2011-2012

# Blueprint For Success

Use this guide to plan a successful energy unit for your classroom that meets your standards of learning.

EVALUATION RECOGNITION

**Grade Level:**

- K - 12

**Subject Areas:**

- Science
- Social Studies
- Math
- Language Arts
- Technology

NEED
National Energy Education Development Project

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# 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.

## Teacher Advisory Board Statement

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

## Permission to Copy



## Energy Data Used in NEED Materials

NEED believes in providing the most recently reported energy data available to our teachers and students. Most statistics and data are derived from the U.S. Energy Information Administration's Annual Energy Review that is published in June of each year. Working in partnership with EIA, NEED includes easy to understand data in our curriculum materials. To do further research, visit the EIA website at www.eia.doe.gov. EIA's Energy Kids site has great lessons and activities for students at www.eia.doe.gov/kids.

National Energy Education Development

**1.800.875.5029**
**www.NEED.org**


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# Blueprint For Success

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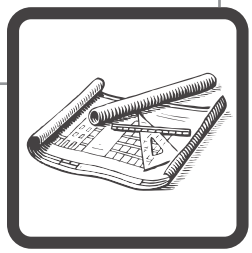


# The Blueprint

## An Introduction to the Blueprint

Energy is the perfect theme for a multi-disciplinary unit. NEED curriculum materials are designed to develop students' critical thinking and leadership skills in science, math, language arts, technology, music, art, and social studies, as well as enhance their general knowledge of energy. If you are team teaching, NEED activities are a good way to encourage students and teachers to work together on a common theme. All of the curriculum materials include a list of the subject areas appropriate for the particular activities included.

This blueprint will help you build an age-appropriate, hands-on energy unit. Included are brief descriptions of all of NEED's materials, along with grade level and the approximate time needed to complete each unit. Many NEED materials are appropriate for a broad range of grade levels with suggestions included for each grade level. An order form can be found in the *NEED Resource Catalog* so you can order the materials you need. NEED curriculum can also be found online at www.NEED.org. For many units, class sets of student materials are available, as well as hands-on kits. All NEED materials are correlated to the National Science Education Content Standards and state standards that can be found out at www.NEED.org/Correlations.

In many areas, teachers also have the opportunity to attend training workshops and conferences. For more information on student and teacher training programs and professional development, please call NEED Headquarters at 1-800-875-5029.

Participating in NEED's Youth Awards Program for Energy Achievement is a wonderful way for students to document and be recognized for their work. Have the students keep a portfolio of their activities as they progress through the energy unit. More information is on pages 35-41.

We hope this guide provides you the structure and resources you need to plan your energy activities in class and outside the classroom.

In addition to the *Blueprint for Success*, NEED has many other tools to help you teach about energy. All of these resources can be found on NEED's website, www.NEED.org. During the school year NEED publishes two newsletters, *Energy Exchange* and *Career Currents*. You can sign up online to have them delivered to your inbox six times throughout the school year. A bibliography suggesting additional reading material on energy topics and sources is available to search online or download. NEED also has an online *Question Bank* that allows you to pick and choose questions as you create assessments tailored to your specific needs. NEED's *Energy Polls* may now be taken online! See page 18 for more information.

NEED strongly values teacher feedback year round. Your feedback helps develop new curriculum pieces and revise our current curriculum portfolio to better meet your needs. Evaluation forms can be found in the back of all curriculum guides. We encourage you to send us feedback at any time by emailing info@need.org.

**New Online Resources!**

- *Energy Polls* available at http://edu.need.org
- *Graphics and Multimedia Library* available at www.NEED.org

**Check out NEED's expanded curriculum for 2011-2012:**

- *The Sun and Its Energy* (page 11)
- *Wonders of the Sun* (page 11)
- *Energy from the Sun* (page 11)
- *Fossil Fuels to Products* (page 10)
- *Transportation Fuels Infobook* (page 13)

# The Steps in a NEED Program

In order for students to receive a comprehensive energy education, NEED has developed eight steps to help teachers plan an energy unit. Teachers may order a Basic NEED Unit appropriate for their grade level. This unit (as shown on page 8) includes materials from each step giving teachers the resources they need to teach their students about energy. The entire portfolio is also available online.

On pages 6-7 is a matrix of all available NEED materials categorized by NEED's steps to energy education and grade level. Educators may use this list and the curriculum descriptions found in this booklet to customize an energy unit.

### Step One: Science of Energy

Students need to learn the science of energy before they can learn about the sources of energy, electric power production, and energy efficiency and conservation. Students learn the forms of energy (heat, light, motion, sound, electricity) and how energy is transformed from one form into other forms. Secondary students can extend their knowledge to thermodynamics. Several hands-on kits are available for sale or rental, such as *Primary, Upper Elementary/Intermediate, and Secondary Science of Energy,* and *EnergyWorks*.

### Step Two: Sources of Energy

These materials give students an understanding of the energy sources used today—their formation, exploration, production, distribution, consumption, and economic and environmental trade-offs. NEED *Energy Infobooks* provide comprehensive information on the major energy sources at four reading levels. Several units about specific energy sources are available.

### Step Three: Electricity and Magnetism

These materials provide students with information and hands-on explorations of the scientific concepts of electricity and magnetism, electricity generation, transmission, and efficient use of electricity. *Wonders of Magnets* explores the basics of magnetism, while *Energy Infobooks* provide background information on electricity. NEED's *ElectroWorks Kit* is available, as well as solar, wind, hydropower kits that include hands-on activities on electromagnetism. *Current Energy Affair* provides students with language arts activities about electricity.

### Step Four: Transportation

Several modules are available that teach students about the transportation sector of the economy, current transportation fuels, and fuels of the future.

### Step Five: Efficiency and Conservation

Students learn how energy is used, about efficient technologies, and ways to conserve energy at home and at school. Energy Management curriculum materials and Energy Management Kits are available for all grade levels. Residential energy management lessons are also available.

### Step Six: Synthesis and Reinforcement

There are many hands-on activities available to synthesize and reinforce the information the students have learned. Also available are activities for students to teach others what they have learned.

### Step Seven: Evaluation

Most NEED activities include evaluation strategies including pre and post surveys. NEED's *Question Bank* on the NEED website at www.NEED.org gives teachers the ability to customize evaluation tools for their energy units.

NEED's *Energy Polls* are available at four grade levels on pages 19-31 of this guide. The polls are also available online at http://edu.need.org/.

### Step Eight: Recognition

Beginning on page 32, the *Blueprint for Success* gives you all the information you need to document your energy activities in a portfolio and to participate in the Youth Awards Program for Energy Achievement. The deadline to submit projects to NEED is April 15, 2012.

For information about NEED's hands-on kits, the NEED *Resource Catalog* has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from **www.NEED.org.**

# NEED Curriculum Matrix

| | PRIMARY (K-2) | ELEMENTARY (3-5) | INTERMEDIATE (6-8) | SECONDARY (9-12) |
|---|---|---|---|---|
| **INTRODUCTORY ACTIVITIES** | Energy Games and Icebreakers<br>Energy Polls (Blueprint for Success) | Energy Games and Icebreakers<br>Energy Polls (Blueprint for Success) | Energy Games and Icebreakers<br>Energy Polls (Blueprint for Success) | Energy Games and Icebreakers<br>Energy Polls (Blueprint for Success) |
| **STEP ONE: Science of Energy** | Primary Science of Energy | Energy Flows*<br>EnergyWorks<br>Science of Energy | Energy Flows*<br>EnergyWorks<br>Science of Energy | Energy Flows*<br>Secondary Science of Energy<br>Thermodynamics* |
| **STEP TWO: Sources of Energy** | Energy Stories and More<br>Primary Energy Infobook<br>Primary Infobook Activities*<br>The Sun and its Energy<br>Water and Energy<br>Wind is Energy | Elementary Energy Infobook<br>Elementary Infobook Activities*<br>Energy Expos*<br>Energy in the Balance<br>Energy on Public Lands*<br>Energy Stories and More<br>Liquefied Natural Gas: LNG*<br>Ocean Energy*<br>U.S. Energy Geography*<br>Wonders of the Sun<br>Wonders of Water<br>Wonders of Wind | Energy Enigma<br>Energy Expos*<br>Energy from the Sun<br>Energy from the Wind<br>Energy from Uranium<br>Energy of Moving Water<br>Energy on Public Lands*<br>Fossil Fuels to Products*<br>Great Energy Debate<br>$H_2$ Educate<br>Intermediate Energy Infobook<br>Intermediate Infobook Activities*<br>Liquefied Natural Gas: LNG*<br>Marine Energy*<br>Ocean Energy*<br>U.S. Energy Geography* | Energy Enigma<br>Energy Expos*<br>Exploring Hydroelectricity<br>Exploring Nuclear Energy<br>Exploring Photovoltaics<br>Exploring Wind Energy<br>Fossil Fuels to Products*<br>Great Energy Debate<br>$H_2$ Educate<br>Liquefied Natural Gas: LNG*<br>Marine Energy*<br>Secondary Energy Infobook<br>Secondary Infobook Activities*<br>U.S. Energy Geography* |
| **STEP THREE: Electricity and Magnetism** | Energy Stories and More<br>Wonders of Magnets* | ElectroWorks<br>Wonders of Magnets* | Current Energy Affair*<br>ElectroWorks<br>Mission Possible* | Current Energy Affair*<br>Mission Possible* |
| **STEP FOUR: Transportation** | Energy Stories and More | Elementary Transportation Fuels Infobook<br>Energy Expos*<br>Energy Stories and More<br>Transportation Rock Performances* | Energy Expos*<br>$H_2$ Educate<br>Transportation Fuels Debate*<br>Transportation Fuels Enigma*<br>Transportation Fuels Infobook<br>Transportation Rock Performances * | Energy Expos*<br>$H_2$ Educate<br>Transportation Fuels Debate*<br>Transportation Fuels Enigma*<br>Transportation Fuels Infobook<br>Transportation Rock Performances* |

| | PRIMARY (K-2) | ELEMENTARY (3-5) | INTERMEDIATE (6-8) | SECONDARY (9-12) |
|---|---|---|---|---|
| **STEP FIVE: Efficiency and Conservation** | All About Trash*<br>Building Buddies<br>Today in Energy*<br>Using and Saving Energy | Building Buddies<br>Energy Conservation Contract<br>Energy Expos*<br>Energy House*<br>Monitoring and Mentoring<br>Saving Energy at Home and School<br>Talking Trash*<br>Today in Energy* | Energy Conservation Contract<br>Energy Expos*<br>Energy House*<br>Monitoring and Mentoring<br>Museum of Solid Waste and Energy*<br>Plug Loads<br>Saving Energy at Home and School<br>Understanding Climate Change | Energy Conservation Contract<br>Energy Expos*<br>Exploring Climate Change<br>Learning and Conserving<br>Museum of Solid Waste and Energy*<br>Plug Loads<br>Saving Energy at Home and School<br>School Energy Survey* |
| **STEP SIX: Synthesis and Reinforcement** | Energy Fair*<br>NEED Songbook*<br>Primary Energy Carnival | Energy Around the World*<br>Energy Carnival<br>Energy Fair*<br>Energy in the Balance<br>Energy Jeopardy*<br>Energy Math Challenge*<br>Energy on Stage<br>Exploring Energy*<br>Global Trading Game*<br>Great Energy Rock Performances*<br>Greek Mythology and Energy*<br>Mystery World Tour*<br>NEED Songbook*<br>This Mine of Mine*<br>Yesterday in Energy* | Energy Analysis*<br>Energy and Our Rivers*<br>Energy Around the World*<br>Energy Carnival<br>Energy Jeopardy*<br>Energy Math Challenge*<br>Energy on Stage<br>Exploring Energy*<br>Global Trading Game*<br>Great Energy Rock Performances*<br>Greek Mythology and Energy*<br>Mystery World Tour*<br>NEED Songbook*<br>This Mine of Mine*<br>Yesterday in Energy* | Carbon Capture and Storage<br>Energy Analysis*<br>Energy and Our Rivers*<br>Energy Around the World*<br>Energy Carnival<br>Energy Jeopardy*<br>Energy Math Challenge*<br>Energy on Stage<br>Global Trading Game*<br>Great Energy Rock Performances*<br>NEED Songbook*<br>Yesterday in Energy* |
| **STEP SEVEN: Evaluation** | Energy Polls (Blueprint for Success)<br>Question Bank* | Energy Polls (Blueprint for Success)<br>Question Bank* | Energy Polls (Blueprint for Success)<br>Question Bank* | Energy Polls (Blueprint for Success)<br>Question Bank* |
| **STEP EIGHT: Recognition** | Youth Awards Program (Blueprint for Success) | Youth Awards Program (Blueprint for Success) | Youth Awards Program (Blueprint for Success) | Youth Awards Program (Blueprint for Success) |

Note:

* Online only

All curriculum is available to download in .pdf format from www.NEED.org.

# How to Get Started

- The chart below shows the suggested materials needed to implement a basic NEED unit according to your grade level.
- Additional activities for each grade level and step are listed on pages 6-7 and are described in this booklet.
- Complete the top of the Order Form found in the *NEED Resource Catalog* or supplied by your workshop presenter if you would like a basic unit.
- Fax the Order Form to NEED Headquarters at 1-800-847-1820. Indicate on the form the date the materials are needed.
- If you have any questions after reviewing the materials call NEED Headquarters at 1-800-875-5029. We're here to help you before and during your energy unit.
- All curriculum guides are available for educators to download free of charge at www.NEED.org.

**BASIC NEED UNIT TABLE**

**Note:** The guides with asterisks (*) are not available in print; they are available online at www.NEED.org to download.

| Basic NEED Units | Basic Primary Unit (K-2) | Basic Elementary Unit (3-5) | Basic Intermediate Unit (6-8) | Basic Secondary Unit (9-12) |
|---|---|---|---|---|
| **INTRODUCTORY ACTIVITIES** | ← Energy Polls (Blueprint for Success and online) → | | | |
| | ← Energy Games and Icebreakers → | | | |
| **STEP ONE: Science of Energy** | Primary Science of Energy | Science of Energy<br>EnergyWorks | Science of Energy | Secondary Science of Energy |
| **STEP TWO: Sources of Energy** | ← Energy Games and Icebreakers → | | | |
| | Energy Stories and More | Energy in the Balance | Great Energy Debate | Energy Enigma |
| **STEP THREE: Electricity and Magnetism** | Wonders of Magnets* | ElectroWorks | ElectroWorks | Mission Possible* |
| **STEP FOUR: Transportation** | Energy Stories and More | Elementary Transportation Fuels Infobook | Transportation Fuels Infobook | Transportation Fuels Infobook |
| **STEP FIVE: Efficiency and Conservation** | Building Buddies<br>Using and Saving Energy | Monitoring and Mentoring<br>← Energy Conservation Contract → | Monitoring and Mentoring | Learning and Conserving |
| **STEP SIX: Synthesis and Reinforcement** | Primary Carnival | Energy Carnival | Energy Carnival<br>← Energy Jeopardy* → | Energy Carnival |
| **STEP SEVEN: Evaluation** | ← Question Bank* → | | | |
| | ← Energy Polls (Blueprint for Success and online) → | | | |
| **STEP EIGHT: Recognition** | ← Youth Awards Program (Blueprint for Success) → | | | |

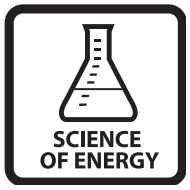
# NEED Curriculum

Rather than ordering a Basic Unit, teachers may choose to order separate curriculum pieces. The matrix on pages 6-7 is designed to assist teachers in planning an individualized energy unit. All NEED materials are listed by grade level and by where the majority of information in the material fits into NEED's Energy Education Steps. Detailed descriptions of the curriculum can be found starting on page 9.

It is important to note that many curriculum pieces overlap steps. *NEED Energy Infobooks* are the foundational piece of any energy education unit. Written at four different levels—primary, elementary, intermediate, and secondary—each Infobook has in-depth information on the major energy sources. Topics also covered in the *Infobooks* include Electricity and Magnetism (Step Three) and Efficiency and Conservation (Step Five). Individual books on specific sources used to generate electricity often include background information on electricity and magnetism. This is the case in NEED's curriculum series on solar energy, hydropower, wind energy, hydrogen, and nuclear.

Whether ordering a Basic NEED Unit or choosing individual curriculum pieces, teachers should thoroughly review all materials and plan their units according to the needs of their students and their classroom timing and sequencing.

In addition to printed materials, NEED also offers many different hands-on kits. For more information on available kits please refer to the *Resource Catalog,* or visit www.NEED.org. All NEED curriculum guides are available online at www.NEED.org.




# Step One: Science of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Energy Flows

online only

**Time:** 45 minutes **Grade Level:** 5–12
**Subjects:** S, SS, M, LA

*Energy Flows* introduces students to forms of energy and energy transformations as a stand-alone activity or as an introductory activity to the *Science of Energy Kits*.

## EnergyWorks

kit available

**Time:** 12–18 hours **Grade Level:** 4–8
**Subjects:** S, M, LA

*EnergyWorks* introduces elementary students to the basic scientific concepts of energy and the tasks it performs—heat, light, motion, and sound. The Teacher Guide includes instructions for each unit, plus teacher demonstrations and graphic masters. The Student Guide contains nonfiction backgrounders and key words on each component and worksheets for each exploration. The Student Guide also shows students how to read thermometers using both Fahrenheit and Celsius scales, how to use spring scales to measure force, and how to use protractors to measure angles of incidence and reflection.

## Primary Science of Energy

kit available

**Time:** 12–18 hours **Grade Level:** 1–3
**Subjects:** S, M, LA

Newly revised, *Primary Science of Energy* introduces primary students to the basic forms of energy—motion, heat, light, and sound—with simple explorations that emphasize observation, comparison, contrast, using simple tools and measurements. The Teacher Guide includes instructions for each activity. The Student Guide contains worksheets for each exploration and how to measure with thermometers, balances, rulers, beakers, and graduated cylinders. The *Primary Science of Energy Kit* contains a class set of Student Guides and the materials needed for the teacher demos and student explorations.

## Science of Energy

kit available

**Time:** 3–6 hours **Grade Levels:** 4–12
**Subjects:** S, M, LA

Newly revised, *Science of Energy* provides comprehensive instruction in energy transformations through a series of inquiry investigations. Students learn about the different forms of energy and how they are converted to other forms. Included are teacher demonstrations, and student worksheets for six stations. Each station explores a different aspect of energy transformations—such as light to electricity, light to heat, motion to sound, motion to heat, etc.

- *Science of Energy* (5-8)
- *Secondary Science of Energy* (9-12)

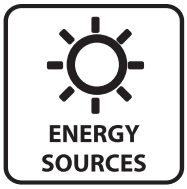
## Thermodynamics

online only

**Time:** 6 hours **Grade Level:** 9–12
**Subjects:** S, M, LA, T

A guide to hands-on experiments that explore concepts of thermodynamics, including molecular structure, conduction, convection, radiation, specific heat, heat of fusion, and heat of vaporization. The Teacher Guide includes teacher demonstrations, an activity for students to calibrate blank thermometers, a list of laboratory materials needed, and a Unit Exam.

For information about NEED's hands-on kits, the NEED *Resource Catalog* has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from **www.NEED.org.**




# Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Energy Infobooks

**In Curriculum Packet**

**Time:** Varies **Grade Level:** K–12
**Subjects:** S, SS, M, LA

NEED's *Energy Infobooks* provide resource information on energy, the sources of energy, electricity, consumption, and environmental effects. Many NEED activities are based on the information in these booklets. Class sets of *Infobooks* are available at elementary, intermediate, and secondary levels. The primary level comes as one book for the teacher and students. Individual infosheets are online.

- *Primary Energy Infobook* (K-2)
- *Elementary Energy Infobook* (3-5)
- *Intermediate Energy Infobook* (6-8)
- *Secondary Energy Infobook* (9-12)

## Energy Infobook Activities

online only

**Time:** Varies **Grade Level:** K–12
**Subjects:** S, SS, M, LA

NEED's *Energy Infobook Activities* are companion student workbooks to the *Infobooks* that include graphs, puzzles, short answer, and fill-in-the-blank activities to reinforce the information in the *Infobooks*. A Teacher Guide and answer key are included. Available at four reading levels—primary, elementary, intermediate, and secondary. Booklets are available online only.

## Energy Enigma

**In Curriculum Packet**

**Time:** 2.5 hours **Grade Level:** 6–12
**Subjects:** S, SS, LA

Students organized in groups use critical thinking skills to unlock the energy source mystery using clues of increasing difficulty.

## Energy in the Balance

**In Curriculum Packet**

**Time:** 3–5 hours **Grade Level:** 3–5
**Subjects:** S, SS, M, LA

This activity explores the advantages and disadvantages of the energy sources through a series of charting and graphing activities. It is an outstanding activity for developing critical thinking skills.

## Energy Expos

online only

**Time:** 4.5–6 hours **Grade Level:** 3–12
**Subjects:** S, SS, LA, T

Students work in groups to develop exhibits and make presentations. Directions for expos focusing on energy sources, transportation fuels, and energy conservation are included in this one guide.

## Energy on Public Lands

online only

**Time:** 5 hours **Grade Level:** 5–8
**Subjects:** S, SS, M, LA

Students learn and teach others how energy resources on public lands are managed with background information and hands-on activities.

## Fossil Fuels to Products

online only

**Time:** 2–8 hours **Grade Level:** 7–12
**Subjects:** S, SS, M

Students learn about exploration, production, refining, chemical manufacturing, transportation, marketing, and uses of petroleum, natural gas, and their products in the industrial sector, with background information and hands-on activities.

## Great Energy Debate

**Time:** 2 hours **Grade Level:** 6–12
**Subjects:** S, SS, M, LA

Appropriate for science or social studies classes. Student groups evaluate and debate the advantages and disadvantages of the ten major energy sources used in the United States today.

## Energy Stories and More

**Time:** Varies by activity **Grade Level:** K–5
**Subjects:** S, SS, M, LA

This booklet contains a series of stories and activities for primary and elementary students introducing basic energy concepts and the major energy sources. Upper elementary students can use the stories to teach primary students about energy.

# Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## $H_2$ Educate

kit available

**Time:** 10 hours **Grade Level:** 6–12
**Subjects:** S, SS, M, LA, PA, T

*$H_2$ Educate* develops a comprehensive understanding of hydrogen as a fuel for the future. It includes a nonfiction backgrounder and hands-on experiments, with a detailed Teacher Guide and Student Guide.

## Hydropower

kits available

**Time:** 6–12 hours **Grade Level:** K–12
**Subjects:** S, SS, M, LA, T

Students learn about water, energy, and the uses of hydropower as a source to generate electricity through developmentally appropriate reading materials. There is a Teacher Guide and Student Guide at each level. Students participate in hands-on investigations to help them extend their understanding that water can be used to do work, including electricity generation.

- *Water and Energy* (K–2)
- *Wonders of Water* (3–5)
- *Energy of Moving Water (*6–8)
- *Exploring Hydroelectricity* (9–12)

## Liquefied Natural Gas: LNG

online only

**Time:** 4.5–7 hours **Grade Level:** 5–12
**Subjects:** S, SS, T

Students learn about chemical properties of natural gas, energy flows, and the natural gas chain from production to market through activities and background reading.

## Marine Energy

online only

**Time:** 1–4 hours **Grade Level:** 7–12
**Subjects:** S, SS, LA

Students conduct a community hearing on the development of energy in coastal areas.

## Nuclear Energy

**Time:** 5-8 hours **Grade Level:** 6–12
**Subjects:** S, SS, LA

Written at two levels, NEED's curriculum on nuclear energy integrates science, social studies, and language arts. Each guide contains information for the teacher that includes hands-on science activities and scenarios for having the class conduct a mock NRC hearing or write persuasive letters about the use of nuclear energy. Each guide also contains a student section presenting background information on energy, the history of nuclear energy, and how uranium is used to generate electricity.

- *Energy From Uranium* (6–8)
- *Exploring Nuclear Energy* (9–12)

## Ocean Energy

online only

**Time:** 5 hours **Grade Level:** 5–8
**Subjects:** S, SS, LA

Students learn and teach others about sources of energy found offshore with background information and hands-on activities.

## Solar Energy

kits available

**Time:** 6 hours **Grade Level:** K–12
**Subjects:** S, SS, M, LA, T

Solar Energy units are available at all four grade levels. The primary level curriculum has one Teacher Guide with background information presented in a read aloud format with corresponding activities. Units at the other levels each include a detailed Teacher Guide and Student Guide with background information and activities.

- *The Sun and Its Energy* (K–2)
- *Wonders of the Sun* (3–5)
- *Energy From the Sun* (6–8)
- *Exploring Photovoltaics* (9–12)

## U.S. Energy Geography

online only

**Time:** Varies **Grade Level:** 4–12
**Subjects:** S, SS, LA

This resource includes U.S. maps covering all ten energy sources, energy production, energy consumption, and more! These maps are an excellent resource for any energy-related discussion or activity.

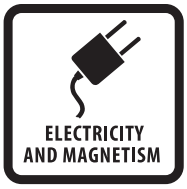
## Wind Energy

kits available

**Time:** 12–18 hours **Grade Level:** K–12
**Subjects:** S, SS, M, LA, T

Wind Energy units are available at all four grade levels. The primary level curriculum has a Teacher Guide with background information presented in a read aloud format. The primary Student Guide is a science notebook for students to record their thinking during the unit. The wind unit at the other levels includes a detailed Teacher Guide and Student Guide with background information and activities.

- *Wind is Energy* (K–2)
- *Wonders of Wind* (3–5)
- *Energy From the Wind* (6–8)
- *Exploring Wind Energy* (9–12)




# Step Three: Electricity and Magnetism

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Wonders of Magnets

online only

**Time:** 3–6 hours **Grade Level:** 1–4
**Subjects:** S, M, LA

*Wonders of Magnets* introduces primary students to the basic concepts of magnetism. The guide includes instructions for each activity, teacher demonstrations, graphic masters, and student worksheets for each exploration.

## ElectroWorks

kit available

**Time:** 6–8 hours **Grade Level:** 4–7
**Subjects:** S, M, LA

*ElectroWorks* introduces elementary students to the basic scientific concepts of electricity—including centers on static electricity, batteries, magnets, electromagnetism, and circuits. The Teacher Guide includes instructions for the unit plus graphic masters. The Student Guide contains a nonfiction backgrounder and key vocabulary worksheets as well as worksheets for each exploration and a Unit Review.

## Current Energy Affair

online only

**Time:** 2.5–3.5 hours **Grade Level:** 7–12
**Subjects:** S, SS, LA, T

*Current Energy Affair* is modeled after a television news broadcast with student-correspondents reporting on seven major areas of electric power generation.

## Energy Stories and More

**Time:** Varies by activity **Grade Level:** K–5
**Subjects:** S, SS, M, LA

This booklet contains a series of stories and activities for primary and elementary students introducing basic energy concepts and the major energy sources. Upper elementary students can use the stories to teach primary students about energy.

## Games and Icebreakers

**In Curriculum Packet**

**Time:** 30 minutes **Grade Level:** 5–12
**Subjects:** S, SS, M

*Electric Connections* is an activity featured in NEED's *Games and Icebreakers* booklet. First, students rank the yearly production of electricity for the nation's top ten energy sources. In groups, students rank the top ten sources once again. Finally, students compare their rankings with the actual production figures.

## Mission Possible

online only

**Time:** 3–5 hours **Grade Level:** 7–12
**Subjects:** S, SS, M, LA

A cooperative learning activity in which secondary students evaluate the advantages and disadvantages of the energy sources used to generate electricity as they develop a plan to increase electricity generation for a fictitious country.

## Solar, Wind, Hydropower, Hydrogen, Nuclear

kits available

**Time:** Varies **Grade Level:** K–12
**Subjects:** S, SS, M, LA, PA, T

The solar, wind, hydropower, hydrogen, and nuclear curricula include extensive information on electricity generated from clean energy sources.

**See descriptions of the curricula on page 11.**

For information about NEED's hands-on kits, the NEED *Resource Catalog* has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from **www.NEED.org.**


# Step Four: Transportation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## $H_2$ Educate

kit available

**Time:** 10 hours **Grade Level:** 6–12
**Subjects:** S, SS, M, LA, PA, T

The *$H_2$ Educate* curriculum develops a comprehensive understanding of hydrogen as a fuel for the future. It includes a backgrounder and hands-on experiments, with a detailed Teacher Guide and Student Guide.

## Transportation Fuels Infobooks

**Time:** 2–5 hours **Grade Level:** 4–12
**Subjects:** S, SS, M, LA, T

Students explore transportation fuels such as ethanol, electricity, biodiesel, compressed natural gas, and propane with nonfiction backgrounders. *Transportation Expo* (in *Energy Expos*) and *Transportation Fuels Rock Performances* are based on the information in these booklets.

- *Elementary Transportation Fuels Infobook* (4-5)
- *Transportation Fuels Infobook* (6-12)

## Transportation Fuels Debate

online only

**Time:** 2–5 hours **Grade Level:** 6–12
**Subjects:**: S, SS, LA

Students evaluate the advantages and disadvantages of conventional and alternative fuels in personal and fleet vehicles. Teacher instructions and graphic masters are included.

## Energy Stories and More

**Time:** Varies by activity **Grade Level:** K–5
**Subjects:** S, SS, M, LA

This booklet contains a series of stories and activities for primary and elementary students introducing basic energy concepts and the major energy sources. Upper elementary students can use the stories to teach primary students about energy.

## Transportation Fuels Enigma

online only

**Time:** 2–5 hours **Grade Level:** 7–12
**Subjects:** S, SS, LA

In *Transportation Fuels Enigma*, student teams are each assigned a different fuel source. Working cooperatively, students use their reading, brainstorming, and organizational skills to hide the identity of their team's fuel while trying to guess which transportation fuels the other teams represent.

## Energy Expos

online only

**Time:** 2–5 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA, T

Students work in groups to develop exhibits and make presentations. Directions for expos focusing on energy sources, transportation fuels, and energy conservation are included in this one guide.

## Transportation Fuels Rock Performances

online only

**Time:** 2–5 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA, PA

Student rock bands write songs and sing about transportation fuels in this entertaining activity. Audiences learn more from these energy rock stars as they tell their stories to interviewers out to get the latest scoops. Teacher and student instructions are included, along with sample songs and interviews.

For information about NEED's hands-on kits, the NEED *Resource Catalog* has descriptions of equipment, cost, and ordering details. You can obtain a catalog by calling 1-800-875-5029 or downloading a copy from **www.NEED.org.**


# Step Five: Efficiency and Conservation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Climate Change

**Time:** 4–8 hours **Grade Level:** K–12
**Subjects: S, SS, M, LA, T**

With four separate books for primary, elementary, intermediate and secondary, our new climate change curriculum addresses current concerns about climate change. Students will understand why humans use the sources they do, and how their use is impacting the world. Students will reflect on their daily habits and decide what steps they can take to lessen their carbon footprint.

- *Understanding Climate Change* (6–8)
- *Exploring Climate Change* (9–12)

## Energy Conservation Contract

**Time:** 1.5–2.5 hours **Grade Level:** 4–12
**Subjects:** S, M, LA, T

Each student surveys his/her family's energy behaviors. After one month, students survey their families once again and tabulate their energy savings. Can be extended to neighbors and friends.

## Energy Expos

online only

**Time:** 4.5–6 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA, T

Students work in groups to develop exhibits and make presentations. Directions for expos focusing on energy sources, transportation fuels, and energy conservation are included in this one guide.

## Energy House

online only

**Time:** 1.5–2.5 hours **Grade Level:** 4–8
**Subjects:** S, SS, M, T

Students work in groups to insulate cardboard houses using caulking, weather-stripping, and insulating materials. Teacher and student instructions are included.

## Energy Management

kits available

**Time:** 4.5 hours, ongoing **Grade Level:** K–12
**Subjects:** S, SS, M, LA, T

NEED's Energy Management curriculum provides students with the fundamentals of energy use, conservation, and the science behind it all. A Teacher Guide with detailed instructions and graphic masters and a Student Guide with background reading and worksheets are available at all levels.

- *Using and Saving Energy* (K-1, guide only)
- *Building Buddies* (2-3)
- *Monitoring and Mentoring* (4-6)
- *Learning and Conserving* (7-12)

## Games and Icebreakers

**In Curriculum Packet**

**Time:** 1.5–2.5 hours **Grade Level:** 5–12
**Subjects:** S, SS, LA, PA

Instructions for *This Week in Energy Conservation* can be found in the *Games and Icebreakers* booklet. Students are organized into groups; each group writes and performs a news brief or public service announcement on a specific area of energy efficiency.

## Plug Loads

**Time:** 2–5 hours **Grade Level:** 6–12
**Subjects:** S, M

Designed to complement *Monitoring and Mentoring* and *Learning and Conserving*, *Plug Loads* guides students through a more in-depth investigation of electricity usage by appliances and machines in their school building. Students gather data on electrical appliances and machines while in use, and while in "sleep" or "standby" mode. Students utilize a spreadsheet to calculate their energy consumption and economic and environmental cost over time.

## Blueprint for School Energy Teams

online only

**Time:** Ongoing
**Audience:** District and School Leaders
**Subjects:** S, M, T

Districts can manage their energy consumption and redirect savings to other needs by implementing energy smart behaviors. This guide provides a seven step approach aligned to the ENERGY STAR Guidelines for Energy Management to help schools and/or districts develop and implement their own energy management plan.

## Energy Management Guide for Schools

online only

**Time:** Ongoing
**Audience:** District and School Leaders
**Subjects:** S, M, T

An effective energy management program will maintain a healthy learning environment, develop and implement an ongoing school-wide energy plan, promote energy efficiency through education, and reduce energy consumption at school. This guide is designed to walk school leaders through the necessary steps to achieve these goals.

# Step Five: Efficiency and Conservation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Saving Energy at Home and School

kit available

**Time:** 4.5 hours, ongoing **Grade Level:** 3–8
**Subjects:** S, SS, M, LA, T

*Saving Energy at Home and School* focuses on residential and commercial energy use and conservation. Students learn how to assess energy usage (lighting, insulation, weatherization, electricity use, and water heating) in the classroom and school. Students then take their learning home and work with their families on assessing home energy use and implementing energy saving measures.

## School Energy Survey

online only

**Time:** Varies **Grade Level:** 9–12
**Subjects:** S, M, T

These energy audit activities teach secondary students about building science and energy management as they use the data collection tools in the *Learning and Conserving Kit* to complete more comprehensive energy audits of their school and make recommendations for change.

## Solid Waste and Recycling

online only

**Time:** 4–6 hours **Grade Level:** K–12
**Subjects:** S, SS, M, LA, T

At the primary level students learn the basics of trash and what happens to it through a nonfiction read aloud and hands-on activities. At the other levels students work in small groups and learn about waste generated in the U.S., recycling, landfilling, and turning waste into energy. Students present exhibits to teach others about trash and its energy implications.

- *All About Trash* (K-2) - Online Only
- *Talking Trash* (3-5) - Online Only
- *Museum of Solid Waste and Energy* (6-8 and 9-12)

## Today in Energy

**Time:** 1–2 hours **Grade Level:** 1–4
**Subjects:** S, SS, M, LA

Appropriate for primary classes with reading skills. Students use cards describing energy-using activities to make choices about their energy use throughout the day.

# Step Six: Synthesis and Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Carbon Capture and Storage

**Time:** 4 hours **Grade Level:** 9–12
**Subjects:** S, SS, T

*Carbon Capture and Storage* introduces students to a potential technique of mitigating climate change through capturing carbon dioxide at power plants and storing it in deep geologic formations. In hands-on investigations students learn about the properties of carbon dioxide as a gas, porosity and permeability, and using carbon dioxide for enhanced oil recovery.

## Energy Analysis

online only

**Time:** 2–5 hours **Grade Level:** 7–12
**Subjects:** S, SS, M, T

This activity for intermediate and secondary students emphasizes research and graph analysis skills to discern energy trends using the Energy Information Administration's *Energy Perspectives* publication. Introductory data is included for students to graph and analyze.

## Energy Around The World

online only

**Time:** 1.5–2.5 hours **Grade Level:** 5–12
**Subjects:** S, SS, M, LA, T

Students make presentations on energy resources and consumption in other countries.

## Energy Carnivals

**Time:** 2–4 hours **Grade Level:** K–12
**Subjects:** S, SS, M, LA

Students combine math, spelling, history, and science knowledge with carnival game skills in this fun activity. Each carnival game has questions or problems for different age levels. The *Primary Energy Carnival* contains nine games designed to reinforce information about the energy sources, renewable and nonrenewable energy, and the things energy does for us.

- *Primary Energy Carnival*
- *Energy Carnival*

# Step Six: Synthesis and Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## Energy Fair—Experimental Design

online only

**Time:** 2 hours **Grade Level:** 1–5
**Subjects:** S, LA

Activities that teach students experimental design with suggestions for science projects focusing on energy.

## Energy Jeopardy

online only

**Time:** 1.5 hours **Grade Level:** 4–12
**Subjects:** S, SS, M, LA

Students work in teams to determine questions for the answers in various energy categories, including efficiency and transportation.

## Energy Math Challenge

online only

**Time:** 1.5–2 hours **Grade Level:** 3–12
**Subjects:** S, SS, M, LA

Students work as individuals and in teams to solve energy math problems.

## Energy On Stage

**Time:** 1–5 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA, PA

The best of NEED's energy plays are included for students to prepare and present to others.

## Energy and Our Rivers

online only

**Time:** 4–8 hours **Grade Level:** 6–12
**Subjects:** S, SS, LA

We use energy every day, but how does it get from production to locations where it can be used? This new module examines how energy products including coal, petroleum, ethanol, and biodiesel, are transported by barge along the nation's inland shipping routes. Hands-on science activities allow students to learn more about a river's course, and barge basics. Social studies activities encourage students to think about the importance of rivers to the nation's development and to analyze maps planning the best routes for transporting energy commodities.

## Exploring Energy

online only

**Time:** Varies with activity **Grade Level:** 4–6
**Subjects:** S, SS, M, LA

This booklet contains short articles and hands-on activities on a variety of energy-related topics such as composting, solar cooking, microwaves, and the greenhouse effect.

## Games and Icebreakers

**In Curriculum Packet**

**Time:** Varies with activity **Grade Level:** K–12
**Subjects:** S, SS, M, LA, PA

This booklet contains activities that reinforce many energy concepts, including *Energy Chants*, *Energy Wasters*, *Energy BINGO*, *Energy Match Game*, and more.

## Global Trading Game

online only

**Time:** 2 hours **Grade Level:** 4–12
**Subjects:** S, SS, M, LA

A hands-on activity in which students assume the roles of geologists, miners, and international traders as they learn about global energy issues and supply and demand.

## Great Energy Rock Performances

online only

**Time:** 2–4 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA, PA

You may choose to do the short or long version of *Great Energy Rock Performances*. In the long version, students write their own songs, introductions, and interviews. In the short version of this activity, students perform sample songs written by NEED.

## Greek Mythology and Energy

online only

**Time:** 2–8 hours **Grade Level:** 4–8
**Subjects:** S, LA, SS

This guide provides resource materials and a Teacher Guide for incorporating Greek mythology into your science curriculum relating to forms of energy. This innovative interdisciplinary activity was developed by Donna Quillen of North Carolina.

## Mystery World Tour

online only

**Time:** 1.5–3 hours **Grade Level:** 4–8
**Subjects:** S, SS, LA

In this activity, developed by the Ohio Energy Project, students create 12 murals depicting energy sources and terms as they learn about how other countries use energy.

## NEED Songbook

online only

**Time:** Varies with activity **Grade Level:** K–12
**Subjects:** S, PA

Sing along to NEED's favorite songs, including the NEED Clap, E-N-E-R-G-Y, and What Do You Do With An Energy Waster?

# Step Six: Synthesis and Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, PA–Performing Arts

## This Mine of Mine

online only

**Time:** 45 minutes **Grade Level:** 2–6
**Subjects:** S, SS, M, LA

Students learn about surface mining and reclamation by building a plot of land with resources, recovering the resources, then reclaiming the land.

## Yesterday in Energy

online only

**Time:** 4-6 hours **Grade Level:** 4–12
**Subjects:** S, SS, LA

This activity allows students to travel back in time without leaving the classroom. Students conduct interviews and do research to learn and make exhibits about energy use in the good old days.

# Step Seven: Evaluation

## Energy Polls

Evaluation and assessment are important components of any energy unit and should be ongoing. NEED offers many assessment and evaluation tools for teachers to use.

Use one of the NEED *Energy Polls* prior to beginning the unit. There are polls on four reading levels—primary, elementary, intermediate, and secondary. The polls are found in this booklet, beginning on page 19, as well as online at http://edu.need.org. We recommend that you use the web-based polls if you have internet capability; the results will be tabulated for you, and you can compare pre- and post-polls for your students. Many NEED activities also contain unit exams and suggestions for how to evaluate student performance. Please feel free to modify these suggestions as necessary. For more information about the online polls, email NEED at info@need.org. If you choose to use the paper version, please forward your results to info@need.org.

## Question Bank

The *Question Bank* was developed by NEED's Teacher Advisory Board to give teachers a tool for designing their own assessments. Whether you want to add one or two questions to an assessment you already use, or you want to develop a customized evaluation tool for your energy unit, questions with answers are available to download at www.NEED.org.

Questions are written at four grade levels: primary, elementary, intermediate, and secondary. At each grade level, the questions are divided into the following topics: Science of Energy and Forms of Energy, Sources of Energy, Electricity, Transportation, and Conservation and Efficiency. Under each topic, knowledge, comprehension and application questions are included. All files are the MS Word (.doc) file format.

## Feedback

We'd like to hear your comments and suggestions about your energy education unit. Please let us know what worked well and what needs improvement. Please complete the *Evaluation Form* on page 43 of this guide, as well as the individual evaluation forms at the back of each activity, and send them to us at info@need.org, or fax 1-800-847-1820.

# Energy Poll Guide

**Grades:** 1-12 (Four Reading Levels Available)
**Time:** 20 Minutes

## A Quick Look At The Energy Polls

The *Energy Polls* can be used to assess students' basic energy knowledge, as well as their opinions about energy before and after your classroom energy unit. There are polls on four reading levels—primary, elementary, intermediate, and secondary.

The polls are also available online at http://edu.need.org where the results will be compiled for you. NEED requests that everyone who has the computer capability use the web-based polls. The polls are designed as a valuable evaluation tool for the NEED program, as well as for your classroom. Call 1-800-875-5029 or email NEED at info@need.org if you have questions about the web-based polls.

## Preparation If Not Using Web-Based Polls

Choose the applicable poll for the reading level of your class. Make one copy of the poll for each student. If you prefer, you can make one transparency of the poll and have the students answer the questions on a piece of paper. In either case, keep the results of the pre-poll so that students can compare their answers after your energy unit.

## Procedure

Direct the students to take the poll as honestly as possible and not to make wild guesses. Explain that the poll will be an important assessment tool to show what they have learned and how their attitudes have changed.

Once you have administered the poll, go over the answers with the students. As a supplemental activity, discuss and chart the answers to the opinion questions. Collect the answers and save them to use after your energy unit is completed.

## Energy Poll Answer Keys

**PRIMARY Answer Key**

| | | | |
|---|---|---|---|
| 1. | Child in Black | 8. | A |
| 2. | 1-Sun, 2-Wheat, 3-Bread, 4-Girl | 9. | A |
| 3. | Boy on Left | 10. | C |
| 4. | Paperclip | 11. | C |
| 5. | C | 12. | C |
| 6. | B | 13. | C |
| 7. | A | 14. | B |

**ELEMENTARY Answer Key**

| | | | |
|---|---|---|---|
| 1. | D | 11. | A |
| 2. | C | 12. | C |
| 3. | B | 13. | B |
| 4. | D | 14. | C |
| 5. | A | 15. | C |
| 6. | A | 16. | B |
| 7. | D | 17. | A |
| 8. | D | 18. | D |
| 9. | B | 19. | B |
| 10. | B | 20. | B |

**INTERMEDIATE Answer Key**

| | | | |
|---|---|---|---|
| 1. | D | 11. | C |
| 2. | B | 12. | D |
| 3. | D | 13. | B |
| 4. | C | 14. | C |
| 5. | D | 15. | C |
| 6. | B | 16. | D |
| 7. | A | 17. | C |
| 8. | D | 18. | C |
| 9. | B | 19. | D |
| 10. | A | 20. | A |

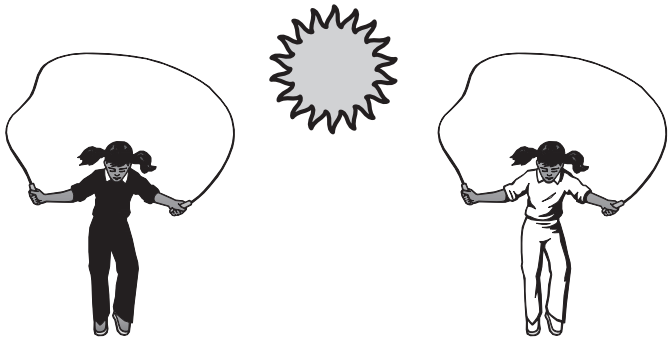
**SECONDARY Answer Key**

| | | | |
|---|---|---|---|
| 1. | A | 11. | B |
| 2. | C | 12. | D |
| 3. | C | 13. | B |
| 4. | B | 14. | A |
| 5. | A | 15. | B |
| 6. | B | 16. | B |
| 7. | D | 17. | C |
| 8. | C | 18. | D |
| 9. | C | 19. | C |
| 10. | D | 20. | D |

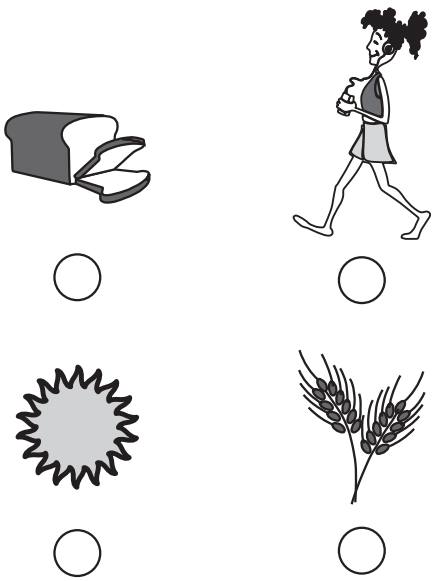
# Primary Poll

## Science of Energy

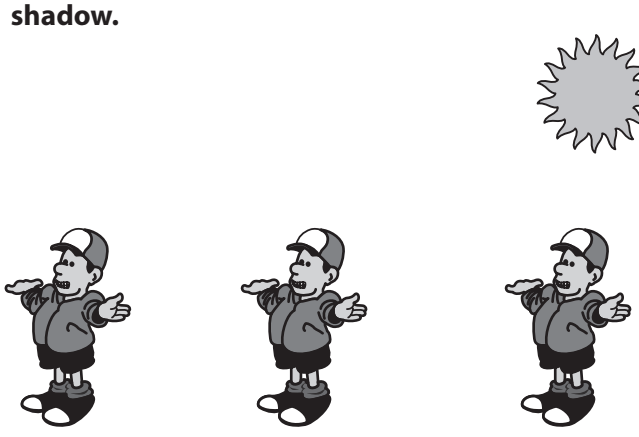
**1. Circle the child who would feel hotter.**



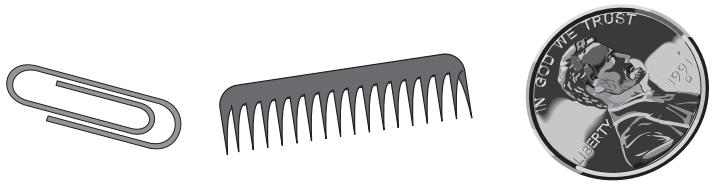
**2. In the circles, number the pictures from 1 to 4 to show the flow of energy through the food chain.**



**3. Circle the boy who would have the longest shadow.**



**4. Circle the object that a magnet would attract.**




## Sources of Energy

**5. Which energy source is renewable?**

a. Coal

b. Propane

c. Solar

**6. Which energy is a fossil fuel?**

a. Wind

b. Coal

c. Biomass

**7. Which energy source provides gasoline for cars?**

a. Petroleum

b. Propane

c. Natural Gas

**8. Which energy source depends on the water cycle?**

a. Hydropower

b. Solar

c. Wind

**9. Which energy source comes from deep inside the earth?**

a. Geothermal

b. Hydropower

c. Biomass

# Primary Poll

**10. Which energy source makes the most electricity?**

a. Propane

b. Petroleum

c. Coal

## Electricity

**11. What is electricity?**

a. Moving Atoms

b. Moving Wires

c. Moving Electrons

**12. When you turn on a TV, which shows that electricity is being used?**

a. The Picture

b. The Sound

c. Both the Picture and the Sound

## Saving Energy

**13. Which is a way to save electricity?**

a. Leave the lights on when you leave the room for just a few minutes

b. Open the windows when you turn on the air-conditioning

c. Use a fan instead of air-conditioning to cool your house

**14. Which way of traveling will save the most fuel?**

a. Ride the school bus

b. Walk to school

c. Have your mom drive you to school

## Opinion

Tell us if you agree with these statements.
Circle your answer.

**1. There are things I can do to save energy.**

No, I don't agree. I agree some. Yes, I agree.

**2. Learning about energy is fun.**

No, I don't agree. I agree some. Yes, I agree.

**3. I know a lot about energy.**

No, I don't agree. I agree some. Yes, I agree.

**4. I like to do activities about energy.**

No, I don't agree. I agree some. Yes, I agree.

## Leadership

How much do you like doing these school activities?
Circle your answer.

**1. Work in a group.**

I don't like to. I like to some. I like to a lot.

**2. Follow directions.**

I don't like to. I like to some. I like to a lot.

**3. Help others in my group.**

I don't like to. I like to some. I like to a lot.

**4. Listen to my teacher.**

I don't like to. I like to some. I like to a lot.

**5. Help with classroom activities.**

I don't like to. I like to some. I like to a lot.

# Elementary Poll

## Science of Energy

**1. Energy is needed to do which of the following?**

a. Make things move
b. Make things grow
c. Make heat and light
d. All of the above

**2. Newton's Law of Motion states that an object in motion stays in motion unless a force changes its motion. If you kick a ball, what force makes the ball stop?**

a. Gravity
b. Friction
c. Both gravity and friction
d. Neither gravity nor friction

**3. Why do most apples appear red to us?**

a. Red apples absorb the color red and reflect other colors.
b. Red apples reflect the color red and absorb the other colors.
c. Red apples reflect ultraviolet radiation.
d. Red apples absorb infrared radiation.

**4. Which of the following increases friction?**

a. Freezing rain on a road
b. Wax on skis
c. Air blowing up on an air hockey table
d. Rubber soles on shoes

**5. When you turn on a lamp, the electricity changes into what forms of energy?**

a. Heat and light
b. Sound and light
c. Electrical and light
d. Heat and electrical

**6. When you place a metal spoon in a pot of boiling water, the handle of the spoon becomes very hot even though it isn't touching the water. What kind of heat transfer is taking place?**

a. Conduction
b. Convection
c. Radiation
d. All of the above

## Sources of Energy

**7. Why are some energy sources called renewable?**

a. They are clean and free to use.
b. They take a long time to be remade by nature.
c. They do not produce pollution.
d. They can be remade by nature in a short time.

**8. In the United States, which energy source produces most of our electricity?**

a. Solar
b. Natural gas
c. Petroleum
d. Coal

**9. Which energy source provides most of our transportation needs?**

a. Solar
b. Petroleum
c. Biomass
d. Coal

**10. Which energy source means heat from inside the earth?**

a. Hydropower
b. Geothermal
c. Coal
d. Natural gas

# Elementary Poll

**11. Which energy source is made by the uneven heating of the earth's surface?**

a. Wind
b. Hydropower
c. Geothermal
d. Solar

**12. Which energy source is used in nuclear power plants?**

a. Petroleum
b. Propane
c. Uranium
d. Biomass

## Electricity

**13. Electricity travels in closed loops called…**

a. Transformers
b. Circuits
c. Shells
d. Generators

**14. Electricity is the movement of…**

a. Neutrons
b. Protons
c. Electrons
d. Molecules

**15. How is the amount of electricity you use at home measured?**

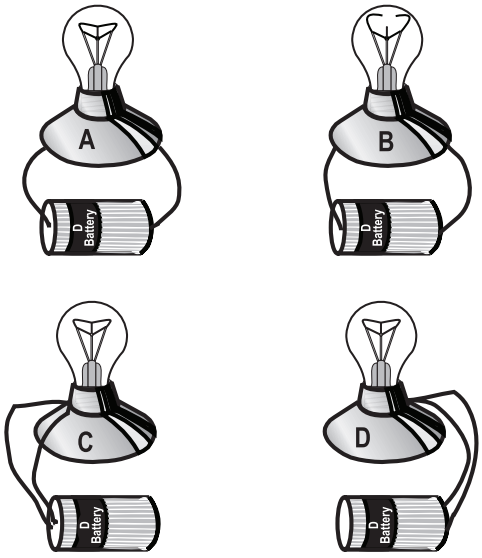
a. Ampere
b. Volt
c. Kilowatt-hour
d. Watt

**16. Generators have which of the following parts?**

a. Magnets and transformers
b. Magnets and coils of copper wire
c. Transformers and coils of copper wire
d. Transformers and reactors

**17. In which picture will the light bulb light?**

a. A b. B c. C d. D




## Efficiency /Conservation

**18. Which task in the average home uses the most energy?**

a. Lighting
b. Keeping food cold
c. Washing and drying clothes
d. Heating and cooling rooms

**19. Which type of light bulb is the most energy efficient?**

a. Incandescent
b. Compact fluorescent
c. Halogen
d. All light bulbs are the same

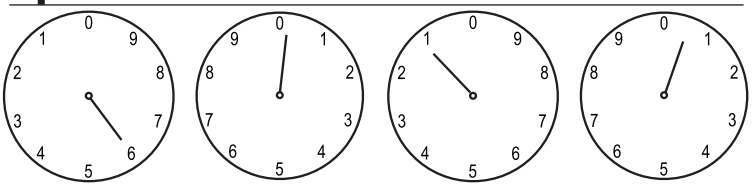
**20. What is the reading on the natural gas meter dials**

# Elementary Poll

**pictured below?**

a. 7011 ccf
b. 6010 ccf
c. 6111 ccf
d. 6000 ccf

## Opinion



Circle the number that best represents how strongly you agree or disagree with the statement.

**1. There are things I can do to save energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. Learning about energy can be fun.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. I want to learn more about energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. Energy is important for our future.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. It's best to use a mix of energy sources.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

## Leadership

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

**1. Talking in front of students in my class.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. Making a presentation to teachers.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. Planning an activity with other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. Showing other students how to do an activity.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. Expressing my ideas to other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

# Intermediate Poll

## Science of Energy

**1. When you turn on a television, the electricity changes into which form(s) of energy?**

a. Sound
b. Light
c. Heat
d. A, B, and C

**2. An increase in the motion of molecules indicates an increase in which form of energy?**

a. Radiant
b. Thermal
c. Chemical
d. Electrical

**3. The human body uses the chemical energy in food to produce which form(s) of energy?**

a. Mechanical
b. Chemical
c. Thermal
d. A, B, and C

**4. All natural energy transformations can be traced back to which form of energy?**

a. Mechanical
b. Chemical
c. Nuclear
d. A, B, and C

**5. Electrical energy can be produced from which form(s) of energy?**

a. Mechanical
b. Chemical
c. Radiant
d. A, B, and C

**6 Molecules are farthest apart in which state of matter?**

a. Solid
b. Gas
c. Liquid
d. Fluid

## Sources of Energy

**7. Which of the following is NOT a fossil fuel?**

a. Uranium
b. Petroleum
c. Natural gas
d. Coal

**8. In the United States, we mainly rely on which source of energy for electricity?**

a. Hydropower
b. Natural gas
c. Petroleum
d. Coal

**9. Renewable energy sources provide what percentage of total U.S. energy consumption?**

a. Less than 1%
b. 5-10%
c. 20-25%
d. 30-35%

**10. Which energy source is NOT a result of solar energy?**

a. Uranium
b. Wind
c. Hydropower
d. Biomass

**11. Which energy source provides most of our transportation needs?**

a. Electricity
b. Natural gas
c. Petroleum
d. Coal

**12. Which energy source is produced by uneven heating of the earth's surface?**

a. Hydropower
b. Biomass
c. Geothermal
d. Wind

# Intermediate Poll

## Electricity

**13. If a carbon atom with six protons is in balance, how many electrons are in its energy levels?**

a. 8
b. 6
c. 12
d. 4

**14. A transformer changes which measure of electricity?**

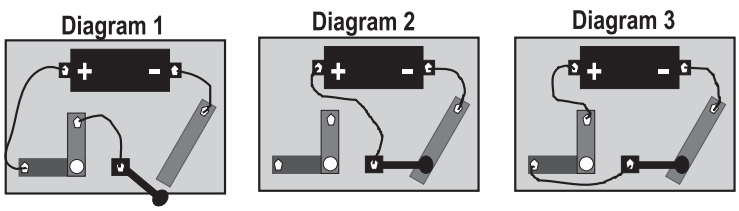
a. Wattage
b. Amperage
c. Voltage
d. Circuitry

**15. What do most power plants use to produce electricity?**

a. Photovoltaics
b. Transformers
c. Turbine generators
d. Batteries

**16. Which of the circuits pictured below will produce an electric current?**

a. Diagram 1
b. Diagram 2
c. Diagram 3
d. Diagrams 2 and 3



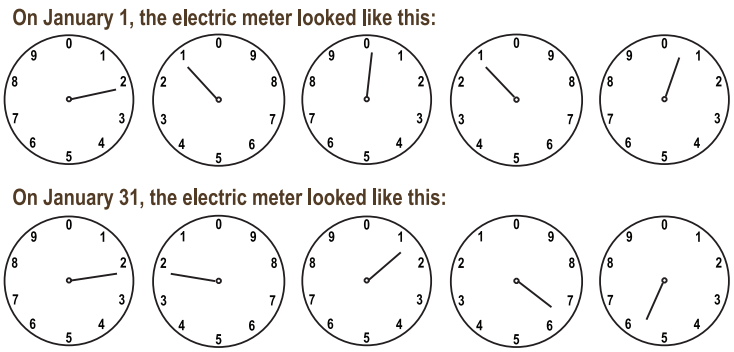

## Efficiency /Conservation

**17. An incandescent bulb converts 10% of the energy it uses into light and 90% into which form of energy?**

a. Radiant
b. Potential
c. Thermal
d. Chemical

**18. Looking at the meters below, how much energy was used in January?**

a. 11,155 kWh
b. 11.55 kWh
c. 1,155 kWh
d. 43,185 kWh



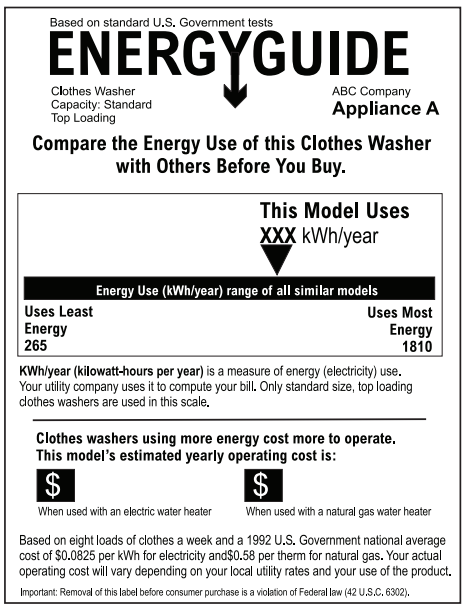

**19. Which task in a typical home uses the most energy?**

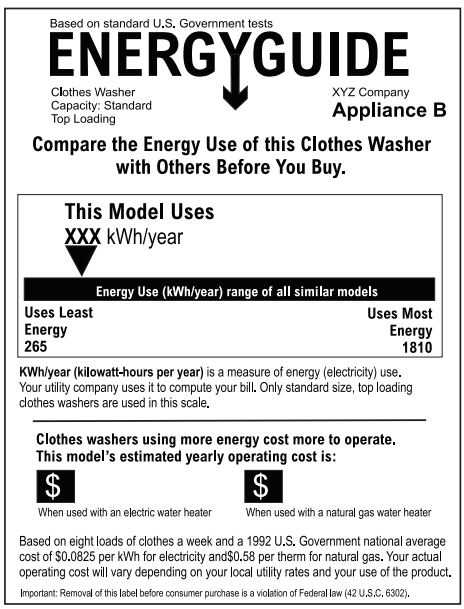
a. Operating appliances
b. Heating water
c. Refrigerating food
d. Heating and cooling rooms

# Intermediate Poll

**20. Look at the EnergyGuide labels below. Which is the correct statement?**

a. Appliance A uses more energy than Appliance B.
b. Appliance A uses less energy than Appliance B.
c. Appliance A uses more water than Appliance B.
d. Appliance A uses less water than Appliance B.




## Opinion

Circle the number that represents your opinion of the statement.

**1. There are a lot of ways to save energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. I'd consider a career that involves energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. Learning about energy can be fun.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. I know a lot about energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. Energy is important to our lifestyle.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**6. I want to learn more about how to save energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**7. Learning about energy is important.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**8. It's best to use a mix of energy sources.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

# Intermediate Poll

## Leadership

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

**1. Organizing students to conduct a school activity.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. Making a presentation to students in your class.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. Making a presentation to teachers at your school.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. Making a presentation to people in the community.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. Planning a lesson for other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**6. Leading a discussion on a topic such as energy.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**7. Teaching other students to conduct a learning activity.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**8. Clearly communicating your ideas to other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

# Secondary Poll

## Science of Energy

1. **What is the nuclear reaction that takes place inside the sun's core?**
   a. Fusion
   b. Activation
   c. Fission
   d. None of these

2. **Most of the energy consumed in the U.S. is stored in which form of energy?**
   a. Kinetic
   b. Thermal
   c. Chemical
   d. Mechanical

3. **Which form of energy is converted to chemical energy during photosynthesis?**
   a. Chemical
   b. Electrical
   c. Radiant
   d. Thermal

4. **Which type of chemical reaction absorbs thermal energy?**
   a. Activation
   b. Endothermic
   c. Exothermic
   d. Fusion

5. **As the thermal energy in substance increases…**
   a. Molecular motion increases
   b. Molecular motion decreases
   c. Mass increases
   d. Mass decreases

## Sources of Energy

6. **Photosynthesis produces the energy in which of the following sources?**
   a. Hydropower
   b. Biomass
   c. Geothermal
   d. Wind

7. **Which sector of the U.S. economy consumes the most petroleum?**
   a. Residential
   b. Commercial
   c. Industrial
   d. Transportation

8. **Global climate change focuses on an increase in which atmospheric gas?**
   a. Ozone
   b. Sulfur dioxide
   c. Carbon dioxide
   d. Nitrous oxide

9. **Which two elements are present in all fossil fuels?**
   a. Nitrogen and hydrogen
   b. Carbon and oxygen
   c. Hydrogen and carbon
   d. Carbon and nitrogen

10. **The energy in which of the following is a result of photosynthesis?**
    a. Coal
    b. Petroleum
    c. Natural gas
    d. A, B, and C

11. **Renewable energy sources provide what percentage of total U.S. energy consumption?**
    a. 1%
    b. 5-10%
    c. 15-20%
    d. 25-30%

12. **Which energy source is NOT a result of solar energy?**
    a. Hydropower
    b. Biomass
    c. Wind
    d. Geothermal

# Secondary Poll

## Electricity

**13. Nearly half of U.S. electricity is produced by which energy source?**

a. Hydropower
b. Coal
c. Uranium
d. Wind

**14. Why is alternating current used instead of direct current in a power system?**

a. It can be transported longer distances economically.
b. It is cheaper to produce.
c. It has more power per kilowatt-hour.
d. It is safer to use.

**15. In the core of a nuclear reactor…**

a. Uranium atoms combine and give off heat.
b. Uranium atoms are split apart and give off heat.
c. Uranium atoms are burned and give off heat.
d. Uranium isotopes are burned and give off heat.

**16. What does it mean if a power plant is 35% efficient?**

a. For every 100 units of energy going into a plant, 35 units are lost during energy transformations.
b. For every 100 units of energy that go into the plant, 35 units are converted into usable energy.
c. For every 35 units of energy that go into the plant, 100 units are produced.
d. For every $100 invested in the production of energy, $35 is made in profit.

## Efficiency /Conservation

**17. In the summer, when is the peak energy demand?**

a. 12:00 am to 6:00 am
b. 6:00 am to noon
c. Noon to 6:00 pm
d. 6:00 pm to 12:00 am

**18. The shorter the payback period of an energy-efficient appliance…**

a. The more energy you save.
b. The less energy you save.
c. The longer you need to use the appliance to save money.
d. The sooner you start to save money.

**19. An incandescent bulb converts 10% of the energy it uses into light and 90% into which form of energy?**

a. Radiant
b. Potential
c. Thermal
d. Chemical

**20. What device can control the indoor temperature of a home according to time of day?**

a. Boiler
b. Ventilator
c. Thermometer
d. Programmable thermostat

# Secondary Poll

## Opinion

Circle the number that represents your opinion of the statement.

**1. There are a lot of ways to save energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. I'd consider a career that involves energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. Learning about energy can be interesting.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. I know a lot about energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. Energy is essential to our country's economy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**6. I want to learn more about how to save energy.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**7. Learning about energy is important.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**8. Energy is a complex topic.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**9. It's best to use a mix of energy sources.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**10. I know how to find information about energy issues.**

| Strongly Disagree | | | | Strongly Agree |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

# Secondary Poll

## Leadership

Below are some activities you may do at school. Circle the number that represents how comfortable you are doing them.

**1. Organizing students to conduct a school activity.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**2. Making a presentation to students in your class.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**3. Making a presentation to teachers at your school.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**4. Making a presentation to people in the community.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**5. Planning a lesson for other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**6. Leading a discussion on a topic such as energy.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**7. Teaching other students to conduct a learning activity.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

**8. Clearly communicating your ideas to other students.**

| Not Comfortable | | | | Very Comfortable |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |


# Step Eight: Recognition

## Background

Activities listed here are designed to empower students to work together to become involved in their schools and communities.

## Energy Outreach Goals

### ■ Setting Your Goals

Decide on the people you want to reach with your activities—your school, the students in your school and their families, the elementary or middle schools that feed into your school, your community at large, your community leaders, or community members.

Decide on the focus for your activities—increased energy awareness, instituting school energy conservation programs, undertaking a community demonstration program, correcting individual problems (such as weatherizing low-income houses), changing individual or group behavior, or changing community policies.

Make a separate folder for each of the goals your group has decided to undertake. If your group is large or you have several goals, you may need to divide your group into committees. You can assign a committee of students and designate a committee chairperson for each goal.

### ■Develop a Workplan for Each Goal

Each committee should meet separately to develop a workplan for achieving its assigned goal. The workplan should include a list of your objectives and an estimate of the time, cost, materials, and number of people it will take to accomplish the objectives. Be sure to include any resource people you may need to contact.

Once the committees have developed workplans for each goal, the group should meet to discuss the plans, offer suggestions, and make revisions. When the workplans are finalized, the group should develop a master plan that includes all of the workplans. The master plan should include a calendar with a timeline that shows when each task should be begun and completed.

### ■ Implementing Your Workplans

Post the master calendar in a prominent place. Have group members sign up for the tasks they want to perform. Make sure that each task has a sufficient number of staff. List the staff members responsible for completing each task on the master calendar.

All of the people who are assigned to a particular project will become the working committee for that goal. The committee should meet to appoint a chairperson and discuss the details of the workplan. The chairperson should make sure that deadlines are met and call meetings if problems arise. The group and the working committees should meet often to ensure that the projects are proceeding as planned.

Document your activities and share your success with your community and NEED.

### ■Evaluate Your Projects

Evaluate the progress of the projects at your group meetings and upon completion of the projects. Ask the people with whom you have worked to evaluate the projects. Write up a formal evaluation of each project and an overall evaluation summary of the master plan.

Use the NEED *Energy Poll* to evaluate pre and post energy knowledge—or write a poll of your own.

# Outreach Program to Youth Awards Project

## Background

NEED encourages all schools to participate in the Youth Awards Program for Energy Achievement by having their students keep a portfolio of their activities to submit to NEED by April 15, 2012. Summaries of winning projects by schools nationwide can be found in NEED's *Annual Report*. Many new activities and school programs are also highlighted in the *Energy Exchange* newsletter, which is sent to all NEED members four times a year. From more information about the Youth Awards Program, go to www.NEED.org/Youth-Awards.

The Youth Awards Program is a central component of NEED's evaluation and recognition, recognizing student leadership, encouraging students to evaluate their knowledge of energy and providing ideas and programs that may be exchanged with other schools in the NEED program.

Students should keep a portfolio that highlights their goals, activities, outreach opportunities, and their evaluation of the activities. The portfolio is simple to complete and should be compiled by the students as a team. In April, portfolios should be submitted to your state's coordinator—located in your state or at NEED Headquarters in Virginia.

The Youth Awards program culminates with the National Youth Awards Recognition Ceremonies, in Washington D.C., June 22-25, 2012.

## Turning Your Energy Outreach Program into a Youth Awards Project

### ▪ Gather Documentation

Take photos of the outreach your group does during the year. Catalog those photos in a separate folder on the computer.

Keep good notes on everything your group does.

Your photographs, letters, evaluations, and samples of your group's work will become part of the documentation section of your portfolio.

### ▪ Fundraising (Optional)

You may need to raise money for your project or to attend the 2012 National Recognition Ceremonies. Fortunately, there are many ways to raise funds, so start early! You can raise money by holding car washes, selling CFLs as a fundraiser, or by sponsoring a school dance or other event. You can also ask community groups or businesses to donate money or supplies to help your group. If you take the latter route, write a letter stating the purpose of your project and enlisting support. Follow up with a phone call or go in person to talk about your project. Remember to write a letter thanking participating businesses for their support.

## Complete Your Portfolio

Obtain an 8 ½" x 11" loose leaf binder in which to compile your portfolio. Use every blank space to tell our judges more about your project. You may submit multimedia resources, but the judges will only review the portfolios during the judging. Make sure to include the following:

### Page 1

**Youth Awards Application Form** (found on page 41 of this booklet and online at www.NEED.org/Youth-Awards)

### Page 2

**Project Summary and Group Photo**

Have a student(s) write a 200 word summary of your project, emphasizing the energy-related activities. If you are selected as a state or national winner, this summary will be included in NEED's *Annual Report*.

Take a high resolution group photo. This photo may be used in the *Annual Report*.

Include a copy of the summary and the group photo as page 2 of your portfolio.

Email your group photo and project summary to info@need.org with the subject line (Your School Name) Youth Awards Summary and Photo. Include in the body of the email the school name, lead teacher name, project title, and state. Projects that have not emailed a photo and summary will NOT be considered for review.

### Pages 3+

**Project Reporting Forms and Documentation**

Fill out a separate reporting form for each of the goals your group has chosen. The judges look for well-defined goals that can be accomplished and that emphasize energy-related objectives and activities. Make as many copies of the reporting form (found on page 41 of this book and at www.NEED.org/Youth-Awards) as you need.

Include documentation following each goal to highlight your activities. Documentation is limited to 15 double sided or 30 single sided pages. Portfolios with more pages will NOT be considered in the national judging.

### Portfolio Power Point Presentation (Optional)

Groups may elect to submit a PowerPoint presentation along with their project portfolio. Presentations will not be included in judging but will be displayed throughout the National Recognition weekend and may be included on the NEED website.

Presentations should be submitted on a CD or USB drive and contain no more than 10 slides.

Slide 1 should include the school name, project title, and project advisor.

Videos should be embedded into the PowerPoint presentation.

Additional videos/ photographs are always welcome.

### Submit Your Portfolio

The deadline for projects is April 15, 2012. Projects must be received at your state coordinator's office by that date. The projects are then reviewed for state awards and forwarded to NEED Headquarters to be entered in the national competition. Call NEED at 1-800-875-5029 to find your state coordinator.

# Youth Awards Program for Energy Achievement

## State Awards Programs

Many state NEED programs host awards luncheons or programs to recognize the outstanding projects in the state. States present plaques and certificates to participating schools. Contact The NEED Project at 1-800-875-5029 or at info@need.org for your state coordinator's information.

## National Youth Awards Program

Your state committee will select the best projects in the Primary, Elementary, Junior, Senior, and Special categories to compete in the national review in April. A national review committee will review all the top state reports and select the School of the Year for each grade level. Finalists for School of the Year will receive special recognition as well. There is a category for Rookie of the Year at all grade levels.

## National Recognition Ceremonies

Representatives from all state projects are eligible to attend The NEED Project's National Recognition Ceremonies on June 22-25, 2012. This four day conference is organized and staffed by NEED student leaders to recognize outstanding teachers and students nationwide. Delegates receive recognition for their projects, learn about new NEED activities, and share ideas had have fun with their counterparts from other states. Registration fees are $550 per person and include double-occupancy lodging, most meals, local transportation, a formal awards ceremony, a Potomac River dinner cruise, tours of Washington, D.C. and Arlington Cemetery, and other special events. Some sponsorship may be available for schools. Call the NEED office for availability.

## Categories for Competition

Primary Projects—Grades K-2
Elementary Projects—Grades 3-5
Junior Projects—Grades 6-8
Senior Projects—Grades 9-12
Independent or Special Category Projects (district-wide, regional, individual, scout troop, etc.)
NEED also recognizes Rookie Schools of the Year at the State and National Levels.

***NEW IN 2011-2012:*** Community Colleges and University Groups may apply in the Independent and Special Category.

## Online Resources

To see last year's winning projects and photos from the 2011 National Recognition Ceremonies, visit www.NEED.org/Youth-Awards.

## Project Judging Criteria

Your project will be reviewed by a panel of educators, students, business people, members of energy organizations, and others. The review panel will award your project points in eight areas as follows:

### Project Goals (0-5 points)

The panel will review your project's goals. Your goals should state the major energy-related achievements your project was trying to attain.

### Activities to Reach the Goals (0-25 points)

This is the most important category in the review, and it receives the greatest weight in points. The panel will consider the number and quality of the activities. Activities should:

- Focus on energy
- Be useful and educational
- Include school/community service
- Have far-reaching/long-term results
- Be well organized and well received
- Be creative or fun
- Include NEED materials

### Energy Content of Project (0-20 points)

The panel will review your activities to determine the energy content of your project. Judges will look for activities that involve the science of energy, energy sources, energy uses, and energy conservation.

### Student Leadership (0-15 point)

The panel will review your activities to determine the extent to which the students took ownership and demonstrated leadership in the activities.

### Community Involvement (0-5 points)

The panel will determine how effectively the students interacted in their communities. Did the students work with other community groups or undertake a community service project?

### Use of Resources (0-10 points)

The panel will determine how well your project made use of NEED materials and other resources. Judges will also see if you called upon knowledgeable people in your community to help make your project a success.

### Evaluation Methods (0-10 points)

The panel will review your evaluation methods.

### Documentation (0-10 points)

The panel will review your documentation. Judges will evaluate how well your project communicates what you have accomplished.

## Activity Ideas

### ENERGY AWARENESS ACTIVITIES

#### Within Your School

- Conduct classroom activities—*Energy Expos, Energy Enigma*, etc.
- Invite guest speakers on energy issues.
- Publish a school-wide energy newsletter.
- Conduct a school-wide energy fair.
- Promote a "Carpool Only Day", "Mass Transit Only Day", or "No Electricity Day."
- Develop and provide lesson plans for teachers to use that integrate energy into their subjects.
- Create an energy time capsule with information about how we use energy now and predictions for the future.
- Conduct an energy audit of the school and prepare a presentation of your findings for the school board and PTA.

#### Reaching Out to Families

- Implement the Energy Conservation Contract activity as a school-wide project.
- Conduct an energy awareness program for a PTA meeting.
- Include energy information in the school newsletter.
- Interview senior citizens and publish a special report on energy in the good old days.

#### For Local Elementary and Middle Schools

- Develop and provide one-week energy unit guides to elementary and middle school teachers.
- Adopt younger classrooms and share energy lessons you have prepared.
- Conduct *Energy Stories and More* for students in grades K-3.
- Assist students in constructing the *Museum of Solid Waste and Energy*.
- Conduct *Science of Energy* experiments for students.
- Conduct an all-day NEED workshop for teachers and students.
- Conduct a "Design a Wind Turbine" or "Design a Solar-powered Anything" program.
- Perform a NEED *Energy Play* or *Great Energy Rock Performance* for the students.
- Sponsor NEED clubs at the schools by becoming mentors.
- Conduct *Energy Carnivals* for local elementary schools.

#### For the Community at Large

- Construct the *Museum of Solid Waste and Energy* and take it on a tour of local malls or public buildings.
- Write Public Service Announcements for the DJ to read on your local radio station.
- Produce an energy video to be shown on local public television stations.
- Write energy articles for community newspapers and newsletters.
- Create placemats for local restaurants to use that teach about energy.
- Conduct energy audits for local businesses.
- Present programs for community meetings.

## Activity Ideas *(continued)*

### ENERGY CONSERVATION PROGRAMS

- Install bicycle racks at your school and promote cycling as an alternative to driving to school.
- Install a carpool bulletin board at your school for after school programs.
- Work with teachers to encourage or require "both sides of the paper" reports.
- Investigate your school cafeteria and suggest alternatives to wasteful practices.

### COMMUNITY POLICY ACTIVITIES

- Encourage your community government to mandate residential and industrial recycling programs.
- Encourage your community government to implement a community-wide composting program for food and yard wastes.
- Encourage your community government to provide tax incentives or assistance for residential and industrial energy-efficiency measures.
- Encourage your community government to provide bike paths and carpool lanes to reduce automobile use.
- Investigate the needs, concerns, or problems of your particular community and make suggestions to your community government.
- Investigate renewable energy options for your local community and present your findings to local government officials and community members.

### COMMUNITY OUTREACH ACTIVITIES

- Write, illustrate, and publish a pamphlet on easy energy conservation tips to be placed in public buildings and businesses.
- Implement mentor and internship programs with the major utilities and energy users in your community.
- Set up energy awareness booths at local fairs and expos.
- Build an energy efficient demonstration house to exhibit at community functions.

# NEED Youth Awards Program For Energy Achievement

## Sample Project Reporting Form

**GOAL #** 1 To conduct an *Energy Expo* at our school.

**ENERGY CONTENT ACTIVITIES**

1. Obtained permission from the principal to conduct the activity.
2. Had all classes sign up to present exhibits on energy sources.
3. Secured free/discount coupons for pizza and ice cream as incentives for students/teachers to participate.
4. Put up posters about the expo around the school.
5. Asked the Science Club to present NEED's *EnergyWorks* and *Science of Energy* experiments.
6. Sent invitations to parents and other schools to visit the expo.
7. Followed-up with thank you notes and prizes to participating teachers and the Science Club.

**STUDENT LEADERSHIP**

A committee of NEED students planned and organized the expo.

**RESOURCES**

1. NEED's *Energy Expo*, *Energy Infobooks*, *EnergyWorks*, *Science of Energy*.
2. Pamphlets from our local utility company.
3. Encyclopedia Americana.
4. Energy websites linked to www.NEED.org.

**EVALUATION**

1. Evaluated the project with completed evaluation forms.
2. Reviewed the evaluation forms from participating teachers and students.
3. All of the teachers and 95 percent of the students indicated they would like to have another expo next year.
4. Four hundred people attended the expo.
5. Pre/post assessment showed knowledge gain.

# NEED Youth Awards Program For Energy Achievement

## Project Reporting Form

State: _____ School Name: _____ Form: _____ of _____

**GOAL #** _____

**ENERGY CONTENT ACTIVITIES**

**STUDENT LEADERSHIP**

**RESOURCES**

**EVALUATION**

# NEED Youth Awards Program For Energy Achievement

## Application Form

State: _____ School Name: _____

**PROJECT LEVEL**

_____ Primary (K-2)

_____ Elementary (3-5)

_____ Junior (6-8)

_____ Senior (9-12)

_____ Independent and Special Category
***New in 2011-2012:** community colleges and university groups may apply*

_____ First Time Entry

**CHECKLIST**

_____ Finished Application

_____ Project Summary (200 words or less, emailed to NEED, info@need.org)

_____ Group Photo (Emailed to NEED, info@need.org)

_____ Reporting Forms (as many as needed)

_____ Doumentation (15 pages front and back)

_____ Standard-size Portfolio (8 ½ x 11)

**Make this application the first page of your project report.**
**Submit your report to your state NEED Coordinator by April 15, 2012.**
**If your state does not have a coordinator, please contact NEED at 1-800-875-5029 for instructions.**

Project Title

Full School Name | Club Name if Applicable

School Street Address | School District

City/Town | County | State | Zip Code

School Phone Number (Area Code) | Last Day of School | US Congressional Representative

School Fax Number (Area Code) | Email Address | School Website

Project Adviser | Student Director(s)

School Principal | Number of Students Coordinating Project | Number of Students Reached

Number of Community Members Reached Directly | Number of Community Members Reached Indirectly (media coverage, etc.)

Home Phone Number of Adviser (Area Code)

**THE FINE PRINT**

As the project adviser and student director(s), we declare that the attached report has been written and assembled with the participation of students and that all information and data in this report are true. We have double-checked to ensure that all materials are included and that documentation has been limited to 30 single-sided or 15 double-sided pages no larger than 8½ x 11 inches.

_____ Project Adviser Signature

_____ Project Adviser Printed Name

_____ Date

_____ Student Director(s) Signature(s)

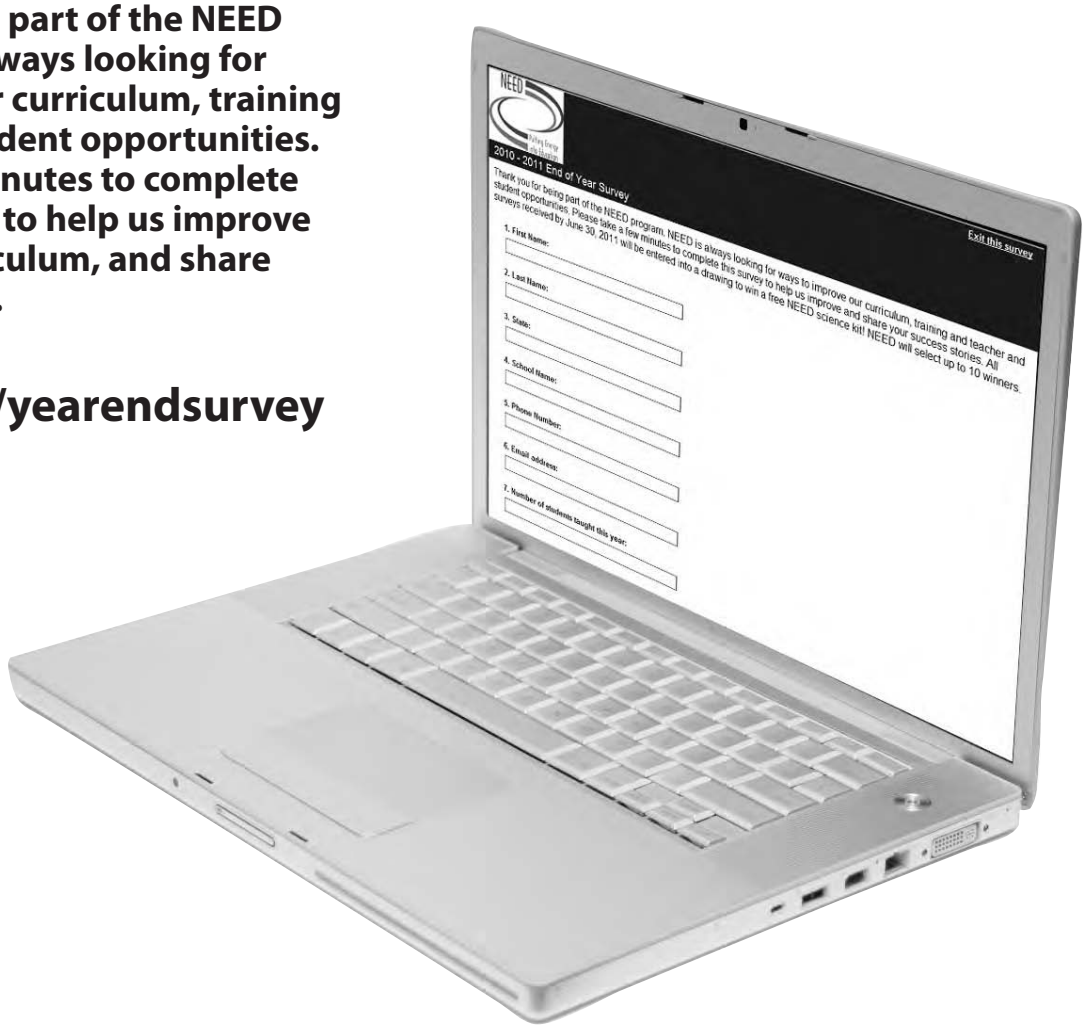
_____ Student Director(s) Printed Name(s)

_____ Date

# Year End Survey

**Thank you for being part of the NEED program. NEED is always looking for ways to improve our curriculum, training and teacher and student opportunities. Please take a few minutes to complete our year end survey to help us improve our programs, curriculum, and share your success stories.**

**www.NEED.org/yearendsurvey**



# NEED National Sponsors and Partners

American Association of Blacks in Energy
American Chemistry Council
American Electric Power
American Electric Power Foundation
American Solar Energy Society
American Wind Energy Association
Appalachian Regional Commission
Areva
Arkansas Energy Office
Armstrong Energy Corporation
Association of Desk & Derrick Clubs
Robert L. Bayless, Producer, LLC
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BP Alaska
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FPL
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Georgia Power
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Gerald Harrington, Geologist
Houston Museum of Natural Science
Hydro Research Foundation
Idaho Department of Education
Idaho National Laboratory
Illinois Clean Energy Community Foundation
Independent Petroleum Association of America
Independent Petroleum Association of New Mexico
Indiana Michigan Power
Interstate Renewable Energy Council
iStem–Idaho STEM Education
Kansas City Power and Light
KBR
Kentucky Clean Fuels Coalition
Kentucky Department of Education
Kentucky Department of Energy Development and Independence
Kentucky Oil and Gas Association
Kentucky Propane Education and Research Council
Kentucky River Properties LLC
Kentucky Utilities Company
Lenfest Foundation
Littler Mendelson
Llano Land and Exploration
Los Alamos National Laboratory
Louisville Gas and Electric Company
Maine Energy Education Project
Maine Public Service Company
Marianas Islands Energy Office
Massachusetts Division of Energy Resources
Lee Matherne Family Foundation
Michigan Oil and Gas Producers Education Foundation
Midwest Energy Cooperative
Mississippi Development Authority–Energy Division
Montana Energy Education Council
The Mosaic Company
NADA Scientific
NASA
National Association of State Energy Officials
National Association of State Universities and Land Grant Colleges
National Fuel
National Grid
National Hydropower Association
National Ocean Industries Association
National Renewable Energy Laboratory
Nebraska Public Power District
New Mexico Oil Corporation
New Mexico Landman's Association
New Orleans Solar Schools Initiative
New York Power Authority
NSTAR
Offshore Energy Center/Ocean Star/ OEC Society
Offshore Technology Conference
Ohio Energy Project
Pacific Gas and Electric Company
PECO
Petroleum Equipment Suppliers Association
PNM
Puerto Rico Energy Affairs Administration
Puget Sound Energy
Rhode Island Office of Energy Resources
RiverWorks Discovery
Roswell Climate Change Committee
Roswell Geological Society
Sacramento Municipal Utility District
Schneider Electric
Science Museum of Virginia
C.T. Seaver Trust
Shell
Snohomish County Public Utility District–WA
Society of Petroleum Engineers
David Sorenson
Southern Company
Southern LNG
Southwest Gas
Space Sciences Laboratory–University of California Berkeley
Tennessee Department of Economic and Community Development–Energy Division
Tennessee Valley Authority
Timberlake Publishing
Toyota
TXU Energy
United States Energy Association
University of Nevada–Las Vegas, NV
U.S. Department of Energy
U.S. Department of Energy–Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy–Office of Fossil Energy
U.S. Department of Energy–Hydrogen Program
U.S. Department of Energy–Wind Powering America
U.S. Department of Energy–Wind for Schools
U.S. Department of the Interior– Bureau of Land Management
U.S. Department of the Interior–Bureau of Ocean Energy Management, Regulation and Enforcement
U.S. Energy Information Administration
U.S. Environmental Protection Agency
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