Facts and Trends

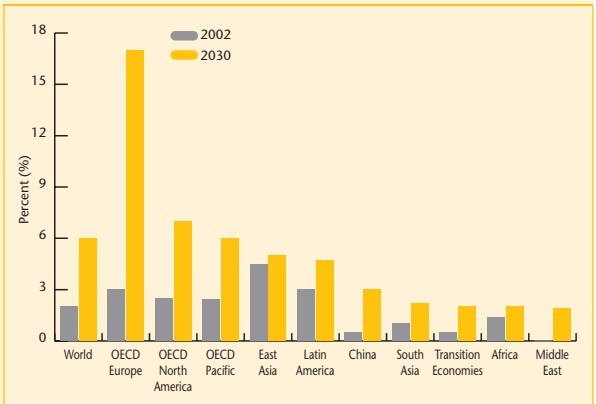
NON-HYDRO RENEWABLES

(IN ELECTRICITY GENERATION)

CONTEXT

- Renewables other than hydro generated nearly 2% of the world's electricity in 2002. Biomass generated more than half of this, with geothermal and wind generating the vast majority of the remainder. Renewables currently have a larger role as sources of direct energy (e.g., biodiesel, solar water heating), where they are more competitive and convenient.
- The International Energy Agency (IEA) projects that non-hydro renewables will account for 6% of power generation in 2030. Other scenarios and commentators advocate much higher renewables shares; sufficient financial and policy support could lead to a generation share of over 10% in 2030. It is unlikely that any policy scenario could raise the share as high as 20% by 2030.

Shares of non-hydro renewables in power generation in 2002 and 2030



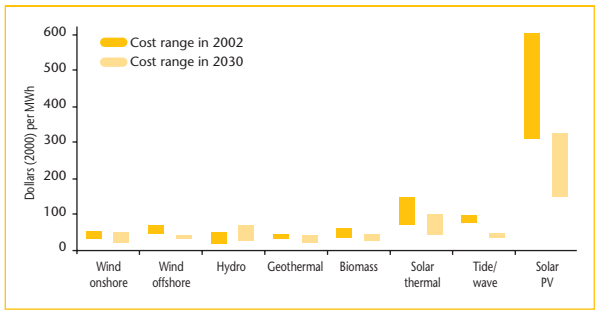
Source: International Energy Agency. *World Energy Outlook 2004.*

- Currently, growth in new renewables is driven by government policy and support schemes (e.g., feed-in tariff support, quotas and tax incentives). Renewable energy policies vary widely between and even within countries, as well as over time.
- The renewable resources are vast and could cover existing electricity demand many times over.

ISSUES

- Only a fraction of the resources are economically accessible with today's technologies; reasonable costs, sufficient surface areas and practical proximity to transmission and/or load centers are required, which all vary on a local basis.
- Other renewables tend to be capital intensive but have low operating costs with low volatility. Their lifetime can be long. In general, wind and solar photovoltaic power are more expensive per unit of electricity generated than conventional technologies.
- Cost improvements will depend on technological innovations, which benefit from increasing scale of deployment, particularly with newer technologies such as solar photovoltaics. On the other hand, increasing scale also means that some resources may become more costly to access. This applies especially to wind power, where many of the most economic on-shore sites have already been developed.

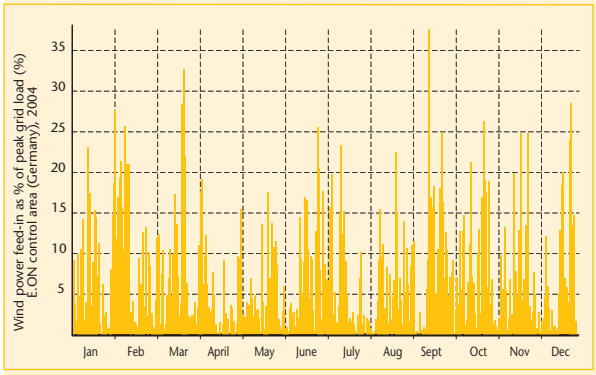
Electricity-generating costs of renewable energy technologies, 2002 and 2030



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

- Many renewables (e.g., wind and solar) are intermittent. On-grid, hydro reservoirs and reserve plants can compensate for intermittency; off-grid, batteries can fill this function, but they are expensive. Large-scale use of intermittent generation would require investment in more capacity for transmission, storage, and/or back-up generation.
- Renewables offer undisputed environmental benefits. Life-cycle GHG emissions per unit of electricity generation are a fraction of those from fossil fuels.
- Local pollution is zero or low; other impacts principally relate to the large areas needed for resource recovery and the visual and other impacts of facilities in attractive natural areas.

Intermittency of wind power



Source: E.ON Netz. *Wind Report 2005.*

THE WAY FORWARD

- The skills required to develop and maintain renewables are still emerging in less developed areas, and will be necessary to support wider implementation.
- R&D activities involve improving resource mapping, the development of both existing and novel technologies, and the continued development of lower cost batteries for electricity storage on- and off-grid.
- The prospects for other renewables also depend on the levels of carbon constraints agreed, on legislation and regulation, on fossil fuel prices and on how capital costs change relative to those from other technologies. They could become significantly more competitive as external costs of environmental and other impacts of other resources are taken into account through new policies and other measures.