JEA

e-SMARTkids

ACTIVITY TIPS

Generation Investigation

This activity appears in the section *How Energy Behaves*. It asks students to identify which energy sources JEA uses to generate electricity and to describe the transformation of energy that occurs when one of these sources is used to produce electricity.

Per the web pages provided for the activity, JEA uses the following energy sources to generate the electricity it provides to its customers: nuclear, coal, natural gas, petroleum coke, solar, biomass, and methane gas. Students will need to identify the initial form of energy present in one of these sources and describe how this form of energy is converted into electricity.

Below are short descriptions for each energy source used by JEA. All of them except solar involve the use of a turbine generator. Students' explanation of electricity production should include some reference to how a turbine generator works. (In very general terms, a turbine generator converts mechanical energy into electrical energy. When turbines spin, they rotate a large magnet inside a coil of wire. As the magnet rotates, it creates a changing magnetic field, which induces an electric current in a wire coil, generating electricity.)

Nuclear: Initial form is *nuclear energy*. When a nucleus splits into many pieces, heat is released. This heat is used to boil water to make pressurized steam. The steam is directed at large turbine blades to make them spin. The spinning blades drive a generator that produces electricity.

Coal, natural gas, and petroleum coke: Initial form is *chemical energy*. Burning these fuels creates a chemical reaction that releases heat. The heat released from these fuels is used to boil water and produce pressurized steam, which spins large turbine blades that drive a generator to produce electricity.

Solar: Initial form is *radiant energy* from sunlight. When sunlight hits a solar cell, electrons are released. The electrons then flow onto wires, forming direct current (DC) electricity. This current can be stored in large batteries for later use or converted to alternating current (AC) electricity and fed into the power grid for delivery over power lines.

Biomass: Initial form is *chemical energy*. Biomass is organic material from tree cuttings, wood, crops, manure, and some garbage. Biomass can be burned to heat water to make pressurized steam, which spins large turbine blades that drive a generator to produce electricity. It can also be converted into a liquid or gas, which can be burned to do the same thing.

Methane gas: Initial form is *chemical energy*. Methane gas is a byproduct of decay in landfills. As garbage rots in the ground, it gives off gases that can be collected and burned to produce heat. This heat is used to boil water and produce pressurized steam, which spins large turbine blades that drive a generator to produce electricity.