Hydropower is an environment-friendly and renewable energy source. In Norway, 99 percent of all power generation is hydropower. Worldwide, hydropower contributes around one sixth of the total electricity supply.

The advantages of hydro are many – it is renewable, it is clean, it is reliable, it is flexible and can serve many generations with low-cost electricity from a local resource. Also, the potential is largest in areas where the energy needs are greatest, such as South America, Asia and Africa. In many developed countries there is an opportunity to optimize the existing plants.

**THE PRINCIPLE OF HYDROPOWER**

The principle behind the production of hydropower is simple; it uses the energy of flowing water. Many hydropower plants benefit from several storage schemes, and in some river systems a number of power stations are positioned in cascade one after the other, so that the water’s energy can be exploited several times before it finally flows out into the sea. Inside the power station, the water drives a turbine, whose mechanical energy is turned into electrical energy in the generator. Hydropower is a highly flexible energy source, since the water can be stored in the reservoirs until needed. Hydropower schemes without reservoirs are often called run-of-river.

**ENVIRONMENTAL ASPECTS**

Hydropower is an environment-friendly and renewable source of energy. It produces no air pollutants, and shows the best Green House Gases (GHG) emission performances of all power generation technologies. This is an extremely important factor, since the stabilisation of GHG emissions is one of the greatest environmental challenges facing the world today.

Besides its positive contributions to combat resource depletion and global warming, hydropower affects river systems. While river regulation helps to protect people and the environment from droughts and floods, the modification of a river’s flow pattern also affects fish and biodiversity. Statkraft’s aim is to maintain healthy river systems. Hence the company has developed considerable expertise in taking care of environmental issues and implementation of mitigation measures. Examples of such measures include ecologically determined water flow, the construction of fish ladders, restocking and biotope protection.

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**FACTS**

- Hydropower has the best CO\textsubscript{2} performance, highest energy efficiency rate and longest life span of all power generation technologies.
- Hydropower with reservoirs provides the required backup energy to sustain other renewables with intermittent service and ensures electricity supply in times when there is no wind or sun.
- By storing water, hydropower reservoirs reduce our vulnerability to floods and droughts.
- Hydropower is available in a broad range of project scales and types. Projects can be designed to suit particular needs and specific site conditions.
- According to the International Hydropower Association (IHA), if 80 percent of the remaining economically feasible potential is developed, the contribution of hydro could be nearly multiplied by three.
- In Norway alone, the available potential, as estimated by Norwegian authorities, is more than 35 TWh in new projects.
- Norwegian hydropower is Europe’s renewable battery – close to 50 percent of the reservoir capacity in Europe is located in Norway.
A century of experience

1895: Paulenfossen
The Norvégian state purchases its first waterfall, Paulenfossen, to supply electricity to the Setesdalsbanen railway line.

1906–1920: Purchase of waterfall rights
The Norvégian state purchases the rights to many waterfalls in Norvég. Norvég is industrialising and the need for power to industry is enormous.

1921: Creation of the NVE
The Norvégian Water Resources and Energy Directorate (NVE) is established, and is given responsibility for the construction and operation of state-owned power plants.

1945–1975: Major hydropower schemes
Many major hydropower schemes are constructed, eg the Tokke scheme in Telemark in 1961, which puts an end to power shortages in the east of the country, and the Nedre Rassåga power station in Nordland, which supplies the ironworks at Mo i Rana with its electricity it needs.

1970–1973: Environmental considerations
The Grytten power station in Møre & Romsdal is constructed. Environmental considerations are an extremely important factor in the construction project.

1993: The last major hydropower scheme
Statkraft’s last major hydropower scheme, the Svartisen power plant in Nordland, goes into operation.

2005: Nordic growth
Statkraft gets its first hydropower capacity outside Norvég by acquiring 19 hydropower plants in Sweden and four in Finland.

2009: European growth
In January Statkraft takes over another 40 hydropower plants in Sweden, 11 in Germany and three in Wales. Later in the year Statkraft acquires six hydropower projects in Turkey.

Statkraft and hydropower
Statkraft produces around 50 TWh of hydropower in a normal year. The Group operates 149 hydropower plants in Norvég, 58 in Sweden, 11 in Germany, four in Finland and three in Wales. Statkraft has ambitions for further European growth in France and Southeast-Europe.

Statkraft is developing and operating hydropower capacity in emerging markets outside Europe through its subsidiary SN Power. This company is active in countries such as Peru, Chile, India, Nepal, Sri Lanka and the Philippines.

Norwegian hydropower
Norvég is blessed by natural resources and a geography which enables to build environment-friendly hydropower stations. A typical hydropower project in Norvég has a reservoir located high-up in a remote mountain area which often benefits from a glacier as second level storage facility. The melting water is then usually either directed through tunnels into underground plants which have an outlet direct into a fjord, or into a river system where several run-off-river power plants located in a cascade optimize the use of the water and allow keeping other rivers in pristine condition.

In the context of meeting the effects of climate change, hydropower with storage capacity will even be more useful, as the reservoirs will be an important tool to mitigate floods and droughts while generating clean, renewable and affordable energy. Close to 50 percent of the reservoir capacity in Europe is located in Norvég.