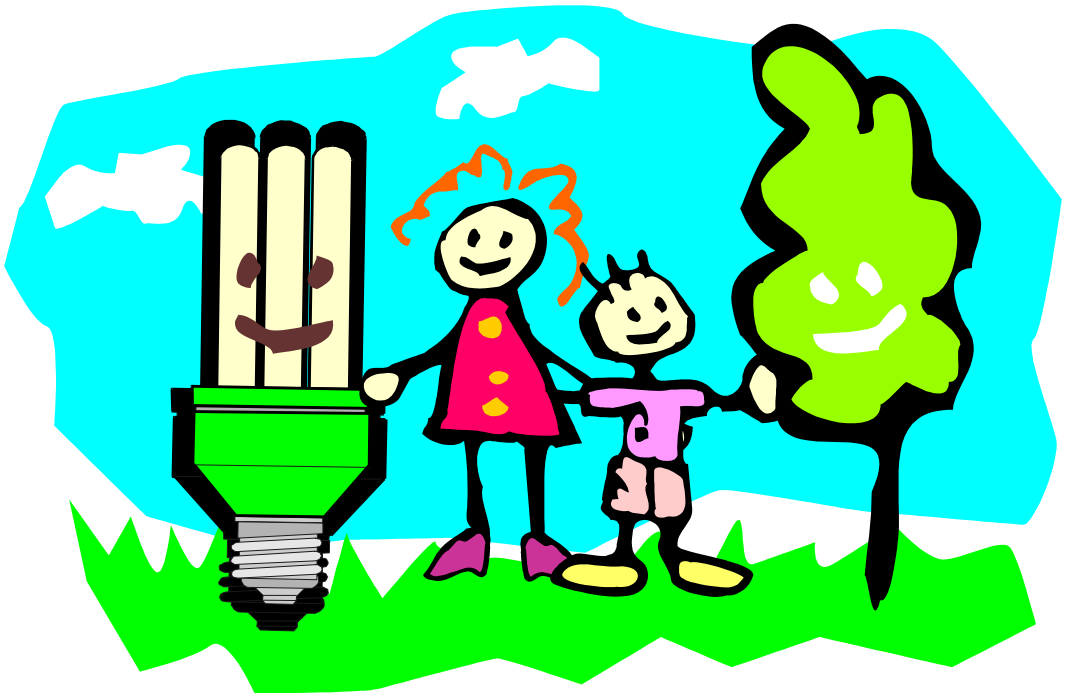
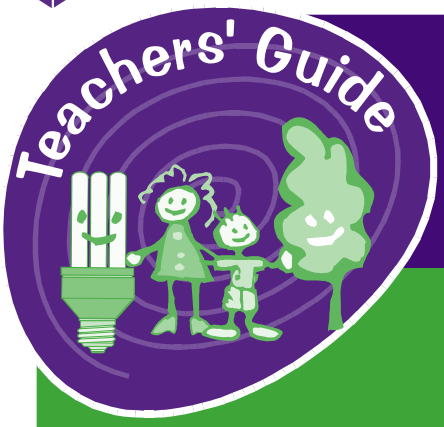
OFFICE OF ENERGY EFFICIENCY
AND RENEWABLE ENERGY

Energize Your Students to Read!



Grade K-3

OFFICE OF
BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS



Overview for Activity One

This activity introduces younger students to the basic concept of energy and its impact on the environment. Terms like stored energy, working energy, electricity, energy efficiency, renewable energy, nonrenewable energy, and global climate change are briefly explored through an in-class presentation. These concepts are reinforced in a bookmark coloring project.

Level :
Grades K-3

Sub ect:
- Reading
- Science

Concepts:
- Energy is the ability to do work.
- Energy can be categorized as stored energy and working energy.
- Nonrenewable energy will run out eventually.
- Renewable energy is expected to last for a long time.
- Using less energy from nonrenewable fossil fuels reduces air pollution.
- Using renewable energy is better for the environment in several key ways.
- Energy conservation is one way we can all help the environment.

Skil :
- Observing and classifying
- Listening and read-aloud experience
- Following instructions
- Using picture clues to aid in comprehension

Material :
- Reproducible in-class presentation on energy and the environment (pp. 2-11)
- Reproducible coloring bookmarks (pp. 13-14)

Figure 1
The Energy Star Label

Background

Energy, and particularly electricity, is something many younger students take for granted. We flip the switch, and the classroom is less dark. We plug in a video game or turn on the computer, and we are entertained or educated. Someone puts the dirty clothes in the washer and dryer and voila! Our clothes are clean and dry. The list goes on. While many of your students have probably been told that they have a lot of energy, very few know what this means, or how it relates to the power we use everyday. Only a handful of your students have probably even considered the environmental impacts of using and wasting energy.

According to the U.S. Department of Energy, 68% of our country's electricity is produced from the stored energy contained in fossil fuels. These fossil fuels are being depleted faster than nature can replace them. Making electricity from fossil fuels creates air pollution and damage to land, water, and other resources. According to the Energy Star program (a joint effort between the U.S. Department of Energy and the Environmental Protection Agency), the electricity produced to supply power for the estimated 3 billion light fixtures in American homes resulted in 100 million tons of carbon dioxide (CO_2). These air emissions have been linked to the greenhouse effect and global climate change.

The picture does not have to be so bleak. The pollution created from fossil fuel mining, transport, and electricity production decreases when we use products that require less energy to do the same work. Products with the *Energy Star* label (see figure 1) have met or exceeded government specifications for energy efficiency and pollution prevention. Your students can also help the environment by taking steps to use renewable energy from the sun, wind, biomass, water, trash, and steam trapped in the earth (geothermal).

Some of these renewable energy sources require investments more suitable to a power plant or public utility. Others can be achieved through the positioning of windows and awnings or the purchase of solar panels, solar collectors, and other equipment.

Getting ready for Activity One:

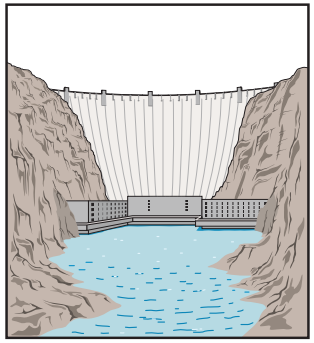
1. Review the background contained in this introduction, the glossary (p. 19), and the reproducible in-class instruction sheets, (pp. 2-12).
2. Reproduce the in-class instruction sheets onto transparencies.
3. Use pages 13-14 to make a double-sided bookmark for each student in your class.

Doing Activity One:

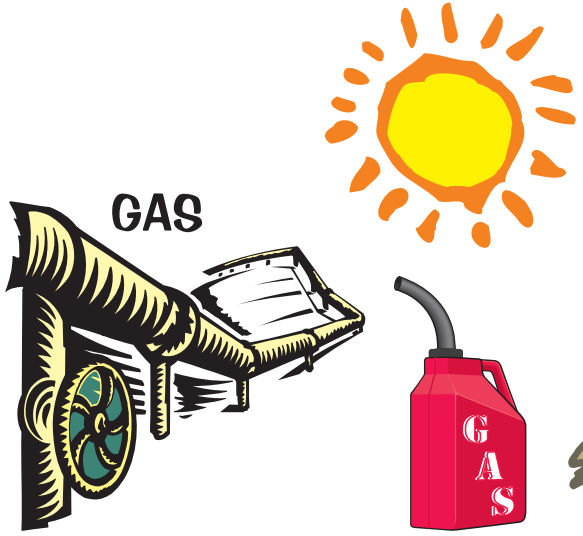
1. Show and discuss the transparencies you made about energy and the environment (pp. 2-12)
2. Distribute the coloring bookmark(s) to your students. (see Figure 2)
3. Tell the students that they are going to color a bookmark for a friend or family member as a gift.
4. Ask the students to write the name of a friend or family member that they'd like to give it to on the back.
5. Collect the bookmarks and laminate them.
6. Return the laminated bookmarks to your students, and ask the class to share their new knowledge about saving energy and the environment with the person who receives the bookmark gift.

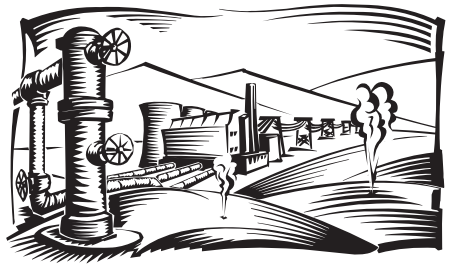
Figure 2
Coloring Bookmarks

Energy is the ability to do work. There are two types of energy:



1. Working Energy





2. Stored Energy

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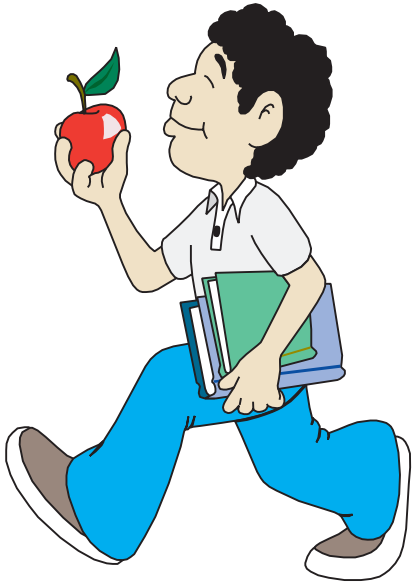
Stored energy becomes working energy when we use it.



You eat food for energy.

Then your body stores the energy until you need it.

When you work and play your stored energy becomes working energy.

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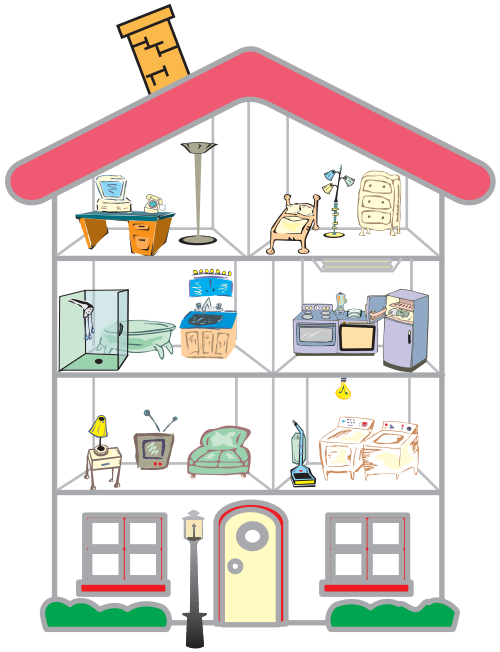
We Use Working Energy To ...

Grow our food

Warm and cool our homes

Clean and dry our clothes



Light our rooms

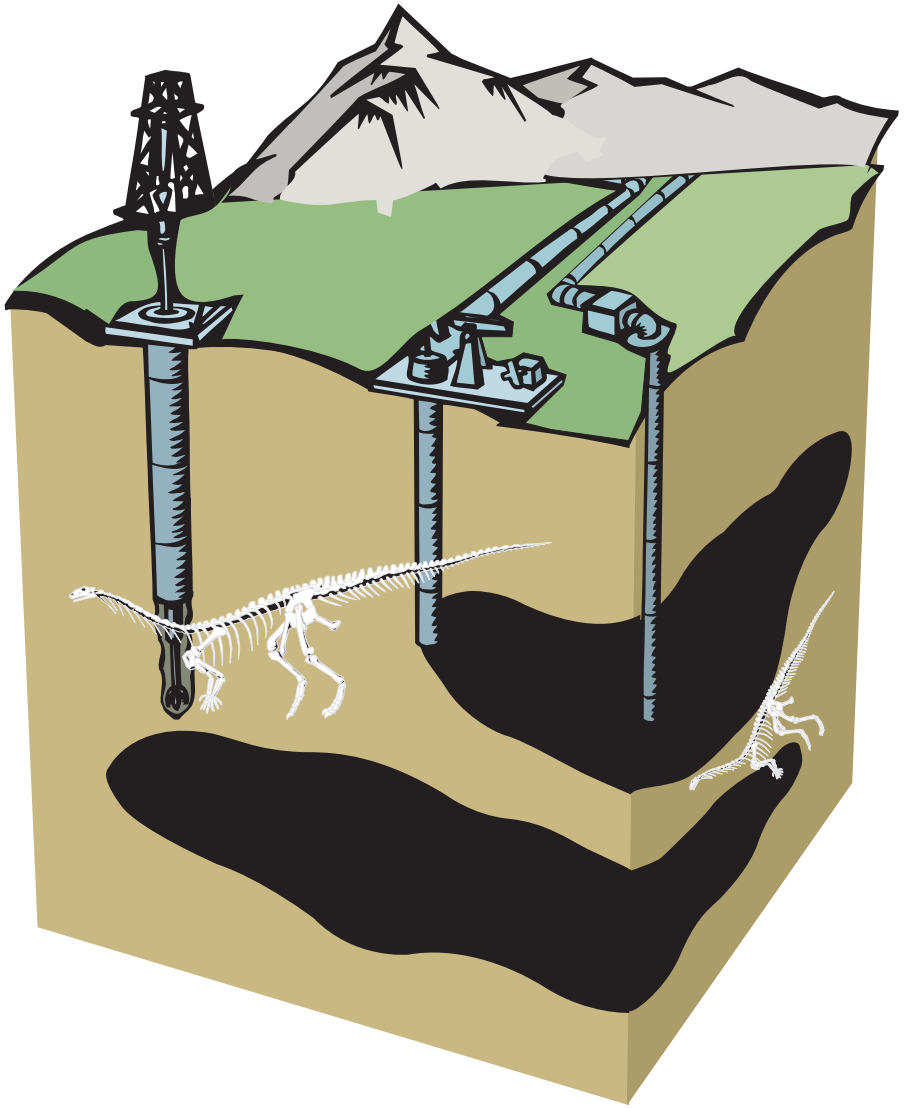
Bring water to our faucets, showers, and baths

Heat our water to make macaroni and cheese

Surf the Internet

Real life Math and Science Activities provided by U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

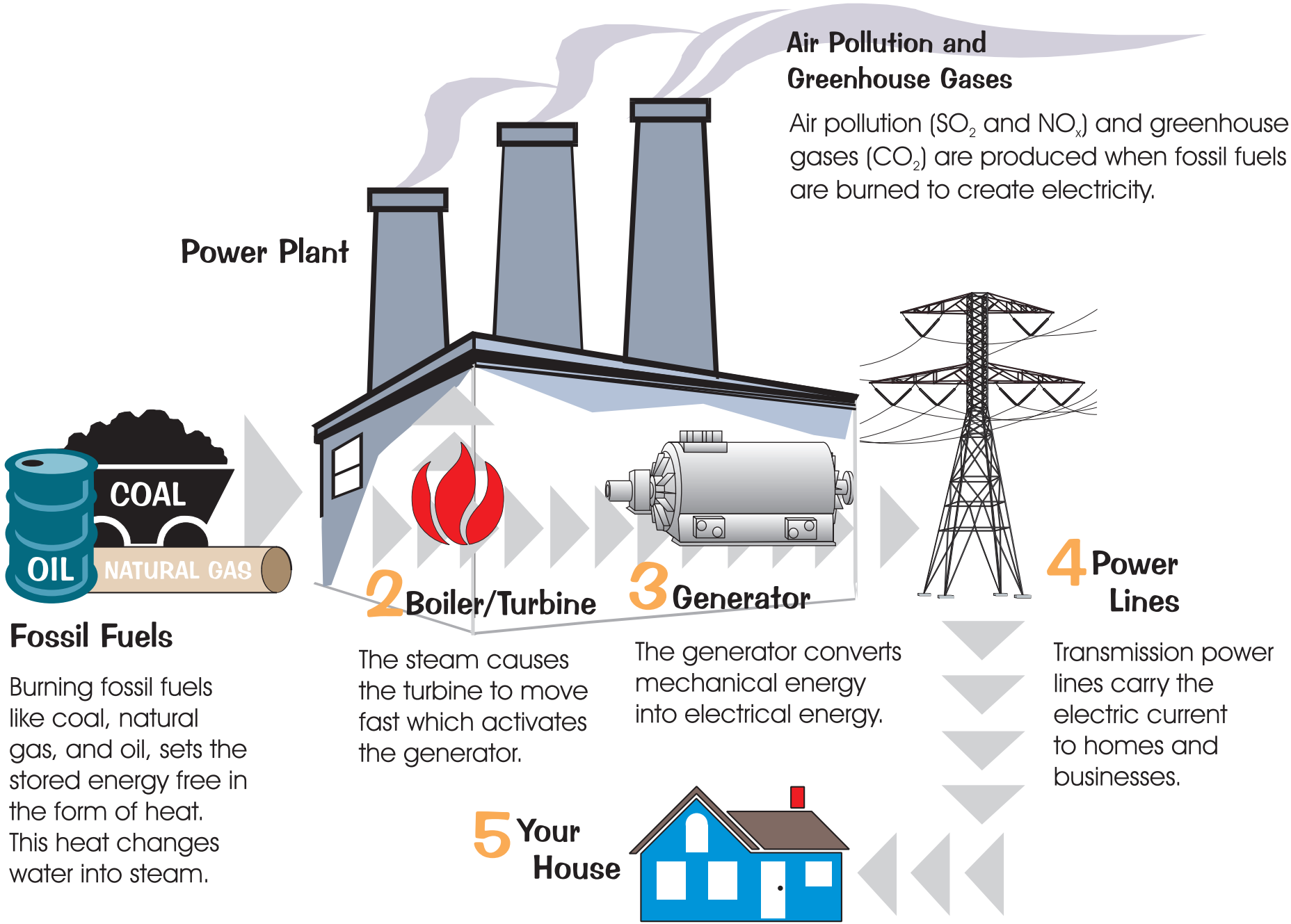
This working energy is usually made from stored energy contained in fossil fuels like coal, natural gas, and oil.



- ✓ Fossil fuels are formed over millions of years from the remains of dead animals and plants trapped between layers of earth and rock.
- ✓ The only way to get fossil fuels out is to drill or mine for them.
- ✓ While fossils fuels are still being created today by underground heat and pressure; they are being consumed more rapidly than they are created.
- ✓ For this reason, fossil fuels are called nonrenewable fuels.

Real life Math and Science Activities provided by U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

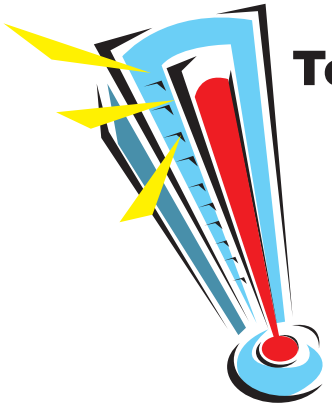
The picture below shows how stored energy contained in fossil fuels is converted into working energy in the form of electricity.



Real life Math and Science Activities provided by U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

Environmental Concerns About Working Energy

Most scientists agree that using too much fossil fuel to make working energy causes global climate change and air pollution. Some possible outcomes include ...



Temperatures may rise over the next 50 years.

Habitats could be altered causing disease and extinction of some species.

Global sea levels could rise due to melting polar ice caps.

Weather patterns could be changed for the worse — torrential rains, floods, droughts.

Acid rain and smog could increase.

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One way to help the environment is to use less energy from fossil fuels.

Less risk of environmental damage during transport of fossil fuels

Less destruction of land and water

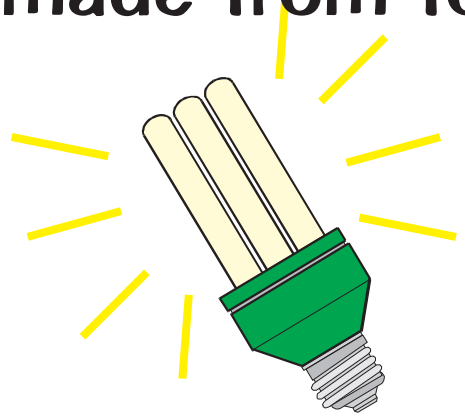
Less greenhouse gases

Reduced air pollution, acid rain, and smog

Global climate change may slow down

Real life Math and Science Activities provided by U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

Energy-efficient products help the environment because they do their job with less electricity made from fossil fuels. For example . . .



One 15 watt energy-efficient compact fluorescent light uses less energy than most light bulbs . . .

. . . and lasts as long as 10 incandescent bulbs

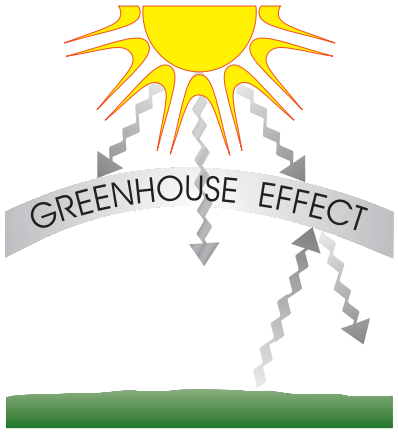
and saves . . .

5.2 lbs. acid rain

423 lbs. of coal

2-8 lbs. Smog

34 gallons of oil



850 lbs. of CO_2

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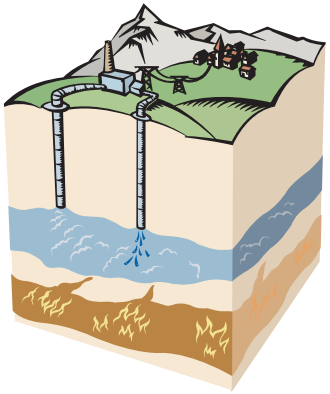
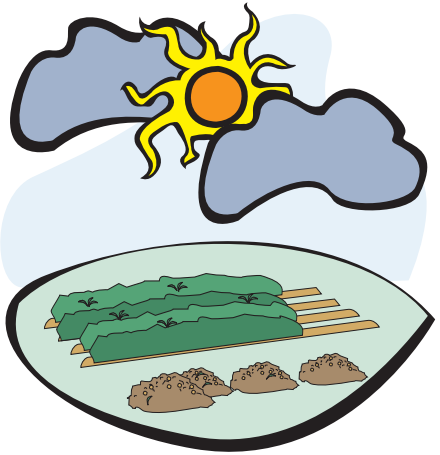
We can also help the environment by using renewable energy — or fuel sources that can be replenished by nature in a very short time. Using renewable energy sources to produce electricity creates less air pollution and environmental damage. Examples include ...



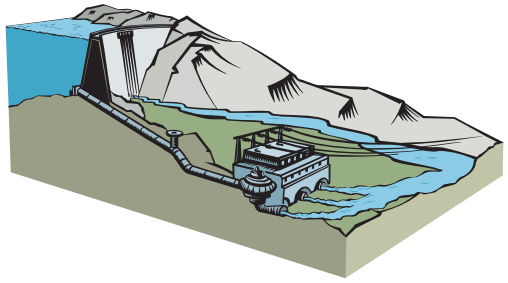
Geothermal

Waste to energy plants

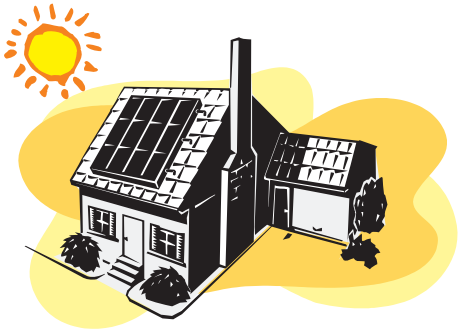


Biomass

Wind



Water



Sun

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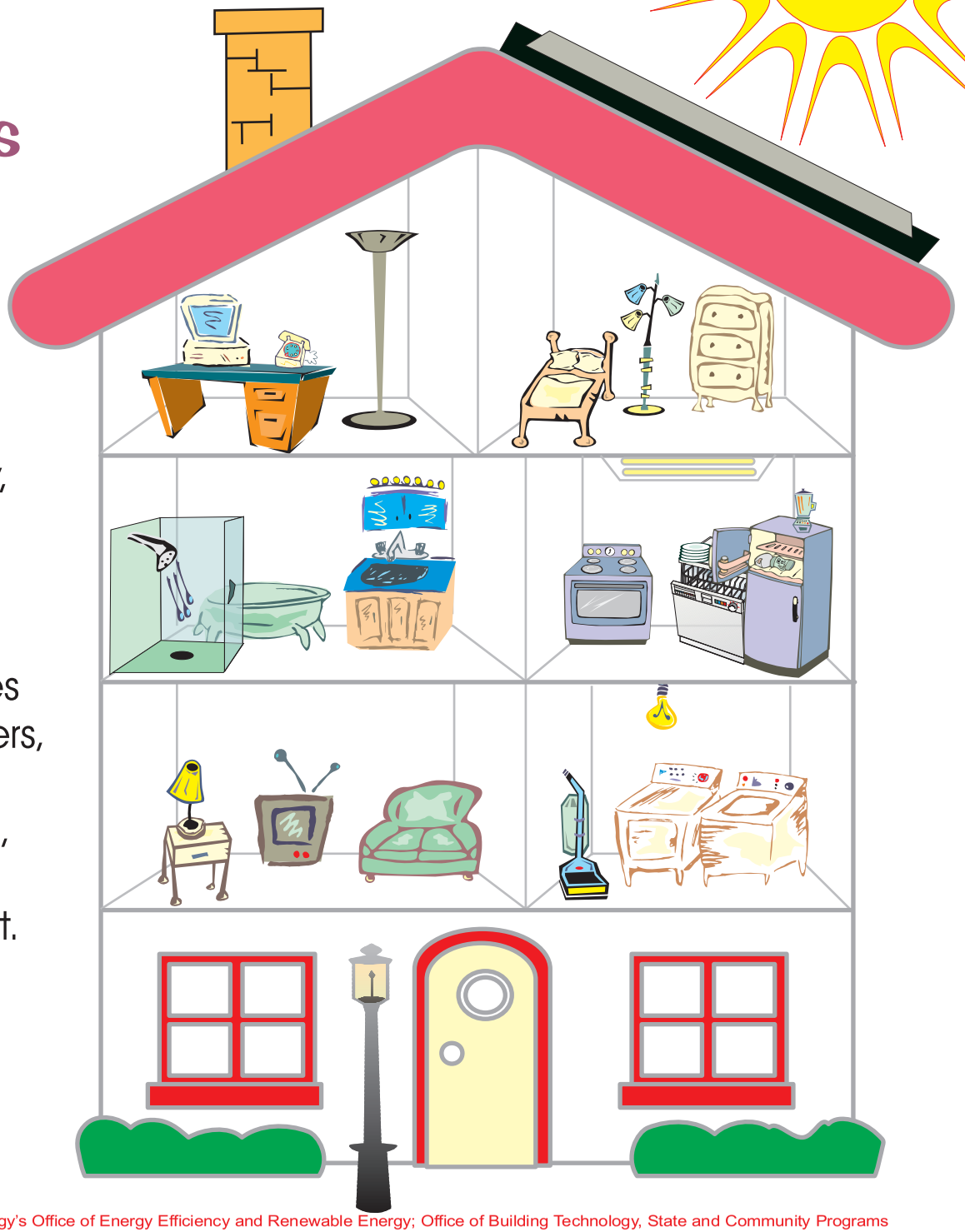
How many energy saving opportunities can you find in this picture?



You can save energy, save money, and reduce air pollution by:

- ✓ Taking showers instead of baths
- ✓ Using energy-efficient appliances (washers, refrigerators, dishwashers, computers, stereos, TVs, heating and cooling equipment, lighting, and building products, like windows) with the ENERGY STAR label on it.
- ✓ Exploring the use of renewable energy.

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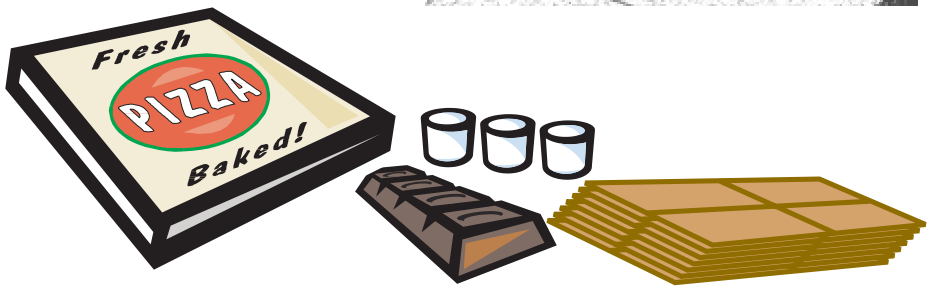
Let's do 3 activities to help us understand more about saving energy and using renewable energy.

3 coloring bookmarks

read to be informed

Roofus' Solar and Efficient Neighborhood



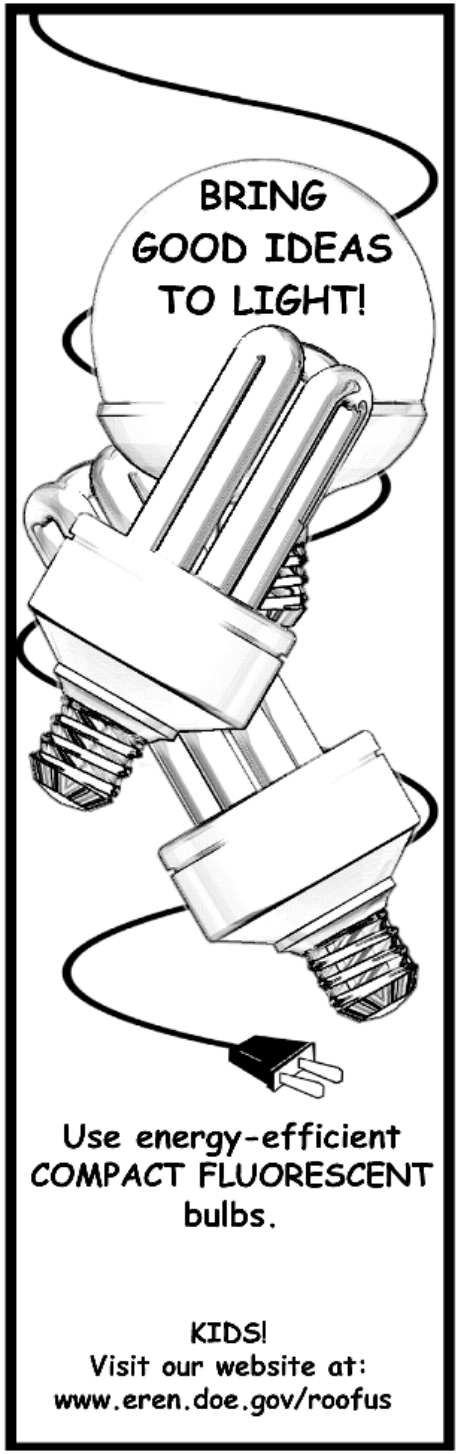
make s'mores in a do-it-yourself solar oven

Real life Math and Science Activities provided by U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

Take a shower instaed of a bath and save about 2,000 gallons of water a year!

And don't forget to wash behind your ears!

KIDS!
Visit our website at:
www.eren.doe.gov/roofus



Use energy-efficient COMPACT FLUORESCENT bulbs.

KIDS!
Visit our website at:
www.eren.doe.gov/roofus

KIDS!
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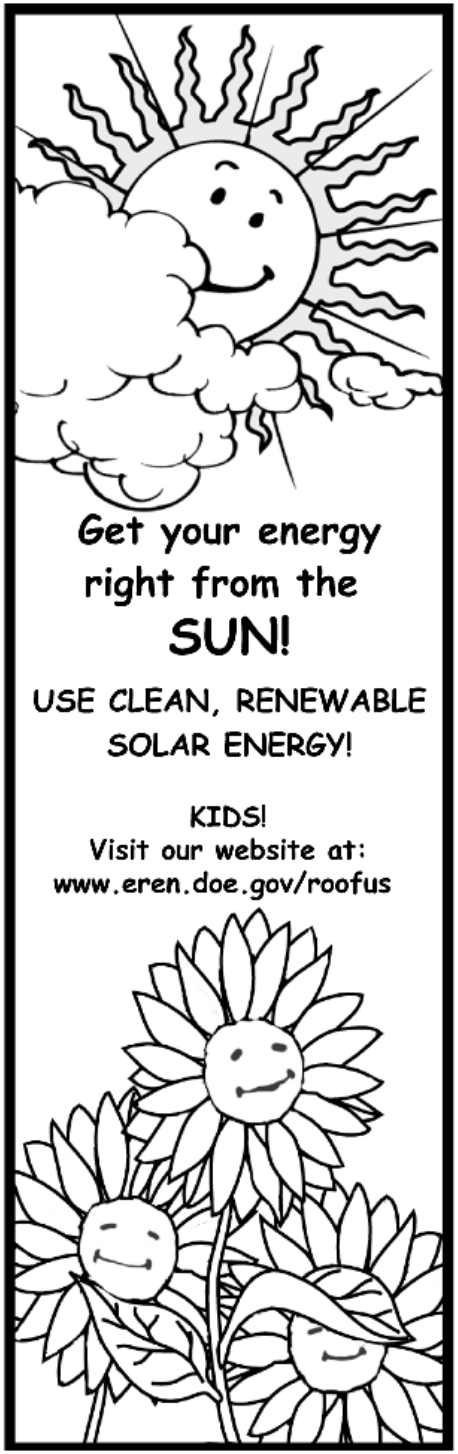
www.eren.doe.gov/roofus



Get your energy right from the **SUN!**

USE CLEAN, RENEWABLE SOLAR ENERGY!

KIDS!
Visit our website at:
www.eren.doe.gov/roofus

CUT HERE

CUT HERE

Every day is EARTH DAY!!

NAME: ____________

AGE: ____________

GRADE: ____________

This bookmark was made for: ____________

Office of Energy Efficiency and Renewable Energy

Building Technology, State and Community Programs

U.S. DEPARTMENT OF ENERGY
1-800-363-3732
www.eren.doe.gov/roofus

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CUT HERE

Overview of Activity Two

In this activity, your students explore Roofus's web page (from the coloring bookmarks). The page was designed by the U.S. Department of Energy's Office of Building Technology, State and Community Programs to teach children about solar energy and energy efficiency. The goal of this activity is to introduce your students to the Internet as a means of *reading to be informed.* This activity can be completed by classes with or without Internet access.

evel
Grades K-3

Sub ect:
- Reading
- Science

Concepts
- Students will understand that they can help the environment by using less energy from fossil fuels and more energy from renewable energy.
- Things that use electricity in the students' homes
- Most of the electricity in the United States is made at power plants that burn things like coal or natural gas
- Solar panels turn sunlight into electricity

Skil
- Reading to be informed
- Identifying an author's purpose
- Using a glossary
- Listening and read-aloud experience

Material
- Internet access computers
- Solar energy reading selection (p. 16)

As es ent:
- Prepare a quiz or essay question referencing the key concepts mentioned in the solar energy reading selection on page 16 or in the glossary on pp. 19-20.

Getting ready for Activity Two

If your class can access the Internet:

1. Go to the media center, library, or other location with computers that have Internet access.
2. Access the Internet and go to the following internet address: http://www.eren.doe.gov/roofus.
3. Mark Roofus's web page with the computers' bookmark or shortcut function.
4. Familiarize yourself with some of the hotlink buttons with information about solar energy.
5. Think about the author's purpose, and identify a few questions to test student comprehension.

If you do not have access to the Internet:

1. Make a copy of page 16 for each student in your class.
2. Think about the author's purpose, and identify a few questions to test student comprehension.

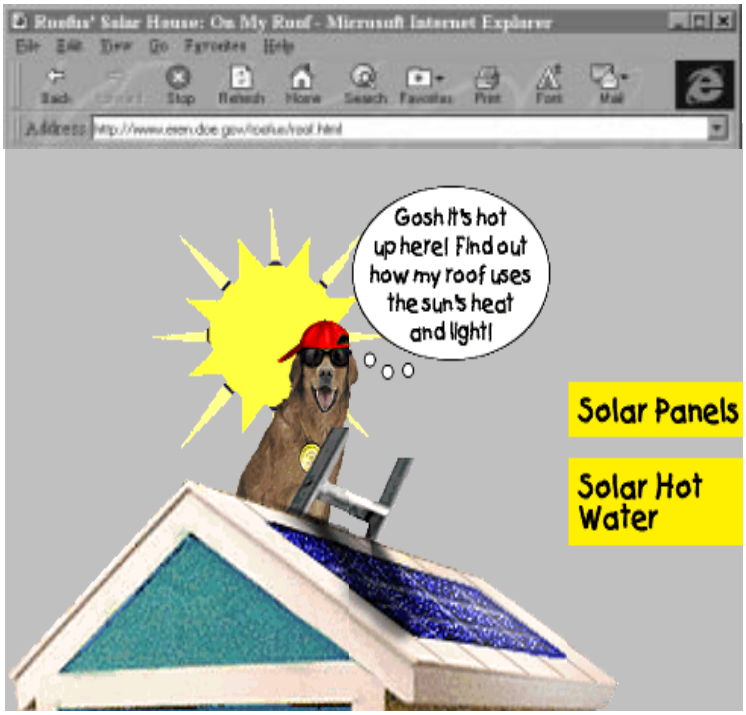
Doing Activity Two

If your class can access the Internet:

1. Go to the media center, library, or other location with computers that have Internet access.
2. Tell the children how to access Roofus's web page. (See getting ready step 3).
3. Encourage the students to click on the various hotlink buttons to familiarize themselves with the way to navigate a web page.
4. Select one or more of the solar links to review as a class.
5. Take turns reading the selection(s) aloud.
6. Ask the students several questions to test their comprehension, participation, and listening skills.

If you do not have access to the Internet:

1. Distribute a copy of page 16 for each student in your class.
2. Take turns reading page 16 aloud. (K-1 teachers may find it easier to read this information during storytime).
3. Ask the students several questions to test their comprehension, participation and listening skills.



Solar Panels

From the Webpage

Big wires carry electricity miles and miles to your home. The electricity comes from power plants.

When you turn on a light in your home, electricity flows through wires up to the light bulb and makes it glow. Lots of things in your house use electricity. Your television set, the telephone, clocks, and stereos are just a few of the things that use electricity. But where does the electricity come from?

Big wires carry electricity to your home. If you live in a house, you can probably see these wires running from somewhere outside your house up to a telephone pole. In an apartment building or in a big city, the wires might be buried so you can't see them. These wires go miles and miles to a big power plant that makes the electricity. Most of the electricity in the United States is made at power plants that burn things like coal or natural gas. The power plants use the heat from burning things to make electricity.

I have a new way to make electricity. The solar panels on my house make electricity from the sun. Whenever the sun is up, even when it's cloudy, my solar panels turn the sunlight into electricity. Instead of a big wire that goes miles away, I just need a wire that goes up to my roof. My house makes its own electricity!

You can build solar cars and other toys that make electricity from the sun. Look for solar toys in electronics stores or toy stores, or you can order them from scientific supply catalogs. These toys use small solar cells to make electricity, so they don't need batteries! There are hundreds of these solar cells built into the solar panels on my roof.

Putting solar panels on your roof is a new way to make electricity.

Not many people have solar panels on their roofs right now, but you'll be seeing a lot more of them as you grow older. The President of the United States has promised to help put a million solar hot water collectors and solar panels on roofs by the year 2010. How old will you be then?

Reproducible student page from the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy; Office of Building Technology, State and Community Programs

Overview Activity Three:

This final activity challenges the students to put the knowledge they have gained about solar energy in the previous two activities to work. The reward to this *reading to perform a task* activity is a tasty, chocolate, marshmallow, and graham cracker snack.

evel
Grades K-3

Sub ect:
- Reading
- Science

Concepts
- Students will understand that they can help the environment by using less energy from fossil fuels and more energy from renewable energy.
- The sun is hot enough to warm foods and make electicity.

Skil
- Reading to be informed
- Reading to perform a task
- Following Instructions

Material
- Internet access computers
- Solar energy reading selection (p. 16)

As es ent
- Assess the pizza box solar ovens to determine if the students' were able to follow the instructions and read to perform the task.

Getting ready for Activity Three

1. Contact your local pizza shop, and ask them to donate a sufficient number of clean, unused pizza boxes to make Roofus's Solar S'mores. (see page 18).
2. Purchase or solicit donations for the other items from Roofus's Solar S'mores recipe.
3. Make a copy of p. 18 for each student in your class.
4. Consider recruiting parent volunteers or teaching assistants to help the students execute this task.
5. Review the instructions for p. 18 and be prepared to supplement it with additional information to ensure the students' success.
6. Set up team stations with all the materials required to make the solar oven and the s'mores. (Note: depending on class time, you may wish to make the solar ovens one day and the s'mores another day.

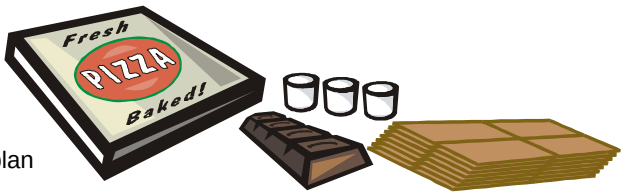
Variation: Teachers with students in the younger grades may wish to complete some of the steps in advance of the class. Alternatively, the Roofus's Pizza Box Solar Oven could be done as a class project, although the number of s'mores produced may not be sufficient for all students in a class.

Doing Activity Three

1. Divide the students into groups, and ask them to go to one of the pizza box solar oven construction stations.
2. Hand out *Build a Pizza Box Solar Oven* construction worksheet to each student. (see p. 18)
3. Tell the students to *read to perform the task* described on this worksheet.
4. If you plan to make the solar s'mores another day, stack the pizza box solar ovens in a safe place in the classroom. If you plan to make the solar s'mores today, proceed to step 5.
5. Divide the students into groups (preferably, the same groups who built the solar ovens), and ask them to go one of the solar s'mores construction stations.
6. Hand out Roofus's Solar S'mores recipe on page 18.
7. Ask the children to *read to perform the task* described on this worksheet.

Extension Activities

1. Access the other information and or download the other activities from Roofus's web page at http://www.eren.doe.gov/roofus.
2. Download the other energy and environment activities contained on the Earth Day web page at: www.eren.doe.gov/buildings/earthday/ or the other educational activities available from the U.S. Department of Energy. Additional sites to gather energy related information are: www.energy.ca.gov/education/index.html and www.nrel.gov.
3. Explore the environmental impacts of energy efficiency more closely. The energy and environmental slides available from the Earth Day web page (www.eren.doe.gov/buildings/earthday/) referenced above will get you off to a good start.
4. Look for the Project Learning Tree Environmental Education Activity Guide's section on energy and photosynthesis. The book is available from the American Forest Foundation.
5. Go to the library and ask the students to choose a book about energy to read that week. Tell them they can use their new bookmarks to remember where to start reading the next day.



make s'mores in a do-it-yourself solar oven

Build a Pizza Box Solar Oven

From the Webpage

The sun is hot enough to bake food. Here's how to make a simple solar oven that gets hot enough to warm up cookies and other treats, like s'mores. It won't get really hot, though, so you can't bake things in it and you won't burn yourself when playing with it. Be sure to have an adult help you with this!

To make your own solar oven you need:

- One pizza box from a local pizza delivery store. Here's a good excuse to ask your parents to order pizza tonight!
- Newspapers
- Tape
- Scissors
- Black construction paper
- Clear plastic wrap
- Aluminum foil
- A piece of notebook paper
- A pencil or pen
- A ruler or a wooden dowel or a stick

Now you are ready to build:

1. Make sure the cardboard is folded into its box shape and closed.
2. Place the piece of notebook paper in the center of the lid of the box and trace its outline on the lid. Put the piece of paper aside.
3. Carefully cut the two long edges and one of the short edges of the rectangle that you just traced on the lid of the box, forming a flap of cardboard.
4. Gently fold the flap back along the uncut edge to form a crease.
5. Wrap the underside (inside) face of this flap with aluminum foil. Tape it on the other side so that the foil is held firmly. Try to keep the tape from showing on the foil side of the flap. The foil will help to reflect the sunlight into the box.
6. Open the box and place a piece of black construction paper in so it fits the bottom of the box. This will help to absorb the sun's heat.
7. Close the box, roll up some newspaper, and fit it around the inside edges of the box. This is the insulation that helps hold in the sun's heat. It should be about 1 to 1 1/2 inches thick. Use tape to hold the newspaper in place, but only tape it to the bottom of the box, not the lid.
8. Cut two pieces of plastic wrap an inch larger than the flap opening on the box top. Open the box again and tape one piece of plastic wrap to the underside of the flap opening. After taping one side, BE SURE TO PULL THE PLASTIC WRAP TIGHT, and tape down all four sides so the plastic is sealed against the cardboard. Then close the box and tape the other piece of plastic wrap to the top of the flap opening. Again, be sure the plastic wrap is tight and tape down all four edges to form a seal. This creates a layer of air as insulation that helps keep the sun's heat in the box.

Finished building Let's give it a try!

On a sunny day, pick a treat to warm up and carry it and the box outside to a sunny spot. If it's cold outside, put a towel or blanket under the box so the bottom doesn't get cold. Open the box, put the treat in the center, and close the box. Now open the flap and turn the box so the foil is facing the sun. The shadow of the flap should go straight back from the back of the box. Move the flap up and down and note how it reflects the sunlight. Use a dowel, ruler, or stick to prop up the flap so that it bounces the sunlight into the box.

Wait about a half hour for the box to warm up in the sun. Then enjoy your warmed-up treat!

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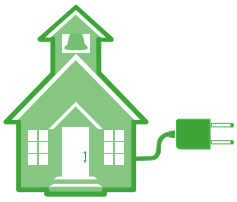


Key Term Glos ary

Acid rain: When sulfur dioxide and nitrogen oxides are emitted from cars and power plants, they mix with water vapor and turn into acids, which in turn, fall to the ground with rain, snow, or fog. This "acid rain" corrodes buildings, damages trees, harms vegetation and can harm or destroy aquatic life.

AMPERE (AMP): The measure of the number of electrons flowing through a wire. If electricity were water in a flowing river, the amps would be the amount of water flowing in that river. (See volt and watt.)

Analysis: An examination of a system, its elements, and their relations; or proof of a mathematical proposition by assuming a result and deducing a valid statement by a series of reversible steps as in the Scientific Method.

Ballast: A device that charges the electrical current in fluorescent lights.

Biomass: Farming wastes, grasses, trees, bark, sawdust, and other things which can be changed into energy by burning it, changing it to a gas, or by converting it to a liquid fuel.

Boiler: A pressurized vessel in which water or another liquid is heated to generate steam energy.

Carbon Dioxide (CO_2): A gas that is the product of burning fossil fuels and contributes to the greenhouse effect. It is also a naturally occurring chemical that is absorbed by plants. The molecule CO_2 has one carbon atom and two oxygen atoms.

Coal: A solid fossil fuel found in the earth that is often burned to make electricity.

Compact fluorescent lights or lamps (CFL): Fixtures that contain gas instead of wire filaments. Electrical current makes the gas atoms glow or "fluoresce." This fluorescence creates light with very little heat. (Note: In this lesson CFL is sometimes referred to as light due to audience knowledge levels.)

Conservation: Protecting something from waste, loss, or harm. Energy conservation means using less energy, both by using more energy-efficient technologies and by changing wasteful habits.

Efficiency: The amount of work you get for the energy you use. An energy-efficient light bulb uses most of its energy to create light, not heat. An efficient power plant gets more electricity out of the coal or oil it burns and less unwanted heat or pollution.

Electricity: One of the most important forms of energy, consisting of oppositely charged electrons and protons that produce light, heat, magnetic force, and chemical change.

Energy: The product of power (watts) and time (hours) or the capacity for doing work. Energy used for lighting can be saved by either reducing the amount of power required to produce the same amount or more light (lumens).

Energy-efficiency: Getting more accomplished with less energy.

Energy-efficient lighting: Lights that produce the same amount of light (lumens) using less electricity (watts) than conventional light bulbs. Efficient lights are usually fluorescent (they don't waste energy making unwanted heat), and they may have reflectors that direct the light where you want it.

ENERGY STAR® labeled products: Products which have met the specifications of a joint program of the U.S. Department of Energy and the U.S. Environmental Protection Agency for energy efficiency and pollution prevention.

Fossil Fuels: Fuels such as oil, coal and natural gas, that formed millions of years ago from decayed plants and animals that contain carbon.

Fuel: A material (liquid, solid, or gas) that can be used to provide power for an engine, power plant, or nuclear reactor.

Generator: A machine that converts mechanical energy into electrical energy.

Geothermal energy: Using the heat from the earth to produce power.

Global Warming: Possible accelerated increase in the Earth's temperature caused by excess production of greenhouse gases due, in large part, to the depletion of forests, air pollution from automobiles, making electricity via fossil fuels and burning fossils fuels for other needs.

Greenhouse Effect: The trapping of the sun's heat. In houses and cars it can be caused by glass. In the Earth's atmosphere it is a naturally occurring phenomenon resulting from the interaction of sunlight with greenhouse gases (such as CO_2 and CFCs). This interaction helps maintain the delicate balance of temperature and breathable air necessary for life as we know it.

Halogen torchiere: A popular, indoor, contemporary floor lamp. This light bulb uses 300-500 watts and has been identified as a potential fire hazard due to the excessive heat (750 -1000 degrees F) generated from the light produced.

Hydropower: Using the energy in flowing water to make electricity.

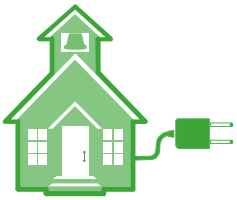
Hypothesis: Educated guess and step 3 in the Scientific Method.

Incandescent light bulbs: Light bulbs that work on the principle of electrical resistance. Electrical current flows through a wire filament, which slows or "resists" the flow of electrons. The wire gets hot and glows. Thus the incandescent bulbs create both heat and light.

Kilowatt: 1,000 watts.

Kilowatt-hour: The amount of work that can be done by one kilowatt during one hour.

Lumens: The measure of the amount of light a bulb puts out.



Key Term Glos ary (continued)

Natural gas: A fossil fuel found deep in the earth—often in oil.

Nonrenewable Energy: Sources of energy that will run out such as coal, gas, oil, nuclear energy, and hydropower.

Oil: A liquid fuel found deep in the earth, which is often used to make electricity, gasoline and other products.

Passive solar house: A house that uses a room or another part of the building as a solar collector.

Photosynthesis: The process by which plants make their own energy. Plants use energy from the sun to convert carbon dioxide (gas) and water into carbohydrates (simple sugars). One of the by-products of photosynthesis is oxygen, which is used by people and other animals to breathe. As animals use energy, they exhale carbon dioxide gas, which can be absorbed up by the plants and used for photosynthesis.

Power: The ability to do or act and or the time rate at which work is performed.

Renewable Energy: Sources of Energy that will not run out, such as sun, wind, wood, biomass, and water.

Science: The organized body of knowledge that is derived from observations and can be independently verified or tested by further investigation.

Scientific Method: An organized approach to problem solving that includes collecting data, formulating a hypothesis, testing it objectively, interpreting results, and stating a conclusion that can later be independently evaluated by others.

Steam Turbine: A machine in which high-pressure steam is made to do work by acting on and rotating blades in a cylinder. Steam turbines are used in the majority of power plants that use fossil fuels to produce electricity.

Solar collectors: Boxes, frames, or rooms that trap the sun's rays to produce heat.

Solar energy: Energy from the sun (i.e. the heat that builds up in your car when it is parked in the sun).

Sulfur Dioxide (SO_2): A toxic, colorless gas which is a dangerous constituent of smog. It is formed by volcanic activity, organic decay and burning of fossil fuels.

Technology: The application of scientific know-how for practical purposes or any use of objects by humans to do work or otherwise manipulate their environment.

Volt: The measure of the force of an electrical current. If electricity were a river, the voltage would be the speed of the water's current. (See amp and watt.)

Waste to energy: Trash or methane gas from decaying food products that are burned to create steam for electricity production.

Watt-hours: The amount of work that can be done by one watt in one hour.

Watt: The measure of electric power produced. One amp multiplied by one volt equals one watt. If electricity were a river, the watts would be the amount of work the water's current could do.
(See amp and volt.)

Wind power: Using the wind to produce electricity by turning blades on a wind turbine.

Wind power plant: a group of wind turbines interconnected to a common utility system.

redits

Quigley, Gwen. Green Schools Energy Project. Washington D.C. Youth for Environmental Sanity (Yes), and Friends of the Earth. pp. 2, 3, 7.

New England Utilities educational activities (1997). How Many People Does it Take to Change a Light Bulb? pp. 1-8.

Webster's New Collegiate Dictionary. (1980). Springfield, Massachusetts, USA. G. & C. Merriam Company. p. 41.

Academic Press Dictionary of Science and Technology. (1992). San Diego, CA. Academic Press. pp. 286, 509, 511, 889, 917, 1709, 1926,2088,2131,2176.

American Forest Foundation. (1995). "Energy Sleuths." Project Learning Tree Environmental Pre K-8 Education Activity Guide. pp. 126-130.

Energy Star Labeled Residential Light Fixtures fact sheet. (1997). Washington D.C. United States Department of Energy and Environmental Protection Agency Energy Star Program.
http:// www.energystar.gov.

Energy Star Web Page. Washington D.C. United States Department of Energy and Environmental Protection Agency Energy Star Program. http:// www.energystar.gov.

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