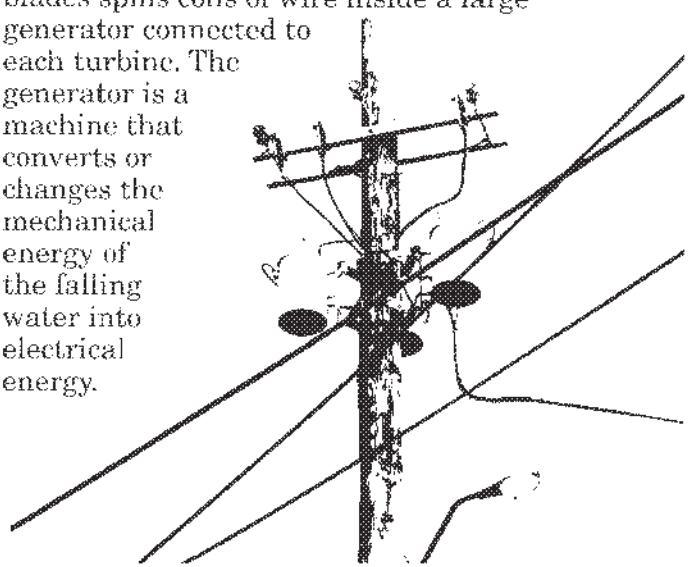
US Army Corps
of Engineers
Portland District

How Electricity is Generated at a Dam

The source of power for the generation of electricity at a dam is the water flowing downstream in the river. As this water passes through the dam's powerhouse it falls from the upstream level behind the dam to a lower downstream level.

Traveling with tremendous force, the water comes against the giant propeller-like blades of the turbines, causing them to rotate in much the same fashion as a gust of wind spins a propeller. This turning action of the turbine blades spins coils of wire inside a large generator connected to each turbine. The generator is a machine that converts or changes the mechanical energy of the falling water into electrical energy.



A basic generator to produce electricity was invented in 1831 by Michael Faraday. He found that by moving a magnet in and out of a coil of copper wire, a flow of electrons inside the wire could make the needle on a compass move. He had caused a current to flow. Later, someone realized that the more turns of wire, the stronger the current.

Faraday used some basic knowledge of electrons in his experiment, which may help you understand how electricity is generated. All living and nonliving things are made up of tiny bits of matter called atoms. The center of an atom is called a nucleus. In the nucleus are tiny bits of matter called protons and other bits of matter known as neutrons. The electrons swirl around the nucleus. These electrons move around the nucleus in fixed paths, just as the planets move around the sun.

They can, however, be made to move out of that path by an outside force. This movement of electrons causes electricity.

A generator runs on this principle. The generator does not really "produce" the electricity, although that is what we often say. The electricity is already there. The action of the generator makes electricity pass through, or flow through, the coils of wire inside the generator. Those coils are called conductors.

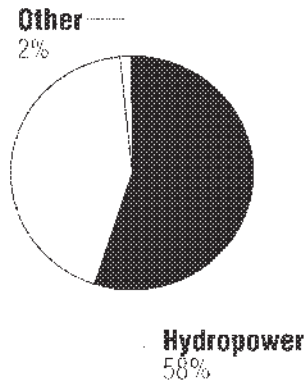
Basically, that's how electricity is generated at dams. This electricity is carried from the dam to you by transmission lines, so that when you want to read or watch television, all you have to do is turn on a switch.

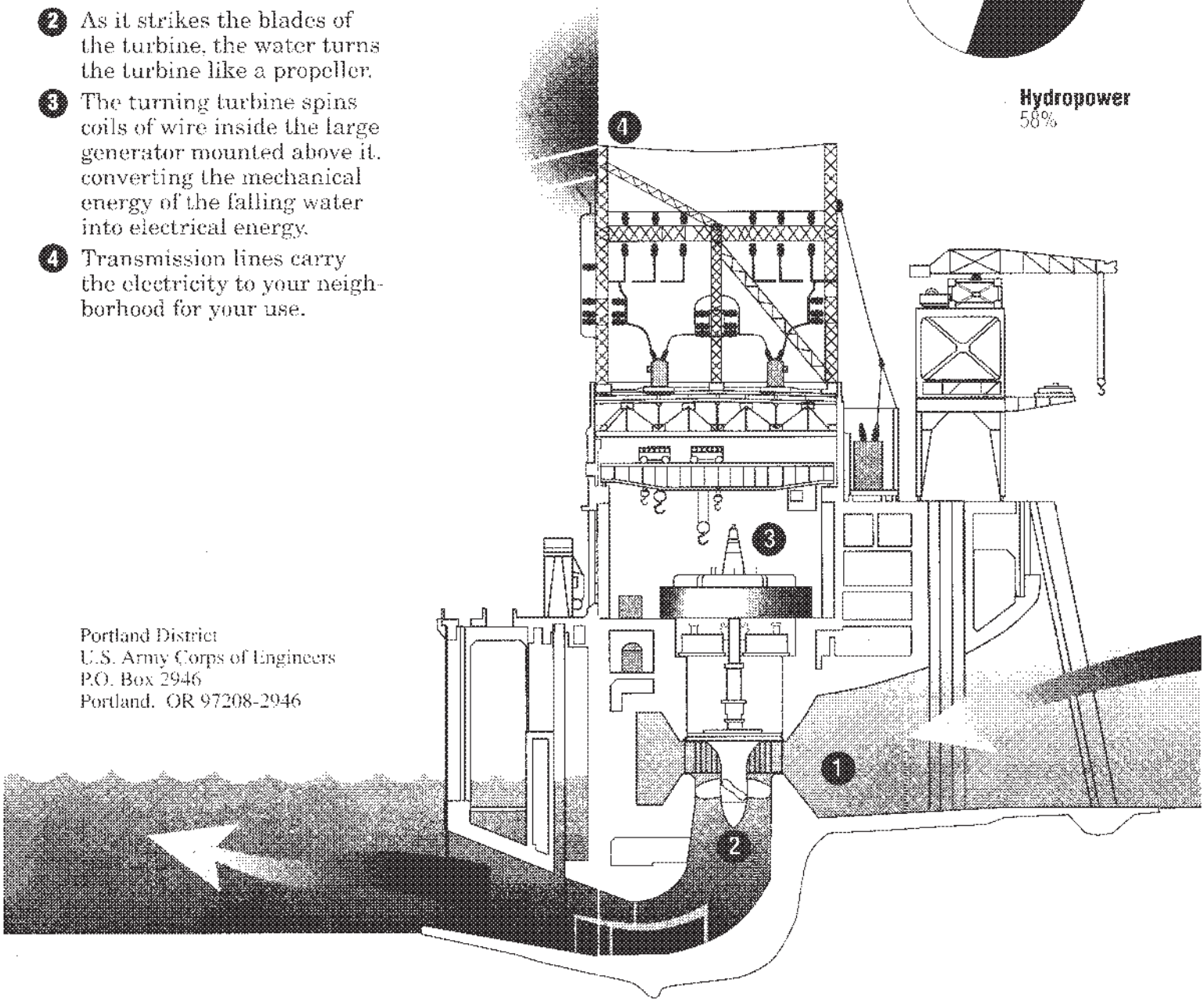
Power produced by dams is called hydroelectric power. Hydro means water. Hydroelectric power is clean. It does not pollute the environment. And, because it uses water, a renewable resource, it does not consume limited fuel such as coal. On a river with many dams, such as the Columbia River, the same water can be used repeatedly to generate power as that water passes each dam. Water is not changed by the power generating process. A glass of water that has gone through a powerhouse to produce electricity looks and tastes the same as any other glass of water. You will not be able to taste the difference.

Cross-section view of a dam powerhouse shows how a typical turbine-generator unit generates electricity:

1. Water, moving with tremendous force, is guided down to the turbine.
2. As it strikes the blades of the turbine, the water turns the turbine like a propeller.
3. The turning turbine spins coils of wire inside the large generator mounted above it, converting the mechanical energy of the falling water into electrical energy.
4. Transmission lines carry the electricity to your neighborhood for your use.

Northwest Electric Energy Sources





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