



5-Minute Refresher: RENEWABLE ENERGY

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Renewable Energy- Key Ideas

- Renewable energy is a source of energy that can be used and replenished naturally in a relatively short period of time.
- Non-renewable energy is energy that cannot be replenished in a short time. Because of this, it will eventually run out.
- Example: Coal is nonrenewable because it takes at least one million years to form. This means it cannot be replenished quickly. If we continue to use coal for energy, it will eventually be depleted.
- It is important to develop and harness renewable energy sources so that we can continue to meet our energy needs in the future.
- Common forms of renewable energy are: wind energy, solar energy, hydropower, biomass, and geothermal energy.
- Common sources of nonrenewable energy are fossil fuels: coal, crude oil, natural gas (petroleum), and uranium (nuclear energy)

Renewable Energy- Sources

- **Wind power:**
 - Wind turbines convert wind energy into electricity.
 - Advantages: wind energy will never run out; does not pollute
 - Disadvantages: technology can be expensive; wind speed is not constant across different locations and seasons
- **Solar power:**
 - Solar cells and solar thermal power plants convert sunlight into electricity.
 - Advantages: minimal impact on environment; sunlight will not run out
 - Disadvantages: amount of sunlight varies daily; solar panels must be very large to generate useful amounts of electricity
- **Hydropower:**
 - Water turns turbines that generate electricity. Example: hydroelectric dams
 - Advantages: Can supply large amount of energy; constantly replenished by water cycle
 - Disadvantages: Dams can harm the local ecosystem. For example, they can decrease the sediment flow downstream of the dam, disrupting fish and plant populations.

Renewable Energy- Sources

- **Biomass:**
 - Energy from plants and microorganisms is converted to useful energy. Examples: burning wood, trapping methane gas, making biodiesel fuel
 - Advantages: biomass is easily obtained and harnessed; can be replenished by growing new plants
 - Disadvantages: burning of biomass may release pollutants; not necessarily sustainable

- **Geothermal:**
 - Heat from within the Earth is used to heat buildings and generate electricity; found near hot springs and volcanoes
 - Advantages: clean and efficient heat and energy production
 - Disadvantages: extracting geothermal energy can disrupt the surrounding environment; not easily transported

Renewable Energy- Learning Objectives for Grades K - 3

- Energy is used to power things, such as lights and cars.
- We get energy from different sources.
- Some energy sources on Earth might run out, while others will not.
- Some energy sources that might run out are coal and oil.
- Some energy sources that will not run out are energy from the sun, wind, and water.

Renewable Energy- Learning Objectives for Grades 4 - 6

- Some energy sources on Earth might run out because they cannot be replenished quickly. This is called nonrenewable energy.
- If humans continue to rely on nonrenewable energy sources, we may run out of energy to supply electricity to buildings, power automobiles, and heat homes in the future
- Some sources of energy will not run out because they are easily replenished. This is called renewable energy.
- Examples of nonrenewable energy are: coal, oil, natural gas, and uranium.
- Examples of renewable energy are: solar power, wind power, hydropower, geothermal energy, and biomass.

Renewable Energy- Prior Knowledge for Grades K - 3

- Students should understand that some things need energy in order to work or function.
- Students should be able to identify different objects that need energy to function. (For example, humans need food, lights need electricity, most cars need fuel, etc.)

Renewable Energy- Prior Knowledge for Grades 4 - 6

- Students should be able to list different ways that humans use energy. (For example: fuel for cars, electricity and heat in homes, cooking food, and so on.)
- Students should have a general understanding of how pollution affects the environment.
- Most students have probably heard of or seen different renewable energy sources such as wind turbines, solar power, biodiesel cars, or dams. Students should be encouraged to reflect on what they already know about these objects.

Renewable Energy- Common Misconceptions

- Renewable energy will never run out.
 - **Reality:** Renewable energy does not necessarily mean that the energy is permanent or sustainable; it means that the energy can be quickly replenished. While biomass is a renewable energy source, it is possible to deplete it faster than we can replenish it, meaning it could possibly run out. Also, wind power, solar power, and geothermal power can be inconsistent sources of energy depending on the time of year and location.
- Renewable energy does not pollute the environment.
 - **Reality:** The amount of pollution released by renewable energy sources depends on how the energy is harnessed and used. For example, using geothermal heat from a hot spring is usually a pollution-free process, but drilling for geothermal heat can release hazardous gasses, such as hydrogen sulfide, into the environment.

Renewable Energy- Additional Information

For more information about why fossil fuels are considered nonrenewable sources of energy, watch the video at the following link:

http://siemensscienceday.com/activities/tragedy_of_commons.cfm