RENEWABLE OR NON-RENEWABLE?

CLASS

1 HOUR

KEY CONCEPTS:

Analyze, compare, graph, team work

COLORADO ACADEMIC STANDARDS:

- *Science 3.1:* Earth and Sun provide a diversity of renewable and nonrenewable resources.
- *Mathematics 3.1:* Visual displays are used to interpret data.
- *Mathematics 4.2:* Geometric figures can be described by their attributes and specific locations in the plane.

LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

GOAL:

Students explore the different types of energy produced within the United States and determine the difference between renewable and non-renewable energy sources.

LEARNING OBJECTIVES:

- Students will describe the differences between renewable and non-renewable energy sources.
- Students will estimate the percent of each energy source used within the United States.
- Students will create a pie chart of the different energy sources used within the United States.

COMMON CORE:

- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- 5 small paper plates
- Pie chart of energy use in the United States (US Energy Information Administration Annual Energy Review), attached
- Descriptions of non-renewable energy sources, attached
- 200 pipe cleaner pieces or marbles or poker chips, anything small to hide well
- Graphs for the renewable vs. non-renewable energy activity, attached

PRE-WORK:

Hide, or have the teacher hide, 200 marbles or some other small consistent item throughout the room. Hide ¼ of them in very easy places, ¼ in harder places, ¼ in even more difficult, and the last ¼ really hard to find.

Have the teacher divide the class into five groups ahead of time.

ACTIVITY:

1. Introduce the three lessons.
2. Discuss the following: different types of energy are used in the United States, how much each source is used, where they are found.
3. Separate the class into 5 teams (prepared by teacher ahead of time). Give each team a plate. Introduce the different energy forms on the board. Each group will then take an educated guess as to the percentage of use in the US for each source. They should use percentage numbers in "10" (10, 20, 30 etc.) for each energy source.
4. On the paper plate the students will create their pie chart by drawing lines to create the pie-shaped percentages. Have them write the percentage and energy

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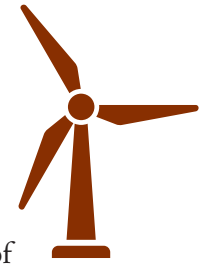
LOCATION:
Indoors

SUGGESTED TIME OF YEAR:
Any

ACTIVITY: (CONT.)

source in each pie slice.



5. Put pie chart of US energy use on the overhead. Talk about what their guesses were and what the reality is. For the rest of our time together we will focus on the green section of the pie chart: renewable energy.
6. Introduce the concept of renewable vs. non-renewable energy sources by showing each list on the overhead or white board. While showing the non-renewables list emphasize the "millions" of years in the descriptions. For the renewable energy sources emphasize how all but geothermal are powered by the sun's energy.
7. Tell them that there is a unique energy source in the room that they can find. These are the 200 pieces the teacher has hidden throughout the room. Have each team write on four pieces of paper the numbers 1 through 4 and place them on a central desk where they will stand in a group. Staying in their teams, give them 30 seconds to find as many as they can. Have the teams place the pieces on the table at the appropriate number for the consecutive collecting time. Give them another 30 seconds to find another batch, again setting the pile at the appropriate number on the table. The students will do this four times, ending up with four separate piles at each number on the table.
8. Hand out the graphs and help them plot their numbers on the graph. Discuss the concept of using a non-renewable energy source. Discuss if the numbers stayed consistent over the four times, or if they dwindled toward the end. Ask the students if they can see a comparison between the numbers of pieces and the Earth's non-renewable resources.
9. Explain what the next lesson will be at the field site and then answer questions.

ENERGY AT YOUR FIELD SITE


FIELD


2 HOURS

KEY CONCEPTS:

Research, testing, hypothesizing, team work

COLORADO CONTENT STANDARDS:

- *Science 3.1:* Earth and Sun provide a diversity of renewable and nonrenewable resources.
- *Mathematics 3.1:* Visual displays are used to interpret data.
- *Reading, Writing and Communicating 1.1:* Effective communication requires speakers to express an opinion, provide information, describe a process, and persuade an audience.
- *Reading, Writing and Communicating 1.2:* Listening strategies are techniques that contribute to understanding different situations and serving different purposes.
- *Reading, Writing and Communicating 2.1:* Literary texts are understood and interpreted using a range of strategies.
- *Reading, Writing and Communicating 2.2:* Ideas found in a variety of informational texts need to be compared and understood.
- *Reading, Writing and Communicating 4.1:* High-quality research requires information that is organized and presented with documentation.
- *Reading, Writing and Communicating 4.2:* Identifying and evaluating concepts and ideas have implications and consequences.

LOCATION:

Field Site

SUGGESTED TIME OF YEAR:

Any

GOAL:

Students research different renewable energy sources that could be used where they live. With this information, students write a proposal to build a renewable energy source at their given field site.

LEARNING OBJECTIVES:

- Students will explore five different sources of renewable energy.
- Students will experiment with the different energy sources and determine the most efficient energy source to use at a field site.

COMMON CORE:

- *Reading Standards for Informational Text #7:* Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- *Reading Standards for Informational Text #9:* Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
- *Writing Standards #1:* Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- *Writing Standards #2:* Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- *Writing Standards #4:* Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- *Writing Standards #7:* Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
- *Writing Standards #9:* Draw evidence from literary or informational texts to support analysis, reflection, and research.
- *Speaking and Listening Standards #1:* Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

Five information packets for each team, attached

<u>Solar Team</u>

- 2 thermometers
- Tape
- Pizza box
- Newspapers
- Scissors

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FIELD

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- *Reading, Writing and Communicating 2.1:* Literary texts are understood and interpreted using a range of strategies.
- *Reading, Writing and Communicating 2.2:* Ideas found in a variety of informational texts need to be compared and understood.
- *Reading, Writing and Communicating 4.1:* High-quality research requires information that is organized and presented with documentation.
- *Reading, Writing and Communicating 4.2:* Identifying and evaluating concepts and ideas have implications and consequences.

LOCATION:

Field Site

SUGGESTED TIME OF YEAR:

Any

BACKGROUND INFORMATION:

- Black construction paper
- Clear plastic wrap
- Aluminum foil
- Ruler
- Worksheets; 1 per student

Wind Team

- Card stock pieces
- Scissors
- Hole punch
- Straight pins
- Pencil with eraser
- 4 small drinking cups
- Marker
- Corrugated cardboard
- Stapler
- Modeling clay
- Worksheets; 1 per student

Biomass Team

- Safety glasses
- Shelled peanuts
- Cork
- Sewing needle
- Large metal can
- Smaller metal can
- Metal BBQ skewer
- Thermometer for liquid
- Lighter
- Worksheets; 1 per student

Hydro Team

- 3 milk, juice or yoghurt cartons
- Scissors
- Nail or long wire
- String
- Medium sized beads
- Worksheets; 1 per student

Geothermal Team

- Metal tongs
- Pot holder
- Safety glasses
- Small glass pan
- Liquid thermometer (make sure color of indicator is red)
- Large metal nut
- Small metal nut
- Candle or sterno
- Worksheets; 1 per student

ENERGY AT YOUR FIELD SITE

FIELD

2 HOURS

KEY CONCEPTS:

Research, testing, hypothesizing, team work

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- *Reading, Writing and Communicating 4.2:* Identifying and evaluating concepts and ideas have implications and consequences.

LOCATION:

Field Site

SUGGESTED TIME OF YEAR:

Any

Pre-Work:
Set up each team in a different section with all the materials they need. If possible, do this activity outside.

Parent volunteers are recommended for the field session (one per group).

ACTIVITY:

1. Welcome to the field site! Orientation to the site for the students, then right into the activity.
2. Review the lessons from the classroom.
3. Inform the students that they will have the next hour to work on their science experiments and research for their presentations on the last day. Go over all the safety rules. Materials are found at the field site and they need to ask if they don't find things there. Each team should have an adult who will keep them on task (if enough volunteers). After they have finished creating and testing their project they will sit down with their adult and complete the worksheets in their packet. This will help them get started on their presentations at that time.
4. Hand out the five packets to the different groups.
5. At least 15 minutes before the students leave, have them begin cleaning up and organizing their items to take back to school with them.
6. Make sure the teachers understand the students will need to work on their presentations before the service session. The students will have a few minutes at the beginning of the service session to finish up, but the majority of their work should be done before the naturalist arrives.

ENERGY PRESENTATIONS

SERVICE-LEARNING 1 HOUR

KEY CONCEPTS:

Research, testing, hypothesizing, team work

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- *Reading, Writing and Communicating 1.2:* Listening strategies are techniques that contribute to understanding different situations and serving different purposes.
- *Reading, Writing and Communicating 2.2:* Ideas found in a variety of informational texts need to be compared and understood.
- *Reading, Writing and Communicating 3.2:* The recursive writing process creates stronger informational and persuasive texts for a variety of audiences and purposes.
- *Reading, Writing and Communicating 4.1:* High-quality research requires information that is organized and presented with documentation.
- *Reading, Writing and Communicating 4.2:* Identifying and evaluating concepts and ideas have implications and consequences.
- *Reading, Writing and Communicating 4.3:* Quality reasoning requires asking questions and analyzing and evaluating viewpoints.

LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

GOAL:

Students present renewable energy proposals and then learn how to incorporate energy saving strategies within their home and school.

LEARNING OBJECTIVES:

- Students will present their renewable energy proposals to the class.
- Students will list three ways that they could conserve energy at home.

COMMON CORE:

- *Reading Standards for Informational Text #7:* Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
- *Reading Standards for Informational Text #9:* Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.
- *Speaking and Listening Standards #1:* Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
- *Speaking and Listening Standards #4:* Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
- *Speaking and Listening Standards #6:* Adapt speech to a variety of contexts and tasks, using formal English when appropriate to task and situation.
- *Language Standards #1:* Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- *Language Standards #3:* Use knowledge of language and its conventions when writing, speaking, reading, or listening.

MATERIALS NEEDED:

- "Contract" for newly hired group, attached
- Energy bucks, one per student, attached
- Northwest Colorado Energy Diet Worksheet, one per student

ACTIVITY:

1. Each group will have 5 to 10 minutes to present their assigned energy source. Encourage the class to come up with 3 pertinent questions and 3 positive comments for the presenting group.
2. As the groups wrap up, it is up to the naturalist and teacher to confer and decide which energy presentation they thought provided the most compelling reason to hire them.
3. Present the contract to the successful group. Because each student did such a great job of researching and presenting they will get paid in "energy bucks."

ENERGY PRESENTATIONS

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LOCATION:

Indoors

SUGGESTED TIME OF YEAR:

Any

ACTIVITY: (CONT.)

4. Pass out the Northwest Colorado Energy Diet form, and review with the students the "Nice and Easy" action items. Encourage them to take the form home and talk with their parents about completing the form. Possibly ask teachers to use this as an extra credit opportunity.
5. Wrap up by asking the students if they feel they have a better knowledge of the renewable energy field and if they would integrate it into their own home. Ask them which energy source they would choose and why.

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