

<b>Lesson Overview</b>	<p>In this lesson, students prepare for Alliant Energy’s upcoming presentation on Energy Conservation and the Environment. The lesson focuses on the differences between renewable and nonrenewable energy sources, emphasizing the growing difficulty of finding energy whose supply is decreasing. The students will track their own use of a nonrenewable energy source during a given day, which will give them a good frame of reference for the Alliant Energy presentation.</p>
<b>Objectives</b>	<ul style="list-style-type: none"> <li>• To participate in a simulation that illustrates the dilemma of searching for nonrenewable energy sources</li> <li>• To compare the availability and types of renewable and nonrenewable energy sources</li> <li>• To investigate their own use of a nonrenewable energy source</li> </ul>
<b>National Standards Addressed</b>	<p><i>K-4 Science Content Standard C – Organisms and Their Environments</i>  Humans depend on their natural and constructed environments. Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms.</p> <p><i>K-4 Science Content Standard D – Properties of Earth Materials</i>  Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use. Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.</p> <p><i>K-4 Science Content Standard F – Characteristics and Changes in Populations</i>  Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population. The supply of many resources is limited. If used, resources can be extended through recycling and decreased use.</p> <p><i>K-4 Science Content Standard F – Changes in Environments</i>  Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans. Some environmental changes occur slowly, and others occur rapidly.</p>

<b>National Standards, continued</b>	<p>Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.</p> <p><i>Math Grades 3-5 – Data Analysis and Probability Standard</i> Represent data using tables and graphs such as line plots, bar graphs, and line graphs.</p>
<b>Desired Outcome</b>	<p>After completing this lesson, students will:</p> <ul style="list-style-type: none"> <li>• Recognize that nonrenewable energy sources come from fossils and that their supplies are limited</li> <li>• Better understand that a limited supply of something — e.g., a nonrenewable resource — increases the difficulty of obtaining it</li> <li>• Have a better understanding of the difference between renewable and nonrenewable energy sources</li> <li>• Be able to track their own use of a nonrenewable resource for a day</li> </ul>
<b>Time Required</b>	<p><i>Teacher preparation:</i> 20 minutes <i>Class time:</i> Two 30-45 minute classes, plus outside time for self-tracking exercise</p>
<b>Materials Needed</b>	<ul style="list-style-type: none"> <li>• 200 pennies</li> <li>• piece of coal</li> <li>• toy pinwheel</li> <li>• data sheet</li> <li>• 4 three-ounce plastic cups per pair of students</li> <li>• permanent markers</li> <li>• overhead projector, blank transparencies, overhead transparency marker</li> <li>• Teacher and/or student resources such as the following Web sites: <a href="http://www.eere.energy.gov/cleancities/">www.eere.energy.gov/cleancities/</a> <a href="http://www.powerhousetv.com/renewable">www.powerhousetv.com/renewable</a> <a href="http://www.alliantenergykids.com/environment">www.alliantenergykids.com/environment</a> <a href="http://www.eere.energy.gov/kids/">www.eere.energy.gov/kids/</a> <a href="http://www.eia.doe.gov/kids/">www.eia.doe.gov/kids/</a> <a href="http://www.culverco.com/ngsw/efficiently/saver.html">www.culverco.com/ngsw/efficiently/saver.html</a></li> </ul>

**Reproducible**

This lesson includes a reproducible data sheet for students to use during a simulation of searching for nonrenewable energy sources.

**Important Terms**

Fossil fuel, renewable energy source, nonrenewable energy source, conservation, recycle, deplete, solar energy, hydroelectric power plant, biomass

**Lesson Steps/Activity**

1. Prior to the class, hide 200 pennies around the room. Make sure that some are hidden in very obscure places.
2. Begin class by showing a piece of coal and asking for student volunteers to tell what it is and what it is used for. Lead the students to classify it as a source of energy that must be burned in order to release energy.
3. Demonstrate the movement of the pinwheel by blowing toward it. Again, ask students to identify the source of the energy. (If they say “you,” be sure to translate that into “wind” or “nature.”) Also, ask how the pinwheel uses the wind — how it is captured or harnessed. Students should be able to recognize that the shape of the pinwheel creates the rotation when a current of air strikes it. (This Web site has an excellent graphic of a wind machine: <http://www.eia.doe.gov/kids/energyfacts/sources/renewable/wind.html>)
4. Ask students to suggest which one of the energy sources is more likely to run out of its supply. In comparing the two energy sources, students should explain why they think one will likely run out and the other is not likely to run out. Label the two energy sources: nonrenewable (coal) and renewable (wind). Put up the overhead to complete the definitions of nonrenewable and renewable resources.
5. Arrange students in pairs and hand out the data sheet [reproducible], plastic cups, and markers. Have them label the cups 1 through 4. Tell them that they are going to be searching for a nonrenewable source of energy (such as the coal discussed earlier) symbolized by pennies hidden throughout the classroom.
6. Give students four 30-second opportunities to find pennies. After each search, have them count, record, and deposit the pennies into a cup (one labeled for each search). At the end of their four searches, they should make a bar graph and analyze their data.
7. When the paired groups have completed the data sheet, ask for volunteers to share their results. Once a few pairs share similar results, lead the class in a discussion. Through the data, students should be able to deduce that due to a limited supply to begin with, the search yielded smaller returns each time.
8. Extend the discussion on renewable and nonrenewable energy sources, connecting the search for pennies to the search for nonrenewable energy sources. Using an overhead, begin making a list of renewable energy

**Lesson Steps, continued**

sources and nonrenewable energy sources.

9. Ask students to track the number of times and ways they use a nonrenewable energy source in one day. (They can simply create a list, or you can develop a table for students to use in charting their use.) When giving the assignment, have students identify some typical examples they will likely encounter, such as watching television, turning on lights, and taking a hot shower.
10. When the students return to class with their assignment, lead a discussion, and compile their information using an overhead. Did they use energy more than they thought they would? Less often?

**Extensions and Modifications**

- Have the partners share results of their graphs with the class, and then compile a whole-class graph that depicts the average number of pennies found in each time period.
- To accommodate visually impaired students or any students with disabilities, have them work with a pair of students rather than just one.
- To extend the lesson, have students examine their tracking sheets to identify any usage of nonrenewable energy sources that they could eliminate or reduce — e.g., the number of times they turned on a light.

# Pennies from ... ?

Pretend you have been hired to find sources of natural gas or coal. Natural gas is used to heat many homes and operate many appliances such as stoves and dryers. Coal is often used to generate electrical power, which we use throughout the day.

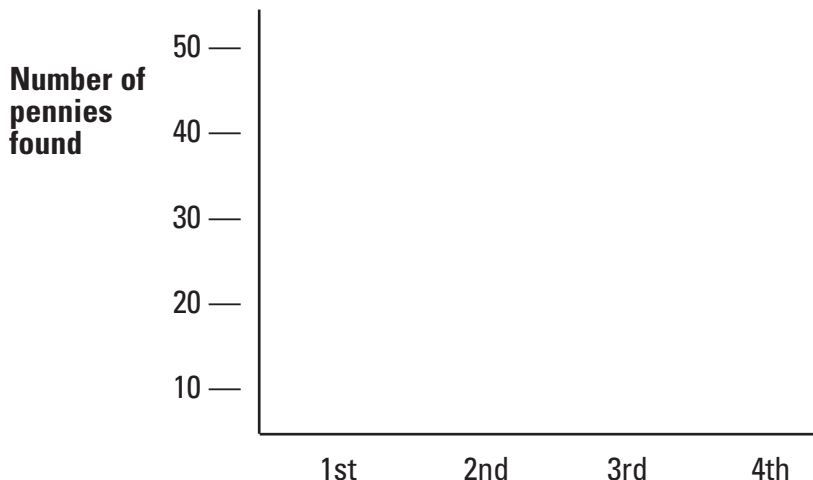


Coal and natural gas are called fossil fuels, because they come from the remains of dinosaurs and ancient plants that existed during their time. When they died and became buried deep in the earth, the heat and pressure of the earth's layers gradually transformed them into coal, natural gas, and other energy sources, such as oil. Fossil fuels are sometimes called "nonrenewable" energy sources because once we find them and use them, they are gone forever!

In this exercise, you will be asked to search for pennies (let's pretend those pennies are coal deposits) in four 30-second sessions. After each search, you will count the pennies, record the total in the area below, and deposit them in the correctly numbered cup. After the fourth search, recount each cup of pennies one at a time, and make a bar graph to show the number of pennies you found in each search.

Good luck searching!

First search \_\_\_\_\_  
Second search \_\_\_\_\_  
Third search \_\_\_\_\_  
Fourth search \_\_\_\_\_



## Questions:

1. Look at your graph. In which search did you find the most pennies? \_\_\_\_\_
2. What is the difference between the number of pennies you found in your tallest graph and your shortest graph? \_\_\_\_\_
3. Why do you think it became increasingly harder to find pennies? \_\_\_\_\_  
\_\_\_\_\_
4. If you were really searching for coal, what does your graph data tell you? \_\_\_\_\_  
\_\_\_\_\_