**Energy**

**Lesson #6: Sources of Energy: Energy Conversion in the Real World**

**Supplementary Lesson to be taught by the Classroom Teachers**

**Time Frame:** 60 minutes

*Please write the vocabulary on the board before each lesson.*

**Vocabulary**

**Renewable Resource** - a natural resource that can be used to produce energy, but does not get used up in the energy production process (example: wind)

**Nonrenewable Resource** - a limited natural resource that can be used to produce energy, but cannot be easily replaced or produced by humans (example: coal)

**Energy Cycle** - exchange, transfer, and storage of radiant energy from the sun

**Learning Standards:**

*Engineering*

Engineering Design

1. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
2. At whatever stage, communicating with peers about proposed solutions is an important part of the design design process, and shared ideas can lead to improved designs.

Crosscutting Concepts

1. People’s needs and wants change over time, as do their demands for new and improved technologies.
2. Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

*English / Language Arts*

1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
2. Draw on information from multiple print or digital sources.
3. Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
4. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
5. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
6. Draw evidence from literary or informational texts to support analysis, reflection, and research.

**Student will be able to:**

1. Understand the main difference between renewable and nonrenewable sources of energy, and be able to classify sources of energy into the two categories.
2. Understand how energy cycle through our natural environment from the sun to plants to animals and eventually to fuel.

**Resources and Materials:**

|  |  |
| --- | --- |
| **Item** | **Amount** |
| iPads |  |
| Sources of Energy: Expert Questionnaire handout | 25 (in bin) |
| Sources of Energy: Research Summary handout | 25 (in bin) |

**Focus Activity:** Play the “It Starts with Producers” Rap for students:

<https://www.youtube.com/watch?v=oMo3xbgBB_k>

Discuss how the human body obtains and uses energy. As a class, discuss the main ideas about how humans obtain energy from plants and animals, and ask students to identify the source of all energy on Earth, which is the sun. Emphasize that food is chemical potential energy. When humans and other animals eat food, they are consuming an energy source that can be converted into other forms of energy, such as mechanical energy.

**Introduction:** Review the types of energy you explored in the last lesson. Then tell students that these different types of energy have to come from a source, but all the energy on Earth originally comes from the sun, whether directly or indirectly. Humans get energy from many different sources. We use both **renewable** and **nonrenewable** resources. When we use non-renewable resources, such as wood from trees, to get the energy we need, we have to use up the source of energy in order to transfer enough of it to a useful form. Ask students to brainstorm examples of this type of resource. When we use renewable energy, we take advantage of the natural movement of the energy source to power other things that generate energy. Can anyone think an example of this type of resource?

**Activity:**

1. Split students into groups. Each group will read several articles about the same energy source and record what they learn in their expert questionnaire sheet. Tell students that they will become "experts" on their energy source and will be responsible for presenting the following information to their classmates:

What is your energy source?

Is it a renewable or non-renewable energy source?

How do humans use this energy source to generate energy?

What are the benefits of your energy source?

Are there any disadvantages to your energy source?

What are some interesting facts about your energy source?

1. There are five different sources of energy that students will explore. We have provided three to four articles for each of the sources of energy below. These articles can be found in Google Drive (under the folder “Lesson 6 Readings), or in the iBooks app on student iPads. Another resource students might use can be easily accessed by clicking on the icon named *EIA Energy Sources* on their ipads.

Wind power:

* <http://www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/022397>
* <http://www.kidcyber.com.au/topics/windenerg.htm>
* <http://www.funkidslive.com/features/curious-kate/curious-facts-about-wind-power/>
* <http://library.thinkquest.org/06aug/01335/wind%20Power.htm>

Solar power:

* <http://www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/022400>
* <http://greenliving.lovetoknow.com/Advantages_and_Disadvantages_of_Solar_Power>
* <http://www.kidzworld.com/article/1288-solar-energy>
* <http://library.thinkquest.org/06aug/01335/solar.htm>

Fossil fuels:

* <http://www.kidzworld.com/article/1423-fossil-fuel-energy>
* <http://www.iptv.org/exploremore/energy/profiles/fossil_fuels.cfm>
* <http://library.thinkquest.org/06aug/00442/whatsupelectricity.html>

Hydroelectric power:

* <http://www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/022399>
* <http://library.thinkquest.org/06aug/01335/hydroelectric.htm>
* <http://kids.actewagl.com.au/education/energy/renewableenergy/hydroelectricity/advantagesofhydro.aspx>

Agricultural biomass:

* <http://www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/022398>
* <http://library.thinkquest.org/06aug/01335/biomass.htm>
* <http://www.kids.esdb.bg/biomass.html>

1. While students are reading, create different groups, ideally 2-3 people, for the energy conversion project that will end the semester. It may be interesting to create groups composed of students who researched different energy sources.
2. Create groups with 1-2 representatives for each energy source. Have expert students teach their group members about their energy source. Students should record what they learn about each type of energy on their student research sheet.

**Closure:** Tell students to think carefully about what they have learned today about sources of energy. Starting next week, we will be doing an energy conversion project in groups. Tell students their groups. Explain that scientists collaborate with one another when they work, so it is important for students to communicate their ideas with their project teammates. Sharing ideas allows students to develop the best design possible to reach their goal.

Review of different types of energy, for when the students start brainstorming for their energy conversion project: <http://www.cpo.com/ipcres/pdfs/unit2/Ch5Sec3.pdf>

**Assessment:** Participation, expert questionnaire sheet, student research sheet

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Sources of Energy: Expert Questionnaire**

**Renewable Resource** - a natural resource that can be used to produce energy, but does not get used up in the energy production process

**Nonrenewable Resource** - a limited natural resource that can be used to produce energy, but cannot be easily replaced or produced by humans

What is your energy source? Is it a renewable or non-renewable energy source?

What type of energy is it? (radiant, thermal, mechanical, chemical, sound, or electric)

How do we use this energy source to power our machines? What type of man-made technology is necessary to harness this type of energy?

What are some of the advantages of your energy source? Name at least 3.

What are some of the disadvantages of your energy source? Name at least 3.

What are some other interesting facts about your energy source?

Challenge question: Do you think that the Berkshires is a good place to use this type of energy? Why or why not?

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Sources of Energy: Research Summary**

*In the table below, summarize what the other experts in your group tell you about their energy sources.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Energy source |  |  |  |  |
| Renewable or nonrenewable resource? |  |  |  |  |
| Type of energy |  |  |  |  |
| How do humans use this energy source to generate energy? |  |  |  |  |
| Name at least 1 advantage |  |  |  |  |
| Name at least 1 disadvantage |  |  |  |  |
| Anything else you found interesting (optional) |  |  |  |  |