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Teacher Instructions

Energy Crunch --- TEACHER INSTRUCTIONS

Title: Energy Crunch: A Look at Renewable and Non-renewable Energy
Grade Focus: 4, 5, 6, 7, 8
Subject: Science
Integration Activity: Imaging, PowerPoint Presentations, Discovering the Internet, Spreadsheets
Recommended Time to Completion: Three to four weeks (three to five hours per week)

INTRODUCTION

Students will learn more about nonrenewable and renewable energy resources. They will work in groups to research one form of renewable energy using the Internet. Each group will develop a PowerPoint presentation to highlight strengths of this energy resource. Using the PowerPoint presentation, they will speak before the "Energy Commission" to persuade the commission to fund more research for their form of renewable energy.

PREREQUISITE EXPERIENCE:

Students should be able to conduct research online and use a word processor.
They will use a spreadsheet, like Excel, to organize data.
Prior PowerPoint or other presentation software tool experience would be helpful.
Experience with image editing software (i.e. Photoshop or Paint) and the ability to capture images from the computer will also be helpful.

TEACHER PREP TIME: 1 hour

Review the identified Web resources in *Explore and Explain* and these training videos from **Nortel LearniT**

- **Discovering the Internet,** http://nortellearnit.org/technology/Discovering_the_Internet/
- **Imaging,** http://nortellearnit.org/technology/Imaging/
- **PowerPoint**, http://www.nortellearnit.org/DiscoveriT.aspx.

PROJECT:

Students will use the Web to conduct their research and an Excel

spreadsheet to organize this information. They will create a PowerPoint presentation highlighting strengths of one renewable energy resource to be used for a persuasive presentation.

ASSESSMENT / GRADING:
Using a presentation rubric, the student PowerPoint presentations will be evaluated on their content, their application of analytical skills, and their demonstration of tools to convey their applied understanding.

TIME MANAGEMENT TIP:
Students should complete some research individually as a homework assignment.
Limit the number of slides students create in their final projects.
It's best for students to work in pairs or teams of three for this lesson.

Engage

What do the terms “renewable” and “nonrenewable” mean? Create a list of materials and substances that fit each category. Do we live in a “renewable” or “nonrenewable” world? Does “recyclable” mean the same thing as “renewable?”

Photo credit: National Renewable Energy Laboratory

Where would you place these energy resources in your list?

- Hydrogen and Fuel Cells
- Nuclear
- Biomass
- Natural Gas
- Solar
- Wind
- Coal
- Geothermal
- Water (Hydropower)
- Oil

Energy is in everything and used to do everything. At this time, we get most of our energy from nonrenewable sources.

What problems does this cause?

Perhaps you can help solve some of these problems. You are about to become an “expert” on one form of renewable energy. You will try to persuade the “Energy Commission” to fund further research into the use of your renewable energy source. Based upon your research and presentation, the “Energy Commission” will determine which resources to fund for our future.

1. To complete this project you'll need a computer with a spreadsheet program (Excel is one example), a presentation software program (PowerPoint is one example), and Internet access.

Before you begin your research, you may want to review this **Nortel LearniT** training video:

- **Discovering the Internet**, http://www31.nortel.com/webcast.cgi?id=3181

2. Create a "pro/con" list for the nonrenewable energy resources. To organize this information, create a spreadsheet.

Include these nonrenewable resources in your spreadsheet.

- Nuclear
- Oil
- Natural Gas
- Coal

Use these resources to find out more about each nonrenewable resource.

Energy Story
http://www.energyquest.ca.gov/story/chapter17.html

Nonrenewable Energy
http://www.eia.doe.gov/kids/energyfacts/sources/non-renewable/nonrenewable.html

Get an overview of renewable resources by viewing the NASA SCI Files™ program, The Case of Energy Crunch." You can stream this video at: http://newali.apple.com/ali_sites/ali/exhibits/1001734/

3. As a class, pool what you know about nonrenewable resources and add this information to the spreadsheet you've created.

4. Now is your chance to find out more about one form of renewable energy. You will be grouped into teams of two or three to research one of the following energy sources: solar, wind, geothermal, biomass, hydropower or hydrogen, and fuel cells. As a group, you will complete

another “pro/con” chart to identify the strengths and weaknesses of this energy source.

Consider these questions as you complete your research:

- What are the benefits of this energy source?
- What are the drawbacks and social ramifications of using this source?
- What are the cost benefits or drawbacks?
- Why aren’t some renewable resources widely accepted today?
- What is meant by the terms “environmental costs” and “social costs?”

5. The following Web sites may help you begin your research. Be sure to document the source of your Internet research and to evaluate each source for credibility.

Generic Renewable Energy Web sites
National Renewable Energy Laboratory
http://www.nrel.gov/

Renewable Energy
http://www.renewableenergy.com/

U.S. Department of Energy -- Energy Efficiency and Renewable Energy
http://www.eere.energy.gov/

Energy Kids’ Page
http://www.eia.doe.gov/kids/energyfacts/sources/renewable/renewable.html

Solar
Solar Power for Lunar Living
http://www.nasa.gov/centers/glenn/multimedia/artgallery/art_feature_003_C90-4023.html

Solar-Powered Aircraft
http://www.nasa.gov/centers/dryden/news/FactSheets/FS-054-DFRC.html

Beam It Down, Scotty!
http://science.nasa.gov/headlines/y2001/ast23mar_1.htm

The Edge of Sunshine
http://science.nasa.gov/headlines/y2002/08jan_sunshine.htm

Wind
National Wind Technology Center
http://www.nrel.gov/wind/

Wind and Hydropower Technologies Program
http://www1.eere.energy.gov/windandhydro/

Geothermal
Geothermal Technologies Program
http://www.nrel.gov/geothermal/

Biomass
Earth Observatory
Biomass Burning
http://earthobservatory.nasa.gov/Library/BiomassBurning/

Biomass Production System
http://weboflife.ksc.nasa.gov/currentResearch/currentResearchHardware/bpsAmes.htm

Hydropower
Wind and Hydropower Technologies Program
http://www1.eere.energy.gov/windandhydro/

National Hydropower Association
http://www.hydro.org/home/

Hydrogen and Fuel Cells
Hydrogen and Fuel Cells Research
http://www.nrel.gov/hydrogen/

Explain

1. Meet with your teacher and discuss your research. Organize what you've learned to be able to answer these questions:

- What are the benefits of this energy source?
- What are the drawbacks and social ramifications of using this source?
- What are the cost benefits or drawbacks?
- Why aren't some renewable resources widely accepted today?
- What is meant by the terms "environmental costs" and "social costs?"

2. Discuss ways to best present this information and consider the interests of your audience as you make choices.

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Elaborate

Photo credit: NASA

1. As a team, determine the best way to highlight the benefits of your energy source while you minimize the drawbacks. Determine the content and number of PowerPoint slides to be created by each member of the team. Remember to be persuasive, yet factual, as you present this information.

2. Before you begin your production, you may want to review the **Nortel LearniT** training video about digital imaging:

- **Digital Imaging Project,** http://video.google.com/videoplay?docid=-9396835454123109 82&hl=en

3. Before you begin creating your own PowerPoint slides, you might want to take a look at a Nortel LearniT video tutorial to get some good tips and tricks on making a great presentation.

http://tinyurl.com/m2mtm

4. As a team, use a PowerPoint Story Board to creatively organize your slides into a persuasive travel brochure.

http://www.nortellearnit.org/Deliver/Word/Storyboard_kica.doc

5. Pictures and sounds will be very important in helping to persuade the "Energy Commission." Download images and sounds to your hard drive, or save the URL as a 'Favorite' in your Web browser.

6. Put a descriptive title screen, credits and references at the end of the PowerPoint presentation. Using the multimedia (pictures, images, sounds etc.) throughout the presentations will help you to communicate your key information.

TIP: When you decide what images (pictures), sounds or text that you want to use in your PowerPoint slides, be sure to check for a copyright notice ©. Some Web sites want you to use their materials for educational projects while others don't. A good practice for you should be to look for an email on the Web page you want to use materials from and use it to send a request for permission to use it in your class PowerPoint project.

It is also important that you identify materials that you use completely in your PowerPoint presentation. This is called "making a citation" of someone else's work. The format that is typically used is as follows:

Last Name, First Name of Author (if known). "Title of work/article/page." *Title of Complete Document* (if applicable). Date last modified. URL (date visited).

7. Practice presenting your PowerPoint presentation to persuade the "Energy Commission" that your renewable source is the best choice. As a team, determine how you should dress and represent your group. Your teacher will identify a group of unbiased adults to act as the "Energy Commission." This group will choose the best energy source based upon the presentations.

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Evaluate

PowerPoint Project Evaluation Rubric

Criteria	Unsatisfactory	Needs Improvement	Satisfactory	Exemplary
Research	Limited research, from limited sources	Somewhat well research from somewhat varied sources.	Well researched, from various sources	Thorough research from varied sources presenting different points of view
Storyboard / planning	Limited planning evident	Some planning evident	Planning evident	Thorough planning evident
Content	Lacks detail	Some detail	Good detail	Excellent detail
Technology Use to Demonstrate Understanding	Technology use with little purpose	Technology use with some purpose	Technology use with purpose	Intuitive technology use with specific purpose
Overall Final Project	Inconsistent and inappropriate aesthetics and technical functionality	Somewhat consistent and appropriate aesthetics and technical functionality	Consistent and appropriate aesthetics and technical functionality	Consistent, creative and appropriate aesthetics and technical functionality

Group evaluation: What did each of you contribute to the task. How did you divide the work?

Self Evaluation: What did you learn? What do you know about your planet that you did not already know?

Add information from the student presentations about renewable energy sources to the nonrenewable energy sources spreadsheet.

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Extend

Consider some of these ideas for extensions:

1. After listening to all class presentations, write a news article choosing the type of alternative energy that you think would be the easiest to adopt. Use persuasive writing to convince your audience.

2. Become an inventor. Use the following Web sites for ideas on how to create a working invention that uses a renewable energy resource.

Photo credit: National Renewable Energy Laboratory

Design your own water wheel
http://www.energyquest.ca.gov/projects/waterenergy.html

Pizza box Solar Oven
http://www.solarnow.org/pizzabx.htm

Investigating Wind Energy
http://www.fi.edu/tfi/units/energy/windguide.html

Science Projects for Kids (Relating to a variety of energy resources)
http://www.energyquest.ca.gov/projects/index.html#hydro

Webwatchers SciGuides – Energy Resources

http://sciguides.nsta.org/guides/guide_preview.aspx?guide_ID=LFzhIup6Qss=&grade_band=3

3. Challenge your school to an "energy efficient" week. Determine what each individual and each class can do to conserve energy.

4. Share what you've learned with your local congressperson via e-mail. If you don't know how to contact them, you can locate them at:
http://www.house.gov/zip/ZIP2Rep.html

Standards