



Fueling Around

Students design a collage or a mobile that displays activities that depend upon the combustion of energy resources.

Grade Level: K–4

Subject Areas: English
Language Arts, Science

Setting: Classroom

Time:

Preparation: 50 minutes

Activity: Two 50-minute periods

Vocabulary: Coal,
Combustion, Electricity, Fuel,
Fuel oil, Gasoline, Natural gas,
Petroleum, Potential energy,
Power plant, Propane

Major Concept Areas:

- Development of energy resources
- Quality of life

Getting Ready:

Cut out a picture of an electrical appliance, a furnace, and an automobile from *Things That Use Energy* if these will be used instead of the words electricity, heat, and travel in the Orientation. Find out what fuel type is used to heat the school and where the school's furnace or boiler room is located (optional). Locate the nearest power plant and mark it on a state map (optional). Have the samples or pictures of fuel materials on display to show students (optional).

Objectives

Students will be able to:

- recognize that some resources are burned to generate heat and light; and
- identify activities in their lives that use energy from electricity or the burning of fossil fuels.

Rationale

Recognizing that many of their daily activities rely on combustion of energy resources helps students appreciate how the world around them depends on a continuous supply of energy.

Materials

- An electrical appliance (optional)
- State map of Wisconsin (optional)
- Copies of *Energy Source Illustrations*
- Photographs or samples of energy sources used in activity (optional)
- A piece of wood that burns easily or a candle
- Matches
- Drawing paper, or magazines for cutting out photographs, or copies of *Things That Use Energy*
- Scissors
- Crayons
- Glue
- Tagboard
- String (for mobile only)
- Clothes hangers (for mobile only)
- Find additional resources related to this activity on keepprogram.org > Curriculum & Resources

Background

The common definition of energy is the ability to do work or change things. Wood, gasoline, coal, and fuel oil all have energy. But when you look at these resources, they don't appear to be doing much work or changing anything. Accepting these objects as having energy involves focusing on the word ability in the definition. Wood, gasoline, coal, and fuel oil are able to do work or change things.

Wood, gasoline, natural gas, coal, and fuel oil all contain stored energy. Because these resources were once living plants that converted solar energy into food, this energy originally came from the sun. Plants use their food to grow. The energy that was stored in the food becomes stored in the body of the plant. Wood comes from plants (trees) that were recently living. One reason trees are cut down is to supply us with the stored energy in firewood.

Gasoline, coal, and fuel oil originate from plants and tiny organisms that existed long ago. Gasoline and fuel oil are derived from petroleum, which is found by drilling into the ground (natural gas is often found along with petroleum deposits) and coal is obtained through mining. Both coal and petroleum are fossil fuels. Millions of years ago when plant materials and single-celled organisms died, they settled to the bottom of shallow seas and swamps. These plants and organisms and their stored energy were buried under layers of sediment. Over time, the pressure of the overlying earth caused the organic materials to change into petroleum and coal. Fossil fuels are often thought of as stored sunlight.

Burning releases the stored energy within materials such as wood. For many centuries, humans have burned wood resources for light and warmth. Later, humans discovered that fossil fuels (such as coal) were also good heat energy sources. Eventually, humans learned that the heat from the combustion of fuels could be harnessed and used to do work. Today, we still burn wood and fossil fuels such as natural gas to generate heat. Gasoline combustion runs our cars and coal is burned to generate electricity. One of the first uses of electricity was to create light. Prior to this we used oil and candles made from animal fat (which also contain stored energy from the sun via the food chain). Today, people

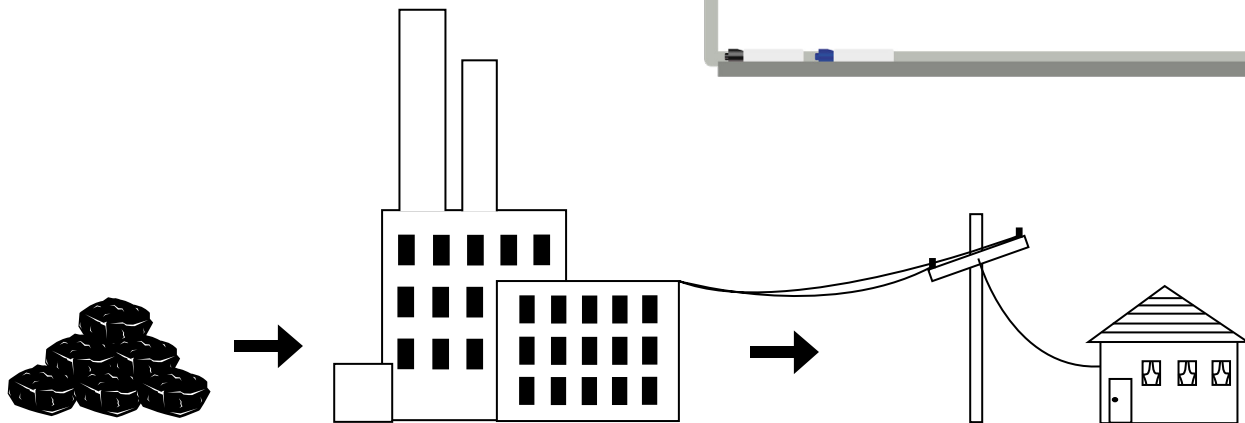
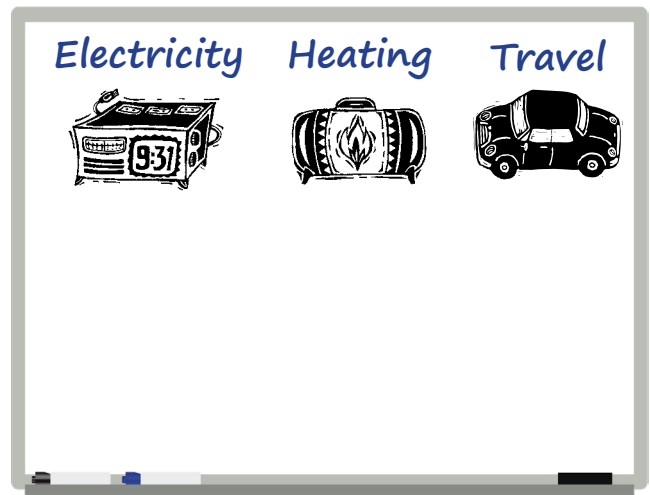
still use candles for light, mainly during power outages and for special occasions, but they are now made from wax that comes from petroleum.

The development and improvement of technologies that burn wood and fossil fuels advanced humans into the modern age. Everywhere you look there is evidence of energy supplied by these resources. Many people wake up in homes heated by burning natural gas, cook breakfast on electric stoves (much electricity comes from burning coal), and drive to work in cars powered by the combustion of gasoline. Considering how many of our daily activities (both work and play) depend on wood, coal, gasoline, and fuel oil, it is easy to see how the definition of energy—the ability to do work or to change things—applies.

Procedure

Orientation

Write the words electricity, heating, and travel on the board or show students pictures of the electrical appliance, the furnace, and the automobile from *Things That Use Energy*. Have students identify things they use in their lives that apply to each topic. For example,



watching television and using a toaster require electricity. Their homes are heated. They may travel to school in a school bus. Ask students where the energy comes from to make automobiles and buses move. Most students will mention going to a gas station and filling their cars with gasoline. If time allows, take students to the boiler room or furnace of the school and discuss energy sources used for heating (natural gas, fuel oil, wood, electricity).

Steps

1. Ask if any students know where we get our electricity. If an electrical appliance is available, plug it in.
Caution: Remind students that electricity can be dangerous and they should always get the help of an adult before plugging in anything. Explain that the electricity from the plug actually comes from a power plant. Provide students with the location of the nearest power plant if known; it may help to point out the location on a map.
2. Tell students that in Wisconsin, many power plants generate electricity by burning fuel such as coal. Draw a simple diagram such as the one below that shows how electricity gets from an energy source, to a power plant, and then to a home.
3. Post the pictures of the *Energy Source Illustrations* on the whiteboard. If available, show students photographs or actual samples.
4. Explain that all these resources have energy. Ask students to look for visible evidence that these things have energy. Students may say they can't see any evidence of energy because the resources are not moving, making sounds, or giving off heat or light.
5. Remind students of the definition of energy (the ability to do work or change things). Discuss the meaning of the word ability, stressing that an object doesn't have to be currently doing work (moving or generating heat, sound, or light) to be able to do work. The resources have the potential to do work; they have stored energy (see "Potentially Kinetic").
6. Show students a piece of wood or candle and explain that it has energy, too. Light the wood or candle to show students that it burns. Now ask students what evidence is there that the wood or candle contains energy? They should comment that it burns and gives off light and heat. Discuss what the heat and light coming from the wood or candle can be used for.

Caution: Remind students that fire is dangerous and that only an adult should use it.

7. Tell students that oil, coal, natural gas, and gasoline also burn. Introduce and define the word fuel ("a resource that is burned to produce heat"). Explain that the heat from burning these materials is used to generate electricity (coal), move automobiles (gasoline), heat rooms, and cook food (fuel oil, wood, natural gas).

Closure

Have students draw pictures or look for magazine photographs that show examples of electricity use, travel, and heating. An alternative is for students to color in and cut out relevant pictures from *Things That Use Energy*. Instruct students to separate the drawings or photographs into piles based on which fuel provides its energy. Have students create a mobile or collage that categorizes things based on energy sources. Students can use their mobiles or collages to quiz each other on energy sources and their end uses (see **Assessment**).

For the Mobile: Instruct students to color the *Energy Source Illustrations* and paste them onto pieces of tagboard cut into circles or other shapes. On the other side of the tagboard, they should paste the appropriate pictures of energy uses they cut out of magazines, drew, or selected from *Things That Use Energy*. Direct students to punch a hole near the top of each piece of tagboard and tie a string through each hole. The strings should be tied onto a clothes hanger so that the tagboard pieces hang down at different lengths. (See **Extensions** for making this project more comprehensive.)

For the Collage: Instruct students to color and paste each *Energy Source Illustration* onto the center of a piece of tagboard. Have students paste around the fuel the appropriate pictures of energy uses that they cut out of magazines, drew, or selected from *Things That Use Energy*.

Assessment

Formative

- Can students list one reason why wood, coal, gasoline, and fuel oil have energy?
- Are students able to match things that use energy to the resource that they depend on?

Summative

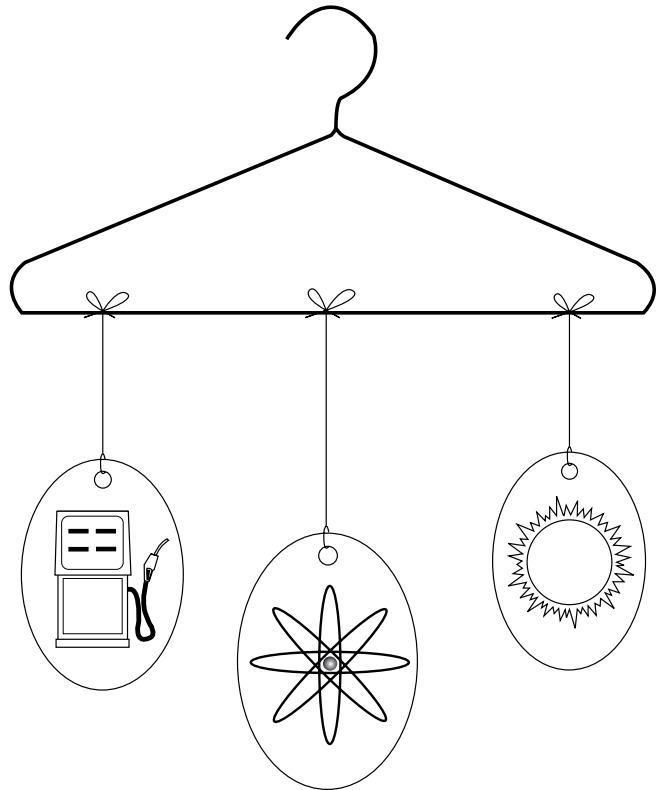
Have students play a guessing game with the collages or mobiles. If the collage is used, have students who made the collage cover up the fuel source, showing only the end uses. Have classmates guess which fuel source supplies the energy for those end uses. If the mobile is used, have students view one side of the mobile hanging items and try to guess what's on the other side.

Extensions

As students learn more about energy resources they can revise the mobile to represent different energy types. For example, they can create different levels, with the top hanger representing energy resources and two lower hangers holding pieces of tagboard that represent renewable and nonrenewable resources. Another approach is to divide the energy resources on the tagboard into those that come from the sun (solar energy, biomass such as wood, wind energy, and fossil fuels such as coal, oil, and natural gas) and those that come from Earth (nuclear energy, geothermal energy, and water falling because of Earth's gravity).

Related KEEP Activities

This activity works well to introduce students to different energy sources. However, you may want to identify and describe these prior to conducting this activity (see K-5 Energy Sparks for Theme II: "Introducing Energy Resources"). The activity "Digging for Coal" orients students to processes and issues involved with development of an energy resource such as coal. Later, students could analyze how coal and other fossil fuels are finite in "Energy Divide." A unit on electricity could begin with this activity and be followed with "Circuit Circus." Food, like coal, contains stored chemical energy. To help students understand that food is a fuel source, you may want to demonstrate how food can be burned (see "Roasted Vittles"). Potential energy is addressed in "Potentially Kinetic."



© 2020 Wisconsin Center for Environmental Education

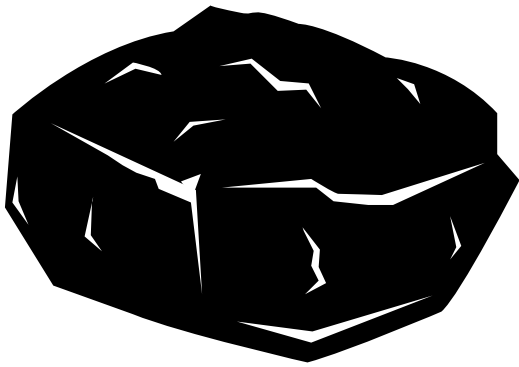
The Wisconsin K-12 Energy Education Program is supported through funding from



Wisconsin K-12 Energy Education Program (KEEP)
College of Natural Resources
University of Wisconsin - Stevens Point



Energy Source Illustrations



COAL



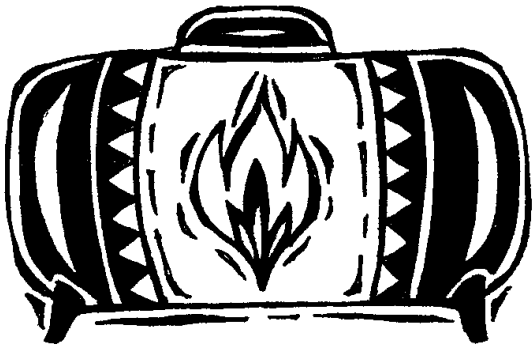
WOOD



OIL



GASOLINE

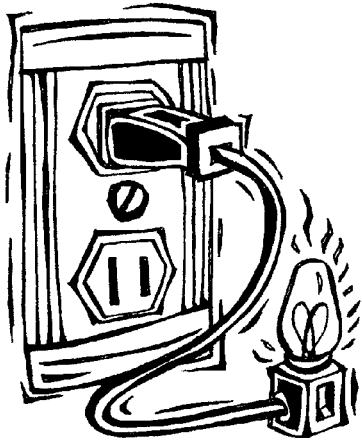


PROPANE

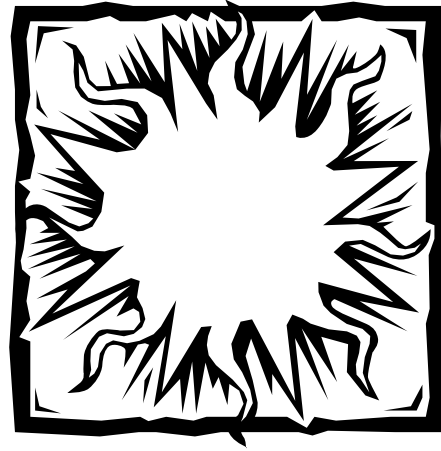


NATURAL GAS

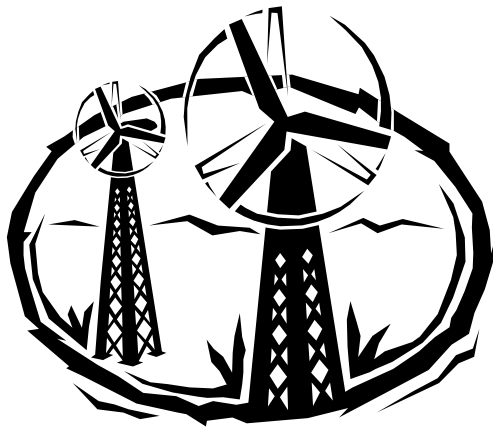
Energy Source Illustrations



ELECTRICITY



SUN



WIND



FOOD ENERGY

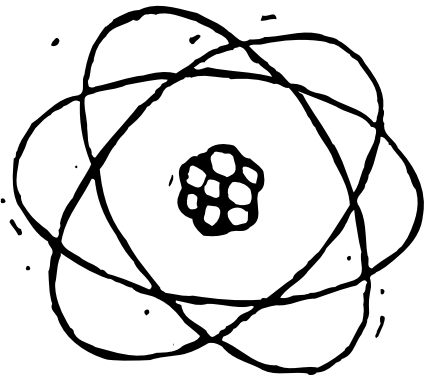


KEROSENE



BIOMASS FUELS

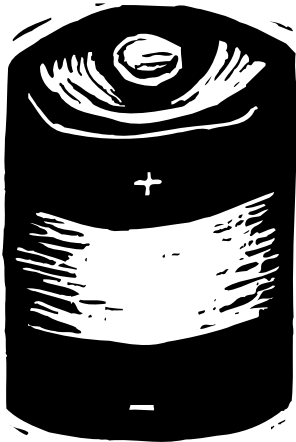
Energy Source Illustrations



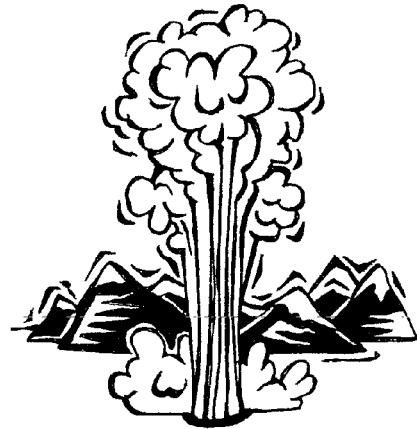
NUCLEAR ENERGY



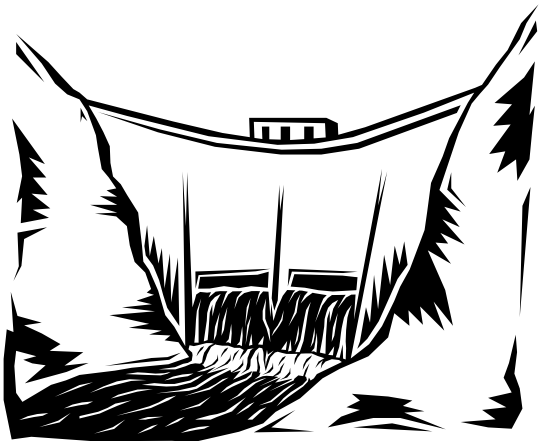
HUMAN ENERGY



BATTERY

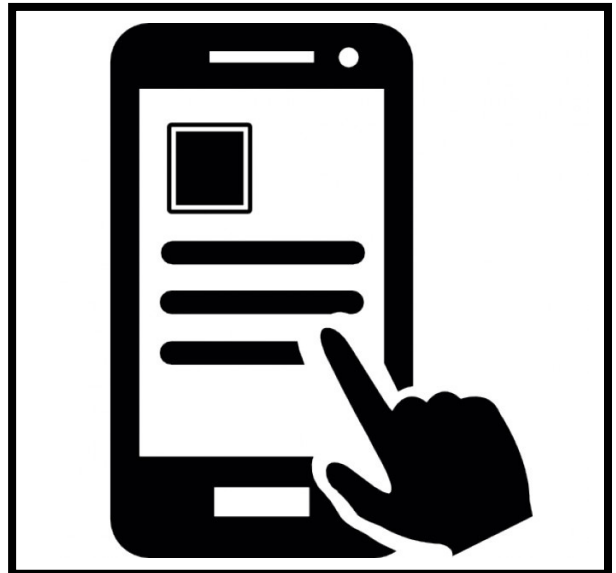
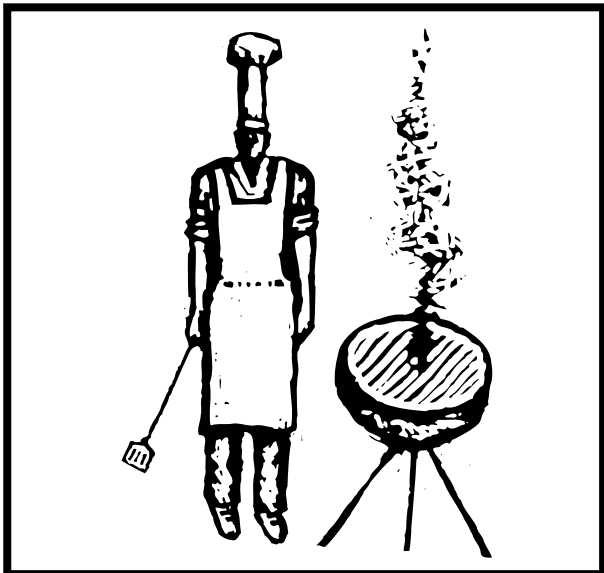
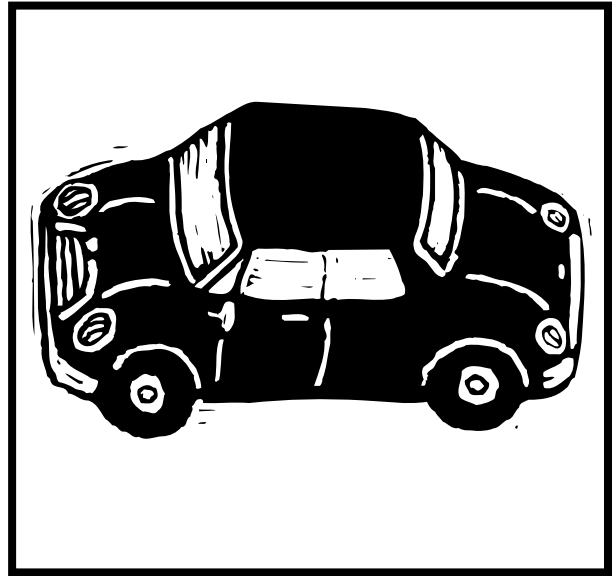
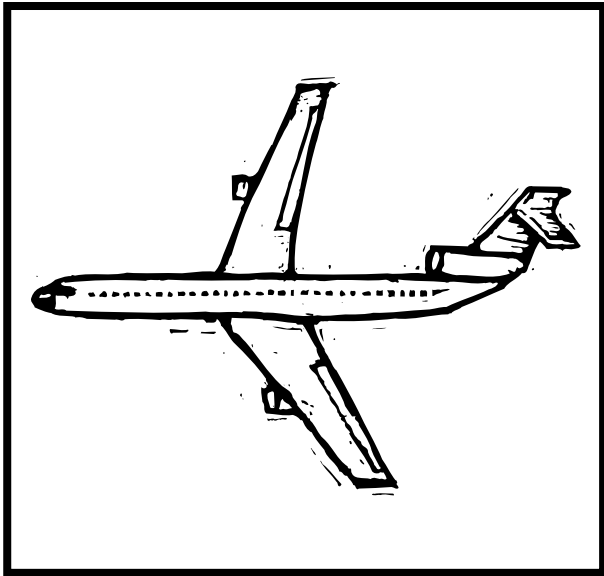


GEO THERMAL ENERGY

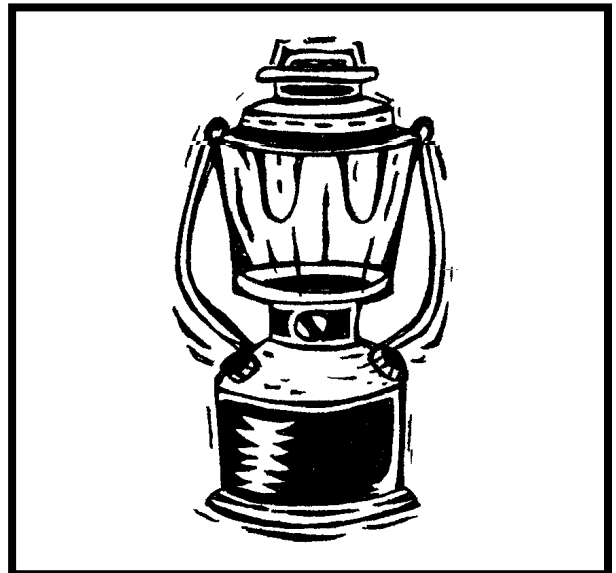
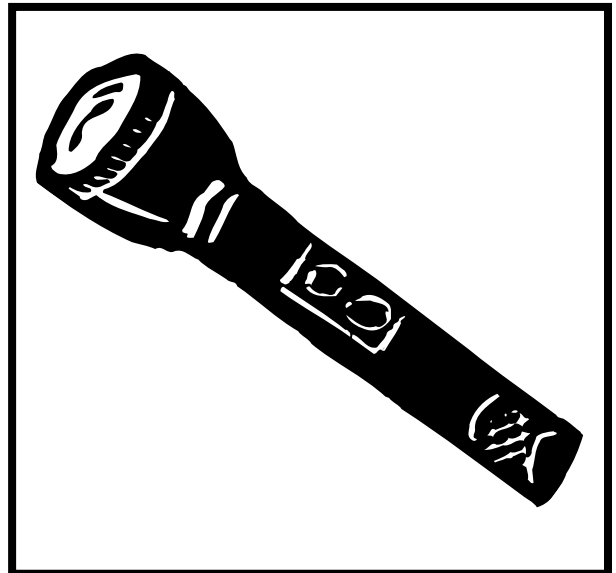
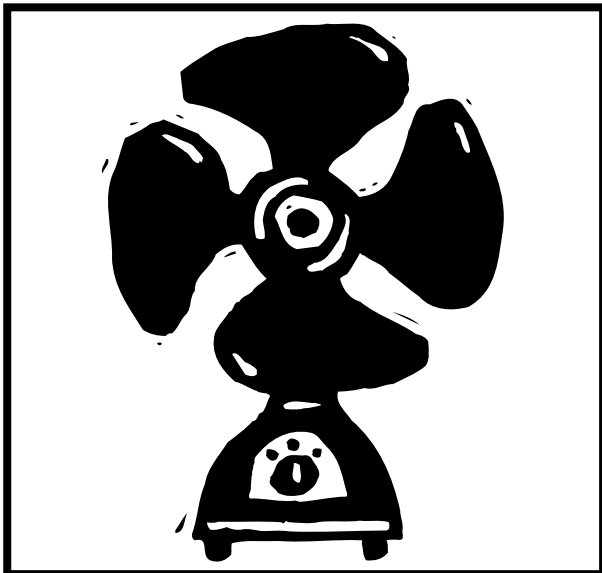
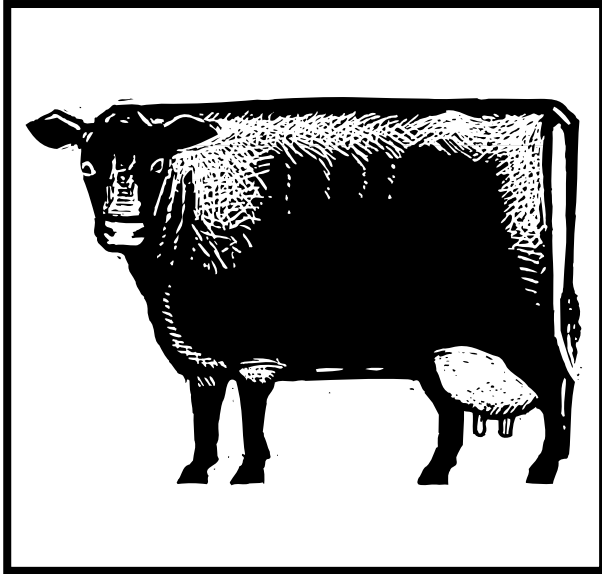


HYDROPOWER

Things That Use Energy



Things That Use Energy



Things That Use Energy

