



# HOME ENERGY AUDIT

## **BENCHMARKS AND TASKS**

**SC.B.1.2.5** The student knows that various forms of energy (e.g., mechanical, chemical, electrical, magnetic, nuclear, and radiant) can be measured in ways that make it possible to determine the amount of energy that is transformed.

**SC.B. 2.2.2** The student recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.

- The student measures the gain or loss of energy by using a variety of tools (e.g., thermometer, electric meter, meter stick).
- The student identifies natural resources and their importance.
- The student classifies resources as renewable or nonrenewable.
- The student examines the risk factors associated with the use of nonrenewable energy sources.
- The student explains that the energy in fossil fuels, such as oil and coal, comes from the sun indirectly, the main source of energy for people, because the fuels come from plants that grew long ago.
- The student develops a plan for energy conservation.

## **KEY QUESTION**

How well does your family conserve energy in your home?

## **BACKGROUND INFORMATION**

Natural **resources** are the raw materials we use for housing, clothing, transporting, heating, cooking, etc. They include the air we breathe, the water we drink, the land we farm, and the space we use for living. They are all the things we use in our physical **environment** to meet our needs and wants.

Natural resources can be classified as **renewable** or **nonrenewable**. Renewable resources (e.g., trees, animals) are materials that can be replenished through natural and/or human processes. However, people sometimes use renewable resources in such a way that they disappear completely.

Nonrenewable resources (e.g., fossil fuels) cannot be replenished.

**Fossil** fuels (e.g., oil, coal) are formed through natural processes. When plants and animals die, some **energy** is still stored in the tissues of their bodies. Over millions of years, as layers of dead plant and animal material build up at the bottom of swamps, lakes, and oceans, this energy becomes concentrated into energy-rich materials such as oil or coal. The energy can be traced back to the **sun** supplying energy for the plants to make their own food. When you turn on the air conditioner or a lamp, you're using energy. Much of the energy we use comes from burning fossil fuels, such as coal, natural gas, oil, and gasoline. If we use all the available fossil fuels, no additional amounts of them will ever be available to us – at least not for millions of years. They are nonrenewable.

People must become more concerned about decreasing the demand for natural resources and saving energy. Without an adequate supply, our society would drastically change. To understand energy conservation we have to first understand what energy is. Simply put, energy is the ability to do work. The more steps there are between the primary energy source and its final use determines the energy waste factor; the more steps, the more waste. For example, if we want to light a lamp in our home, we receive energy from a power plant. The power plant receives its energy from turbines. The turbines receive their energy to spin from steam power that, in turn, receives its energy from the burning of fossil fuels. The problem is that whenever energy changes from one form to another, some of it is changed to **heat energy**, which dissipates into the atmosphere.

## **MATERIALS**

### **Per student**

*Home Energy Audit* worksheet

## **TEACHING TIPS**

1. This activity will take several weeks to complete.
2. Communicate with parents ahead of time so they will be prepared to support this investigation.

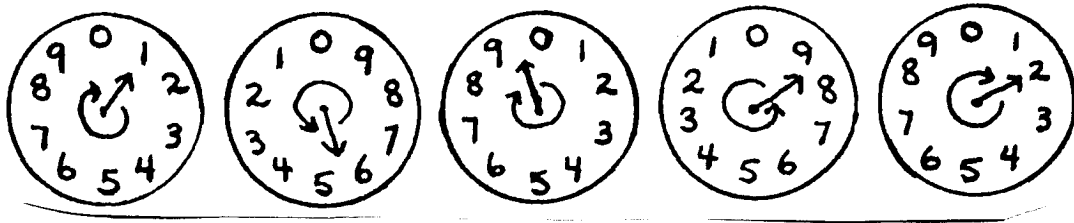
## **ENGAGE**

1. Ask students to brainstorm a list of natural resources. (See Background Information.)
2. After the lists have been compiled, students should use a Tree Map to classify the resources as renewable or nonrenewable.
3. Ask students to think about ways to save energy and what they could do to become less reliable on natural resources, especially nonrenewable resources.

## **EXPLORE**

1. Ask: *How would you like to win a bet with your parents that you could help them save money on their electric bill? Do you think that by making your parents more aware of their energy usage, you can help them save energy costs?*
2. The students will have a discussion about energy conservation in their homes and talk about ways they could all become more energy conscious.
3. Next, tell them that with a little help from science, you have come up with a plan to help them save energy costs in their homes. If they are willing to participate and if your plan works, their parents may agree to treat them.
4. Students will use the *Home Energy Audit* sheet, interview each family member, and put tally marks next to their responses. Explain how students should complete the interview process with their family members.
5. After collecting all the responses, students will share the data with family members. They should note the areas with the most tallies, especially those checked next to “very easy” and “easy.”
6. Finally, students will ask family members if they are willing to avoid using appliances marked in the “very easy” and/or “easy” columns for a period of one week. Once everyone has agreed not to use the specified appliances, students are ready to start the next phase of the investigation.

- Teach the class how to read an electric meter so they can determine the amount of kilowatt-hours their family uses in a week's time. (This data can be displayed as a collective bar graph in the class.)



- Explain to the students where electric meters can be found on the outside walls of their homes.
  - Most electric meters have four or five dials, each numbered from 0 to 9 in opposite directions. Every other dial turns counter-clockwise. To read the dials, start with the right most dial. If the pointer is between two numbers, read the lower of the two numbers.
  - Read each meter and record the numbers for each dial. Write the numbers down right to left.
- Now that students have the data from their audits and they know how to read an electric meter, see if they can use this information to help their families lower the electric bill. Students should take a meter reading at the beginning of a week and again at the end of a week during which the family is using appliances as per usual. They should then subtract the two readings to determine the number of kilowatt-hours the family uses in one typical week.
  - Students will take another meter reading at the beginning of the week before the family reduces energy consumption by using fewer appliances and again at the end of that week. By comparing that reading with the first reading they can see if their families were able to reduce the number of kilowatt hours used. If there is a savings, then they can collect on that bet!

### **EXPLAIN**

*How many kilowatt-hours did your family use during a typical week?*

*Was your family able to conserve energy by using fewer appliances?*

*By how much were they able to reduce their energy consumption?*

*Which appliances were the most difficult to give up for a week? Why do you think so?*

*Why do we need to conserve energy? (When you turn on the air conditioner or a lamp, you're using energy. Much of the energy we use comes from burning fossil fuels such as coal, natural gas, oil, and gasoline. If we use all the available fossil fuels, no additional amounts of them will ever be available to us – at least not for millions of years. They are nonrenewable resources.)*

*How would you and your family be affected if we completely depleted our supply of fossil fuels (coal, petroleum, gas) and they were no longer available to us?*

*Even if you and your family don't give up the use of certain appliances permanently, what can you do to reduce the amount of energy you use? (Buy energy-efficient appliances; think before opening the refrigerator door, etc.)*

*What did you and your families learn about energy conservation during this investigation?*

### **EXTEND AND APPLY**

1. Students should bring the data they have collected from their family's home energy audit to class. They will use this data to create a class graph.
2. Challenge students to find out more about fossil fuels and how the energy we use today (e.g., coal, oil) can be traced back to the sun and plants and animals that lived millions of years ago.

## HOME ENERGY AUDIT

**How difficult would it be for you to give up this appliance for a one-week period?**

	<b>Very Easy</b>	<b>Easy</b>	<b>Difficult</b>	<b>Very Difficult</b>	<b>Impossible</b>	<b>Not Applicable</b>
Air conditioner						
Blender						
Can opener						
Carving knife						
Clocks						
Clothes dryer						
Clothes washer						
Coffeemaker						
Computer						
Curling iron						
Dishwasher						
DVD/VCR						
Electronic games						
Fans						
Freezer						
Frying pans						
Garbage disposal						
Hair dryer						
Hot water heater						
Ice cream maker						
Iron						
Lights						
Microwave oven						
Mixer						
Popcorn maker						
Power tools						
Radios						
Range						
Record player/CD						
Refrigerator						
Space heaters						
Televisions						
Toaster						
Toothbrushes						
Trash compactor						
Vacuum cleaner						

