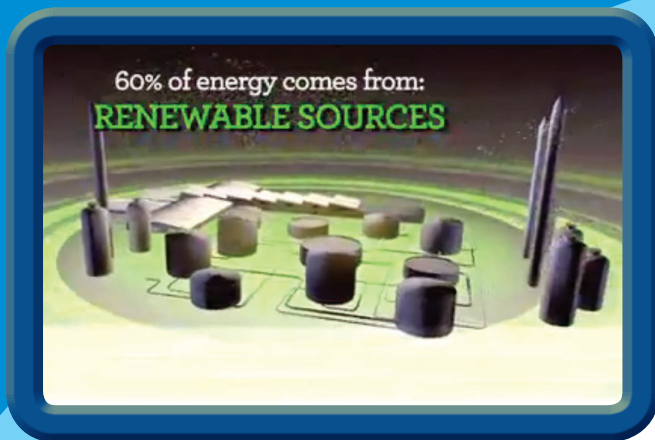


Natural Resources & Human Impacts



RESOURCE REPORT:

<http://gp.com/nature/video.html>

In this one-minute video clip from Georgia-Pacific, find out how innovative methods like recapturing condensation from cooling units at the Georgia Aquarium help save over one million gallons of water per year. You'll also learn that more than half of the energy Georgia-Pacific uses in its mills and plants comes from renewable energy sources.

Next Generation Science Standards

Natural Resources, 4-ESS3-1

Energy and fuels that humans use are derived from natural sources, and their use affects the environment in many ways. Some resources are *renewable*, which means more can be made over time. Other resources are *nonrenewable*, which means the resources are limited; once they run out, they are gone forever. It is important to use renewable sources, such as solar, wind, biomass, hydropower and geothermal energy when practical to conserve our natural resources.

Human Impacts on Earth's Systems, 5-ESS3-1

Individuals and communities work to protect Earth's resources and environments. For example, recapturing condensation from cooling units saves water, and using renewable energy for electricity conserves other resources.

WORDS TO KNOW:

biomass: energy derived from plants and other natural materials

condensation: the occurrence of water vapor in the air getting cold and turning back into a liquid

conservation: planned management of a natural resource to prevent exploitation, destruction or neglect

energy: the ability to do work

geothermal: energy derived from the use of heat generated by Earth's interior

hydropower: the process of changing the energy produced by flowing water into electrical power

nonrenewable energy: energy that took millions of years to form and will run out one day; includes petroleum, natural gas, coal and uranium

renewable energy: energy that will never run out; includes solar, wind, biomass, hydropower and geothermal energy

solar energy: energy derived from the sun's rays (solar radiation); can be converted to heat and electricity

wind energy: energy derived from the spinning blades on a wind turbine



Natural Resources & Human Impacts

INTRODUCING THE LESSON:

1. Explain that scientists define energy as the ability to do work. Then encourage students to share what they know about energy. Ask students, "What are some sources of energy?" Create a list on the board.
2. Discuss with the class the difference between renewable energy and nonrenewable energy. Explain that nonrenewable energy sources are limited. Once they run out, they are gone forever, so conservation of these resources is very important. Nonrenewable energy sources include petroleum, natural gas, coal and uranium. Then explain that renewable energy sources can be replenished but still need to be used wisely. Renewable energy sources include solar, wind, biomass, hydropower and geothermal energy. Share definitions for unfamiliar terms.
3. Referring to the list on the board, have students circle nonrenewable energy sources in red and renewable energy sources in blue. Discuss their choices.
4. Finally, as a class, brainstorm different ways to save energy both at school and at home. Create a class pledge to enact some of these energy-saving options.

I've heard of some areas using wind turbines to collect energy for electricity.



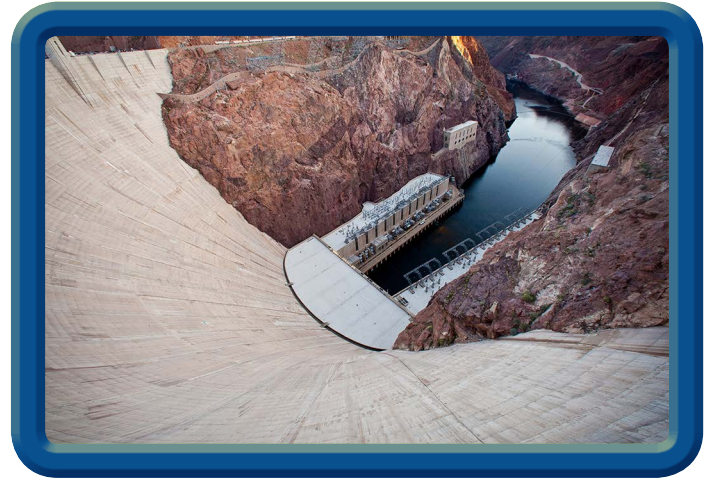
My neighbor has solar panels on his roof to capture solar energy.

I make sure to turn the lights off when I leave a room.

BUILDING HOOVER DAM

DID YOU KNOW?

A dam is used to hold the water from a lake or a river. When the Hoover Dam was created in 1935, it was the highest dam in the world. A dam creates pressure so that water can produce electrical power. This power is called hydropower. It is renewable energy because the energy source can be replenished. The water stays in the water cycle and can keep producing energy for generations to come.



Event Cards—Use with the Hoover Dam timeline.

1931: Construction is started by a company called Six Companies, Inc.
1987: The Bureau of Reclamation assumes control of running the powerhouses.
1905: Heavy rainfall and melting snow cause the Colorado River to flood the entire Imperial Valley.
2011: President Obama extends the power allocation contracts until 2067.
1934: Congress authorizes a 50-year contract that defines how Hoover Dam's electricity is to be allocated and sold.
1902: U.S. Congress passes the Reclamation Act. This act provides a plan to pay for the construction to control the Colorado River.
1922: The Reclamation Service asks to build a dam on the Colorado River for flood control and power generation. The name of the project is called the "Boulder Canyon Project."
1984: Congress sets power allocations from the dam for the period of 1987 to 2017.
1936: The dam is turned over to the federal government from Six Companies, Inc., more than two years ahead of schedule. Hoover Dam begins transmitting electricity to Los Angeles.
1928: President Coolidge signs the bill in Congress to start the project.
1935: Hoover Dam is dedicated by President Franklin Roosevelt.

BUILDING HOOVER DAM

Cut out each event card.

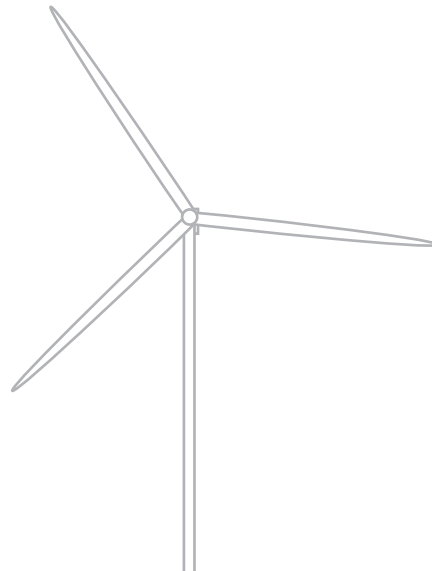
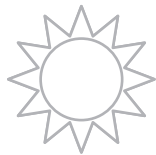
Read the events and place them in order.

Glue the cards to the timeline.



DID YOU KNOW?

Hydropower is a renewable resource.
Other renewable resources are solar, wind,
biomass and geothermal energy.



RENEWABLE ENERGY BUILDING HOOVER DAM

ANSWER KEY

- 1902:** U.S. Congress passes the Reclamation Act. This act provides a plan to pay for the construction to control the Colorado River.
- 1905:** Heavy rainfall and melting snow cause the Colorado River to flood the entire Imperial Valley.
- 1922:** The Reclamation Service asks to build a dam on the Colorado River for flood control and power generation. The name of the project is called the “Boulder Canyon Project.”
- 1928:** President Coolidge signs the bill in Congress to start the project.
- 1931:** Construction is started by a company called Six Companies, Inc.
- 1934:** Congress authorizes a 50-year contract that defines how Hoover Dam's electricity is to be allocated and sold.
- 1935:** Hoover Dam is dedicated by President Franklin Roosevelt.
- 1936:** The dam is turned over to the federal government from Six Companies, Inc., more than two years ahead of schedule. Hoover Dam begins transmitting electricity to Los Angeles.
- 1984:** Congress sets power allocations from the dam for the period of 1987 to 2017.
- 1987:** The Bureau of Reclamation assumes control of running the powerhouses.
- 2011:** President Obama extends the power allocation contracts until 2067.

Natural Resources & Human Impacts



Solar Energy S'mores

Next Generation Science Standard

Natural Resources, 4-ESS3-1

Energy and fuels that humans use are derived from natural sources, and their use affects the environment in many ways. Some resources are *renewable*, which means more can be made over time. Other resources are *nonrenewable*, which means the resources are limited; once they run out, they are gone forever. It is important to use renewable sources, such as solar, wind, biomass, hydropower and geothermal energy when practical to conserve our natural resources.

ESTIMATED LESSON TIME:

45 minutes (allow extra time for cooking)

Note: To ensure the quickest cooking time, choose a very sunny day to heat the solar oven snacks.

TEACHER PREPARATION:

1. Gather the materials needed.
2. Arrange for an adult volunteer to assist with step 4 of the solar oven assembly.

MATERIALS FOR EACH GROUP:

- craft knife (for the adult volunteer only)
- clean, medium-size pizza box
- aluminum foil
- black construction paper
- clear plastic wrap
- scissors
- glue
- tape
- ruler
- pencil

MATERIALS FOR EACH STUDENT:

- graham cracker
- square of chocolate
- large marshmallow

WORDS TO KNOW:

energy: the ability to do work

nonrenewable energy: energy that took millions of years to form and will run out one day; includes petroleum, natural gas, coal and uranium

renewable energy: energy that will never run out; includes solar, wind, biomass, hydropower and geothermal energy

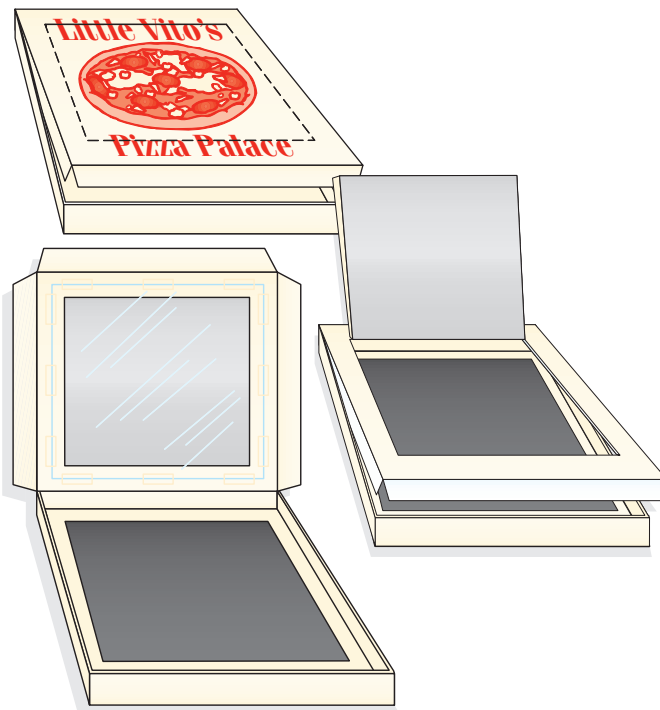
solar energy: energy derived from the sun's rays (solar radiation); can be converted to heat and electricity



Natural Resources & Human Impacts

INTRODUCING THE LESSON:

1. Ask the students what they know about energy. Explain that scientists define *energy* as the ability to do work.
2. Discuss with the class the difference between renewable energy and nonrenewable energy. *(Nonrenewable energy sources are limited. Once they run out, they are gone forever. Nonrenewable energy sources include petroleum, natural gas, coal and uranium. Renewable energy sources can be replenished but still need to be used wisely. Renewable energy sources include solar, wind, biomass, hydropower and geothermal energy.)*
3. Ask students, “Why don’t we use renewable energy all of the time?” *(We can’t store up wind and sunshine to use whenever we need to make more electricity. On cloudy days or days with no wind, there wouldn’t be enough power for everyone.)*
4. Discuss the term *solar energy*, which is energy that comes directly from the sun. Solar energy can be used for heating buildings and water and for electricity. Then discuss both the benefits and limitations of solar energy. *(Benefits: Solar energy systems do not produce air pollution or carbon dioxide. When located on buildings, they have minimal impact on the environment. Solar energy is Earth’s most available energy source. Limitations: Sunlight amounts are not consistent; they vary by location, time of day, time of year and weather conditions. Because the sun doesn’t deliver much energy to any one place at a time, a large surface area is required to collect enough energy to be useful.)*
5. Inform students that about 0.1% of U.S. electricity comes from solar power.* Explain to the class that they are going to try out solar energy by creating solar ovens.
6. Invite each table group to a distribution station to gather the materials needed for the activity. Then guide the student groups through the steps to assemble their solar ovens.



* As of 2009. Source: U.S. Department of Energy

Natural Resources & Human Impacts

RESOURCE REPORT

STEPS:

1. Cut a layer of aluminum foil to fit the inside bottom of the pizza box. Glue the aluminum foil, shiny side up, in place.
2. Cover the aluminum foil with a layer of black construction paper cut to size. Glue the paper in place.
3. Close the box. With your ruler and a pencil, draw a two-inch border around the edge of the box top.
4. Have an **adult volunteer** cut three sides of the border with a craft knife. Carefully pry the flap open. This becomes your sun window. Fold the window up along the uncut side. Glue a layer of aluminum foil cut to size on the inside of the flap.
5. Open the box and tape a sheet of plastic wrap on the inside of the lid. Try to make the seal as airtight as possible.
6. Discuss how a solar oven works. *(The clear plastic wrap allows the sunlight to shine in the box and keeps the heat from escaping. The black paper absorbs the sun's heat and causes the solar oven to warm up. The aluminum foil reflects the sun's rays back into the box.)*
7. Distribute a recipe to each group along with the ingredients to create the treat.
8. Enjoy your solar snacks!

RECIPE CARD

SOLAR S'MORES

INGREDIENTS FOR ONE:

- 1 graham cracker
- 1 square of chocolate
- 1 large marshmallow



DIRECTIONS:

Break the graham cracker in half. Stack the chocolate square and the marshmallow on one graham cracker half. Top with the second graham cracker half. Heat the s'more in the solar oven in the sun for several hours. Yummy!