

# HYDROPOWER IN DAMS

## Hydropower in numbers

Water power has been used for grinding flour and other purposes since ancient times. The world's first hydroelectric plant was commissioned in 1878. Today, hydropower is one of the main purposes of dam building. Of the world's approximately 50,000 large dams, at least 8,200 are linked to hydropower plants. While smaller dams mainly serve irrigation purposes, the world's 44 largest reservoirs all have hydropower as their main goal.

Hydropower is generated in more than 150 countries, and accounted for 15% of global electricity generation in 2011. The world's top producers are China, Brazil, Canada, the United States and Russia. The biggest projects are the Three Gorges Dam in China – with a capacity of 22,500 megawatts – and the Itaipu Dam in Brazil/Paraguay at 14,000 megawatts.

Hydroelectric plants are generally categorized as large – more than 10 megawatts; small – up to 10 megawatts; micro – up to 100 kilowatts; and pico – up to 5 kilowatts. While most projects rely on dams, hydroelectricity is increasingly also generated through tidal plants and hydrokinetic turbines that do not require dams. Many micro and pico hydroelectric plants also operate without damming a river.

## Costs and benefits

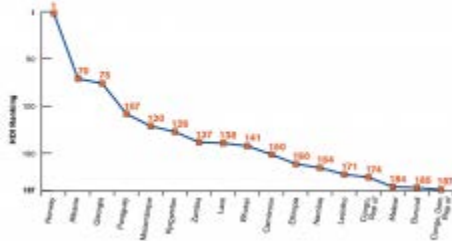
In suitable locations and purely financial terms, hydropower can be a cheap source of electricity with low emissions. Storage-based hydropower plants can be turned on and off quickly, allowing operators to respond flexibly to changing demand. If planned and operated properly, hydropower plants can operate for more than 100 years.

However, hydropower generation often has serious social and environmental impacts, which are often ignored in economic cost-benefit analyses. Dams have inundated a land mass the size of Sweden, and made freshwater ecosystems the most seriously affected by species extinction. They have displaced at least 40-80 million people, and negatively affected more than 470

million people living downstream. (These impacts include the effects of irrigation dams, which are typically smaller than hydropower dams.)

#### Hydro-Dependency – a Recipe for Poverty?

The countries which depend on hydropower for more than 82 percent of their electricity supply occupy the following positions on the Human Development Index (HDI) countries listed:



***Most hydro-dependent countries have remained poor***

Complex, large hydropower projects often face serious time and cost overruns. Most highly hydro-dependent countries are very poor and have failed to turn their main source of electricity into social and economic development.

#### **A renewable source of power?**

Especially if they are located in the tropics, large, shallow reservoirs emit high levels of methane, a potent greenhouse gas. And while water is a renewable resource, rivers and the ecosystems that they sustain – including floodplains, wetlands, estuaries and marine environments – are not. Given the serious, irreversible ecological impacts of dams, dam-based hydropower cannot be considered a renewable source of power.

In recent years, the construction of wind and solar capacity has overtaken new hydropower capacity. Particularly in rural areas that are not connected to the electric grid, wind, solar and small hydro are cheaper than electricity from large dams and more likely to reach those living in poverty. Due to their flexible, decentralized nature, wind, solar and small hydro projects are also more resilient to climate change than large, centralized dams.

Source : <http://www.internationalrivers.org/resources/hydropower-7901>