

Power from water

Water constantly moves through a vast global cycle, in which it evaporates (due to the activity of the sun) from oceans, seas and other water reservoirs, forms clouds, precipitates as rain or snow, then flows back to the ocean. The energy of this water cycle, which is driven by the sun, is tapped most efficiently with hydropower. The use of water to generate mechanical power is a very old practice. A flowing stream can make a paddle turn, but a waterfall can spin a blade fast enough to generate electricity. The real key in the magnitude of waterpower is the physical height difference achieved between source and sink - the distance through which the water falls.

When considered as a whole, the energy locked within the Earth's water cycle and ocean waves is extremely large, but harnessing this energy has proved to be exceedingly difficult. There are many different ways to harness the energy in water. The most common way of capturing this energy is hydroelectric power, electricity created by falling water.

The principal advantages of using hydropower are its large renewable domestic resource base, the absence of polluting emissions during operation, its capability in some cases to respond quickly to utility load demands, and its very low operating costs. Hydroelectric projects also include beneficial effects such as recreation in reservoirs or in tail water below dams. Disadvantages can include high initial capital cost and potential site-specific and cumulative environmental impacts.

History

Simple water-wheels have been used already in ancient times to relieve man of some forms of hard manual labour. Water power was probably first mentioned by the Greeks, around 4000 B.C. Greeks used hydro power to turn water wheels for grinding wheat into flour as well. Much later, but long before the advent of the steam engine, the art of building large water-wheels and the use of considerable power capacities was highly developed. The use of this natural energy resource became even easier and more widespread with the invention of the water turbine in the early 1800's and hydro power was quickly adapted from mechanical uses, such as grist mill, to spinning a generator to produce electricity. The first small industries emerged soon after in many regions of Europe and North America, powered by water turbines.

In later years, when cheap oil became available world-wide, interest in hydro power was lost to a great extent in many areas, but today the situation is different again. Governments, policy-makers, funding and lending agencies, institutions and individuals take a growing interest. This led -and still does - to the reassessment of many projects once found not feasible; the identification of new sites and potentials, and a number of other activities related to hydro development.