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Hydroelectric Energy

Pros:

- Energy can be stored upstream for later.
- There are no fuels involved other than water making hydroelectric a safe renewable energy source.
- Widely used method of producing electricity. Every state has hydroelectricity, and Niagara Falls was the US's first hydroelectric facility built in 1881.
- Low maintenance cost, and can bring energy costs down in places with many hydroelectric facilities such as Washington state (over 70% of the state's electricity comes from hydropower).

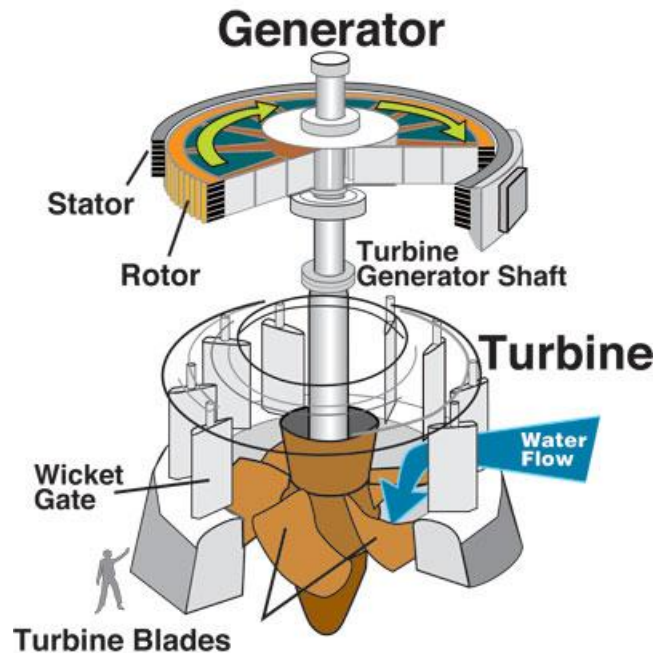


Figure 1: "A hydraulic turbine converts the energy of flowing water into mechanical energy. A hydroelectric generator converts this mechanical energy into electricity. The operation of a generator is based on the principles discovered by Faraday."

Cons:

- Limited number of reservoirs that are suitable, as hydroelectric energy requires dams to be built on large rivers where drops in elevation occur.
- Dams disrupt the natural flow of rivers, which may impact aquatic life, and construction of dams also brings about the construction of roads and powerlines.
- Droughts can impact the cost of energy with hydroelectric, the less water available, the higher the cost.
- Expensive to build.

Sources for hydroelectric:

<https://water.usgs.gov/edu/hyhowworks.html>

<https://energy.gov/articles/top-10-things-you-didnt-know-about-hydropower>

<http://energyinformative.org/hydroelectric-energy-pros-and-cons/>

Passive Solar Energy

Pros:

- ❖ Passive solar energy can save money, because it requires the sun, a naturally occurring energy source. “*Passive Solar Heating* is most cost-effective way of warming buildings and the goal of any passive solar heating systems is to capture and store the sun’s heat within the buildings materials and then release the heat during periods when the sun is not shining.”
- ❖ There is no pollution or noise in required in a passive solar system (no fossil fuels).
- ❖ It is a renewable energy source, as long as the sun is shining we can harness the light and convert it into electricity.

Cons:

- ❖ As a whole passive solar can be expensive, materials may cost less, but building a house to fit a passive solar system may be expensive.
- ❖ Passive solar needs an unobstructed view of the sun, large trees can become problems, and the building must be able to receive sunshine both in the summer and winter months (the building must be consciously positioned according to solar position).
- ❖ Unreliable – heating a building depends entirely on the weather.

Sources for Passive Solar Energy:

<http://colby-sawyer.edu/sustainable/sustainable-classroom.html>

<https://energy.gov/energysaver/passive-solar-home-design>

<https://nyln.org/passive-solar-energy-pros-and-cons-list>

<http://www.alternative-energy-tutorials.com/energy-articles/passive-solar-energy.html>

<http://www.livestrong.com/article/212598-the-disadvantages-of-passive-solar-heating/>

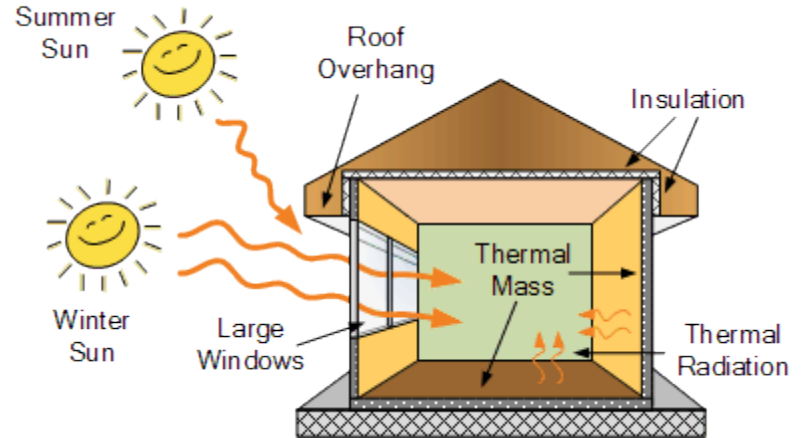


Figure 2: "Passive Solar Energy is the use of solar energy by passive means to reduce the heating demand of a building. Passive solar energy relies purely on the design, positioning and style of construction of the home (or other building)."



Figure 4: Colby-Sawyer College's Sunshack (outside view). This building was built by students, faculty, and volunteers. Today, it is a sustainable classroom.



Figure 3: Colby-Sawyer College's Sunshack (inside view of cob benches and concrete floors which add thermal mass).

Nuclear Energy

Pros:

- High energy density - nuclear fission reactions release 10 million times more energy than released by the burning of fossil fuels.
- The high energy density of nuclear energy makes it a cheap way to produce energy, as it requires less input and a massive amount of energy is output.
- Nuclear energy does not rely on fossil fuels, therefore, fluctuations in oil and gas costs do not impact this energy source.

Cons:

- Accidents – radioactive waste is dangerous to the environment and to humans (Chernobyl, Three Mile Island). Earthquakes can trigger meltdowns of nuclear power plants (Fukushima).
- There may not be excessive air pollution, however, mining for uranium and waste management creates radioactive waste which cannot be disposed of safely anywhere.
- Not a renewable energy source. Uranium still runs the risk of eventually running out.
- Nuclear power plants because of the devastating impacts already witnessed in accidents, can turn into targets for terrorists.
- The debate of whether or not nuclear is ethical, can represent another con. Is it ethical to produce an energy source that has the potential to negatively impact so many lives?

Sources for Nuclear Energy: https://www.eia.gov/energyexplained/index.cfm?page=nuclear_home

<http://energyinformative.org/nuclear-energy-pros-and-cons/>

<https://www.renewableresourcescoalition.org/nuclear-energy-pros-cons/>

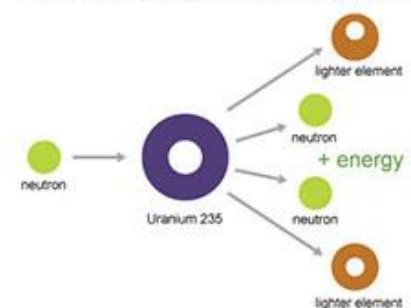
<http://aquila.usm.edu/cgi/viewcontent.cgi?article=1099&context=ojhe>



Figure 5: An atom has a nucleus (or core) containing protons and neutrons, which is surrounded by electrons. Enormous energy is present in the bonds that hold the nucleus together. This nuclear energy can be released when those bonds are broken. The bonds can be broken through nuclear fission, and this energy can be used to produce electricity.

All nuclear power plants use nuclear fission, and most nuclear power plants use uranium atoms. During nuclear fission, a neutron collides with a uranium atom and splits it, releasing a large amount of energy in the form of heat and radiation. These neutrons continue to collide other uranium atoms, and the process repeats itself over and over again. This process is called a nuclear chain reaction. (Uranium is considered a nonrenewable energy source, even though it is a common metal found in rocks worldwide.).

How fission splits the uranium atom



Source: Adapted from National Energy Education Development Project (public domain)

Q & A section

Which energy source do you think is the most sustainable long-term? Why?

Solar Energy is the most sustainable option for the long-term because as long as the sun remains shining humans can survive, and with that passive solar energy can benefit humanity. However, from my understanding, passive solar is only a way to heat and cool a building or home. This is still a positive, sustainable long-term solution because passive solar eliminates a need to heat and cool homes and buildings with nonrenewable resources (fossil fuels). This is significant because, “Heating and cooling account for about 48% of the energy use in a typical U.S. home, making it the largest energy expense for most homes.” (<https://energy.gov/public-services/homes/heating-cooling>).

What is one innovative way to produce energy that totally inspires you and explain why you feel so strongly about it.

I am a very strong solar supporter. However, I do believe that hydroelectric has many benefits as well. Such as the fact that energy can be stored for later. Water can be held up stream and be released at any time to produce more energy. But, solar still takes the lead in my book. Without the sun life on this planet could not be sustained. We need the sun to grow plants. Without plants humans and all other species would die off. Think of that feeling after a long, hard winter, when the spring comes and life starts to flourish again. The sun shines down on us and warms our skin and chases away the chill in the air. But that sun, it can be harnessed to give us electricity, it can heat and cool systems, cook our food, and solar cookers can even be used to sterilize medical equipment in developing countries. It might even be surprising to know there would no winds, ocean currents, or clouds to transport water without the sun. Solar energy has existed for billions of years, while humans haven't been around that long they have been using solar energy for thousands of years. As long as we have the sun, we should recognize its significant and incorporate more solar options into our daily lives.

Source: <https://www.nationalgeographic.org/news/power-sun/>

Social Media Post:



steph_what [#pgc2017](#) Day 5: Energy. "Heating and cooling account for about 48% of the energy use in a typical U.S. home, making it the largest energy expense for most homes" (energy.gov). Passive solar energy is the long-term sustainable alternative. Colby-Sawyer's sustainable classroom aka the sunshack incorporates passive solar using cob benches and concrete as thermal mass. The building was designed and constructed with solar positioning in mind! [@turninggreenorg](#)

