent of the global energy supply, with bioenergy (predominantly from the use of wood as fuel for cooking and heating) providing 10.2 per cent of this amount. The most optimistic scenarios suggest that by 2050, renewables could account for nearly 80 per cent of the energy mix and significantly contribute to stabilising GHG emissions in the atmosphere.

Technically, it is feasible to supply all the current demand for energy from renewable sources as the technical capability of renewable energy systems are substantially greater than the global demand for energy. In order to better exploit this potential the full range of renewable energy sources needs to be used. There are, however, challenges related to integrating different types of renewable energy into existing energy supply systems that must be addressed if rapid increases in renewable systems are to be realised. For example, distribution infrastructure might need to be extended to incorporate remotely distributed renewable systems.

Depending on the type of renewable source and local conditions, GHG emissions from renewable technologies are often significantly lower than from fossil fuels over the system life cycles. Land use change, associated with bioenergy production, should be properly regulated and managed if negative impacts, such as reduced biodiversity, are to be avoided. In addition, renewable energy can help developing countries to grow in a sustainable manner. The benefits of modern energy supplies, such as solar power for heating water or drying crops, help promote social and economic development in remote rural areas by speeding up access to energy for 1.4 billion people currently unable to access electricity supplies.

The levelised costs of renewable energy (total costs levelled over its lifetime) are generally higher when compared with existing energy prices. However, in some circumstances, renewable energy is already economically competitive. Including the external costs of energy supply would make renewable energy more competitive with existing energy supplies. Costs associated with renewable technologies have decreased over recent decades and further technological developments, such as greater capacity wind turbines, are likely to see renewable costs fall further.

Estimates on the required investment for the transition to a low carbon power sector are different in the four scenarios analysed in the report, but, in all cases, the annual average investments are smaller than 1 per cent of world GDP. Increasing the share of renewables would decrease the share of fossil and nuclear energies for any given energy demand, therefore the avoided costs associated with these decreases should be considered when assessing the needed investments in renewable energy.

Source: Edenhofer, O., Pichs-Madruga, R., Sokona, Y. *et al.* (2011) Summary for Policy Makers. In *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* [Edenhofer, O., Pichs-Madruga, R., Sokona, Y. *et al.* (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, USA.

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Theme(s): Climate change and energy

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To cite this article/service: "[Science for Environment Policy](#)"; European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.