Reading 1.1: Energy Resources

Getting ready:

As you have learned in this activity, mining is an important source of materials you use every day. Think about materials and resources you used just to get ready for school today. Did you take a shower or brush your teeth? Did you use any warm or hot water? If you did any of these, then water is one resource you used. Plus, more resources were used to heat the water. Were any lights, heat, or air conditioning turned on where you live? Did you use roads, bridges, or sidewalks to get to school? Did you get to school using gasoline? The list goes on and on. Many items you use every day are made from resources that were mined.

But, mining also causes damage to the Earth. Imagine what it would be like to go without electricity for several days. Maybe you have experienced a day without power, like during a storm. What are some things that do not work without electricity?

Most of the energy around the world begins with fossil fuels. All resources have pros (positives) and cons (negatives) associated with using them. As you read, put a "+" by the good reasons to use certain resources or the benefits you get from them. Put a "-" by the drawbacks of using those same resources.

Fossil fuels

The main energy supply that humans rely on is fossil fuels: oil, coal, and natural gas. They are non-renewable sources of energy. Why? Because they take millions of years to form. When a plant dies, the material that makes up the plant becomes part of the Earth. Fossil fuels are formed when plants die and decay, and get buried in layers of sediment. New layers of sediment are deposited on top of older layers. Pressure from layers upon layers pressing on the decayed material, and very high temperatures from inside the Earth, compress and solidify the material deep in the ground. This is what happens to create coal.

Coal is used to generate power, but you don't usually see how coal turns into electricity. When coal is burned, it releases thermal energy. That energy gets converted to mechanical energy and finally to electrical energy that we can use. Today, coal provides more than half of the electricity in the U.S. With the population on Earth continuing to grow, scientists are working to develop new types of renewable energy to meet everyone's needs for the future.

What are some of the pros and cons of non-renewable versus renewable energy?

Non-renewable energy

Fossil fuels as a source of energy are currently available throughout the world. Fossil fuels do not depend on climate or weather, which makes them a dependable resource. Resources like coal and oil

are relatively easy to transport from one place to another. Pipelines, trucks, and ships can move fossil fuels across many miles. Many people have jobs related to mining and to transporting and using fossil fuels. The cost of providing fossil fuels is not as expensive as some other forms of energy.

But there are many drawbacks to using only fossil fuels. Mining upsets the environment, especially for the plants and animals that live there. That means it causes extensive damage to ecoysystems and how all things in the environment work together. Accidents can cause oil spills in the ocean and on land. Oil spills have very dangerous consequences for ecosystems. Another negative aspect of fossil fuels is that burning them causes air pollution. You may have learned that carbon dioxide is a greenhouse gas that contributes to global warming. You will soon learn more about global warming. For now, it is important to know that higher temperatures on Earth affect humans, as well as whole populations of animals and plants. Finally, as a non-renewable energy source, once fossil fuels are used up, they cannot be replaced. Scientists use models and data as evidence for their claim that the fossil fuel reserves on Earth will be used up within 50–120 years.

Renewable energy

Renewable energy, such as solar, wind, and hydropower, is unlimited. There will always be sun, wind, and water all over the world. These three resources will not run out over time. All three resources are also clean sources of energy that do not pollute the environment. (One exception is dams that are built for hydropower. Building dams can have negative consequences for organisms that live in the water.) Many new ways to use these power sources are being developed, so new jobs will be created as people are needed to work in these areas.

There are also challenges to relying on renewable energy. The current technology to use these resources is expensive. All technology becomes less expensive when it is no longer new. So, as advances are made, renewable energy will cost less to produce. At first, it is expensive to build a renewable energy plant, but over time, the maintence costs are relatively low. Harvesting renewable energy can also require a lot of land. For example, hundreds of windmills are often located on wind farms to supply a large amount of energy. Using land affects the plants and animals that live there. Finally, although renewable energy is available all over the world and will never run out, it is dependent on the weather. For example, less solar power is available on a cloudy day.

Could you solve these energy challenges someday? Renewable and non-renewable sources of energy both have benefits and drawbacks. Using fossil fuels is not a long-term solution for energy production because the resources will one day be used up. Scientists need to develop new sources of energy so that people can continue to heat and cool their homes, ride transportation, drink clean water, and other uses you have been talking and reading about. Scientists and engineers are constantly working on ways to make renewable energy less expensive and available to people everywhere. Maybe one day you will choose to work on solving energy challenges!

Activity 1.2: Cycling of Fossil Fuels

What Will We Do?

In this activity, we will compare maps and graphs that show where natural resources are located and how much of the different types of resources are used around the world. Then we will create a presentation about our findings.

Procedure

- ☐ **1.** In your group, brainstorm why comparing the maps and graphs is useful for understanding how much fossil fuel is available and how much is used.
- ☐ **2.** With your team, come to a consensus about what you want to graph to compare fossil fuel availability and consumption. What will be on the *x* axis? What will be on the *y* axis? (Your teacher might assign you something to compare instead.)
- ☐ **3.** Use graph paper to create a graph comparing the different statistics.
- ☐ **4.** In your group, talk about some of the potential problems of fossil fuel availability as you look at these maps and graphs. What are some potential solutions to the problems you notice?
- ☐ **5.** Make a poster board presentation with your graph, problems/challenges, and solutions to share with the class.

Data

1. Make graph based on your group's consensus comparing fossil fuel reserves and consumption.

2. What claim can you make based on the data in your graph?

Making Sense

1. Why do you think some countries use more energy and others use less?

2. What problems/challenges did your team identify based on your graph results?

3. What solutions does your group recommend for improving how people use energy sources?