Colorado
The Official eNewsletter of the Colorado Governor's Office of Energy Management and Conservation

Hydropower

Hydropower has the potential to significantly reduce dependence on fossil fuels. Currently, about 10% of U.S. electricity comes from hydropower and accounts for approximately 90% of all electricity that comes from renewable resources. Hydropower is a reliable, domestic, emission-free resource that is renewable through the hydrologic cycle and harnesses the natural energy of flowing water to provide clean, fast, flexible electricity generation. Hydropower projects can range in size from as little as two hundred watts up to 12,000 megawatts (MW) worldwide. The largest U.S. project is 6,180 MW.

The most common type of hydropower plant uses a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which, in turn, activates a generator to produce electricity. Hydropower doesn't necessarily require a large dam; some hydropower plants use a small canal to channel the river water through a turbine.

Another type of hydropower plant—called a *pumped storage plant*— stores power. The power is sent from a power grid into the electric generators. The generators then spin the turbines backward, which causes the turbines to pump water from a river or lower reservoir to an upper reservoir, where the power is stored. To use the power, the water is released from the upper reservoir back down into the river or lower reservoir. This spins the turbines forward, activating the generators to produce electricity.

Even though hydropower provides a cleaner source of energy, there are environmental consequences. Large-scale hydropower can disrupt water temperature, composition, and flow, altering ecosystems. Millions of dollars in research and mitigation efforts are spent each year to address concerns. Researchers are working on advanced turbine technologies that will maximize the use of hydropower and minimize adverse environmental effects. In addition, smaller scale plants (below 30 MW) that individuals can operate for their own energy needs or to sell power to utilities have less impact on the environment.

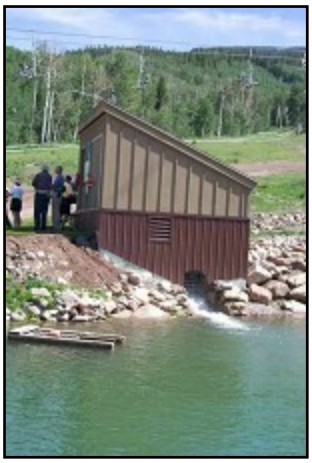
XCEL ENERGY HYDROPOWER IN COLORADO

Name	Description	Power	Source	Location
Ames	Hydroelectric Generating Station	3.75 MW	Trout Fork Drainage of San Miguel River, stored in Trout Lake, and second diversion from Howard's Fork of the San Miguel River.	Near Ophir in Illium Valley
Cabin Creek	Hydroelectric Pumped Storage Power Plant	324 MW	Two reservoirs totaling 1,977 acre feet.	Outside Georgetown
Georgetown	Hydroelectric Generating Station	1.2 MW	Water stored and then released from Georgetown Forebay. Additional water stored and released from Clear Lake Reservoir.	Georgetown
Salida	Hydroelectric Generating Station	1.4 MW	Water from the South Arkansas River and Tributaries	Poncho Springs
Shoshone	Hydroelectric Generating Station	15 MW	Water diverted from Colorado River and returned to the river after use	Glenwood Springs
Tacoma	Hydroelectric Generating Station	8.5 MW	Water is stored and then released from Electra Lake Reservoir.	North of Rockwood in the Animas River Canyon

Cabin Creek Station Power Plant
Large Hydropower Plant

Located outside of Georgetown at an elevation of 10,018 feet, Cabin Creek Plant is capable of producing 324 megawatts (MW) . The water is supplied from two reservoirs. During high electricity use periods, water is release from an upper reservoir, which turns the turbine generators and generates power. The water is then stored in the reservoir to pump back to the upper reservoir.

Snowmass Micro-hydro Power Plant



Aspen Skiing Company (ASC) and OEMC, among other supporters, partnered in a project to install a micro-hydro power plant at Snowmass Ski Area in 2004. The goal was to put existing renewable energy sources to use and save the resort thousands of dollars in annual energy costs.
The micro-hydro power plant uses the existing snowmaking system's underground pipes to channel spring runoff through a turbine, generating electricity. The expelled water is returned to the stream. The system will produce power from May through August, when the snow pack causes the runoff to be at the highest levels.
The plant's building houses a 115kW turbine attached to a 10-inch steel snowmaking pipe that drains water from a storage pond, which is fed by West Brush Creek and sets about 800 feet up the mountain. 2005 was the first complete year of operation and the plant made some 200,000 kW hours (enough to power 40 homes), while preventing the emission of 400,000 pounds (181,437 kg) of carbon dioxide.

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Advancing Colorado