SAVING ENERGY EXPO

Students work in groups to create hands-on exhibits about ways to save energy at home and school, then use these exhibits to teach others.

NEED

2009-2010

Putting Energy into Education



GRADE LEVEL 4—12

SUBJECT AREAS

Science Social Stdies Language Arts Technology



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Teacher Advisory Board Vision Statement NEED Mission Statement

The mission of the NEED Project is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy education programs.

In support of NEED, the national Teacher Advisory Board (TAB) is dedicated to developing and promoting standards-based energy curriculum and training.

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Correlations to National Science Standards

(Bolded standards are emphasized in the unit.)

PRIMARY (K-4) STANDARD-F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

3. Types of Resources

- a. Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population.
- b. Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel, and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety.
- c. The supply of many resources is limited. If used, resources can be extended through recycling and decreased use.

INTERMEDIATE (5-8) STANDARD-E: SCIENCE AND TECHNOLOGY

2. Understandings about Science and Technology

f. Perfectly designed solutions do not exist. All technological solutions have trade-offs, such as safety, cost, efficiency, and appearance. Risk is part of living in a highly technological world. Reducing risk often results in new technology.

INTERMEDIATE STANDARD-F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

3. Natural Hazards

c. Hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

4. Risks and Benefits

d. Important personal and social decisions are made based on perceptions of benefits and risks.

SECONDARY (9-12) STANDARD-F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

3. Natural Resources

a. Human populations use resources in the environment to maintain and improve their existence.

5. Natural and Human-induced Hazards

d. Natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society, as well as cause risks. Students should understand the costs and trade-offs of various hazards--ranging from those with minor risk to a few people to major catastrophes with major risk to many people.

Introduction

INCLUDED IN THIS BOOKLET

- Correlations to the National Science Education Content Standards
- Teacher Guide with Resource List
- Student Guides for each Exhibit

OBJECTIVES

Students will work in groups to create and present exhibits on ways to save energy at home and school.

Students will enhance reading, writing, researching, public speaking, art and critical thinking skills.

TECHNOLOGY CONNECTION

In addition to, or instead of having students work in groups to make exhibits, have the groups use the exhibit guides to make computer-generated multimedia slide shows on their topics.

EXHIBIT TOPICS

Exhibit 1–Energy Consumption in the U.S. Exhibit 2–Why Saving Energy is Important Exhibit 3–Heating Exhibit 4–Cooling Exhibit 5–Lighting Exhibit 6–Water Heating Exhibit 7–Electrical Devices and Appliances Exhibit 8–Taking Care of Trash

GRADE LEVEL

This activity is designed for students in grades 4-12.

TIME NEEDED

Students can complete this activity in four-five days (one 45-minute period per day for four/five days.)

MATERIALS NEEDED

Class set of Energy Infobooks—Intermediate (5–8), or Secondary (7–12) class set of Monitoring & Mentoring (5–6) or Learning & Conserving (7–12) Student Guides, and Museum of Solid Waste and Energy.

Other resources and materials for creating the exhibits.

Teacher Guide

ASSIGN STUDENTS TO GROUPS

Divide students into eight groups. (This allows three/four students per group. Assign the groups topics listed on page 6.

MAKE EXHIBIT FOLDERS

Make an informational packet for each exhibit. Put all the materials in a folder and label it with the exhibit's topic. Each folder should include:

- Energy Infobook & Energy Management Student Guide (one copy per student)
- Student Exhibit Guides (one copy per student in the group)
- Any special materials and/or resources you have on the topic/source

COLLECT SUPPLIES AND OTHER MATERIALS

- one exhibit board for each group (optional)
- construction paper and posterboard
- colored markers, crayons, paints

LESSON PLAN FOR DAY 1

- 1. Introduce the activity to the students. Topics to cover in your introduction include:
- An overview of the ways we use energy and the importance of using energy wisely—economic, environmental, and societal impacts.
- The concept that using energy has advantages and disadvantages.
- A review of how students should work together in small groups and a timetable for working on the exhibits.
- 2. Divide the students into their groups and assign their topics. Hand out the folders.
- 3. Review the Student Guide format and the information in the folders with the students. Explain the grading rubric with a total of 40 possible points as follows:

5 = Excellent	Total points 36-40	Excellent (A)
4 = Very Good	Total points 31-35	Very Good (B)
3 = Satisfactory	Total points 24-30	Satisfactory (C)
2 = Fair	Total points 20-23	Fair (D)
1 = Poor	Total points < 20	Poor (F)

4. Have students begin working on their assignments. Have the groups get your approval of the lists and scripts they are to write before they proceed to the next step.

Teacher Guide

LESSON PLAN FOR DAY 2

- 1. Monitor group work. Students should complete Steps 2 and 3 and begin working on Step 4 of the Student Guide.
- 2. Check work product. At the end of the assigned time, check each group's script.
- 3. Take a few minutes to review the schedule of presentations for Day 4 (or Day 5, if you determine that the students need more time).

LESSON PLAN FOR DAY 3

- 1. Monitor group work. Students complete Step 4.
- 2. Check work product. Make sure that students are ready to make presentations on Day 4.

LESSON PLAN FOR DAY 4 (AND 5 IF NECESSARY)

- 1. Set up exhibits.
- 2. Student presentations.
- 3. Evaluate student performance using the rubric.

EXTENSION/OUTREACH

- 1. Invite other classes in to visit your expo or take your expo to other schools.
- 2. Put on a presentation for the PTA.

RESOURCES & LANGUAGE ARTS CONNECTIONS

For graphics and other materials to use as resources for this activity, look on NEED's website (www.NEED.org).

The NEED website has links to many different energy organizations, including the ones listed on the next page. These organizations can provide supplemental resource materials on energy or a specific energy source. As a language arts activity, consider having your students write to these organizations for additional information a few weeks before you begin the activity.

Resource List

National Energy Information Center, EI-30 www.eia.doe.gov www.eia.doe.gov/kids

> U.S. Department of Energy www.energy.gov

Energy Savers www.energysavers.gov

ENERGY STAR and Change a Light Campaign www.energystar.gov

> Alliance to Save Energy www.ase.org

STUDENT GUIDE TO CREATING AN EXHIBIT Exhibit 1—Energy Consumption in the U.S.

STEP 1-LEARN ABOUT ENERGY CONSUMPTION.

- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

How much energy do we use in the U.S.?

How does energy consumption in the U.S. compare to that of other countries? What are the sectors of the economy and how much energy do they use? What are the main tasks for which we use energy? What are the advantages of U.S. energy consumption?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts]

□ As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Make graphs of U.S. population and U.S. energy consumption.

Make a poster explaining the sectors of the economy and how they use energy.

Display objects that use energy even when they are turned off.

STEP 3-USE YOUR TALENT.

[1-5 pts] As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4—CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Write a two minute script using the list of important facts.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING AN EXHIBIT Exhibit 2—Why Saving Energy is Important

STEP 1-LEARN ABOUT SAVING ENERGY.

- **[1-5 pts]** Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

How much of each energy source does the U.S. use? What is the percentage of renewable and nonrenewable energy use? What are the environmental impacts of U.S. energy consumption? What are the economic impacts of U.S. energy consumption? Why is it important for the U.S. to conserve energy?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts]

□ As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Make a diagram of how much of each energy source we use.

Display utility bills for electricity and natural gas.

Draw a map showing possible impacts of global warming on low lying areas.

STEP 3-USE YOUR TALENT.

[1-5 pts] □ As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Write a two minute script using the list of important facts.
- **[1-5 pts]** Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.

STEP 5-TEACH OTHERS!

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 3—Heating

STEP 1-LEARN ABOUT HEATING.

- **[1-5 pts]** Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

Why do we heat buildings and to what temperatures should we heat them?What devices do we use to heat buildings and what fuels do they use?How much energy does heating buildings consume?How is energy wasted when heating buildings?How can we conserve energy when heating buildings?

STEP 2–PLAN YOUR EXHIBIT.

[1-5 pts] As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Display different types of insulation.

Display caulking and weatherstripping.

Make a poster showing where heat escapes in the typical house.

STEP 3-USE YOUR TALENT.

[1-5 pts] As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Urite a two minute script using the list of important facts.
- **[1-5 pts]** Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.
- **[1-5 pts]** Practice the script so that you don't have to read it. Use notecards with the important facts listed on them.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 4—Cooling

STEP 1-LEARN ABOUT COOLING.

- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

Why do we cool buildings and to what temperatures should we cool them?What devices do we use to cool buildings and how are they powered?How much energy does cooling buildings consume?How is energy wasted when cooling buildings?How can we conserve energy when cooling buildings?

STEP 2–PLAN YOUR EXHIBIT.

[1-5 pts] As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Display a programmable thermostat and explain how it can save energy. Demonstrate how a fan can make people feel cooler. Display other alternatives to air conditioners.

STEP 3-USE YOUR TALENT.

[1-5 pts] As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Write a two minute script using the list of important facts.
- **[1-5 pts]** Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 5—Lighting

STEP 1-LEARN ABOUT LIGHTING.

- **[1-5 pts]** Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

Why is lighting important?

What types of lighting are used in homes and schools?

What is the energy consumption of different lights?

How much light is needed for different tasks-reading, television, security?

How can we reduce the energy used to light homes and schools?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts] As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Compare life cycle costs of incandescent and fluorescent lights.

Display the optimum light levels for differet tasks.

Demonstrate the use of daylighting to reduce artificial lighting use.

STEP 3-USE YOUR TALENT.

[1-5 pts] □ As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Write a two minute script using the list of important facts.
- **[1-5 pts]** Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 6—Water Heating

STEP 1-LEARN ABOUT WATER HEATING.

- **[1-5 pts]** Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

Why is hot water important? What methods and energy sources do we use to heat water? How hot should water be to perform different tasks? How do we waste hot water? How can we save energy when heating water?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts] As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Make a poster showing important uses of hot water.

Make a chart showing the optimum temperature for different tasks that need hot water. Make a hot water DO and DON'T chart.

STEP 3-USE YOUR TALENT.

As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- □ Write a two minute script using the list of important facts.
- [1-5 pts] Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.

[1-5 pts]

[1-5 pts]

STEP 5-TEACH OTHERS!

□ Give a presentation of your exhibit to others.

[1-5 pts]

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 7—Electrical Devices & Appliances

STEP 1-LEARN ABOUT ELECTRICAL DEVICES.

- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

What energy sources generate electricity in the U.S.?

Why is electricity important to the U.S. economy and individuals?

How is electricity measured and how much does it cost?

How do electrical devices and appliances waste energy?

How can we save energy when using electrical devices and appliances?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts]

□ As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Make a diagram showing how electricity is generated.

Display devices that use energy even when they are turned off.

Make a display showing how to read EnergyGuide Labels.

STEP 3-USE YOUR TALENT.

[1-5 pts] As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Urite a two minute script using the list of important facts.
- **[1-5 pts]** Practice the script so that you don't have to read it. Use notecards with the important facts listed on them.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING AN ENERGY EXHIBIT Exhibit 8—Taking Care of Trash

STEP 1-LEARN ABOUT TRASH AND ENERGY.

- **[1-5 pts]** Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- **[1-5 pts]** As a group, make a list of the facts you want to teach others. Make sure you answer these questions:

How is trash part of the energy picture?

How much trash does the typical American generate compared to people in other countries?

How do we dispose of our trash in the U.S.?

How is energy wasted in trash disposal?

How can we save energy when disposing of our trash?

STEP 2-PLAN YOUR EXHIBIT.

[1-5 pts]

□ As a group, make a list of the displays you can use to make your exhibit interesting. Here are some suggestions:

Display different kinds of trash and explain its energy content.

Make a poster showing how reducing, reusing, repairing and recycling can save energy. Show how landfills can produce methane gas for energy use.

STEP 3-USE YOUR TALENT.

[1-5 pts] As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the script?

Who will make the displays?

Who will collect the materials we need?

Who will learn the script and teach the others?

STEP 4-CREATE YOUR EXHIBIT AND WRITE YOUR SCRIPT.

- **[1-5 pts]** Write a two minute script using the list of important facts.
- **[1-5 pts]** Create an interesting display with posters and hands-on materials. Make sure the display and the script cover the same information.

STEP 5-TEACH OTHERS!

[1-5 pts] Give a presentation of your exhibit to others.

STUDENT GUIDE TO CREATING A MULTIMEDIA PRESENTATION

STEP 1-LEARN ABOUT YOUR TOPIC.

- □ Read about your topic in your infobook and in your other materials. Underline the main ideas. Put a star (*) by the most important facts.
- □ As a group, make a list of the facts you want to include in your presentation.

STEP 2-PLAN YOUR PRESENTATION.

□ As a group, look at your facts and group them into five related categories, such as:

Introduction & Formation Exploration & Development Distribution Uses Economic & Environmental Impacts

STEP 3-USE YOUR TALENT AND ORGANIZATIONAL SKILLS.

□ As a group, decide who will do which jobs. Write down the name of each person in the group. Next to each name, write the person's jobs. You can have more than one person helping on each job.

Who will write the text? Who will find/make the graphics? Who will design the presentation? Who will edit and revise the presentation? Who will make the presentation to the class?

STEP 4-CREATE YOUR PRESENTATION.

□ Create five slides with original and creative use of:

Headings	Bullets with details and examples
Font	Color
Buttons	Sound
Graphics	Animation

STEP 5-EDIT AND REVISE YOUR PRESENTATION.

- □ Check all of the facts for accuracy. Make sure you included all of the important facts.
- □ Check grammar and spelling.
- □ Practice your presentation.

STEP 6-TEACH OTHERS.

□ Make your presentation to the class.

	MULTIMED	JIA PROJE	CT RUBRI	U
CATEGORY	4	3	2	-
CONTENT [20 points]	Presentation covers the topic in-depth with many details and examples. Subject knowledge is excellent.	Presentation includes essential information about the topic. Subject knowledge appears to be good.	Presentation includes essential information about the topic, but there are 1-2 factual errors.	Presentation includes minimal information about the topic, or there are several factual errors.
REQUIREMENTS [20 points]	All requirements are met and exceeded. Five slides with graphics, buttons, animation, and sound.	All requirements are met. Five slides with graphics and buttons.	One requirement was not completely met.	More than one requirement was not completely met.
ORGANIZATION [15 points]	Content is very well organized using headings or bulleted lists of related information.	Content includes headings or bulleted lists, but the overall organization of information is flawed.	Content is logically organized for the most part.	There is no clear or logical organizational structure, just a compilation of facts.
ATTRACTIVENESS [5 points]	Presentation makes excellent use of fonts, color, graphics, and special effects.	Presentation makes good use of fonts, color, graphics, and special effects.	Presentation makes some use of fonts, color, graphics, and special effects.	Presentation makes use of fonts, color, and graphics, but they detract from product.
ORIGINALITY [5 points]	Presentation shows much original thought. Ideas are creative and inventive.	Presentation shows some original thought. Work shows new ideas and insights.	Presentation uses ideas of others with credit, but there is little evidence of original thinking.	Presentation uses other people's ideas, but does not give them credit.
WORKLOAD [10 points]	The workload is divided and shared equally by all team members.	The workload is divided and shared fairly equally by all team members, though workloads may very.	The workload is divided, but one person in the group is viewed as not doing fair share of the work.	The workload is not divided, or several in the group are viewed as not doing fair share of the work.

SAVING ENERGY EXPO Evaluation Form

St	tate: Grade Level: Numb	er of Students:	
1.	Did you conduct the entire activity?	Yes	No
2.	Were the instructions clear and easy to follow?	Yes	No
3.	Did the activity meet your academic objectives?	Yes	No
4.	Was the activity age appropriate?	Yes	No
5.	Were the allotted times sufficient to conduct the activity	? Yes	No
6.	Was the activity easy to use?	Yes	No
7.	Was the preparation required acceptable for the activity	? Yes	No
8.	Were the students interested and motivated?	Yes	No
9.	Was the energy knowledge content age appropriate?	Yes	No
10.	Would you use the activity again?	Yes	No

How would you rate the activity overall (excellent, good, fair, poor)?

How would your students rate the activity overall (excellent, good, fair, poor)?

What would make the activity more useful to you?

Other Comments:

Please fax or mail to: NEED Project PO Box 10101 Manassas, VA 20108 FAX: 1-800-847-1820

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