How Can Moving Air and Water Generate Electricity?

Renewable energy sources are becoming increasingly important as our fossil fuel supplies are declining. Wind power and hydropower (water) are both renewable energy sources. The beauty of using wind and water to generate electricity is that both are generally readily available, and are not destroyed by being used. Water and wind can be used over and over.

Using wind and water as energy sources is not a new phenomenon. In fact, there is strong evidence that China, Persia (modern-day Iran) and the Middle East harnessed wind power through simple windmills to pump water and grind grain around 200 BE. The Greeks used hydropower to grind wheat into flour, saw wood and power textile mills approximately 2000 years ago!

Wind Power

Wind power is a low cost energy source. Today, wind farms have been built in many countries around the world to generate electricity for homes, buildings and farms. To create electricity, the wind farms convert wind energy into electricity by using wind turbines.

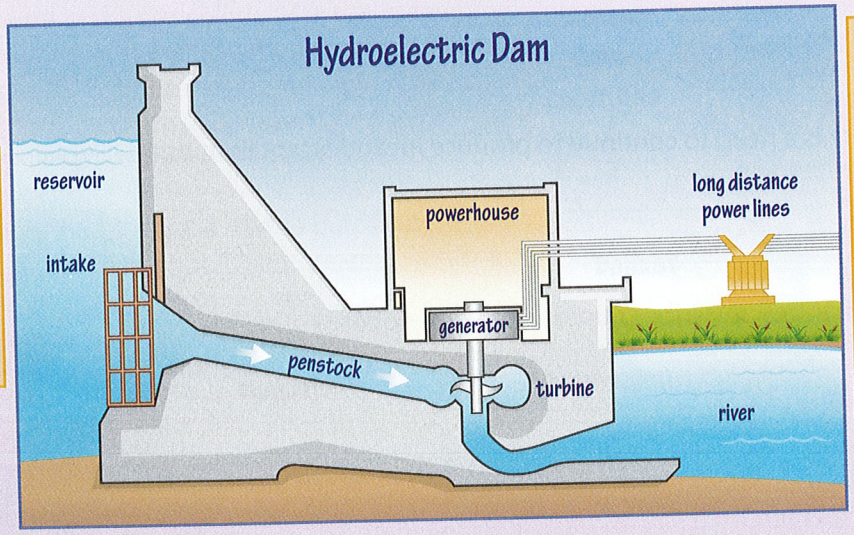
A wind turbine is comprised of 3 propeller-like blades connected to a rotor that is attached to the main shaft. The shaft is mounted on a tall tower approximately 20 m high. The height of the tower is important because the less turbulent, faster winds are found high above ground level. Also, the bigger the wind turbine, the more electricity it produces.

Wind turbines are not effective unless there is wind present. Wind pushes the blades causing the shaft to spin. The shaft is connected to a generator inside the structure. The generator produces electricity.

Hydropower

Hydropower is energy generated from flowing water, usually from a dam or river. It has been used to power watermills for thousands of years. Today, hydropower is an extremely important energy source. Incredibly, a small number of countries around the world use hydropower as their main energy source. Below is a simple diagram that demonstrates how the gravitational force of falling water produces electricity from hydroelectric dams.

Water from the reservoir is forced through a large pipe called a penstock.



The flowing water pushes the blades on the propeller-like turbine, which turns a metal shaft connected to the electric generator. This machine transforms mechanical energy into electricity.