

Nonrenewable and Renewable Energy Unit



CCSS/Curriculum 2.0 Standards:

- **Represent and interpret data. 2.2.A.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up unit, or by making repeated measurements of the same object. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.
- **Measure and estimate lengths in standard units. 2.2.A.1** Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- **Natural Resources and Human Needs. Investigations in Science Grade 6.** Differentiate between renewable and non-renewable resources. Determine ways humans impact the environment obtaining and using natural resources. Apply the design process to solve problems in and beyond the classroom.
- **Environmental Issues. Investigations in Science Grade 6.** Identify the effects of human impact on the environment.

IEP/FLS Goals:

- SWBAT identify the ways that they use energy in the house.
- SWBAT explain methods to conserve energy and/or to save on energy costs.
- SWBAT read and implement recipes – safety in food temperature??

Sources:

- The NEED Project. US Department of Energy Efficiency and Renewable Energy. "Power to the Plug: An introduction to Energy, Electricity, Consumption, and Efficiency."
- TVA Public Power Institute. "Renewable Energy Sources, Elementary 3-5."

Name: _____ Date: _____

What is Energy?

Energy makes things change. Scientists define **energy** as the ability to do work. Energy moves cars along the road and boats over the water. It bakes a cake in the oven and keeps ice frozen in the freezer. It plays our favorite songs on the radio and lights our homes. Energy helps plants to grow. Energy makes our bodies grow and allows our minds to think.



Directions: Draw 3 examples of things that need energy.

| | | |
|----|----|----|
| 1. | 2. | 3. |
|----|----|----|

We have to get our energy from an energy source. An energy source is something that can produce, or make, energy. You need a source to create electricity to power your lamp or your oven. You need a source to create the gas you put in your car. There are 2 types of energy sources: **renewable** and **nonrenewable**.

Nonrenewable Energy Sources

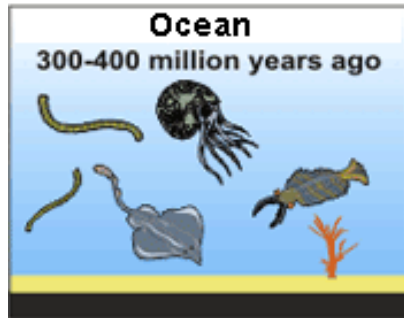
An energy source is **nonrenewable** when you cannot get more of the energy source after you use it, or that it is very hard to get more of it. A nonrenewable energy source is **limited**. Some examples of nonrenewable energy sources are coal, petroleum, and natural gas. We use these to make electricity, power our cars, heat our homes, and make products.



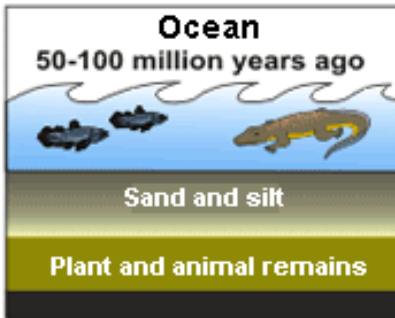
| Vocabulary Word | | Definition | |
|-----------------------------------|------------|------------|--|
| Nonrenewable Energy Source | | | |
| Example #1 | Example #2 | Example #3 | |
| | | | |

Focus on Petroleum

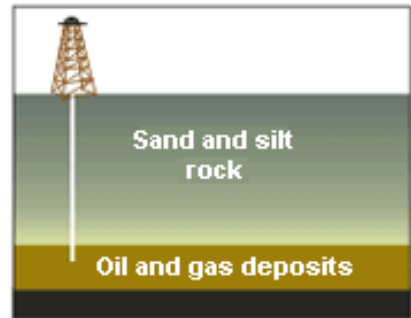
It takes millions of years to form petroleum (also known as crude oil). Read the diagram below to find out how it is made.



Tiny sea plants and animals died and were buried on the ocean floor. Over time, they were covered by layers of silt and sand.



Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned them into oil and gas.



Today, we drill down through layers of sand, silt, and rock to reach the rock formations that contain oil and gas deposits.

After the petroleum is extracted from underground, you can't use it right away for energy. The petroleum is sent to a factory in order to be turned into gasoline or other products. This process is called oil refinery.



Drilling for petroleum undersea



Refinery factory

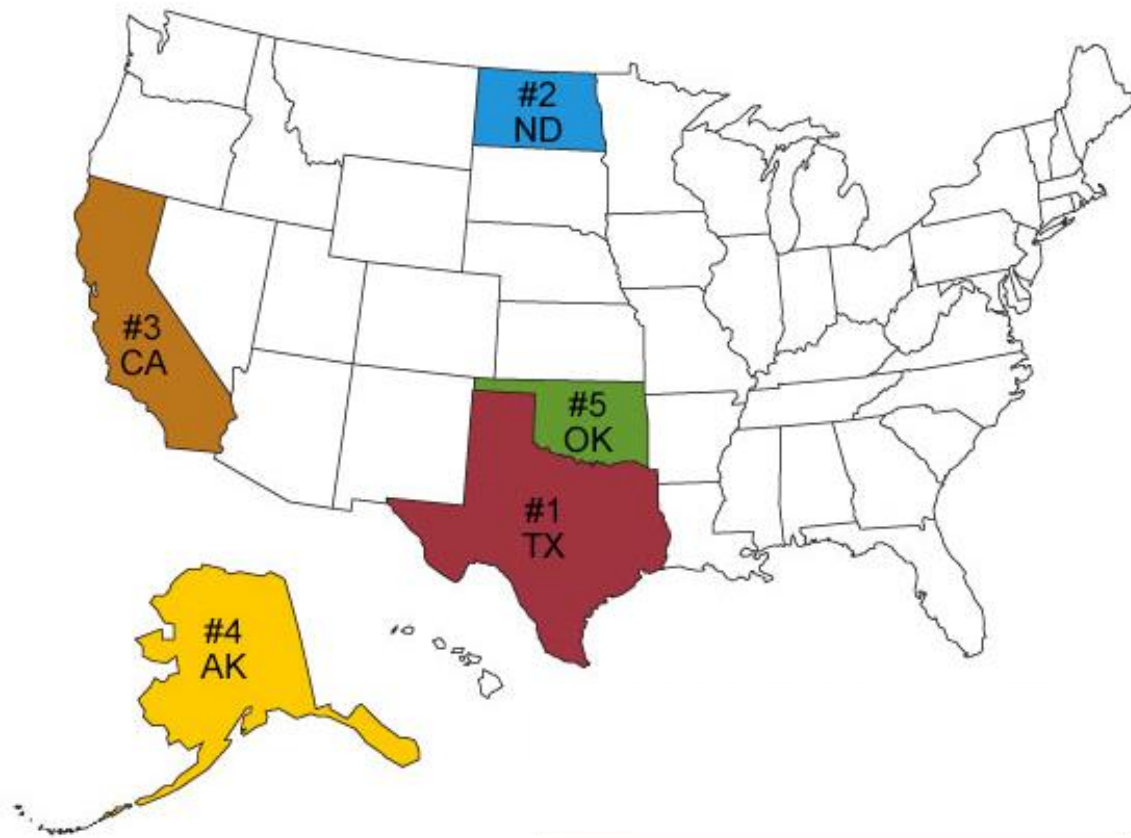


The gas we put in our cars

Why do you think petroleum is a nonrenewable resource?

Directions: Read the following graph. Use the graph to answer the question below.

Top crude oil producing states, 2014



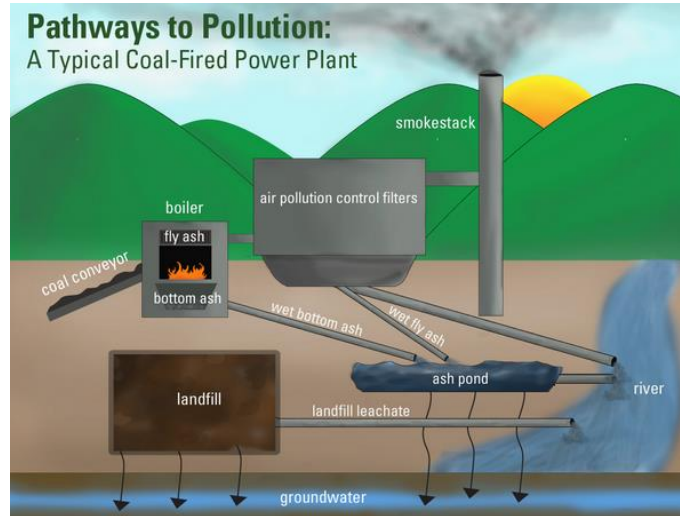
Source: U.S. Energy Information Administration, *Petroleum Supply Monthly*, Table 26 (February 2015), preliminary data for 2014



Which two states produce the most crude oil (petroleum) in the United States?

Impact of Using Nonrenewable Energy Sources

Nonrenewable energy sources, such as coal or natural gas, are used more because they are cheaper and easier to use. However, using these nonrenewable energy sources to create electricity pollutes the environment. Air pollution can lead to breathing problems, heart attacks, and cancer. Carbon dioxide emissions also trap heat on Earth and make the planet's temperature go up, which greatly affects our health, environment, and climate.



Using nonrenewable energy sources can also harm the environment when we extract the sources. For example, drilling for petroleum in the ocean destroys oceanic habitats.

Sometimes, the ships holding the oil may leak, which also kills animals that live in the ocean.



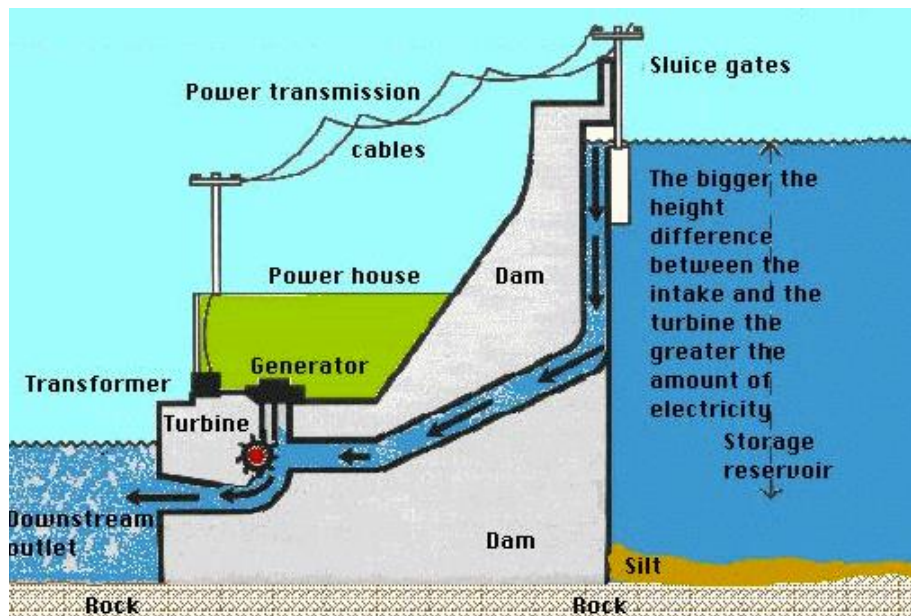
How does using nonrenewable energy sources impact the environment?

Renewable Energy Sources

An energy source is **renewable** when you can get more of the energy source. It will renew itself. Some examples of renewable energy sources are hydropower, solar energy, and wind energy. We mostly use these to make electricity.



| Vocabulary Word | Definition | |
|----------------------------------|------------|------------|
| <h2>Renewable Energy Source</h2> | Example #1 | Example #2 |
| | | Example #3 |

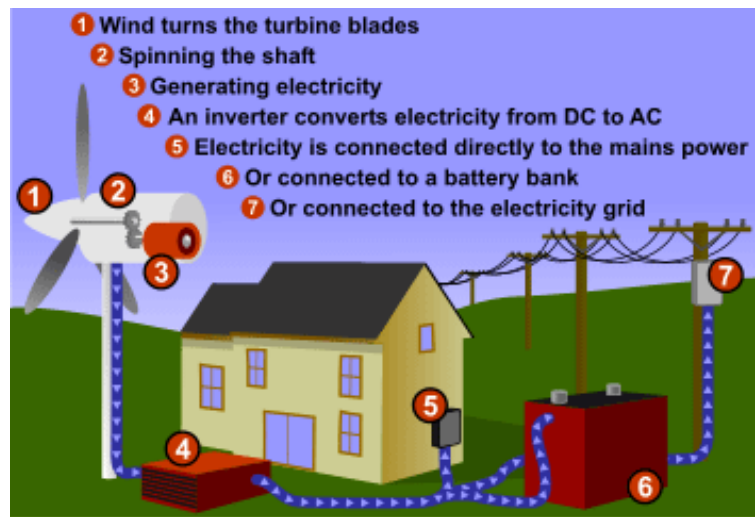


Impact of Using Renewable Energy Sources

Most renewable energy sources, like wind or water, produce very little pollution. This can reduce sicknesses that people get from breathing in air

pollution. In addition, getting renewable energy sources does not harm the environment. You don't have to dig up the land to get sun

energy or wind energy. Most of all, it will continue to renew itself. There will always be wind blowing and there will always be sun shining, so we can continue to use its energy.

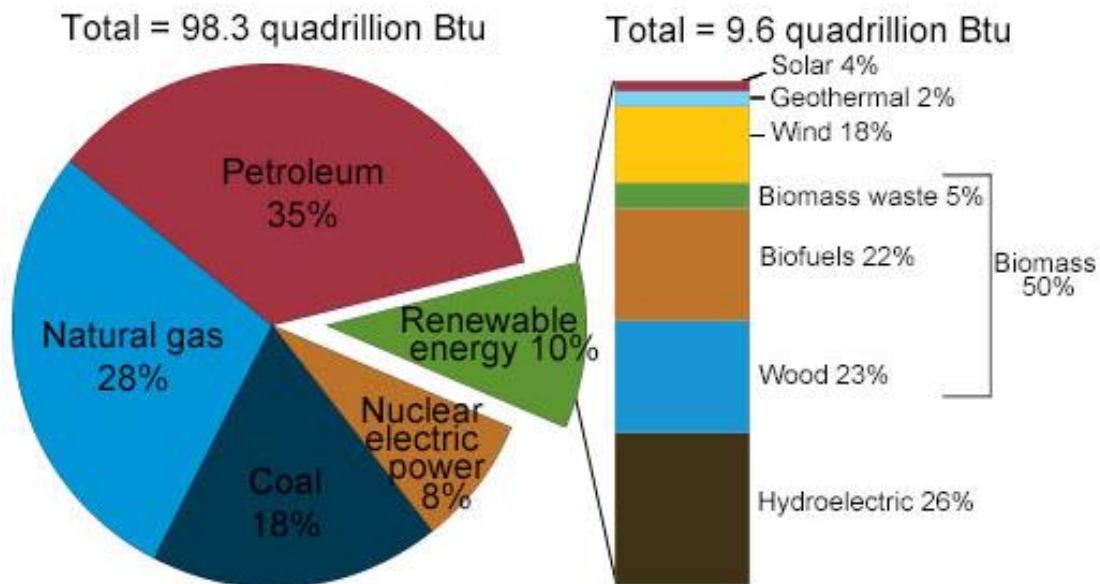


Would you encourage people to use nonrenewable energy sources or renewable energy sources? Explain why or why not.

Focus on Energy Consumption

Directions: Read the following graph. Use the graph to answer the question below.

U.S. energy consumption by energy source, 2014



Note: Sum of components may not equal 100% as a result of independent rounding.

Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1 (March 2015), preliminary data



1. Which type of energy was the most used in the United States in 2014?

2. Which type of energy was the least used in the United States in 2014?

3. Out of the energy use in the United States, what percent was nonrenewable energy?

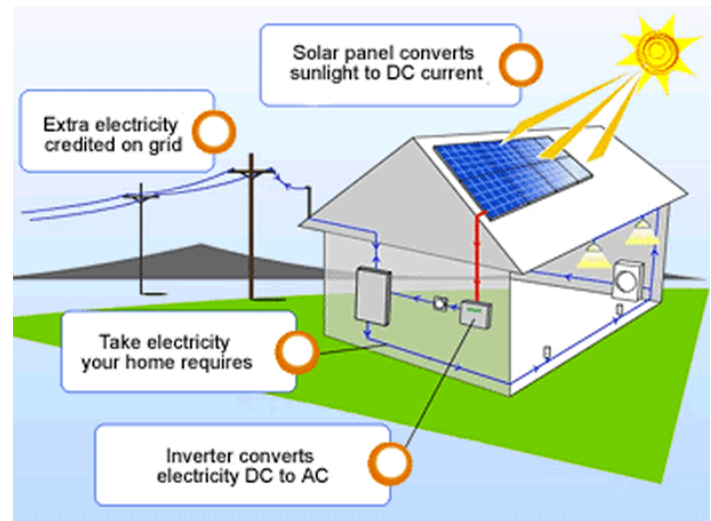
4. Out of the energy use in the United States, what percent was renewable energy?

Directions: Based on what you have learned so far, fill in the chart!

| Nonrenewable Energy | Renewable Energy |
|--------------------------------|--------------------------------|
| Definition: | Definition: |
| Examples: | Examples: |
| One reason we should use LESS: | One reason we should use MORE: |

Using Solar Energy

We can capture sunlight and use its energy for many different things. In the U.S., people use solar energy mostly to heat buildings and water and to generate electricity. In some countries, many people use solar energy to cook food by building **solar cookers**.



Facts

- There are over 100,000 solar cookers being used in both India and China
- More than 5000 families in Kenya are using solar cookers because of Solar Cookers International
- Developing countries are fuel poor but sun rich
- In the Touloum Refugee Camp in Chad, Africa, 5,000 women have been trained to use solar cookers and about 16,000 have been distributed.

Videos

Video of the solar cookers in Touloum:

http://www.youtube.com/watch?v=BfHQhVpS1yY&feature=player_embedded

Making popcorn on a solar cooker

<http://www.youtube.com/watch?v=hUjYLLXhs&feature=related>

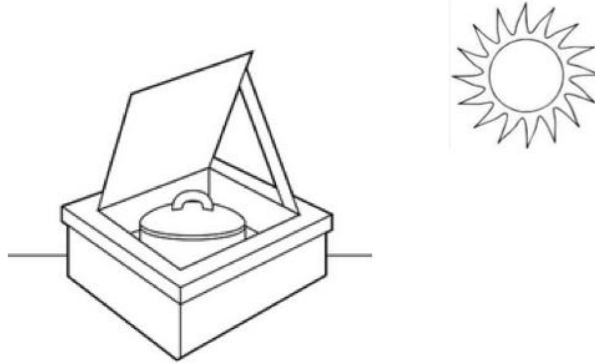


Solar cooking conference in Dinguyare, Guinea

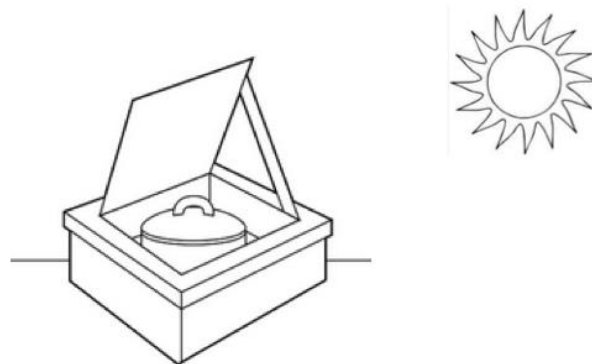
How Do Solar Cookers Work?

Directions: Read about 3 ways solar cookers work with the sun's energy. In each diagram, follow the directions to color or label it.

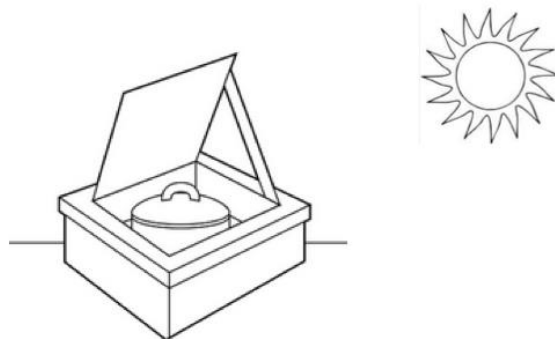
1) Solar cookers **concentrate sunlight**. A mirror or shiny foil reflects the rays of the sun. Color the foil on the flap gray. Draw the sun's rays reflecting off of the foil.




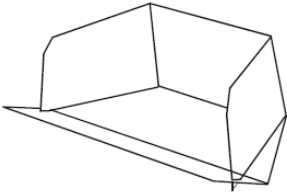
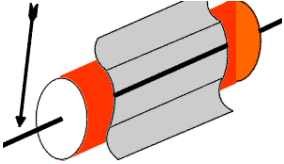
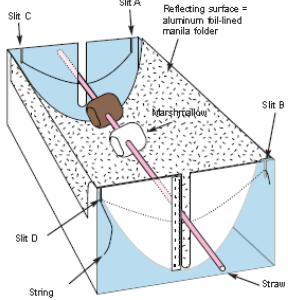
2) Solar cookers **turn light into heat**. The black paper absorbs the rays and heat of the sun. Color the inside of the box black. Draw the sun's rays being absorbed.



3) Solar cookers **trap heat**. The black paper and the plastic keep the hot air inside the solar cooker so it can't escape. Color the plastic blue. Draw the sun's rays being trapped inside.



SOLAR COOKER MODEL PROJECT

| Period 1 | Period 2 |
|---|--|
| <p data-bbox="386 317 607 348">Pizza box oven</p>  <p data-bbox="404 636 589 667">Trifold oven</p>  | <p data-bbox="1036 317 1240 348">Pringles oven</p>  <p data-bbox="967 611 1308 642">Reflective solar cooker</p>  |

Directions: Cut out pictures to paste into vocabulary boxes:



PETROLEUM



SOLAR



NATURAL GAS



HYDROPOWER



COAL

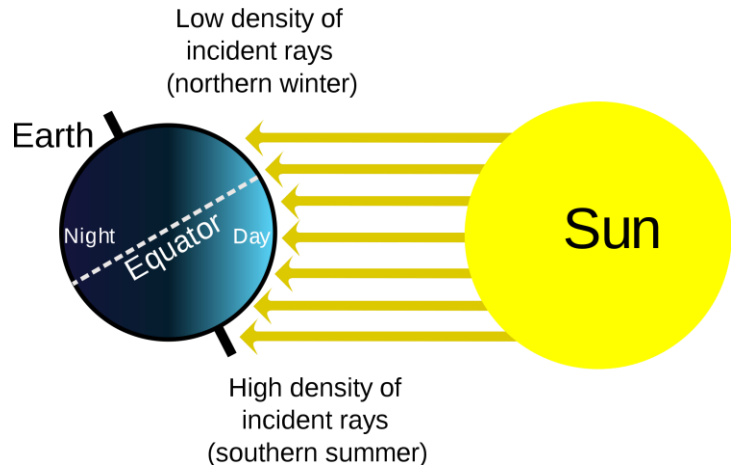


WIND

Solar Energy

The sun is a star and a giant ball of gas. It sends out huge amounts of energy every day. Most of the energy goes off into space. Only a small part reaches the Earth, but this amount is large enough to provide energy for many things!

The sun provides a limitless, nonpolluting, free source of energy for the earth. Plants need to have sunlight in order to live. Through photosynthesis, plants give off oxygen, which we need in order to live! We also need the sun's heat and light in order to survive on earth. If there were no sun, we would all freeze to death!



<http://www.eia.gov/kids/index.cfm>

www.need.gov

Big Ideas

- What is energy?
- What do you use energy for in your house?
- Sources of energy
 - Renewable vs. nonrenewable energy
 - Benefits of renewable energy
- Solar energy
 - What can you use it for?
 - How it works – what you need
 - **Application – solar cooker, solar water heater**
- Energy conservation

Vocabulary

- Energy
- Renewable
- Non-renewable
- Consumption
- Conservation