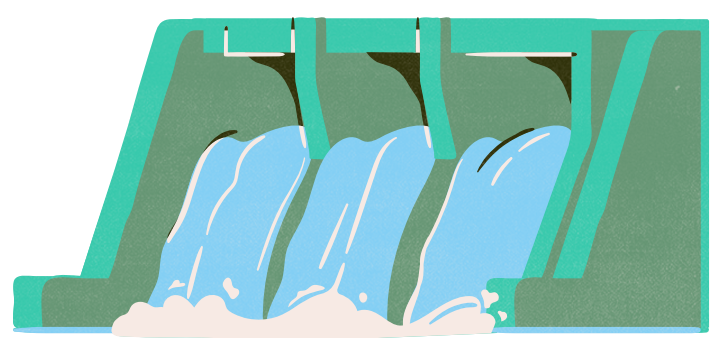


# Hydropower

## What Is It?

Hydropower is the creation of electricity using the movement of water to turn turbines, most commonly placed in a dam on a river, lake, or reservoir.



## How Clean Is It?

Hydropower does not produce any emissions, however the construction of dams does create emissions. In particular, hydropower uses large quantities of steel and concrete. Further, lakes and artificial reservoirs can occupy large land areas and generate some net emissions.



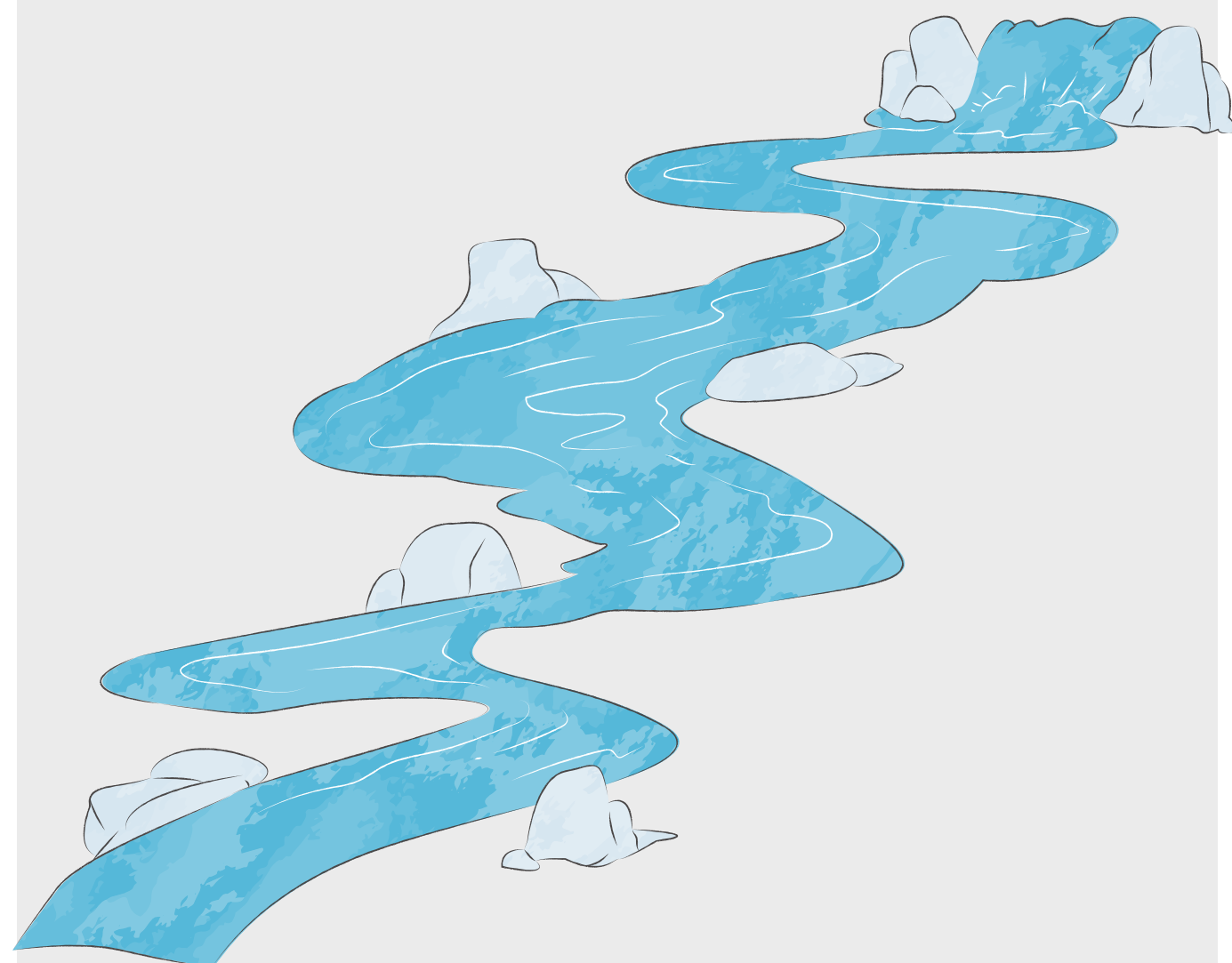
## What Does It Cost?

Hydropower is very low-cost, with the average cost of electricity per kilowatt hour (kWh) standing at around 8 cents.



## How Does It Work?

1. Water from a dammed river or reservoir contains potential energy due to its elevation.
2. Specific volumes of water are released into channels, either on demand or continuously at a controlled rate.
3. Each channel within a hydroelectric dam contains one or more turbines for harnessing the water's kinetic energy.
4. The turbine is connected to a generator that turns the mechanical energy of the moving blades into electricity.
5. The hydroelectric facility sends power onto the wider electrical grid.
6. Water flows out of the dam in a controlled release and gates on the reservoir side of the dam shut when a designated amount of water is released.



## Space



Hydropower facilities include dams, pump storage buildings, diversion channels, and the reservoir created behind dams. Hydropower takes up around 8.7 million acres in the U.S., using approximately 300 acres per MW.

## Point

- Hydropower can produce vast amounts of energy from different types of natural or diverted rivers, as well as dams and reservoirs, storing water at elevation and letting it flow downhill.
- Hydropower has a low environmental impact, and the facility can last for 50 to 100 years.
- Hydropower is among the lowest-cost methods of producing electricity, projected to cost 6.42 cents/kWh within five years.
- Hydropower is capable of capturing 90 percent of the kinetic energy from flowing water.
- Hydropower has one of the lowest fatality rates of any energy source.

## Counterpoint

- ↔ ○ High water volumes may be needed to make a hydropower project economical. Many regions also lack adequate water resources or elevation (or both) to utilize hydropower, limiting its concentration geographically.
- ↔ ○ Damming water can usurp wildlife habitats, and with some turbines, up to 15 percent of fish caught in turbines may be killed.
- ↔ ○ Often only larger dams and hydroelectric facilities are economically viable for constructing.
- ↔ ○ Despite a high efficiency, hydropower has only provided around 6 percent of electricity to the U.S. each year over the last decade.
- ↔ ○ Although rare, dam collapses can lead to catastrophic flooding and loss of life.

## Did You Know?

Pumped hydropower is a net negative energy source, because it requires power to elevate water, but this can serve as a battery and on-demand power source.

## What's Next?

Micro-hydropower has seen some success in harnessing energy from stored water. This works by storing a large amount of water at a high elevation, then releasing it in the path of turbines. The most common micro-hydropower facilities are located on shorelines and use the change in tides as an energy source.