Energizing Resources

Purpose

Students will describe how electrical energy can be produced from a variety of energy sources and will recognize and explain that different ways of obtaining and transforming energy have different environmental consequences.

Materials

For the teacher: chalk, chalkboard
For each student: science journal, piece of paper, pen or pencil
For each group of students: resource materials, copy of Black Line Master (BLM) *Energizing Resources*, poster board, markers

Activity

A. Pre-Activity Discussion

1. Ask the students: "What is *electrical energy*?"
2. Discuss how *electrical energy* is one form of energy that creates the ability to do work, such as turning on a light bulb.
3. Ask students for some examples of where we get electrical energy. Write their answers on the board under the word "sources."
4. Include the following types of energy if they were not given as examples: fossil fuels (coal, oil, gas), hydroelectric, geothermal (volcanoes, hot springs), nuclear, solar, wind.
5. Tell students that in order to get electrical energy from any of these sources, a conversion must take place.
6. Ask students: "How is coal, a fossil fuel, converted to electricity?"
7. Explain that coal is burned for heat energy, which is transformed into electrical energy. Explain that when coal is burned, its heat energy is used to produce steam and the steam turns turbines that are attached to an electrical generator.
8. Ask students if they know of any environmental problems related to burning coal. Explain to students that when coal is burned, it not only produces heat, but also byproducts such as air pollutants. Discuss how sulfur is one such byproduct.
9. Explain that when sulfur dioxide is released into the atmosphere, it can combine with water vapor to form acid rain. Explain that acid rain has detrimental effects on the environment.
10. Explain that energy exists in a variety of forms and can be converted from one form to another, sometimes with damaging environmental consequences.

(continued)

English/ Language Arts

Have the students deliver a persuasive presentation that states a clear position in support of one of the arguments presented during the poster presentations.

Have students research and report on the use of alternative energy sources in the United States. Direct students to include information about energy policy, research and development, and environmental issues.

Standards Links
7.1.9, 7.1.10, 7.3.14

Activity (continued)

B. Energizing Resources

1. Divide the class into small groups.
2. Have each group find definitions for the following words and write them in their science journals: conversion, combustion, fuel, conversion efficiency, energy conversion device, kinetic energy, thermal energy, chemical energy, nuclear energy.
3. Assign each group a type of energy, such as fossil fuels (these can be divided further into coal, oil, and gas), hydroelectric, geothermal, nuclear, solar, or wind.
4. Explain to students that they will be researching how electrical energy can be produced from their particular energy source.
5. Distribute a copy of the BLM *Energizing Resources* and research materials to each group of students and direct each group to work on the BLM.
6. Instruct students to create a poster, summarizing the information from part I on the BLM.
7. Tell students to make one side of the poster an advertisement for the type of energy and the other side of the poster a campaign against the type of energy.

C. Energizing Presentations

1. After students in each group have completed the BLM *Energizing Resources* and completed their posters, have them present their posters to the class.
2. Discuss the main points of each poster with the class and clarify the main points concerning each type of energy.
3. Discuss the variety of sources of electrical energy and how they ultimately can have very different environmental consequences.

Classroom Assessment

Basic Concepts and Processes

During the presentations, ask questions, such as the following:

- Which side of the poster do you agree with, the advertisement or the campaign against using this energy source? Why?
- Why does the United States use energy sources that are known pollutants?
- Why doesn't the United States use more kinds of energy that are not harmful to the environment?
- Did you have any difficulties conducting your research?

Name: _____

Energizing Resources

Use separate pieces of paper to answer the following questions:

Part I

1. What is your group's type of energy?
2. How is the energy source obtained?
3. Describe the conversion of this form of energy into electricity. Make sure to name the forms of energy throughout the conversion and how the energy source is obtained and transformed.
4. Draw a diagram of the conversion from question 3.
5. How does the process in question 3 affect the environment?
6. What are the advantages of using this type of energy?
7. What are the disadvantages of using this type of energy?

Part II

Complete the data table below from information given in the group presentations.

Type of Energy	Energy Forms	Advantages	Disadvantages
Fossil Fuels: Coal			
Fossil Fuels: Petroleum (oil)			
Fossil Fuels: Gas			
Hydroelectric			
Geothermal			
Nuclear			
Solar			
Wind			