Teacher's Guide
Grade 5: Energy Resources

TEKS 5.7 Earth and Space: The student knows that Earth is constantly changing and consists of useful resources. The student is expected to:

A) explore the processes that led to the formation of sedimentary rocks and fossil fuels;

C) identify alternative energy resources such as wind, solar, hydroelectric, geothermal, and biofuels.

Background Information: This unit reinforces the idea that the surface of the Earth is constantly changing due to natural forces and processes. Students explore and illustrate the processes that led to the formation of sedimentary rocks and fossil fuels and learn about the advantages and disadvantages of using nonrenewable fossil fuels for energy. They discover that the energy stored in fossils fuels originally came from the Sun and was converted and stored as chemical energy during the process of photosynthesis.

They also learn about alternative energy resources, such as wind, solar, hydroelectric, geothermal, and biofuels, and the advantages and disadvantages of using these renewable energy resources.

Prerequisite Knowledge: Prior to this year, students have learned that the natural world includes earth materials. They understand the surface of the Earth is constantly changing due to the forces of flowing water, blowing wind and the formation and movement of ice. These forces and processes are responsible for the ongoing recycling of Earth materials. They have examined properties of soils including color and texture, capacity to retain water, and the ability to support the growth of plants. Students are able to describe physical properties of natural sources of water and give examples of ways that soil, and rocks can be useful.

Students also understand that the natural world can be observed in cycles, patterns, and systems. They are able to distinguish between natural and manmade resources. Students have explored the characteristics of natural resources and are able to identify what makes these resources useful in products and materials such as clothing and furniture.

Common Misconceptions: Students often believe that there is an endless supply of water, petroleum, and mineral resources. It is important for students to understand that these resources are finite; if they are used continuously we will eventually exhaust them. Students need to recognize the importance of protecting and conserving natural resources and in developing alternative sources of energy that include as solar, wind, geothermal, hydroelectric and biofuels.

Essential Questions:

1. How does sedimentary rock form?

   Flowing water, blowing particles of sand and soil, the freezing and thawing of ice in the cracks in rocks and the movement of glaciers can weather and break down rock. The pieces of broken rock, called sediments, are eroded by flowing water and blowing wind. Eventually these sediments are deposited on the surface of the Earth due to the density of the materials and the force of gravity. The sediments are laid down in layers with the newest layers towards the top and older layers of sediments towards the bottom. The weight of the addition of layers of sediments on top causes lower layers of sediments to be compacted and compressed, cementing them together to form rock. Occasionally the remains of plants and animals are buried in the layers of sediments. The soft body parts slowly decay and the hard body parts are fossilized as the weight of new layers of sediments compress and compact the layers of older sediments.

2. What are fossil fuels and how did they form?

   Coal, oil or petroleum, and natural gas are called fossil fuels. The energy stored in fossil fuels originally came from the Sun. Plants transform the Sun's light energy into chemical energy during photosynthesis. This energy is stored in the plant's stems and leaves and was trapped there when ancient plants were buried under sediments in swamps and marshes. Over millions of years, the layers of sediments deposited on top created heat and pressure that caused the remains of the plant materials to turn into coal.

   Oil, or petroleum, and natural gas form when tiny marine organisms such as algae and plankton, which also use the Sun's energy, become buried in the sediments at the bottom of

oceans. Over time, heat and pressure from layers of sediments deposited on top turns the remains of these organisms into oil and natural gas.

3. Why could the use of fossil fuels present challenges to the environment?

The use of fossil fuels could present challenges because they are a non-renewable resource, and can eventually become depleted. In addition to being non-renewable, burning coal and oil produce harmful gases which pollute the atmosphere and are detrimental to the environment.

4. What can be done to prevent fossil fuels from being used up quickly?

Using renewable resources, such as energy from the Sun, will decrease the amount of fossil fuels we use, allowing us to conserve what we have. The Sun and the wind that the Sun creates are renewable resources because they are constantly being renewed.

Notes: