

Energy We Use

Major Topic: Energy

PBL Topic: Sources of Energy

Length: 4 1-hour class periods

Stage 1 – Desired Results	
<p>Established Goals: Virginia Science Standards</p> <ul style="list-style-type: none"> ● 3.11 (Investigate and understand different sources of energy.) <ul style="list-style-type: none"> ○ 3.11a Energy from the sun; ○ 3.11b Sources of renewable energy; ○ 3.11c Sources of non-renewable energy 	
<p>Understandings: <i>Students will understand that...</i></p> <ul style="list-style-type: none"> ● there are many sources of energy use by people. ● most of the energy we use comes either directly/indirectly from the sun, including solar, wind, fossil fuels, hydroelectric, biomass, foods, etc. 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> ● Where does the energy we use come from? ● How can we trace sources of energy? ● How can we illustrate or show this?
<p>Student objective (outcomes): <i>Students will know...</i></p> <ul style="list-style-type: none"> ● the different sources of energy that people rely on, as well as the connection many sources have with the sun. <p><i>Students will be able to...</i></p> <ul style="list-style-type: none"> ● explain the connection between energy sources that people use and the sun. ● produce a graphic to show the origin of those energy sources. 	
Stage 2 – Assessment Evidence	
<p>Performance Task(s): A graphic report for National Geographic Kids featuring energy sources.</p>	
Stage 3 – Learning Plan	
<p>Technology:</p> <ul style="list-style-type: none"> ● Go! Temps ● Computers ● Video on “Energy” (not included) 	

Materials:

- Solar Cooking materials
 - large aluminum baking pan, aluminum foil, raised grill, Go-Temp probe, laptop computer, black blanket, notepad and pencil, mini-foil pans, graham crackers, marshmallows, chocolate bars, spatula, and napkins
- Supplemental materials
 - Trade Books, Science Textbooks, student energy resource booklets, Internet sites
- Graphic/Diagram materials
 - Posterboard, chart paper, construction paper, scissors, markers, crayons, tape, glue, classroom computers and color printer
- Energy Survey (not included)
- Graphic report rubric (not included)

Lesson Format: 5 E's

Day 1:

Engage students through an introductory mini-lesson:

- Students will put together and participate in a solar cooking activity. We will create a “solar cooker” and use it to cook s’mores outside on a sunny day.
- We’ll discuss how to utilize the sun’s heat energy before we head outside. Also, we’ll put together s’mores beforehand and carry them out in mini-foil pans.
- Outside, we’ll use the Go-temp probe to measure the change in temperature in our cooker, as we cook a few s'mores at a time. Later, we’ll use the temperature data and our own observations to discuss solar energy and how we can use it.
- Lastly, students will be introduced to the scenario:

The graphic illustrators for National Geographic Kids are all sick with a tropical disease. They won't be well in time to meet the deadline for the next issue which is about energy. The editor has asked you to find out about sources of energy originating from the sun and those not from the sun, and to make some type of graphic feature to show the data. In groups of four, you need to research and prepare a list of energy sources used by people. Then you will research the origin of the energy sources and sort them into those that do and do not come from the sun. Finally, make a large, colorful diagram or other graphic feature to show the information.

The editor will choose the best projects that accurately show data about energy, including data about the most common sources of energy. Be sure to include any pages of notes your group took.

Explore

- As homework, students will survey adults at home and in the school of sources of energy we use in our daily lives (with provided survey form).

Day 2 and 3:

- Discuss the results from the energy survey as whole class. Be sure to discuss the following energy sources as especially important: solar, wind, fossil fuels, hydroelectric, nuclear, burning wood/biomass. Encourage students to include this information in their projects.
- Also, explore the following resources: video “Energy” (as a whole class), science textbook pages , books from the library, including, student energy resource booklets, and internet sites (not included)

Explain that:

- energy can change forms. Demonstrate how electrical energy can change to sound and light energy, light energy can become heat energy, friction can produce heat and sound, etc.
- use the temperature data and observations to discuss solar energy and how we can use it (from solar oven activity, day 1).

Extend to students that:

- energy can be stored. Demonstrate how coal can burn, how energy stored in batteries can be used in several forms, and discuss how food is stored in the bodies of organisms.

Day 4:

Evaluate student projects -

- Students will work on their graphic report for National Geographic Kids featuring energy sources.
- Consider how well they communicate the relationships of energy sources to the sun, and the inclusion of at least four of the following energy sources: solar, wind, hydroelectric, nuclear, burning coal, natural gas, oil/gasoline, and burning wood/biomass.
- Students should also be able to orally explain if and how these sources originate in the sun.

*Lesson format adapted from UBD design by Grant Wiggins and Jay McTighe, 2004