



Facts and Trends

HYDRO

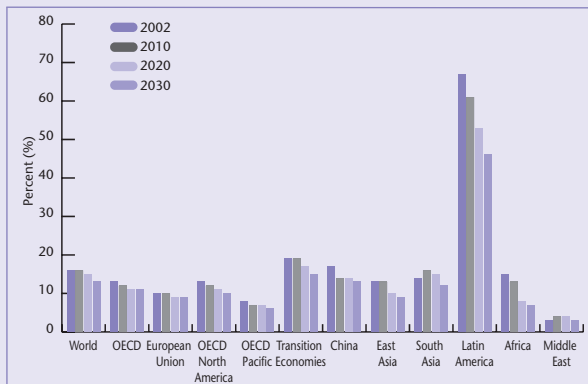
CONTEXT

- Hydropower is a major renewable energy source, responsible for 89% of the world's renewable electricity production in 2002. Hydro's share was 16% of worldwide electricity generation in 2002, with 801 gigawatts (GW) of installed hydro capacity worldwide generating some 2,610 terrawatt-hours (TWh) of electricity.
- The International Energy Agency (IEA) projects that hydro capacity will increase by 63% between 2002-2030. New hydro plants will continue to be built, but not at a high enough rate to maintain the current share of electricity generation; this is projected to fall to 13% by 2030.
- It is estimated that two-thirds of the world's economically feasible potential is still to be exploited and is mainly concentrated in developing countries in Africa, Asia and South America. China has used only one-quarter (115 GW in 2005) of its huge potential of 450 GW. It is the main contributor to hydro development today and government figures suggest that it will add more than 12 GW of new capacity each year until 2020 to reach 300 GW.

ISSUES

- Hydropower is the main function of only about 10% of dams, the rest being used primarily for irrigation or other purposes. The development of large hydropower is almost always part of larger water management schemes (other services are primarily flood control, irrigation, access to drinking water and tourism).
- Hydro schemes often have major positive impacts on social and economic local development in areas with water resources but with inadequate or no access to basic needs such as electricity.
- Attention has recently focused on environmental and social issues, particularly the resettlement of people due to the construction of large reservoirs. By following available guidelines (for example, those of the International Hydro Association), large schemes can be developed with mitigated and acceptable impacts.

Share of electricity generation: Hydro



Source: International Energy Agency. *World Energy Outlook*. 2004.



- One constraint on development is the geographical separation between potential supply and demand, which involves the development of costly infrastructure (long transmission lines, roads, etc.).
- GHG emissions from reservoirs in tropical areas can be significant, due to emissions of methane from biomass contained in the reservoir. However, overall emissions are significantly below those of fossil fuels. Studies for northern countries show that emissions are 100 times lower than for coal.

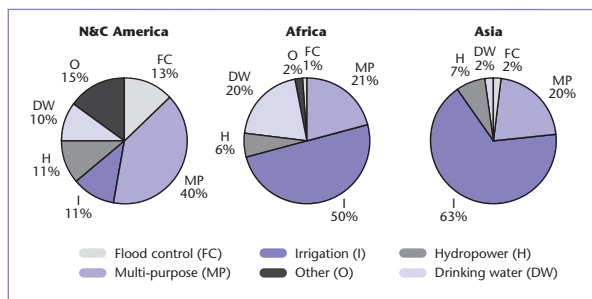
THE WAY FORWARD

- The development prospects of hydro in developing countries are encouraging and should be supported by international financial institutions and technological know-how from developed countries.

- Developed countries are now beginning to focus on rehabilitation and upgrading (increasing capacity and/or generation, optimization, and safety) programs. Few such schemes have been developed to date but can offer significant improvements. In some countries, proposed upgrading schemes for one large hydro plant offer an increase in renewable generation of the same order as the generation from all other (non-hydro) renewables.
- Hydro scheme impacts can be both positive and negative and are not fixed by purely technical factors; good governance is key. Stakeholder participation and public/private partnerships are important to properly develop hydro projects and to optimize and share the costs and benefits of multi-purpose projects.
- The development of hydro schemes is almost always sustainable and will thus yield projects under the Kyoto Protocol's Clean Development Mechanism (CDM). The first carbon credits (CERs) issued under the CDM (October 2005) were for small-scale hydro plants in Central America. Now, efforts are being made to obtain CERs for larger hydro projects worldwide. Many studies and measurements are assessing the net impact of reservoirs on greenhouse gas emissions.

- R&D for hydro projects is mainly focused on environmental aspects such as improvement of turbine design for reducing fish mortality or development of new lubricating systems which have no risk of leakage, do not use any oils or use "green" oil to avoid water pollution in case of leakage.

Dam uses by continent



Source: International Commission On Large Dams (ICOLD)

