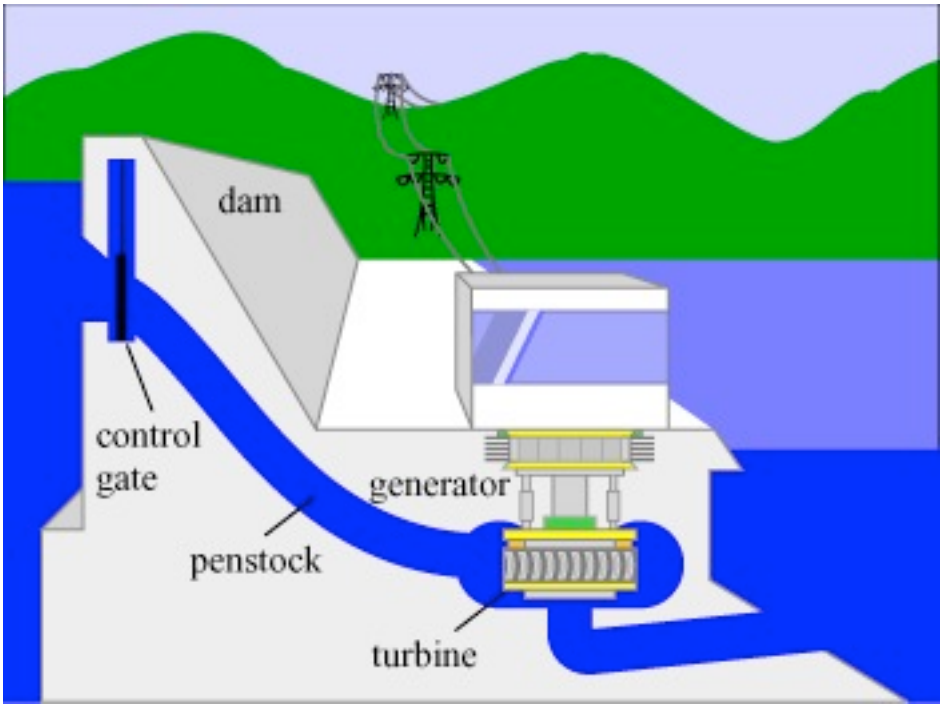
hydropower plants

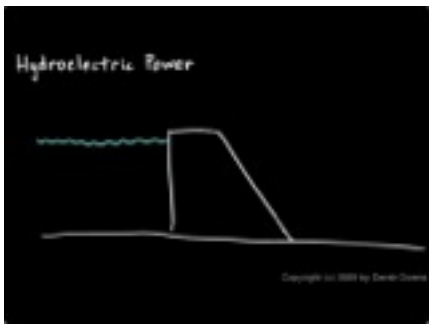


In a hydroelectric power plant, water from the upper reservoir is controlled to flow through the dam to turn the turbine generator.

Context

The production of electrical power through the use of the gravitational force of falling or flowing water. It is the most widely used form of renewable energy.

Most hydroelectric power comes from the potential energy of dammed water driving a water turbine and generator. The power extracted from the water depends on the volume and on the difference in height between the source and the water's outflow. The amount of potential energy in water is proportional to the difference in hight. A large pipe delivers water to the turbine.



A movie about Hydroelectric Power

Generating methods

Pumped-storage

This method produces electricity to supply high peak demands by moving water between reservoirs at different elevations. At times of low electrical demand, excess generation capacity is used to pump water into the higher reservoir. When there is higher demand, water is released back into the lower reservoir through a turbine.

Kölnbreinsperre in Carinthia – foto: © VERBUND TOURISMUS

Run-of-the-river

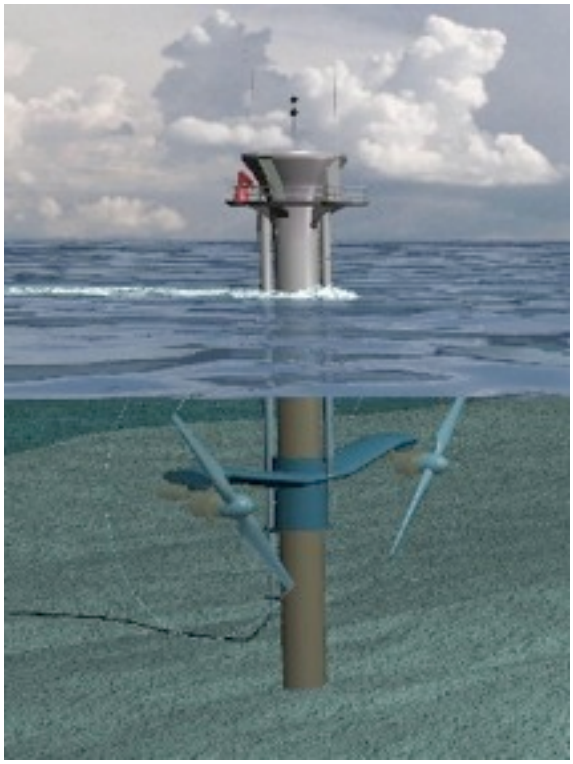
Run-of-the-river hydroelectric stations are those with small or no reservoir capacity, so that the water coming from upstream must be used for generation at that moment, or must be allowed to bypass the dam.

foto: © VERBUND

Run-of-the-river hydroelectric plant in Gralla near Leibnitz/Austria

Tide

A tidal power plant makes use of the daily rise and fall of ocean water due to tides; such sources are highly predictable, and if conditions permit construction of reservoirs, can also be dispatchable to generate power during high demand periods. Less common types of hydro schemes use water's kinetic energy or undammed sources such as undershot waterwheels.



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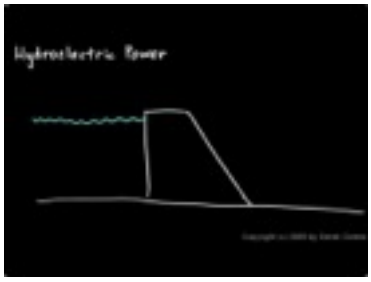
1. Proof your knowledge about hydropower plants: ?



2. Watch the movie about hydroelectric power:

The hydropower plant of the Hoover dam generates nearly 4 Billion kWh per year.

a) How many t heating oil can be substituted with this energy?

(Notice: The calorific value of heating oil is 9,8 kWh/l and the density **ρ** = 0,8 kg/l)

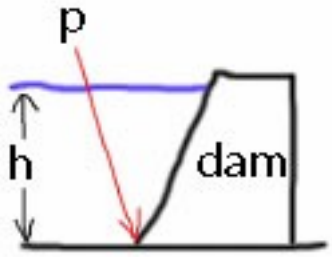
b) How many m^3 natural gas can be substituted with this energy?

(Notice: The calorific value of natural gas is 10,1 kWh/m^3)

c) How many t fuelwood do you need for generating this energy?

(Notice: The calorific value of fuelwood is 4 kWh/kg)

3. The Hoover dam has a maximum water depth 180 m.



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All responsibility for the content of this publication is assumed by the author.