

Sources of Energy

5th Grade

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Benchmark and SLC#:

SLC 9: A. Students will explore how energy changes (transforms) from one form to another within their surroundings. B. Students will communicate their knowledge of energy changes.

Objectives:

Students will learn the ten different sources of energy and be able to distinguish non-renewable sources from renewable sources.

Materials:

- Ohio Energy Project Energy Sources Poster
- Energy Sources definition sheet

Initial Demonstration/Initial Observation:

Ask the question: How have you used energy today? Make a list of all the observed uses/forms of energy. Follow up by asking:

Where do lights get energy? –Electricity

Where does electricity come from? –Power plant

How does the power plant get electricity? –Burning fossil fuels, water, sun, wind, nuclear fission, and from the heat of the earth.

These are all sources of energy. Some of these sources are renewable – i.e. they don't use up resources. Others are non-renewable – i.e. they use up resources. Which ones are which?

Energy is converted to electricity, which is again converted to energy, conserving the total amount of energy.

Target Observations:

- Lights, gasoline, food, walking, cars, radios, heaters, sound, etc. are all related to energy

Target Model:

-Energy is the ability to do work

-Energy is everywhere and is essential to life

-Energy has ten different sources: coal, propane, nuclear, natural gas, petroleum, wind, geothermal, hydropower, solar, and biomass

-Energy is always conserved

Procedure:

1. Split the class up into 10 different groups. Have 10 different energy stations set up around the room each with a description of a different source of energy. Each group will have to read the description and then answer a short list of questions about the resource (name, description and where it comes from).

2. After all groups have had a chance to read about and answer their questions ask them to describe each source of energy.
3. Next have each group categorize the different sources. After a few minutes and ask them how they separated the different sources. Eventually lead them to two different categories: renewable and nonrenewable.
4. The renewable resources are sources that we can use over and over again or are easily replenished
5. The nonrenewable resources are sources that we are using up and cannot form in a short period of time.
6. Have students add to their sheet of questions if the energy source is renewable or nonrenewable.
7. Hand out the definition cards, which accompany the Energy Sources Poster to each group.
8. Each group has to discuss which source is being used and then when they have figured it out, will come up to the poster and attach the definition next to the appropriate energy source.

Target Revised Model:

-Energy is the ability to do work

-Energy is everywhere and is essential to life

-Energy has ten different sources: coal, propane, nuclear, natural gas, petroleum, wind, geothermal, hydropower, solar, and biomass

-Energy is always conserved

-Renewable sources include: wind, geothermal, hydropower, solar, and biomass

-Non-renewable sources include: coal, propane, nuclear, natural gas, and petroleum

WHAT IS BIOMASS?

- Biomass is any organic matter (anything that was once alive) that can be used as an energy source.
- Wood, crops, and yard and animal waste are examples of biomass.
- People have used biomass longer than any other energy source.
- For thousands of years, people have burned wood to heat their homes and cook their food.
- Burning is the most common way to release energy from biomass.

WHAT IS COAL?

- Coal is a fossil fuel formed from the remains of plants that lived and died millions of years ago, when parts of the earth were covered with huge swampy forests.
- Coal is a solid black rock
- **The energy we get from coal today came from the energy that plants absorbed from the sun millions of years ago.**
- **Millions of years ago, dead plant matter fell into swampy water. For thousands of years, a thick layer of dead plants lay decaying at the bottom of the swamps.**
- **The weight of the top layers of water and dirt packed down the lower layers of plant matter.**
- **What once had been plants gradually turned into coal, a solid black rock.**
- Coal miners use giant machines to remove coal from the ground. They use two methods: surface mining and underground mining.

WHAT IS GEOTHERMAL ENERGY?

- Geothermal energy is heat from within the earth.
- Geothermal energy is generated in the earth's core, almost 4,000 miles beneath the earth's surface.

- Deep underground, the rocks and water absorb the heat from magma.
- We can dig wells and pump the heated, underground water to the surface.
- People around the world use geothermal energy for heat and to produce electricity.

WHAT IS HYDROPOWER?

- Hydropower (hydro means water) is energy that comes from the force of moving water.
- The force of moving water can be very powerful.

WHAT IS NATURAL GAS?

- Natural gas is a fossil fuel like petroleum and coal.
- This gas is colorless and odorless
- Natural gas is called a fossil fuel because most scientists believe that it was formed from the remains of ancient sea plants and animals.
- When the plants and tiny sea animals died, they sank to the bottom of the oceans, where they were buried by sand and silt.
- The layers of sand, silt, and plant and animal matter continued to build until the pressure and heat from the earth turned them into petroleum and natural gas.
- Natural gas is trapped in underground rocks much like a sponge traps water in its pockets.
- Natural gas is really a mixture of gases. The main ingredient is methane.
- People use natural gas mostly for heating.
- Natural gas should not be confused with gasoline, which is made from petroleum.

WHAT IS PETROLEUM?

- Petroleum is a fossil fuel. Petroleum is also called oil.
- Oil is a thick black liquid
- It is called a fossil fuel because it was formed from the remains of tiny sea plants and animals that died millions of years ago.
- When the plants and animals died, they sank to the bottom of the oceans.
- Here, they were buried by thousands of feet of sand and silt.
- As the layers increased, they pressed harder and harder on the decayed remains at the bottom.
- The heat and pressure changed the remains, and eventually, petroleum was formed.
- Petroleum deposits are locked in porous rocks almost like water is trapped in a wet sponge.
- If oil is found, a pump moves the oil through a pipe to the surface.

WHAT IS PROPANE?

- Propane is an energy-rich gas that is related to petroleum and natural gas.
- Propane is called a fossil fuel because it was formed millions of years ago from the remains of tiny sea animals and plants.
- When the plants and animals died, they sank to the bottom of the oceans where they were buried by layers of sand and silt.
- Over the years, the layers became thousands of feet thick.
- The layers were subjected to enormous heat and pressure, changing the remains into petroleum and natural gas deposits.
- Pockets of these fossil fuels became trapped in rocks like a sponge holds water.
- Petroleum's most important product is gasoline and propane is another.

WHAT IS SOLAR ENERGY?

- Every day, the sun radiates (sends out) an enormous amount of energy.
- It radiates more energy in one second than the world has used since time began.
- This energy comes from within the sun itself.
- Every day enough solar energy reaches the earth to supply our nation's energy needs for a year!
- It takes the sun's energy just a little over eight minutes to travel the 93 million miles to earth.
- Solar energy travels at a speed of 186,000 miles per second, the speed of light.
- Today, people use solar energy to heat buildings and water and to generate electricity.
- A solar collector is one way to capture sunlight and change it into usable heat energy.
- A closed car on a sunny day is like a solar collector.
- As sunlight passes through the car's windows, it is absorbed by the seat covers, walls, and floor of the car. The absorbed light changes into heat.
- The car's windows let light in, but they don't let all the heat out. A closed car can get very hot!

WHAT IS NUCLEAR ENERGY?

- Nuclear energy is energy in the nucleus (core) of an atom.
- Atoms are tiny particles that make up every object in the universe.
- Nuclear energy can be released from atoms in two ways: nuclear fusion and nuclear fission.
- In nuclear fusion, energy is released when atoms are combined or fused together to form a larger atom.
- In nuclear fission the nucleus of an atom could be split apart by bombarding it with a neutron.
- Enormous amounts of energy can be produced by nuclear fission.
- Nuclear fission is used to generate electricity.

- Fission takes place inside the reactor of a nuclear power plant.
- Uranium atoms are commonly split apart.

WHAT IS WIND?

- Wind is simply air in motion. It is caused by the uneven heating of the earth's surface by the sun.
- Since the earth's surface is made up of land and water, desert and forest, the surface absorbs the sun's heat of different amounts.
- During the day, the air above the land heats up more quickly than air above water.
- The warm air over the land expands and rises, and the heavier, cooler air rushes in to take its place, creating winds.
- Today, people use wind energy to make electricity.
- Wind machines use blades to collect the wind's energy.