Unit 2- Renewable Energy

Alternatives to Fossil Fuels

Objective: Students will be able to identify the different forms of renewable energy and describe the advantages that these have as opposed to fossil fuels

---

What is Renewable Energy?

Although the burning of fossil fuels remains the primary source of energy throughout the world, there are alternative sources known as renewable energy. The United Nations define renewable energy as energy "derived from natural sources that are replenished at a higher rate than they are consumed." To put this simply, there is an abundance of these resources, and they naturally regenerate at a faster rate than fossil fuels- which take millions of years to form. Alternatives to fossil fuels are crucial to lowering the greenhouse gas emissions contributing to global warming: bringing us one step closer to a livable future.

5 Types of Renewable Energy

Biomass	Energy from *plants and animals* usually in the form of agricultural waste, wood processing waste, and animal manure Biomass create biofuels- a liquid fuel used to replace gasoline and diesel fuel- for transportation
Hydropower	Energy from *moving water* This type of energy is created when water pushes turbines

	connected to an electricity generator. They are found on a large-scale through dams and on small-scale called run-of-river facilities Hydropower relies heavily on water availability therefore changes in precipitation patterns will affect energy production. For example, if droughts are prevalent to the area, performance will decline.
Geothermal	Energy from *heat within the Earth's* surface Modern geothermal power plants emit no greenhouse gasses. It uses heat from the Earth to create steam. The steam moves turbines to generate electricity. It is also used to heat and cool communities.
Wind	Energy from the movement of air generated by wind turbines. Similar to the other forms of renewable energy the wind moves the blades spinning a generator that creates electricity
Solar	Energy from the sun Solar technology takes radiation from the sun, using light not heat. Extreme weather conditions and darkness create limitations for solar energy. Most common types *Photovoltaics*- These are known to be solar panels. The particles from the sun strike the solar cells and generate *direct current* electricity. This type of energy is converted by an inverter to make the energy into *alternating currents*. This is what our homes and buildings use. *Concentrating solar-thermal power*- Unlike the solar panels, CSP relies on mirrors to reflect sunlight onto receivers that collect solar energy into heat.

Teacher's Note:
Unit to introduce the hands-on learning experience of building solar-panel battery packs. Important to connect to students' interests: how can renewable energy relate to them? (Charging their phones and other electronic devices

References

Bioenergy Basics. (n.d.). Energy.gov. https://www.energy.gov/eere/bioenergy/bioenergy-basics

Geothermal explained - U.S. Energy Information Administration (EIA). (n.d.). https://www.eia.gov/energyexplained/geothermal/

Geothermal explained - U.S. Energy Information Administration (EIA). (n.d.-b). https://www.eia.gov/energyexplained/geothermal/

How does solar work? (n.d.). Energy.gov. https://www.energy.gov/eere/solar/how-does-solar-work

Hydropower Basics. (n.d.). Energy.gov. https://www.energy.gov/eere/water/hydropower-basics

Hydropower explained - U.S. Energy Information Administration (EIA). (n.d.). https://www.eia.gov/energyexplained/hydropower

Solar explained - U.S. Energy Information Administration (EIA). (n.d.). https://www.eia.gov/energyexplained/solar/

United Nations. (n.d.). *What is renewable energy? | United Nations*. https://www.un.org/en/climatechange/what-is-renewable-energy

Wind Energy Basics. (n.d.). Energy.gov. https://www.energy.gov/eere/wind/wind-energy-basics