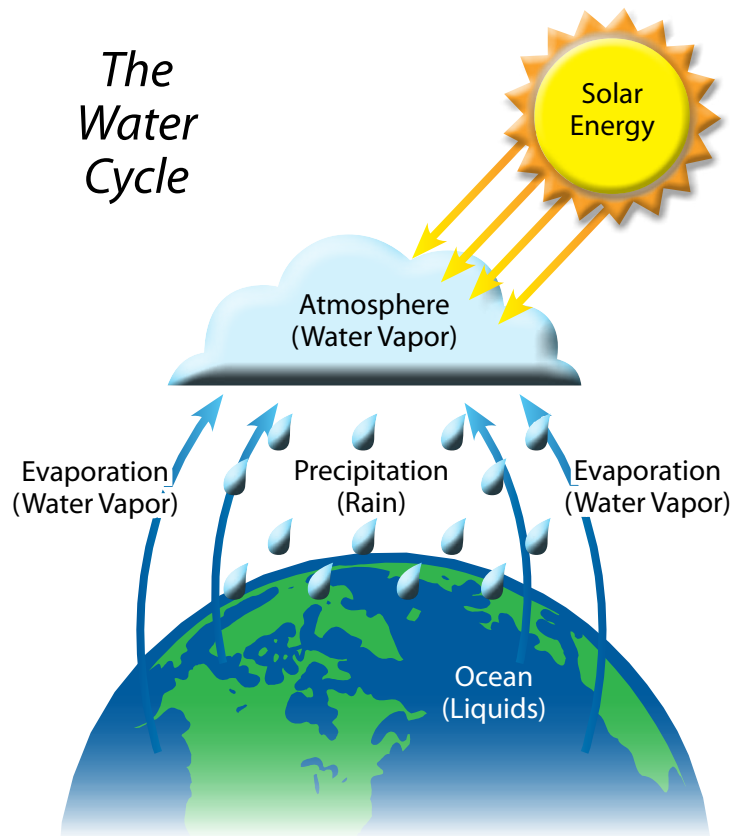


## The Water Cycle



## The basics of hydropower

Hydropower is the renewable energy source that produces the most electricity in the United States. It accounted for 6 percent of total U.S. electricity generation and 67 percent of generation from renewable resources in 2008. Washington public utility districts get 82 percent of their electricity from hydropower resources.

Understanding the water cycle is important to understanding hydropower as a renewable resource. In the water cycle:

Solar energy heats water on the surface, causing it to evaporate.

This water vapor condenses into clouds and falls back onto the surface as precipitation (rain, snow, etc.).

The water flows through rivers back into the oceans, where it can evaporate and begin the cycle over again.

The amount of available energy in moving water is determined by its flow or fall. Swiftly flowing water in a big river like the Columbia River carries a great deal of energy in its flow. Water descending rapidly from a very high point, like Niagara Falls, also has lots of energy in its flow.

In either instance, the water flows through a pipe, or *penstock*, then pushes against and turns blades in a turbine to spin a generator to produce electricity.


In a **run-of-the-river system**, the force of the current applies the needed pressure, while in a **storage system**, water is accumulated in reservoirs created by dams, then released as needed to generate electricity.

Hydropower is one of the oldest sources of energy. It was used thousands of years ago to turn a paddle wheel for purposes such as grinding grain.

Our nation's first industrial use of hydropower to generate electricity occurred in 1880, when 16 brush-arc lamps were powered using a water turbine at the Wolverine Chair Factory in Grand Rapids, Mich. The first U.S. hydroelectric power plant opened on the Fox River near Appleton, Wis., on Sept. 30, 1882.

Until that time, coal was the only fuel used to produce electricity. Because the source of hydropower is water, hydroelectric power plants must be located on a water source. Therefore, it wasn't until the technology to transmit electricity over long distances was developed that hydropower became widely used.

Over half of U.S. hydroelectric capacity for electricity generation is concentrated in three states: Washington, California, and Oregon. Approximately 31 percent of the total U.S. hydropower is generated in Washington – also home to the nation's largest hydroelectric facility, the Grand Coulee Dam. Most of the nation's large dams are in the West, but there are numerous smaller facilities operating around the country.

Only a small percentage of all dams in the United States produce electricity. Most dams were constructed solely to provide irrigation and flood control. 

Source: U.S. Energy Information Administration