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TEACHER GUIDE

NON-RENEWABLE AND RENEWABLE ENERGY GRADES 3-5

COMMON MISCONCEPTIONS

- **Energy is created at power plants.**
Energy is transformed from one type to another more usable type in power plants. For instance, natural gas energy can be transformed to electrical energy, or hydropower energy transformed to electrical energy, in electrical power-generating plants.
- **Energy is a fuel.**
Fuels are sources of potential energy. When fuels are burned or otherwise transformed, the potential energy is released to become useful forms of energy for our world, such as electricity.
- **Energy can be destroyed.**
Energy is neither created or destroyed, it is only transformed from one type of energy to another, or it is available as potential energy.
- **Renewable energy is cost-free and pollution-free.**
There are costs associated with renewable energy that can limit how and where it is used. Solar collectors and generators use costly materials that can make them expensive to produce. Wind generators have production costs, and can impact wildlife - particularly birds. Power transmission from remote solar and wind generation sites can entail road-building and power line construction, with associated environmental impacts and building costs. Biomass energy production can release greenhouse gases that contribute to air pollution and climate change.

ENERGY

Energy is the capacity to do work. Work is energy transferred from one system to another, and is defined as a force that causes movement. There are two basic forms of energy: kinetic and potential. Kinetic energy is found in movement. Sound and heat are forms of kinetic energy, and electricity is the kinetic energy of electrons flowing between atoms. Potential energy is energy that is stored. It can be chemical, nuclear, gravitational, elastic, or mechanical. Potential energy can be transformed into forms of kinetic energy that are useful in our world. Energy can shift between forms but is never destroyed or created.

ENERGY SOURCES

Natural sources of energy are found in the processes that are happening everywhere on Earth, such as: sunlight; various types of heat and light; sound; magnetism; gravity; movement of all kinds, including wind and water; and in all life functions. Fuels are substances that provide energy in a system by going through a transformation or reaction.

RENEWABLE ENERGY

Renewable energy is energy that is found in earth processes that are present and ongoing. Earth processes that provide renewable energy are: wind; hydropower in various forms (rivers, oceans); sunlight; geothermal activity; biomass sources from wood, waste, and agriculture. Some types of renewable energy sources depend on specific locations on Earth, such as places with consistent wind, areas that receive relatively uninterrupted sunlight, and forested areas that provide wood as a source of fuel.

NON-RENEWABLE ENERGY

Non-renewable energy is from energy sources that take a very long time, as in millions of years, to form or replenish. There is a finite amount of non-renewable energy available on Earth, which means that non-renewable energy sources can be depleted. Non-renewable energy sources on Earth are fossil fuels such as crude oil and its refined products, natural gas, coal, and uranium.

WIND ENERGY

Wind is typically harvested with turbines, like windmills. They have blades that are pushed by the force of the wind. The blades are mounted on a turning shaft, which spins a generator that converts the mechanical energy of the spin to electrical energy. Wind electrical generators can stand alone to create power for remote areas, and they can be connected to wide-spread power grids that combine multiple electrical sources to meet demand.

SOLAR ENERGY

Solar energy is chiefly used in two ways: as a source of heat (thermal energy) and to convert sunlight to electricity (solar photovoltaic cells). Solar thermal energy is used to heat water or other fluids, both for use as hot water in washing and swimming pools, and to heat buildings in radiators. Solar cookers are used to cook and dry foods around the world.

HYDROELECTRIC ENERGY AND HYDROPOWER

Hydroelectric power is produced from moving water. Hydroelectric energy power plants are typically located on or near water. Rivers and waterfalls are the major sources of hydroelectric power in the world. Hydropower has been in use for thousands of years. Grain and lumber mills were powered directly with hydropower. It is one of the oldest sources of energy for producing mechanical and electrical energy.