Chapter 20 General Science

Energy Resources

\* Name as many energy sources as you can think of in three minutes.

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\* There are more than 5,000 windmills at Tehachapi Pass. These produce enough electricity to meet the residential (housing) needs of about 500,000 people.

What are the possible benefits of using wind as a source of energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Where would the best place to have windmills? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* The Spanish word for sun is “sol”. This is where the word *solar* (which describes things having to do with the sun, such as *solar collector, solar energy, and solar eclipse.*

\* The prefix *hydro-* in hydroelectric means “water,” and *geo-* in geothermal means “earth”. Look up several other words beginning with *hydro-* or *geo-* and give their meanings. Examples include *hydrofoil, hydrophobic, hydroponics, geography, geode, and geology.* Feel free to choose words other than these.

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20-1 Fossil Fuels

\* Recall from chapter 13 that coal, oil, and natural gas are fossil fuels. List everything made from fossil fuels that you use in an average day.

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\* Are we dependent of fossil fuels? Defend your argument. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* We get our energy from many sources. An explosion, for example, releases a lot of energy. Ocean waves and strong winds are full of energy, too. The sun has an almost unlimited source of energy. Even tiny atoms hold huge amounts of energy.

\* You already know a lot about energy. You know the forms it will take: heat, sound, light, electricity, chemical forms, and mechanical forms.

\* Burning fossil fuels releases energy. Over 80% of all the energy used in the United States comes from burning fossil fuels. Fossil fuels are used to run cars, heat homes, and provide power for factories. Many plastics come from fossil fuels.

\* Worldwide percentages of energy use from fossil fuels are: oil=33%, coal= 27%, natural gas= 18%.

What are the percentages for the United States? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Fossil fuels are made of organisms that died millions of years ago.

\* There are two serious problems with burning fossil fuels for energy.

1.) There is only so much fossil fuel in existence.

\* Fossil fuels take millions of years and just the right conditions to form. We are using them at a rate much faster than they are produced in nature.. We can not make more (synthetics). When fossil fuels run out, they are gone for good.

2.) Fossil fuels cause air pollution.

\* The wastes from fossil fuels are poisonous and very harmful to the environment.

\* People can help with these problems. The less often fossil fuels are used, the longer the supplies will last.

\* Gasoline can be saved by riding a bike, walking, or taking a train/bus instead of a car. These ways of get around keep you healthy and keep the air cleaner.

\* Insulation in homes helps, too. Using insulation means less energy is needed to heat the homes.

*20-2 Other Energy Resources*

**nuclear reactor**- a device that splits atoms to release energy

**radioactive**- giving off radiation, or harmful rays

**solar collector**- a device with a dark surface that absorbs sunlight and changes it into heat energy

**hydroelectric energy**- the electrical energy from moving water

**turbine**- a machine with blades that can be turned; used to run an electric generator

**geothermal energy**- the heat contained in rock deep inside the Earth

**geyser**- a hot spring that shoots steam and hot water into the air

\* How does the blue calculator get its power? The black one?

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\* How do we get our electricity to our homes? How is it made?

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\* Nuclear power plants use **nuclear reactors**. In a nuclear reactor, millions of atomic nuclei are split every second. This process releases a great deal of heat (excess energy). The heat is used to change water into steam. The steam is then used to power electric generators. The generators change heat energy into electricity.

\* Nuclear fission has some serious problems.

1.) **Radioactive** waste

\* These wastes remain dangerous for millions of years. These can injure and even kill living things. There is not a safe way to permanently dispose of them.

\* Burying them can cause pollution to the groundwater and soil. Scientists are looking for safe ways to bury them safely. The site must be dry. Why?

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\* There must not be a chance for natural disaster (earthquake, volcano, etc.). Why?

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2.) Human error.

\* Accidents occur. Bridges have collapsed. Roads crack. Harmful substances have leaked from the power plants. Many people think nuclear energy is not worth the risk.

\* You learned earlier that scientists know how to split the nucleus of an atom. This process is nuclear fission. It releases a tremendous amount of energy.

\* Scientists are looking for ways to use the energy released by nuclear fusion. Nuclear fusion is the process the sun uses to release heat and light energy.

\* Nuclear fusion is a very clean process. The fuel used in nuclear fusion is hydrogen. Hydrogen is easy to get from saltwater. This can be found in sea and ocean water.

\* Scientists do not know how to control the nuclear fusion process. The problem with nuclear fusion is reaching and maintaining the high temperatures (at least 50 million degrees Celsius) required for fusion to occur. Scientists have used powerful magnetic fields to produce fusion in laboratories for short periods of time, but it takes more energy to generate the fields than the fusion produces.

\* Solar energy is produced by the sun. Have you ever sat in a car on a sunny day (hot or cold). How is the temperature different in the car than outside? Why?

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\* Sunlight hitting your car was turned into heat energy and trapped inside. This is how a **solar collector** works. Here’s how a solar collector heats a house:

1.) Sunlight strikes the solar collector on the house. The solar collector changes the sunlight into heat energy.

2.) The heat warms the water in the solar collector.

3.) The heated water is pumped into the house through a pipe.

4.) A fan blows air across the warm pipe, warming air in the house.

\* Solar energy can be used to produce electricity. A *solar cell* changes sunlight into electricity. This technology is very expensive.

\* It takes many years to return the money spent on solar panels. If it takes 20 years, do you think this is a good idea? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\* Another problem with solar energy is that the sun’s light is spread over wide areas. Scientists are looking for better ways to collect it.

\* Energy from the sun is clean, there is a lot of it, and it is free. Scientists are hoping to use more and more of it to provide much of the world’s energy in the future.

\* Complete the Great Energy Challenge quiz at the link below.

http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/solar-power-quiz/

\* Another type of energy is **hydroelectric energy**. A darn traps the water in a river. The water behind the darn is released a little over time, often by opening the flood gates.

\* The moving water strikes a **turbine**. When the moving water hits the turbine, it turns the blades. The motion runs an electric generator, which changes the mechanical energy of the blades into electrical energy.

\* Darns provide energy to many cities. People do not want to darn up too many rivers, though. Darns can affect fish or other wildlife found in or neat rivers by changing the ecology of the area.

\* Moving water produces about 4% of the energy used in the United States.

\* The heat contained in rock deep inside the Earth is called **geothermal energy**.

\* The heat is produced by radioactivity and the movements of rock below the surface of the Earth. Geothermal energy heats rock and any water that trickles through cracks in the rock.

\* Sometimes that heat is released in **geysers** and hot springs.

\* Old Faithful geyser in Yellowstone National Park erupts every 76 minutes or so. Steam that is formed inside the Earth will cause the geyser to erupt.

\* Scientists have learned to use the geothermal energy to heat homes and produce energy. Wells are drilled into the ground. Hot water is pumped out to heat buildings.

\* If the rock is hot enough, steam rises to the surface and is used to run an electric generator.

\* Only a few places exist where rock is hot enough and close enough to the surface to make drilling worthwhile. These places include:

1.) Iceland

2.) New Zealand

3.) Italy

4.) Japan

5.) California

\* People have also used the energy of wind for many centuries. All over the world, windmills pump water, grind grain, and make electrical energy.

\* Obviously windmills work the best when it is windy.

\* Oceans waves and tides also have a great deal of energy. Power plants use the energy in waves and tides to produce electrical energy.

\* Conditions must be just right for setting up a power plant.

Complete the fossil fuel Webquest by completing as many questions as you can in the time allotted by your teacher.

<https://sites.google.com/site/277fossilfuelswebquest/>

If you finish early, try this one.

<http://www2.fultonschools.org/teacher/wanderr/index_files/Page368.htm>

For a bigger challenge, try this one.

<http://glencoe.mcgraw-hill.com/sites/0078797859/student_view0/unit2/webquests.html>