

# 1. Energy Sources

**Subjects:**

Science, Environmental Science, Social Science, Language Arts, Health

**Process Skills:**

Listening, reading, writing, grouping facts, conducting research

**Grades:**

4–6

**Cognitive Task Level:**

Average to difficult

**Time for Activity:**

30 minutes to start, then as a homework assignment

**Key Vocabulary:**

Chemical, jojoba, organic, fossil, nuclear, electricity, hydraulic, hydroelectric, petroleum, windmill, refuse

**Intended Learning Outcomes:**

Completing this activity will allow students to:

- Observe different types of energy sources
- Learn more about energy and where it comes from
- Conduct their own research reports on energy sources.

**Background**

Sources of energy are all around us, and come in a variety of different forms. Energy for a person is different than energy for an automobile. In this activity, the teacher demonstrates several different types of energy, and assigns a research report topic for small groups of students.

**Materials**

- Picture of the sun (optional)
- Fruit or vegetable
- Container of vegetable oil
- Piece of firewood
- Piece of charcoal or coal
- Container of motor oil
- Gas lighter
- Cup of water and an empty cup
- Child's pinwheel
- Picture of lightning or a
- light bulb
- Picture of a nuclear power plant
- Piece of discarded trash
- Battery

## Procedure

1. Using the information on pages 78—79, demonstrate the different energy sources. Write the names of the different types of energy sources on the chalkboard.
2. Once students have received their introduction to energy sources, inform them that they will be conducting research reports to find out more about their energy sources. Break the class into groups of two or three students. Assign each group a different energy source. Instruct each group to complete a three-page report about the energy source. Since the project will be a collaborative effort between two or three students, encourage the students to divide the work, so that each student contributes a section to the final report.
3. Take a trip to the library. Work with the librarian to show the students how to find the information they need to complete the report on their energy source. Be sure they know how to use the encyclopedia and other resources. Provide time for the students to do their research, work together in their groups and write the report.
4. After the reports are completed, have each group give a five-minute presentation about the energy source they studied.
5. After all the presentations have been given, initiate a discussion with your class about what they learned. Ask your class to choose the safest energy source, the most efficient energy source, the energy source that's least destructive to the environment and the cheapest energy source. Then, write a list of the energy sources on the board, and have the class vote for the "best" source. You may have them vote for the top two or three.

## Extensions/Modifications

- As a simpler version of this activity, assign the energy words as homework vocabulary assignments to your students. Have them complete sentences using the words.
- An even simpler version of the activity would be to simply conduct the demonstration as described in the activity.
- To extend this activity, have each student write a one-page essay on which three energy sources they would choose as the "best" sources of energy for the world. Tell them to explain why they chose what they did. This can be given as an in-class assignment or as a homework assignment. When the essays have been completed, ask some students to read theirs aloud. Display the completed essays in the classroom.

## Energy Sources

**Sunlight:** Point to the sun, or hold up a picture of the sun. The light that comes to the earth from the sun is pure energy. The sun is the original energy source. Nearly all other sources of energy originally got their energy from the sun. Organic matter, like plants, convert solar energy into leaves, flowers and fruits. Animals, which eat organic matter, convert the energy into body mass. When animals die, their energy is decomposed and over extensive time, becomes stored as oil, coal or natural gas.

**Food:** Hold up an apple, orange or other fruit or vegetable. Food is the source of energy used by people. Food that we eat is digested, and the stored energy is used by the body to keep the heart beating, the blood pumping and the body growing. When a body has "low blood sugar," the body needs to eat and process more energy, so we can continue working, playing and growing.

**Organic Oils:** Hold up a bottle of vegetable oil. Vegetable oil and animal oil have played an important role in human history. Vegetable oils, like olive oil, corn oil or safflower oil, are often used

in cooking. Jojoba oil (from the jojoba bean) is used in cooking or lubricating, as well as in lotions and soaps. Animal oil, like that from whales, seals and livestock, was used in the past for lighting lamps as well as for waterproofing.

**Wood:** Hold up a piece of firewood. Wood comes from trees, which are, of course, plants. The plants got their energy from the sun. When trees are cut down and burned, they release their energy in the form of heat. Many homes are heated with wood-burning stoves.

## Fossil Fuels

The following three energy sources come from prehistoric fossils. Like the methods described above, ancient plants absorbed the energy from the sun and converted it into more plants. Ancient animals, like dinosaurs, ate the plants. When the plants and animals died, their remains collected under mountains of earth and, over millions of years, they decomposed into a source of fuel. The remains of these plants and animals are what we refer to as fossil fuels.

**Coal:** Hold up a piece of charcoal, or, if possible, a piece of real coal. Coal is burned to heat homes and run electrical machinery. About 20 percent of the energy we use comes from coal.

**Oil:** Hold up a container of motor oil (preferably in clear plastic so students can see the oil). Other petroleum products similar to motor oil are burned to fuel motor vehicles and heat homes. About 45 percent of energy used comes from oil.

**Natural Gas:** Hold up a lighter, and light it. Natural gas is used to heat the homes of many people. About 25 percent of the energy we use comes from natural gas. The fuel used in lighters is not the same as the natural gas used to heat homes, but the lighter can be used as an example.

Most of the energy used by people today comes from these fossil fuels. But fossil fuels are limited in their supply, can pollute and are sometimes hard to find.

## Other Energy Sources

The following energy sources do not require the sun. They are derived from other aspects of the earth's ecosystem.

**Water:** Pour water from one cup to another, simulating a waterfall. Water is not an energy source, but water is used to generate energy. Water falling downhill is used to run turbines, which generate electricity. This is called hydroelectric power. About 5 percent of the world's power is now produced by hydroelectric dams. A similar type of energy comes from geothermal energy. Pockets of boiling water under the earth's surface send steam to the surface of the earth. This hot water also can be used to generate electricity. Dams can impede the movement of fish up and down river to reach spawning grounds or for other migratory purposes.

**Wind:** Hold up a pinwheel and blow on it. Winds that blow can be used to turn windmills, which generate electricity. Windmills have been used for centuries in some parts of the world, like Holland. Windmills are also used in the United States.

**Electricity:** Hold up a picture of lightning, and/or a light bulb. An electrical storm contains a great deal of natural electrical energy. Benjamin Franklin first proved that lightning was electricity

in 1752. His discovery helped scientists learn how to harness electricity and how to generate electricity from other methods. The electricity we use today was created by other sources, not by the energy released by lightning.

**Nuclear Power:** Hold up a picture of a nuclear power plant. Nuclear power comes from the radioactive ore uranium. It produces far more power per ton than any other energy source. Nuclear power does not contribute to air pollution. However, radioactive waste is hazardous to living things. Exposure to radioactive materials can result in mutations, illness or death. The drawback to using nuclear power is finding a safe place to dispose of the nuclear waste. About 6 percent of the energy used in the world comes from nuclear power.

**Refuse-derived fuel:** Hold up a piece of discarded trash. Now, we are able to extract energy from garbage! Garbage is burned in a waste-to-energy facility. As it burns, water pipes are heated. This hot water is used to generate electricity. Most waste-to-energy facilities produce enough energy to run the plant and supply additional power to the community. This is a small but growing source of energy.

**Chemical energy:** Hold up a battery. Batteries create energy through chemical reactions. When different chemicals react with one another, energy is released. Eventually the reaction stops, and the battery must be replaced. Batteries are used in motor vehicles and many smaller appliances, like clocks, hearing aids and toys.

Credit: The National Wildlife Federation's Animal Tracks Activity Guide for Educators. Copyright © National Wildlife Federation 1995.