

Renewable Energy

by Sophia



WHAT'S COVERED

In this lesson, we will cover the topic of renewable energy. We will discuss some basic concepts of renewable energy, and explore the various types: solar, wind, water, biomass, and geothermal. We will also discuss the impacts of, and general challenges with, renewable energy. Specifically, this lesson will cover the following:

1. What is Renewable Energy?

Renewable energy comes from sources that, if properly managed, do not run out and can be sustained indefinitely because they replenish in a relatively short amount of time. Renewable energies are considered alternative energy sources because they come from things other than fossil fuels.



DID YOU KNOW

At the time of making this tutorial, approximately 29% of global electricity comes from renewable sources. There has been recent growth in renewable energy use due to technology advancements and growing environmental concerns surrounding reliance on fossil fuels.

2. Sources of Renewable Energy

The following are five main types of renewable energy:

- Wind
- Water
- Solar
- Biomass
- Geothermal

2a. Wind

Wind power utilizes wind currents produced when air heated by the sun rises, and then sinks as it cools. The wind currents turn massive turbine blades, like the ones shown below, which generate electricity.

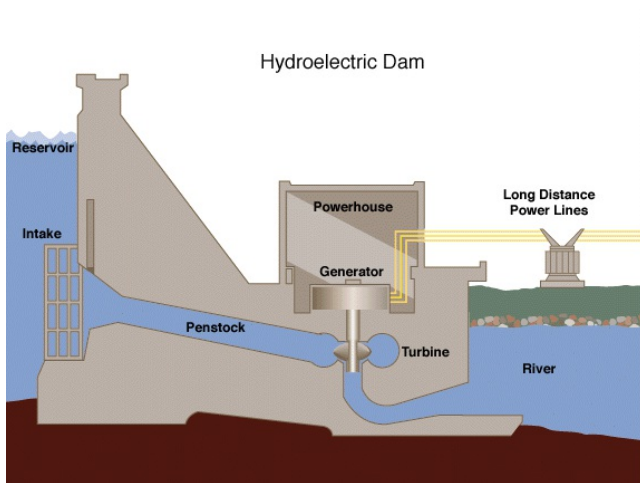
Wind farms can be built either on land (called onshore) or in the ocean (called offshore). The majority of wind

energy in the United States comes from onshore wind farms. In 2017, the first offshore wind farm in the country was built off the coast of Rhode Island.



2b. Water

Hydroelectric dams, as well as tidal and wave generators, utilize the movement of water to spin turbines and generate electricity. Dams rely on the flow of rivers and make up nearly all energy from water sources, while tidal energy is energy harnessed from the power of waves, tides, and currents and is not yet widely used.



2c. Solar

Solar or photovoltaic energy refers to the energy of solar rays that are caught and used for heating spaces or water. Solar energy is also converted into electricity through the photovoltaic effect. Small-scale solar arrays are becoming increasingly popular on roofs to power homes and offices.



2d. Biomass

Biomass is a form of energy. Biomass materials are burned to harness biomass energy, which produces heat or electricity. Examples of using biomass energy include burning wood for heating and cooking and burning switchgrass, a high yield crop, for energy use or using it to make ethanol.

Ethanol can be used as a fuel, as utilized in Brazil, or as a fuel additive, as done in the United States. It can come from corn, switchgrass, as well as other biomass sources.

Alcohol and methane can also be extracted from biomass to be turned into a fuel source.



HINT

While biomass as a concept does include animals and other organisms, they are not usually used as renewable energy because it would not be efficient enough.

2e. Geothermal

Geothermal is when heated water from below Earth's surface is captured, and the steam produced is used to generate electricity.



BIG IDEA

As mentioned before, only 10% of the world's energy currently comes from renewables. Each form of renewable energy, except for geothermal energy, actually relies on the sun in some way: solar and photovoltaic for its direct radiation, wind to create wind currents, hydroelectric to facilitate the water cycle, and biomass to create growth.

3. Impacts and Challenges of Renewable Energy

Because renewable energies can quickly replenish themselves or are inherently infinite, they are more sustainable than fossil fuels. Renewable energies can help the economy by providing jobs and a domestic source of energy which can reach more rural communities than traditional sources of energy. Compared to fossil fuels, renewable energy can have significantly less waste, especially in the form of air pollution, and as a result, it can have fewer negative impacts on the surrounding ecology and human health. Also, in operation, renewable energies produce little to no greenhouse gas emissions, which means they contribute significantly less to global climate change.

Renewable energies do have their challenges, however. It can be difficult to produce and store enough energy from renewable sources as compared with fossil fuels. This is because it can be difficult and costly to build and transport renewable energy infrastructure. It is often more suitable in remote areas. Renewable energy supply may not always match demand because weather can be unpredictable, which affects water, wind, and sun resources. The supply of renewable energy may be geographically far from the demand, making transport of that electricity difficult. Additionally, renewable energy often gets pushback from locals who are concerned that the installation of turbines or arrays will negatively impact their wildlife or aesthetics.



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SUMMARY

In this lesson, we learned about **renewable energy**, which comes from sources that, if properly managed, do not run out and can be sustained indefinitely because they replenish in a relatively short amount of time. We learned about its various **sources** and types, such as **wind**, **water**, **solar**, **biomass**,

and **geothermal**. Finally, we learned about the **impacts and challenges of renewable energy**.

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