Solar Education for NY
SchoolPower...Naturally

Our Dependence on Fossil Fuels

SPN LESSON #2

TEACHER INFORMATION

LEARNING OUTCOME: As the result of participating in a simulation, students realize that global fossil fuel resources are limited.

LESSON OVERVIEW: The purpose of this lesson is to make students aware of their dependence on fossil fuels. In the introductory activity not all students are treated equitably to emphasize that fossil fuels are finite resources. Then students are asked to list the external sources of energy used to address everyday needs in their lives.

GRADE-LEVEL APPROPRIATENESS: This introductory general energy lesson may be used in a middle-level social studies classroom or in any other classroom studying PV systems in Level II or Level III.

MATERIALS: Paper bag containing peanuts in shells or wrapped pieces of candy

SAFETY: Because edible food will be dispensed, make sure that it is dispensed in accordance with your school's food policies. Should anyone in the class have an allergy to nuts, you might want to substitute hard candies.

TEACHING THE LESSON: In a deep paper bag place about three times as many pieces of candy or peanuts as there are students in your class. (Students should be able to reach into the bag without seeing the contents.) Explain to your students that you have put an undetermined number of pieces of candy or peanuts into the bag, and emphasize that you would like to share the candy or peanuts with everyone in the classroom. Invite each student, therefore, in turn, to take as many pieces of candy or peanuts as she/he likes, but do not allow any student to eat any candy or peanuts until all have been served. Every now and then add a few more pieces of candy or peanuts to the bag. There will probably be very few or no peanuts or pieces of candy for the last students to be served.

Have students answer questions 1–6 on the student handout. After they have finished, ask them to share their answers. Then point out that the peanuts or pieces of candy represent fossil fuels, and have them answer questions 7–8 on the student handout.

Next have students list ten everyday activities, the source of energy that was transformed to enable each activity to happen, and the form into which students transformed the energy. After

they complete this assignment; students should answer questions 9–12. Conclude the lesson by asking students to share their answers, particularly to question 12.

ACCEPTABLE RESPONSES FOR DEVELOP YOUR UNDERSTANDING SECTION:

Student answers to the questions on the handout will vary, but it is important that students realize that the candy or peanuts added to the bag from time to time represented the discovery of additional deposits of fossil fuels.

Some typical responses to the assignment regarding the transformation of external energy sources to address everyday human needs might be the following:

Activity	Source of energy	Form into which energy is transformed
Go to school	Gasoline	Motion
Listen to music	Electricity	Sound
Watch television	Electricity	Sound and light
Cook dinner	Gas or electricity	Heat
Work on computer	Electricity	Light
Keep house warm	Gas or oil	Heat
Read after dark	Electricity	Light
Take shower	Gas, oil, or electricity	Heat (for hot water)
Tell time	Electricity	Motion (of hands of clock)
Talk on telephone	Electricity	Sound

ADDITIONAL SUPPORT FOR TEACHERS

SOURCE FOR THIS ADAPTED ACTIVITY: New York Science, Technology, and Society Education Project, *Energy: How Does It Impact Our Lives?* (Research Foundation of the State University of New York, 1994), Activity 1.1

BACKGROUND INFORMATION: Fossil fuels are being used at rates far greater than they can be created on Earth. Because of this, they are said to be *nonrenewable*. Although they have brought much convenience to our lives, we will eventually run out of them. Preserving the quality of our lifestyles, therefore, requires finding energy sources that are continually replenished; these sources are said to be *renewable*.

REFERENCES FOR BACKGROUND INFORMATION: The most up-to-date information about fossil fuel reserves and other data pertaining to energy are available from the Energy Information Administration. The URL of their website is www.eia.doe.gov.

LINKS TO SOCIAL STUDIES LEARNING STANDARDS:

Standard 3 — Geography: Students will use a variety of intellectual skills to demonstrate their understanding of the geography of the interdependent world in which we live—local, national, and global—including the distribution of people, places, and environments over the Earth's surface.
Key Idea 1: Geography can be divided into six essential elements which can be used to analyze important historic, geographic, economic, and environmental questions and issues. These six elements include: the world in spatial terms, places and regions, physical settings (including natural resources), human systems, environment and society, and the use of geography. (Adapted from The National Geography Standards, 1994: Geography for Life)

Standard 4 — Economics: Students will use a variety of intellectual skills to demonstrate their understanding of how the United States and other societies develop economic systems and associated institutions to allocate scarce resources, how major decision-making units function in the U.S. and other national economies, and how an economy solves the scarcity problem through market and nonmarket mechanisms.
Key Idea 1: The study of economics requires an understanding of major economic concepts and systems, the principles of economic decision making, and the interdependence of economies and economic systems throughout the world.

- Explain how societies and nations attempt to satisfy their basic needs and wants by utilizing scarce capital, natural, and human resources. (intermediate)
- Understand how scarcity requires people and nations to make choices which involve costs and future considerations. (intermediate)
- Analyze the effectiveness of varying ways societies, nations, and regions of the world attempt to satisfy their basic needs and wants by utilizing scarce resources. (commencement)
- Understand the nature of scarcity and how nations of the world make choices which involve economic and social costs and benefits. (commencement)

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nyserda.ny.gov

(STUDENT HANDOUT SECTION FOLLOWS)

Name_____

Date _____

Our Dependence on Fossil Fuels

Your teacher will pass around to each member of your class a paper bag containing peanuts in shells or wrapped pieces of candy, and you will be invited to reach in, without looking, and take as many peanuts or wrapped pieces of candy as you like. Do not eat the peanuts or candy until all students have been served and you have answered the following questions:

DEVELOP YOUR UNDERSTANDING

1. Are you happy with the number of peanuts or wrapped pieces of candy you have? Why?

2. Is it fair that some students have five or six peanuts or wrapped pieces of candy and others have very few or none?

3. Do you believe that the first people who took peanuts or candy tried to gain an unfair advantage over those who were last?

4. Were the first people who took peanuts or candy wrong to take big handfuls?

5. If you had known that the supply of peanuts or candy was limited, would you have taken a different number?

6. What did you learn from this part of the activity?

Consider that the peanuts or wrapped pieces of candy in the bag represent Earth's supply of fossil fuels (coal, oil, and natural gas). Fossils are believed to have formed when material that later became rock was deposited along with the remains of organisms that were once alive. Fossil fuels are so named because they were similarly formed millions of years ago from the organisms themselves.

7. Why did your teacher replace some of the peanuts or pieces of candy in the paper bag?

8. Suppose we didn't have enough fossil fuels to address our energy needs? Could we get more? Why or why not?

According to the first law of thermodynamics, energy is neither created nor destroyed; therefore, we never really "use" energy. Rather, we *transform* it—from some other form into a form that will address our needs. Some of this energy is transformed by our bodies from the food we eat, so that we can perform certain activities of our own choosing. Think about the external sources of energy you transform to address your needs. Make a list of ten activities in a day that require transforming external energy sources. List them in the following table, along with the energy sources and the form into which you transformed the energy.

Activity	Source of energy	Form into which energy is transformed

9. How many of the activities you listed use fossil fuels (coal, oil, or gas) as a source?

10. How many activities use electricity as a source?

11. Do you know the energy source for your electricity locally? Is this source a fossil fuel?

12. What might a nation do to become less dependent on fossil fuels?