

**Hydroelectricity:  
Using Water to Generate Electricity**

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I. Introduction

- A. Hydroelectricity is the most used renewable resource in the world.
- B. Hydroelectricity has been used for many years.
- C. Thesis: Hydroelectricity is safe and reliable, but concerns arise about the initial expenses and the effects it has on the environment.

II. Body

- A. What is hydroelectricity?
  - 1. Generating electricity using water
  - 2. How hydroelectricity works
  - 3. Hydroelectric power source
    - a. Hydropower turbines
    - b. Hydropower plants
- B. People have used water to do work for many years.
  - 1. Earliest advances
  - 2. First project
- C. There are some advantages to using hydroelectricity.
  - 1. Free, safe, clean, reliable renewable resource
  - 2. Cheaper utilities
  - 3. Creation of jobs
- D. There are also disadvantages to using hydroelectricity.
  - 1. Need for large areas
  - 2. High initial cost
  - 3. Destruction of environment

III. Conclusion

- A. Hydroelectricity produces cheaper utilities, generates electricity more safely, create jobs and, is easy to manage.
- B. In regards to hydroelectricity, the advantages exceed the disadvantages, and for this reason, it is the most used renewable resource.

It would be wonderful to live a world with no pollution, cheaper utilities, and a free and safer way to generate electricity. Hydroelectricity may just be the way to address these issues. Hydroelectricity is the most used in the world and has been used for many years. It is safe and reliable, but concerns arise about the initial expenses and the effects it has on the environment.

Hydroelectricity (also called hydropower) is the generation of electricity from flowing water that is recycled. The water is stored in a reservoir and is then channeled through turbines with help of generators to make energy that is transformed into electricity (“Hydroelectric Power,” 2016). The water travels through a cycle coming from lakes and oceans, which make clouds. It then turns into rain or snow, which goes back into the ocean. The sun propels the energy of the water cycle, which can be drawn to make electricity or for jobs such as grinding grain (“How Hydropower Works,” n.d.).

All hydroelectric facilities are driven by energy from water flowing downstream. “There are three types of hydroelectric facilities: impoundment, diversion, and pumped storage. Some plants use dams” (“Types of Hydropower Plants,” n.d.). The various types usually vary in size. Small systems are used to supply electricity to homes, and larger systems are used to generate electricity for utilities. The impoundment facilities are the most common hydropower plants. It is a large system that uses dams to store water in a reservoir. The water that comes from the reservoir goes through a turbine. The turbine spins and starts up a generator to make electricity. A diversion facility does not always use a dam. It drains from part of a river through a canal. It stores electricity that has been generated by other sources that can be used for later. The energy is stored by pumping water from a low reservoir to a high reservoir, but it pumps in the opposite direction when less electricity is needed. When the need for electricity

is high, the water goes back into the lower reservoir, which leads to the generation of electricity by turning a turbine (“Types of Hydropower Plants,” n.d.). Impulse and reaction turbines are the main types of hydropower turbines. The height of standing water and the flow or the volume of water determines which type of turbine will be used at a site. The Pelton wheel, turgo wheel, and cross-flow are the different types of impulse turbines. The propeller turbine, bulb turbine, straflo turbine, tube turbine, Kaplan turbine, Francis turbine and the kinetic energy turbines are examples of the reaction turbines (“Types of Hydropower Turbines,” n.d.).

People have used water to do work for many years. Over 2000 years ago, the Greeks used a water wheel to aid in the grinding of wheat into flour. Water power was originated during the Han Dynasty in China between 202 BC and 9AD. A vertical-set water wheel was used to activate trip hammers to pound and remove hull from grain and break ore. It was also used to help make paper. It is believed that hydropower is connected to the rise of economic growth. In 1771, Richard Arkwright used hydropower when he started Crumford Mill, a cotton mill in England. Arkwright felt that this project was such a success and felt that hydropower was very beneficial, so he began another project a few years later. Instead of using hydropower that was going straight to machines, he decided to use a steam engine to move water into a pond. He also started a chain of huge industrial buildings after his establishment expanded. Even though hydropower was being overlooked because coal-fired steam engines were being used for generation of electricity, it had a great influence on the industrial revolution. In the first part of the 19<sup>th</sup> century, major evolutions of hydroelectricity took place. French engineer Benoit Fourneyron invented a reaction turbine that could make six horsepower. The Francis turbine was the first present-day turbine invented in 1849 by British-American James Francis.

An impulse turbine, called the Pelton wheel, was invented in the 1870s by an American inventor by the name of Lester Allen Pelton. In 1878, the first hydroelectric project was used in Northumberland, England, to generate light for a lamp. The first hydroelectric plant was opened in Wisconsin to supply private and commercial customers and within the next ten years, hundreds of hydropower plants were organized. Hydroelectricity is still being used today (“A Brief,” n.d.).

There are benefits to using hydropower. Hydroelectric power is a way to generate energy more safely. Using water to generate electricity is free and can never be used up; for this reason, it is a renewable resource. Hydroelectric power is considered a firm intermittent because it is energy that is there when you need it. It can firm and shape other renewable resources because it can handle the electricity demand when it fluctuates (Culbertson, 2008). In 1933, the Tennessee Valley Authority (TVA) was put into place by President Franklin Roosevelt to fix issues such as flooding, soil erosion and poverty that had been affecting the seven states within a 41,000 square-mile radius. With funding from the government, the TVA built and kept up the maintenance on dams to help with lowering the prices on electricity, control flooding and to start a program to stop soil erosion in the area. Businesses began to be drawn to the area because of the lower prices of electrical power. This opened a door for employment in the area and helped with the poverty issues (Clark, 2011).

Hydroelectricity can be very beneficial for the economy, but it also has a down side. Building dams and plants can be very expensive, and depending on the size, they can negatively affect the environment. One problem with using hydroelectric power is that it's not very reliable if the supply of water is low. Water is needed in order to make energy, and in order to

distribute the water and keep it treated, energy is needed. Due to the lack of water power, plants have run into problems in the last ten years. Temperature has been steadily rising, causing the air to retain water. When the water is retained in the air, it causes a shift in energy balance, and water does not travel through its cycle as it should. The higher temperatures that we have been experiencing have caused problems with the water cycle. High temperatures have been causing people to use air conditioning more regularly, and this causes the power plants to have to try to compensate and generate more electricity. When this happens, more water is having to be used (Averyt, 2016). Another issue that arises in regards to using hydropower is that when the dams are built, they need to be kept up, and if they are not, they can collapse.

In regards to hydroelectricity, the advantages exceed the disadvantages, and for this reason, it is the most used renewable resource in the world. Hydroelectricity produces cheaper utilities, generates electricity more safely, creates jobs, and is easy to manage. It has played a significant role in the elevation and reconstruction of economic development and can continue to do so.

## References

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