

HYDROPOWER



CASES

FACT SHEET

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What is Hydropower?

Hydropower is generated by using the force of moving water to turn kinetic energy into electricity. The production of hydropower typically relies on the presence of a river or stream. The movement of tides and waves is also used to produce energy but to a much lesser extent than rivers.

There are three types of river-based hydropower plants. Run-of-river hydropower plants rely on the natural decline of the river either by installing a turbine and generator in a river or in a canal constructed adjacent to the river. They are often small and minimally destructive to local ecosystems. When a canal is built, water can be stored in a small reservoir and power generation can be controlled through a system of gates and valves. Otherwise, the amount of power produced is dependent on the natural flow of the river.

Pumped storage hydropower plants are systems that rely on an upper and a lower storage reservoir. When water is released from the upper reservoir to the lower reservoir, the gravitational force of the moving water powers a turbine to generate electricity. The water is then pumped back into the upper reservoir. The large amount of power required to pump the water into the upper reservoir relies on an external source of power. Therefore, pumped storage hydrogen is considered an energy storage system. Rather than providing a constant source of power, it stores potential energy until it is needed.

Reservoir hydropower provides both constant energy production and stored potential energy. A reservoir or dam is built within a river. Some of the flow of the river is stored behind the dam while spillways allow the rest of the water to

continue down the river. The amount of electricity produced is determined by the amount of water released from the reservoir to power the turbine.

What is Hydropower Used For?

Hydropower is one of the oldest and most widely used forms of renewable energy. The advantage of hydropower over wind and solar is that it can provide constant power and stored power. The amount of electricity produced can also be controlled through the use of reservoirs.

Reservoirs can serve additional purposes beyond power generation. The control over the flow of rivers can assist in flood mitigation, irrigation, drought relief, and municipal water supplies.

Hydropower facilities have higher upfront costs and longer planning, approval and construction phases than wind and solar plants, so capturing additional value by including auxiliary services can make hydropower projects more economically viable.

Hydropower and Renewable Energy

Hydropower can provide reliable, grid-scale energy production with low emissions. In jurisdictions where hydropower is the primary source of electricity, electricity costs are usually inexpensive.

There are, however, several major environmental and climate issues associated with hydropower. Large dams, which are more economical than smaller hydropower facilities,

require large amounts of emissions-intensive materials, particularly concrete and steel. They also have the potential to cause damage to local ecosystems. This not only poses problems for fish and wildlife populations, it can also lead to the build up of dead vegetation in the water. The decomposition of this plant material produces methane, a potent greenhouse gas.

Climate change also presents challenges to the reliability of hydropower. Warmer temperatures and reduced precipitation are reducing the size of rivers, which in turn decreases the amount of electricity that hydropower facilities are able to produce.

