

WORDS TO KNOW

As you read, look inside, around, and beyond these words to figure out what they mean.

- **demand**
- **facilities**
- **efficient**

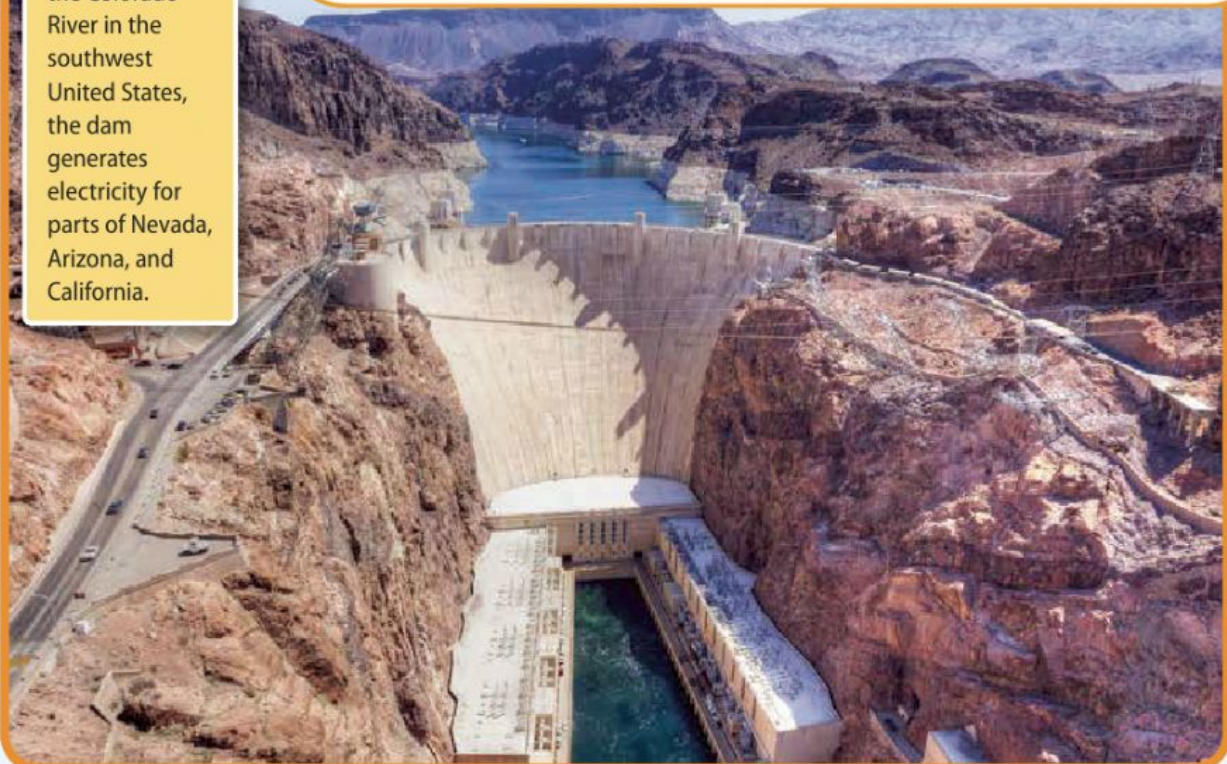
This photograph shows Hoover Dam. Built on the Colorado River in the southwest United States, the dam generates electricity for parts of Nevada, Arizona, and California.

HYDROELECTRIC POWER

BY THE UNITED STATES GEOLOGICAL SURVEY

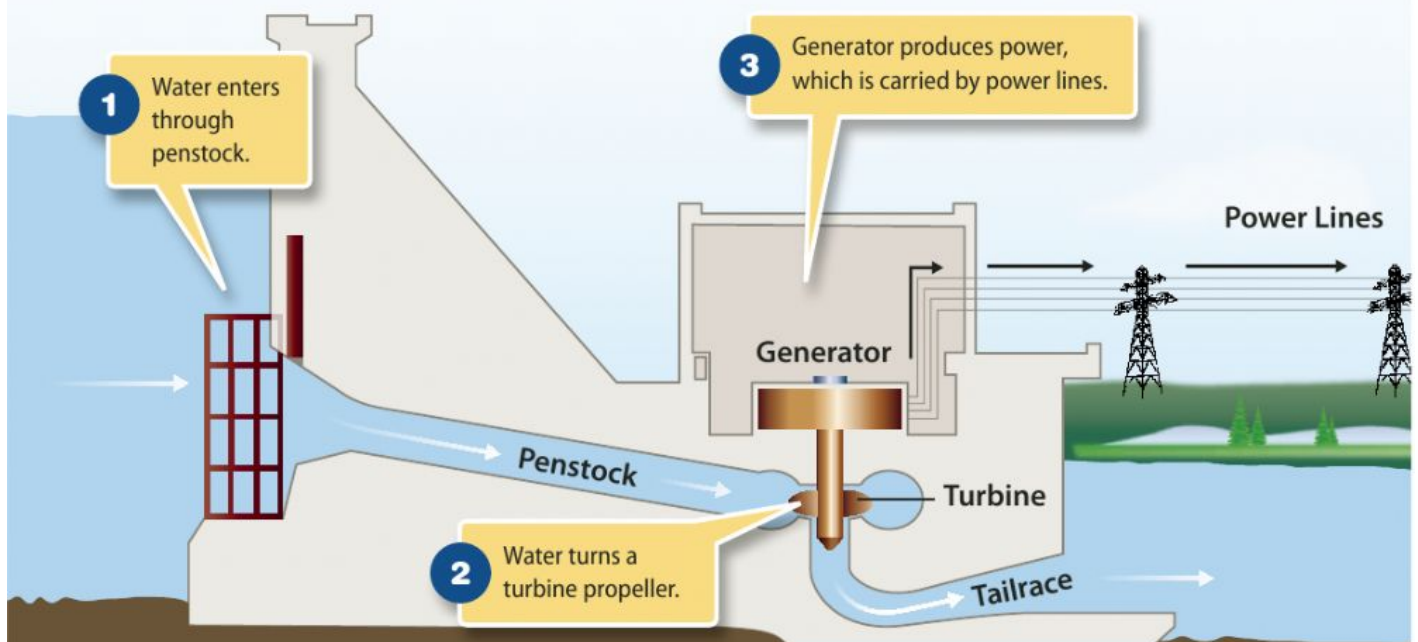
Hydroelectric Power: How It Works

- 1 So just how do we get electricity from water? Actually, hydroelectric and coal-fired power plants produce electricity in a similar way. In both cases, a power source is used to turn a propeller-like piece called a turbine. The turbine then turns a metal shaft in an electric generator. The generator is the motor that produces electricity. A coal-fired power plant uses steam to turn the turbine blades. A hydroelectric plant uses falling water to turn the turbine. The results are the same.



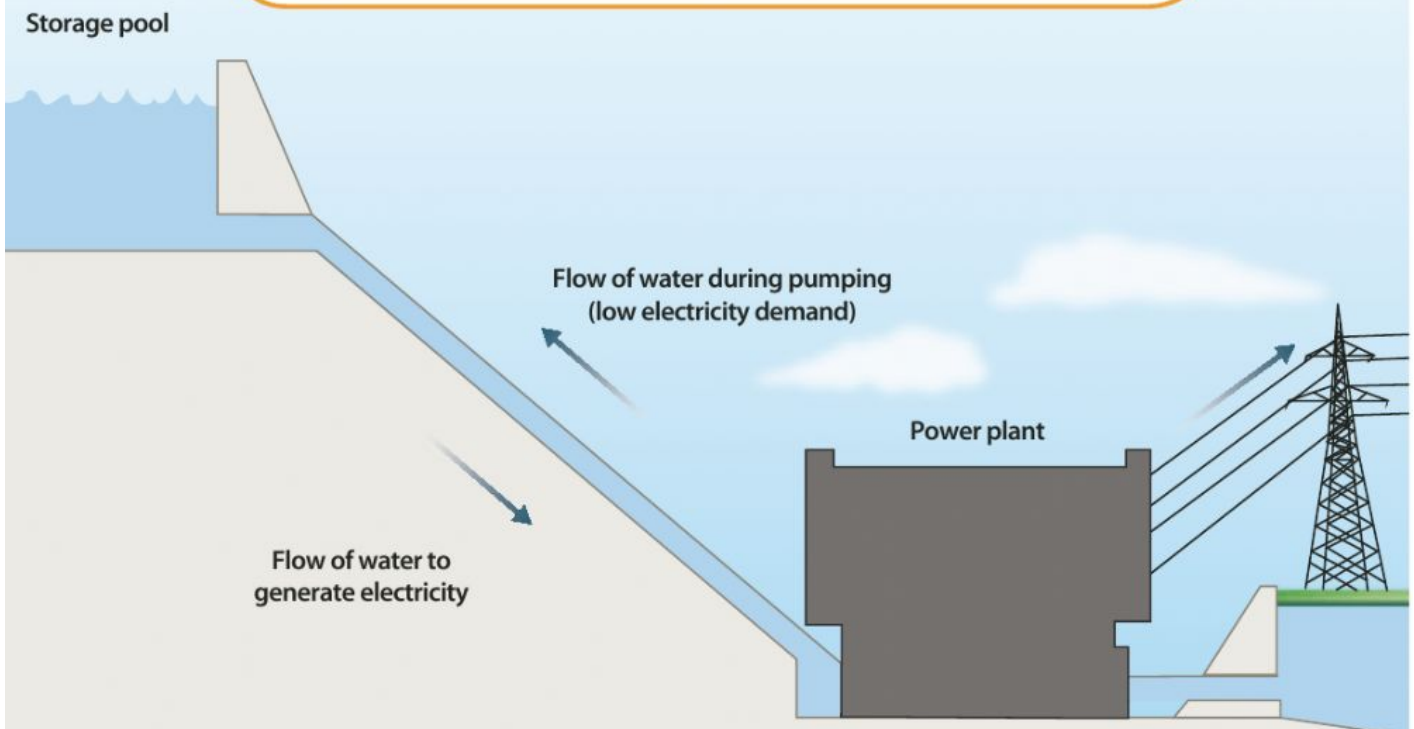
- 2 A typical hydroelectric dam is built on a large river with a large drop in elevation. The dam stores lots of water behind it in the reservoir. Near the bottom of the dam wall there is the water intake called a penstock. Gravity causes the water to fall through the penstock inside the dam. At the end of the penstock, there is a turbine propeller, which is turned by the moving water. The shaft from the turbine goes up into the generator, which produces the power.¹ Power lines connected to the generator carry electricity to your home and mine. The water continues past the propeller through the tailrace. The water then flows into the river, past the dam. By the way, it is not a good idea to be playing in the water right below a dam when water is released!

¹ For the generator to produce electricity, loops of wire must spin rapidly through force fields made by magnets.



Pumped Storage: Reusing Water for Peak Electricity Demand

- 3 Demand for electricity is not “flat” and constant. Demand goes up and down during the day. Overnight there is less need for electricity in homes, businesses, and other facilities. For example, at 5:00 PM on a hot August weekend day, there may be a huge demand for electricity to run millions of air conditioners! But, 12 hours later at 5:00 AM . . . not so much. Hydroelectric plants are more efficient at providing for peak power demands during short periods than are fossil fuel and nuclear power plants. One way of doing that is by using “pumped storage,” which uses the same water more than once.
- 4 Pumped storage is a method of keeping water in reserve for peak periods of power demand. Pumps move water that had already flowed through the turbines back up to a storage pool above the power plant. That happens when customer demand for energy is low, such as during the middle of the night. The water is then allowed to flow back through the turbine-generators at times when electricity demand is high.



Think Use what you learned from reading the technical text to respond to the following questions.

- 1** The boxes below describe four events from “Hydroelectric Power.” Two events are causes, one event is an effect, and one event results from that effect. The events are in no particular order.

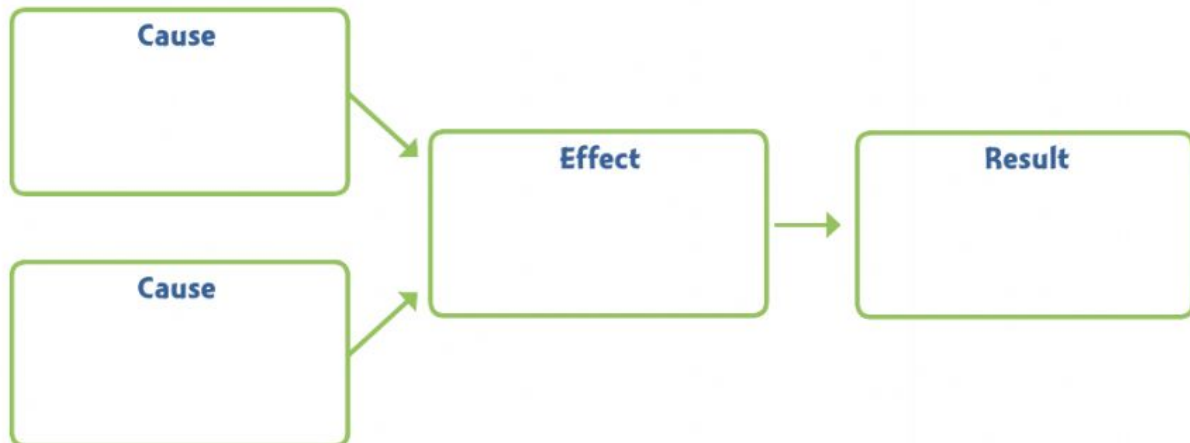
Water is stored in response to changing demand.

People use more electricity in the day.

The demand on a power plant changes over time.

Electricity use drops at night.

Complete the diagram below by copying each event in the correct box.



- 2** Which sentence describes a way hydroelectric plants are better than other power plants?
- A** “Actually, hydroelectric and coal-fired power plants produce electricity in a similar way.”
 - B** “A typical hydroelectric dam is built on a large river with a large drop in elevation.”
 - C** “Overnight there is less need for electricity in homes, businesses, and other facilities.”
 - D** “Hydroelectric plants are more efficient at providing for peak power demands during short periods than are fossil fuel and nuclear power plants.”

- 3** This question has two parts. First, answer Part A. Then answer Part B.

Part A

Select the statement that **best** describes how water produces electricity.

- A** Water is stored during periods when electricity is not needed.
- B** A coal-fired power plant turns steam into electricity.
- C** Moving water turns a turbine within a generator.
- D** A penstock is needed to create electricity from water.

Part B

Which **two** sentences from the text **best** show the relationship described in Part A?

- A** "Actually, hydroelectric and coal-fired power plants produce electricity in a similar way."
- B** "The generator is the motor that produces electricity."
- C** "A hydroelectric plant uses falling water to turn the turbine."
- D** "A typical hydroelectric dam is built on a big river with a large drop in elevation."
- E** "Power lines connected to the generator carry electricity to your home and mine."
- F** "Pumps move water that had already flowed through the turbines back up to a storage pool above the power plant."

- 4** Read the sentence from the text.

The turbine then turns a metal shaft in an electric generator.

Which dictionary entry **best** defines turbine?

- A** a natural force that causes things to fall
- B** a gate for regulating the flow of water
- C** an engine with a part that turns like a wheel
- D** a machine for carrying things to different levels in a building