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Blueprint For Success

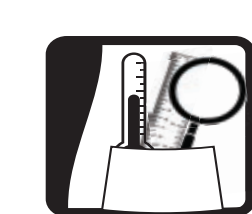
A guide designed to assist with planning and implementing effective energy education programs in the classroom.



Grade Level:

K-12 Primary, Elementary, Intermediate,
Secondary

Subject Areas:



Science



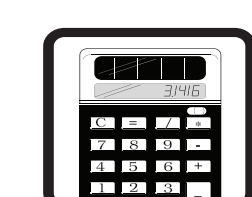
Social Studies



Language Arts



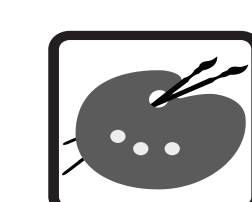
Technology



Math



Public Speaking



Creative Arts

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.

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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 yearly. Working in partnership with EIA, NEED includes easy to understand data in our curriculum materials. To do further research, visit the EIA web site at www.eia.gov. EIA's Energy Kids site has great lessons and activities for students at www.eia.gov/kids.



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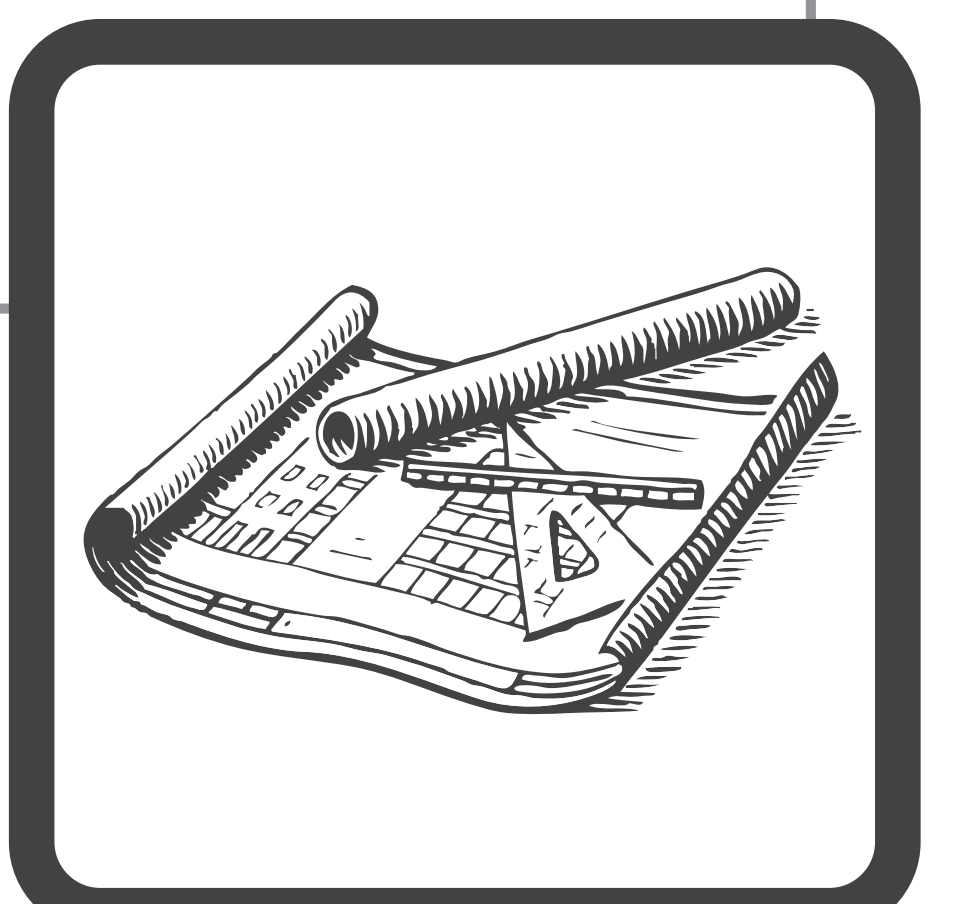
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Blueprint For Success

Table of Contents

■ An Introduction to the Blueprint	4
■ The Steps in a NEED Program	5
■ NEED Curriculum Matrix	6
■ How to Get Started	8
■ Step One: Science of Energy	9
■ Step Two: Sources of Energy	10
■ Step Three: Electricity and Magnetism	12
■ Step Four: Transportation	13
■ Step Five: Efficiency and Conservation	14
■ Step Six: Synthesis and Reinforcement	16
■ Step Seven: Evaluation	18
■ Energy Poll Guide and Answer Keys	19
■ Primary Poll	20
■ Elementary Poll	24
■ Intermediate Poll	29
■ Secondary Poll	35
■ Step Eight: Student Leadership and Outreach	40
■ Youth Awards Program for Energy Achievement	41
■ Rubric for Evaluation	44
■ Sample Project Ideas	45
■ Sample Outline and Information Planner	47
■ Outline and Information Planner	48
■ Required Application Information Planner	49
■ Integrated Energy Unit Planner	50
■ Year End Survey	51





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, creative arts, social studies, and public speaking, as well as enhance their general knowledge of energy. If you are working as an interdisciplinary team, 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 required. 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 Common Core State Standards, individual state science standards, and work well to meet the needs of the Next Generation Science Standards. These correlations can be found at www.NEED.org/curriculumcorrelations.

In many areas, teachers also have the opportunity to attend training workshops and conferences. For more information on teacher and student training programs and professional development, please visit the NEED calendar at www.NEED.org/calendar_list.asp or call NEED headquarters at 1-800-815-5029.

Participating in NEED's Youth Awards Program for Energy Achievement is a wonderful way for students to document and be recognized for their efforts in the classroom. Have students keep a portfolio documenting activities as they progress through the energy unit. More information about projects and the application process can be found on pages 41-49.

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 web site, www.NEED.org. During the school year NEED publishes newsletters. Sign up online to have them delivered to your inbox six times throughout the school year. A book list 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 strongly values teacher feedback year round. Your feedback helps us 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 return these and/or send us feedback at any time by emailing info@NEED.org.

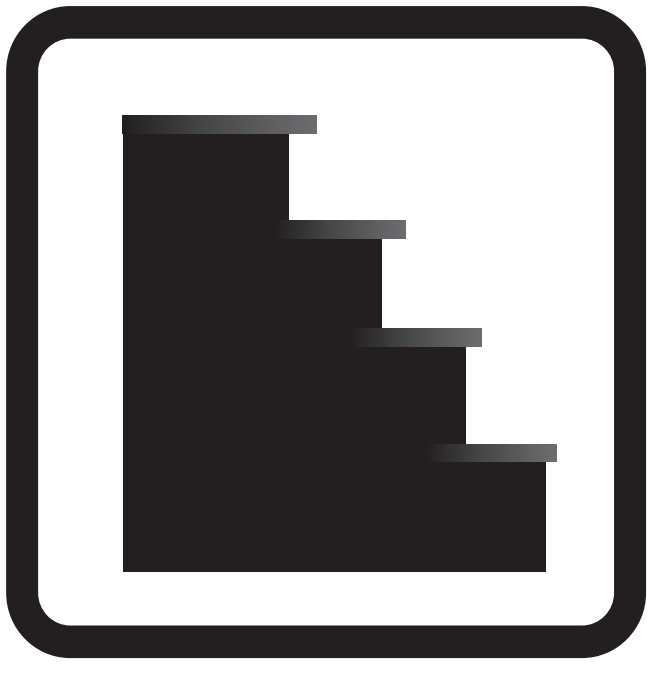


Online Resources:

- *Graphics and Multimedia Library* available at <http://need-media.smugmug.com>
- Online E-publication Guides at www.NEED.org
- The NEED Blog at www.NEED.org

Check out what's new and exciting at NEED:

- *New Web Page*
- *Science of Energy—improved for 2014-2015!*
- *Youth Awards Program*



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 NEED Basic Curriculum 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 guide 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, 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 and electricity, while *Energy Infobooks* provide background information on electricity. NEED's *ElectroWorks* curriculum is available, as well as solar, wind, and 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 and technologies 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. Activities are also available for students to teach others what they have learned.

Step Seven: Evaluation

Most NEED activities include evaluation strategies such as pre and post assessments. NEED's *Question Bank* on the NEED web site 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 19-39 of this guide.

Step Eight: Student Leadership and Outreach

Beginning on page 41, 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, 2015.

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.

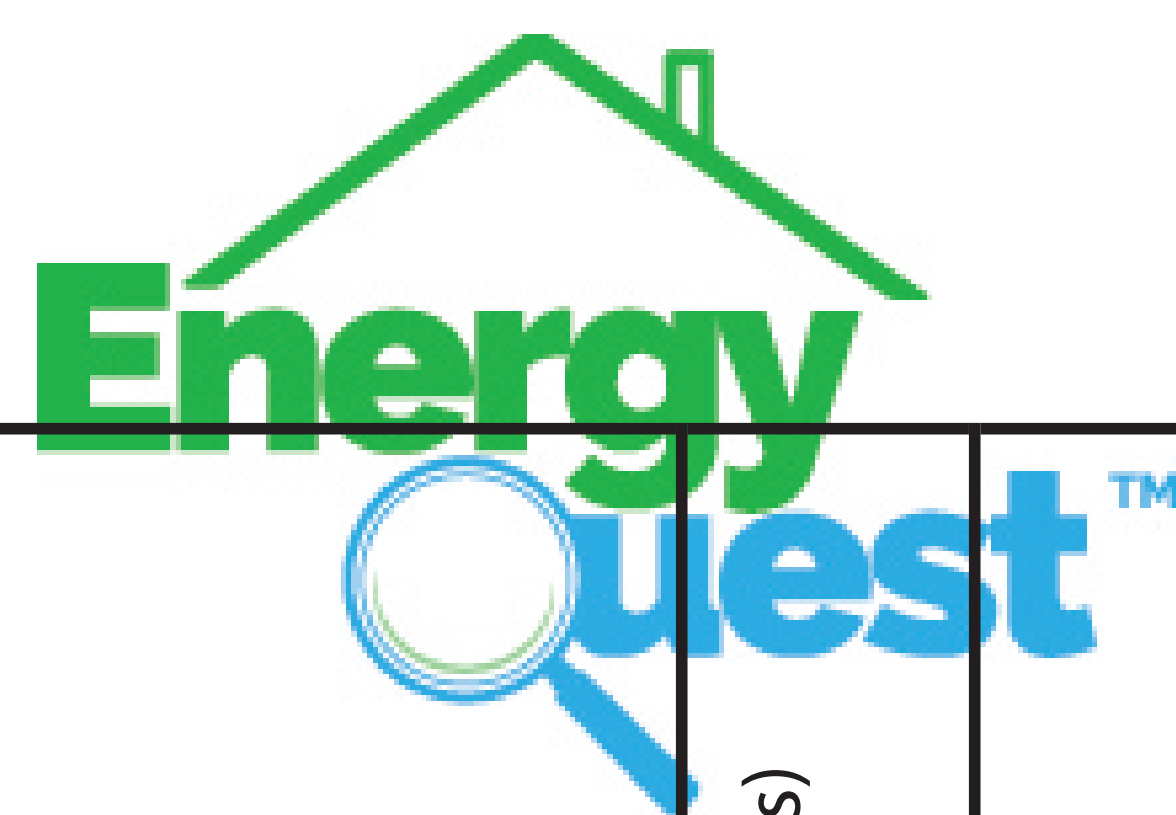
Rather than ordering a NEED Basic Curriculum Unit, teachers may choose to order separate curriculum pieces. The matrix on pages 6-7 is designed to assist teachers in planning an individualized energy unit. All NEED materials are listed by grade level and by where the majority of information in the material 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 energy.

NEED CURRICULUM MATRIX

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

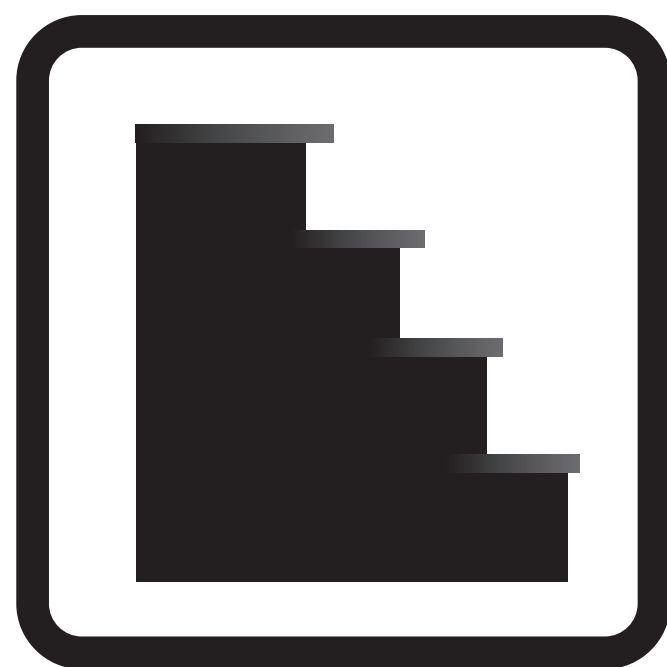


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	PRIMARY (K-2)	ELEMENTARY (3-5)	INTERMEDIATE (6-8)	SECONDARY (9-12)
STEP FIVE: Efficiency and Conservation	All About Trash* Building Buddies Energy Games and Icebreakers Primary Energy Infobook Today in Energy* Using and Saving Energy*	Building Buddies Elementary Energy Infobook Energy Conservation Contract Energy Expos* Energy Games and Icebreakers Energy House* Monitoring and Mentoring Saving Energy at Home and School Talking Trash* Today in Energy*	Building Science Energy Conservation Contract Energy Expos* Energy Games and Icebreakers Energy House* Intermediate Energy Infobook Learning and Conserving Monitoring and Mentoring Museum of Solid Waste and Energy* Plug Loads Saving Energy at Home and School Understanding Climate Change*	Chemistry and Energy Efficiency* Energy Conservation Contract Energy Expos* Energy Games and Icebreakers Exploring Climate Change* Learning and Conserving Museum of Solid Waste and Energy* Plug Loads Saving Energy at Home and School School Energy Survey* Secondary Energy Infobook
STEP SIX: Synthesis and Reinforcement	Energy Fair* Energy Games and Icebreakers NEED Songbook* Primary Energy Carnival* This Mine of Mine*	e-Presentations* Energy Around the World* Energy Carnival* Energy Fair* Energy Games and Icebreakers Energy in the Balance* Energy Jeopardy* Energy Math Challenge Energy on Stage* Energy Rock Performances Global Trading Game Greek Mythology and Energy* Mystery World Tour* NEED Songbook* Primary Energy Carnival* This Mine of Mine* Yesterday in Energy*	e-Presentations* Energy Analysis* Energy Around the World* Energy Carnival* Energy Games and Icebreakers Energy Jeopardy* Energy Math Challenge Energy on Stage* Energy Rock Performances Global Trading Game Greek Mythology and Energy* Mystery World Tour* NEED Songbook* This Mine of Mine* Yesterday in Energy*	Carbon Capture, Utilization and Storage* e-Presentations* Energy Analysis* Energy Around the World* Energy Games and Icebreakers Energy Jeopardy* Energy Math Challenge Energy on Stage* Energy Rock Performances Global Trading Game NEED Songbook*
STEP SEVEN: Evaluation	Energy Polls (Blueprint for Success) Question Bank*	Energy Polls (Blueprint for Success) Question Bank*	Energy Polls (Blueprint for Success) Question Bank*	Energy Polls (Blueprint for Success) Question Bank*
STEP EIGHT: Student Leadership and Outreach	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: All curriculum is available to download in PDF format from www.NEED.org.

* Guides with asterisks (*) are not available in print.



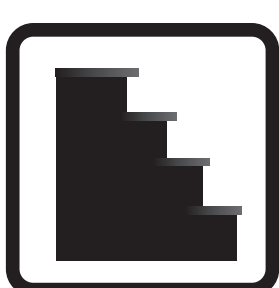
How to Get Started

- The chart below shows the suggested materials needed to implement a NEED Basic Curriculum 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* if you would like a basic curriculum 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 are 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.

NEED BASIC CURRICULUM UNIT TABLE

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

NEED Basic Curriculum 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) -----> ←----- Energy Games and Icebreakers ----->			
STEP ONE: Science of Energy	Primary Science of Energy	Elementary Science of Energy EnergyWorks	Intermediate Science of Energy Energy Infobooks	Secondary Science of Energy
STEP TWO: Sources of Energy	←----- Energy Stories and More	Energy Games and Icebreakers and Energy in the Balance	Energy Infobooks and Activities Great Energy Debate	-----> Energy Enigma
STEP THREE: Electricity and Magnetism	←----- Wonders of Magnets*	Energy Games and Icebreakers and ElectroWorks*	Energy Infobooks and Activities 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 Using and Saving Energy	Energy Games and Icebreakers and Monitoring and Mentoring	Energy Infobooks Monitoring and Mentoring Energy Conservation Contract	-----> Learning and Conserving
STEP SIX: Synthesis and Reinforcement	←----- Primary Energy Carnival*	Energy Games and Energy Carnival*	Icebreakers Energy Carnival* Energy Jeopardy* Global Trading Game	----->
STEP SEVEN: Evaluation	←----- Question Bank* -----> ←----- Energy Polls (Blueprint for Success) ----->			
STEP EIGHT: Student Leadership and Outreach	←----- Youth Awards Program (Blueprint for Success) ----->			



NEED Curriculum

Whether ordering a NEED Basic Curriculum 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. A sample planning guide for your energy unit is included on page 50.

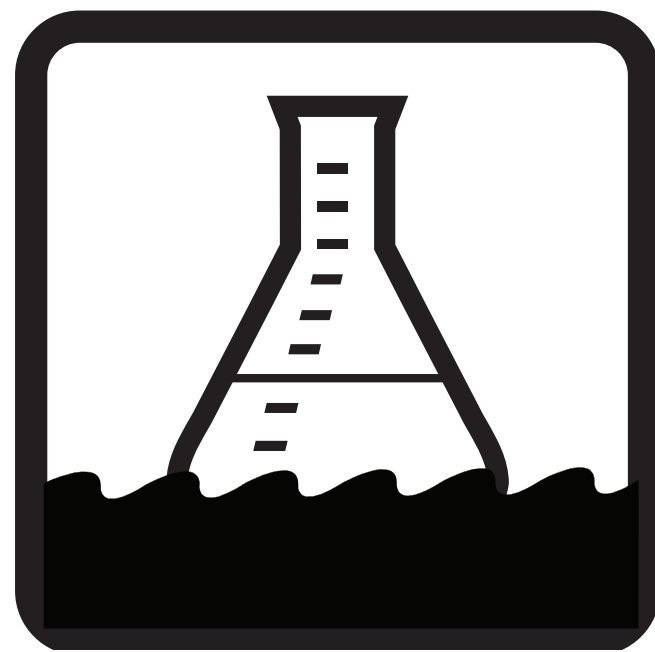
In addition to printed materials, NEED also offers many different hands-on kits. For more information on available kits please refer to the *Resource Catalog*, or visit www.NEED.org. All NEED curriculum guides are available online at www.NEED.org.

E-Publications

The NEED Project offers e-publication versions of various guides for in-classroom use. Guides that are currently available as an e-publication will have a link next to the relevant guide title on NEED's curriculum resources page, www.NEED.org/curriculum.

Don't see what you're looking for?

Check back often, as new e-pubs will be added throughout the year.



Step One: Science of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

Energy Flows

online only

Time: 45 minutes

Grade Level: 5–12

Subjects: S, LA

Energy Flows introduces students to the forms of energy and energy transformations. *Energy Flows* can be used as a stand-alone activity or as a companion activity to the *Science of Energy Kits*.

Energy Infobooks

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Energy Infobooks provide information on energy, the sources of energy, electricity, consumption, and environmental effects. Many activities are based on the information in these booklets. Class sets of *Infobooks* are available at elementary, intermediate, and secondary levels. Individual infosheets can be found online.

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

EnergyWorks

kit available

Time: 12–18 hours

Grade Level: 4–8

Subjects: S, M, LA, T

EnergyWorks introduces elementary students to the basic scientific concepts of energy and the tasks it performs—heat, light, motion, growth, 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 as well as worksheets for each exploration.

Primary Science of Energy

kit available

Time: 12–18 hours

Grade Level: 1–3

Subjects: S, M, LA

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 demonstrations and student explorations.

Science of Energy

kit available

Time: 4–8 hours

Grade Level: 4–12

Subjects: S, M, LA, PS

The *Science of Energy* guides provide 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 radiant to electricity, radiant to thermal, motion to sound, motion to thermal, etc.

- *Elementary Science of Energy* (3–5)
- *Intermediate Science of Energy* (6–8)
- *Secondary Science of Energy* (9–12)

Thermodynamics

online only

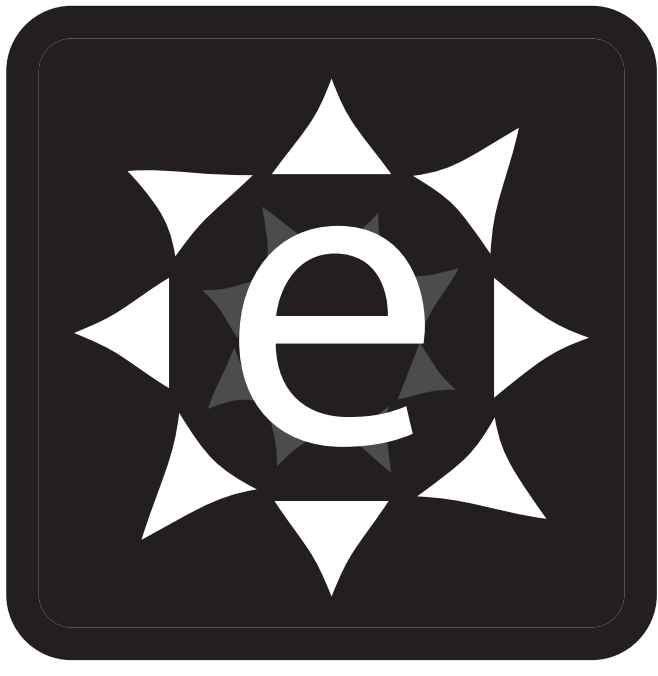
Time: 6 hours

Grade Level: 9–12

Subjects: S, M, LA, T

Thermodynamics is a hands-on guide of 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, a list of laboratory materials needed, and a Unit Exam. Student worksheets and background information are contained within the Student Guide.

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, CA–Creative Arts, PS–Public Speaking

Energy Enigma

Time: 2–2.5 hours

Grade Level: 7–12

Subjects: S, SS, LA

Students work in groups using critical thinking skills to unlock the energy source mystery. Students play against other teams using clues of increasing difficulty to disguise their own source while trying to guess others. An HTML version of the clues is available for play at www.NEED.org.

Energy Expos

online only

Time: 4.5–10 hours

Grade Level: 4–12

Subjects: S, SS, LA, T, PS

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

Energy Games and Icebreakers

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, CA, PS

This guide offers entertaining activities that reinforce many energy concepts, including *Energy Chants*, *Energy Wasters*, *Energy BINGO*, *Energy Match Game*, and more.

Energy in the Balance

online only

Time: 2–5 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 Infobooks

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Energy Infobooks provide information on energy, the sources of energy, electricity, consumption, and environmental effects.

See page 9 for a full list of *Infobooks* and descriptions.

Energy Infobook Activities

online only

Time: Varies

Grade Level: K–12

Subjects: S, SS, LA

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.

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

Energy on Public Lands

online only

Time: 5 hours

Grade Level: 6–8

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.

Energy Stories and More

Time: Varies

Grade Level: K–5

Subjects: S, SS, M, LA, CA

Energy Stories and More 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.

Exploring Ocean Energy

online only

Time: Varies

Grade Level: 5–8

Subjects: S, SS, LA, T

Students learn and teach others about sources of energy found in and under the ocean with background information and hands-on activities including a community hearing on the development of energy in coastal areas.

Fossil Fuels to Products

online only

Time: Varies

Grade Level: 7–12

Subjects: S, SS, M, T

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, LA, PS

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.



Step Two: Sources of Energy

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

H₂ Educate

kit available

Time: 5–10 hours

Grade Level: 6–12

Subjects: S, SS, M, LA, PS, T

H₂ Educate introduces students to hydrogen as an important energy carrier. It includes a nonfiction text and hands-on experiments, with a detailed Teacher Guide and Student Guide.

Hydropower

kits available

Time: Varies

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 and hands-on investigations.

- *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: 5–8 hours

Grade Level: 5–12

Subjects: S, SS, LA, 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.

Nuclear Energy

online only

Time: Varies

Grade Level: 6–12

Subjects: S, SS, LA, T

Each guide presents background information on energy, the history of nuclear energy, how uranium is used to generate electricity, and includes hands-on activities and scenarios.

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

Oil and Gas

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Students are introduced to the concepts of energy, oil and natural gas formation, composition, exploration, production, processing, and use.

- *Oil, Gas, and Their Energy* (K–2)
- *Wonders of Oil and Gas* (3–5)
- *Exploring Oil and Gas* (6–12)

Schools Going Solar

online only

Time: Varies

Grade Level: 6–12

Subjects: S, SS, M, LA, T

These lessons and activities support and incorporate installed photovoltaic systems into the classroom learning environment.

Solar Energy

kits available

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Written at four levels, primary, elementary, intermediate, and secondary, students learn about solar energy transformations including solar energy to thermal energy and solar energy to electricity. All levels include multiple hands-on investigations 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: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Written at four levels, primary, elementary, intermediate, and secondary, students learn about wind formation, the history of wind use, and how wind is used to generate electricity. All levels include multiple hands-on investigations and activities.

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

Wind for Schools

online only

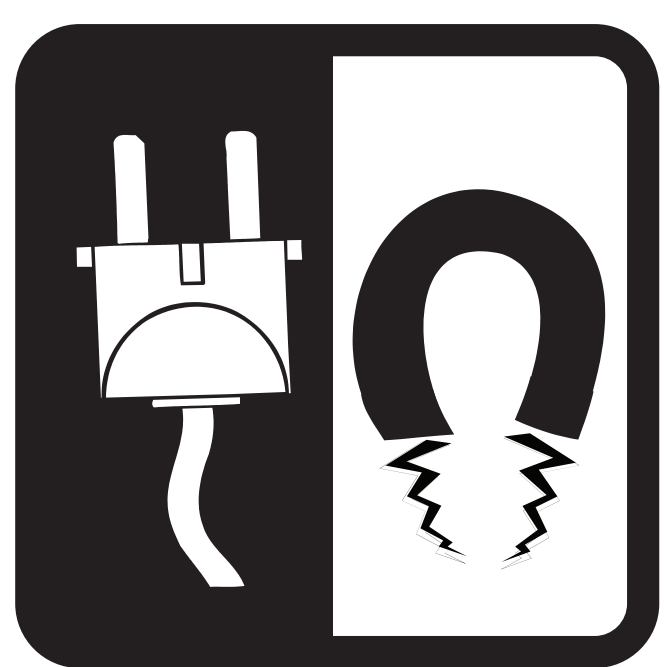
Time: Varies

Grade Level: 6–12

Subjects: S, SS, M, LA, T

These lessons and activities support and incorporate small wind systems and wind data into the classroom.

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 Three: Electricity and Magnetism

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

Current Energy Affair

online only

Time: 2.5–3.5 hours

Grade Level: 6–12

Subjects: S, SS, LA, T, CA

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

ElectroWorks

online only

Time: Varies based on grade level

Grade Level: 4–7

Subjects: S, M, LA, T

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 instructional masters. The Student Guide contains a nonfiction text and key vocabulary worksheets as well as worksheets for each exploration and a Unit Review.

Energy Games and Icebreakers

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, CA, PS

This guide offers entertaining activities that reinforce many energy concepts, including electricity. In *Electric Connections*, for example, students work individually and collectively to assemble a “top ten” list of electricity producing sources.

Energy Infobooks

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Energy Infobooks provide information on energy, the sources of energy, electricity, consumption, and environmental effects.

See page 9 for a full list of Infobooks and descriptions.

Energy Infobook Activities

Time: Varies

Grade Level: K–12

Subjects: S, SS, LA

Energy Infobook Activities contain worksheets and puzzles that accompany and reinforce concepts covered in the *Energy Infobooks*.

See page 10 for a full list of titles, descriptions, and availability.

Energy Stories and More

Time: Varies

Grade Level: K–5

Subjects: S, SS, M, LA, CA

Energy Stories and More 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.

Mission Possible

online only

Time: 3–6 hours

Grade Level: 9–12

Subjects: S, SS, M, LA, T

This cooperative learning activity engages secondary students in a challenge evaluating the advantages and disadvantages of the energy sources as they develop a plan to increase electricity generation for a fictitious country.

Smart Meters

online only

Time: Varies

Grade Level: 6–8

Subjects: S, SS, M, LA, T

Smart Meters allows students to explore smart meter technology, ways to save energy at home, investigate electricity consumption of electrical devices, and determine ways to reduce energy consumption at home.

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.

Wonders of Magnets

online only

Time: 3–6 hours

Grade Level: 1–4

Subjects: S, SS, M, LA

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



Step Four: Transportation

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

Energy and Our Rivers

online only

Time: 5–8 hours

Grade Level: 6–12

Subjects: S, SS, M, LA, T

This 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.

Energy Expos

online only

Time: 2–4 hours

Grade Level: 4–12

Subjects: S, SS, LA, T, PS

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

Energy Stories and More

Time: Varies

Grade Level: K–5

Subjects: S, SS, M, LA, CA

Energy Stories and More 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.

H₂ Educate

kit available

Time: 5–10 hours

Grade Level: 6–12

Subjects: S, SS, M, LA, PS, T

The *H₂ Educate* curriculum introduces students to hydrogen as an important energy carrier. It includes nonfiction text and hands-on experiments, with a detailed Teacher Guide and Student Guide.

Hybrid Buses

online only

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

These guides teach students about hybrid electric buses and encourage them to evaluate the economic and environmental advantages and disadvantages of such vehicles.

- *Hybrid Buses* (K–5)
- *Exploring Hybrid Buses* (6–12)

Transportation Fuels Debate

online only

Time: 2 hours

Grade Level: 5–12

Subjects: S, SS, LA, PS

Students evaluate the advantages and disadvantages of fuels used in personal and fleet vehicles. Teacher instructions and graphic masters are included. An HTML version of the clues is available for play at www.NEED.org.

Transportation Fuels Enigma

online only

Time: 2–5 hours

Grade Level: 7–12

Subjects: S, SS, LA

In *Transportation Fuels Enigma*, students work cooperatively to 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.

Transportation Fuels Infobooks

online only

Time: 2–4 hours

Grade Level: 3–12

Subjects: S, SS, LA, T

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

- *Elementary Transportation Fuels Infobook* (3–6)
- *Transportation Fuels Infobook* (6–12)

Transportation Fuels Rock Performances

online only

Time: 2–5 hours

Grade Level: 4–12

Subjects: S, SS, LA, PS, CA

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, CA–Creative Arts, PS–Public Speaking

Building Science

kit available

Time: Varies
Grade Level: 6–8
Subjects: S, SS, LA, T

Building Science teaches students the science behind keeping building occupants healthy and comfortable and the buildings energy efficient, through hands-on, kit-based activities.

Chemistry and Energy Efficiency

online only

Time: Varies
Grade Level: 9–12
Subjects: S, SS, LA, T

In this curriculum, teachers and students take an in-depth look at chemistry in daily life, the use of energy by the chemistry industry, life cycles of products and activities, careers in the chemistry industry, and the impact the chemistry industry has on carbon dioxide production and climate change.

Climate Change

online only

Time: Varies
Grade Level: 6–12
Subjects: S, SS, M, LA, T

With guides for intermediate and secondary students, the climate change curriculum addresses current concerns about climate change. Students will develop an understanding of 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 through these critical thinking activities.

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

Energy Conservation Contract

In Curriculum Packet

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

Each student surveys his/her family’s energy behaviors and after one month, students survey their families once again and tabulate their energy savings. These activities can be extended to neighbors and friends.

Energy Expos

online only

Time: 4.5–10 hours
Grade Level: 4–12
Subjects: S, SS, LA, T, PS

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

Energy Games and Icebreakers

In Curriculum Packet

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

This guide offers entertaining activities that reinforce many energy concepts, including *Energy Chants*, *Energy Wasters*, *Energy BINGO*, *Energy Match Game*, and more.

Energy House

online only

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

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

Blueprint for School Energy Teams

online only

Time: Ongoing
Audience: District and School Leaders
Subjects: S, SS, 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, School, and Community Leaders
Subjects: S, SS, 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 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, CA–Creative Arts, PS–Public Speaking

Energy Infobooks

In Curriculum Packet

Time: Varies

Grade Level: K–12

Subjects: S, SS, M, LA, T

Energy Infobooks provide information on energy, the sources of energy, electricity, consumption, and environmental effects.

See page 9 for a full list of *Infobooks* and descriptions.

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, activities, and worksheets are available at all levels.

- *Using and Saving Energy* (K–1, guide only, online only)
- *Building Buddies* (2–3)
- *Monitoring and Mentoring* (4–8)
- *Learning and Conserving* (7–12)

Plug Loads

Time: 2–5 hours

Grade Level: 6–12

Subjects: S, SS, M, LA, T

Designed to complement *Monitoring and Mentoring* and *Learning and Conserving*, *Plug Loads* guides students through a more in-depth investigation of electricity consumption 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.

Saving Energy at Home and School

kit available

Time: 4.5 hours, ongoing

Grade Level: 3–12

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 consumption (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, SS, M, LA, 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, Energy, and Recycling

online only

Time: 3–6 hours

Grade Level: K–12

Subjects: S, SS, LA, T

Students learn the basics of 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)
- *Talking Trash* (3–5)
- *Museum of Solid Waste and Energy* (6–12)

Today in Energy

online only

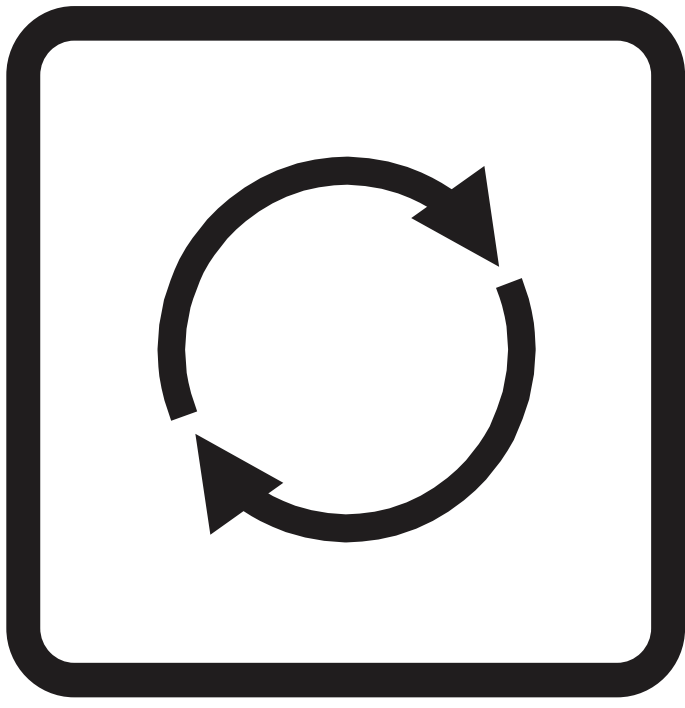
Time: 1–2 hours

Grade Level: K–4

Subjects: S, SS, M, LA

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

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 Six: Synthesis and Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

Carbon Capture, Utilization and Storage online only

Time: 5–10 hours **Grade Level:** 9–12
Subjects: S, SS, LA, T

Carbon Capture, Utilization 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. Through 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.

e-Presentations: Kids Teaching Kids online only

Time: Varies **Grade Level:** 5–12
Subjects: S, SS, LA

Students are introduced to the ten major sources of energy used in the United States, as well as energy consumption and electricity production. Students teach others by creating interactive and informative digital presentations.

Energy Analysis online only

Time: 2–4 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, PS

Students explore energy use in countries around the world, and prepare presentations for the class, comparing their assigned country to U.S. energy use and energy use around the globe.

Energy Carnivals online only

Time: 2–4 hours **Grade Level:** K–8
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 that reinforce information about the energy sources, renewable and nonrenewable energy, and the things energy does for us. The *Primary Energy Carnival* contains nine games appropriate for students in grades K-3.

- *Primary Energy Carnival* (K–3)
- *Energy Carnival* (4–8)

Energy Fair online only

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

This module is a guide to teaching students experimental design with an emphasis on developing energy-related science fair projects. Sample science projects are also available on the NEED web site.

Energy Games and Icebreakers

In Curriculum Packet

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

This guide offers entertaining activities that reinforce many energy concepts, including *Energy Chants*, *Energy Wasters*, *Energy BINGO*, *Energy Match Game*, and more.

Energy in the Balance online only

Time: 2–5 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 Jeopardy online only

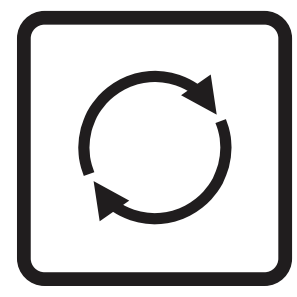
Time: 1–1.5 hours **Grade Level:** 4–12
Subjects: S, SS

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

Energy Math Challenge

Time: 1–2 hours, depending on grade level **Grade Level:** 3–12
Subjects: S, M

Students work as individuals or in teams to solve energy math problems, while strengthening critical thinking skills and energy knowledge.



Step Six: Synthesis and Reinforcement

Subjects: S–Science, SS–Social Studies, M–Math, LA–Language Arts, T–Technology, CA–Creative Arts, PS–Public Speaking

Energy on Stage

online only

Time: 1–5 hours

Grade Level: 4–12

Subjects: S, SS, LA, CA

This resource contains plays and poems on energy sources and energy conservation, with individual teacher guides that include expanded vocabulary and extension activities.

Energy Rock Performances

In Curriculum Packet

Time: 2–4 hours

Grade Level: 4–12

Subjects: S, SS, LA, PA

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

Global Trading Game

In Curriculum Packet

Time: 2 hours and prep

Grade Level: 5–12

Subjects: S, SS, M, LA

In this hands-on activity, students assume the roles of geologists, miners, international traders, and economic advisors as they learn about global energy issues and supply and demand.

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: 1.5–4 hours

Grade Level: 4–8

Subjects: S, SS, LA

In this activity, students identify the energy challenges of different countries around the world and compare them to the United States. Students create a proposal and a presentation to share with the class who will tour and try to identify the nations.

NEED Songbook

online only

Time: Varies

Grade Level: K–12

Subjects: S, CA

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? These songs reinforce energy concepts in a creative way.

This Mine of Mine

online only

Time: 1–3 hours

Grade Level: 2–6

Subjects: S, SS, T

Students learn about surface mining and reclamation by building a plot of land with resources, recovering the resources, then reclaiming the land. Activities also reinforce the geology and formation of coal.

Yesterday in Energy

online only

Time: 4–6 hours

Grade Level: 4–8

Subjects: S, SS, LA, PS

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 within this guide, beginning on page 19. We also encourage you to return them to NEED to share how your students have grown in their energy knowledge.

Many NEED activities also contain unit exams, rubrics, and suggestions for how to evaluate student performance. Please feel free to modify these suggestions as necessary.

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 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 in 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 *Year End Survey* online, as well as the individual evaluation forms at the back of each guide, and send them to us at info@NEED.org, or fax them to 1-800-847-1820.

Additional Resources

NEED's Smug Mug Gallery

<http://need-media.smugmug.com/>

You can find pictures of NEED students learning and teaching about energy. You can also find pictures from NEED workshops, and photos of energy from around the country that were submitted for the Great American Energy Scavenger Hunt. NEED's SmugMug Gallery hosts more than just photos!

Would you like to submit images or videos to NEED's gallery? Email info@NEED.org for more information.

Use SmugMug for the following resources:

Videos

Need a refresher on how to use *Science of Energy* with your students? Watch the *Science of Energy* videos.

Find videos produced by NEED students teaching their peers and community members about energy.

Online Graphics Library

Would you like to use NEED's graphics in your own classroom presentations, or allow students to use them in their presentations? Download graphics for easy use in your classroom.

NEED Energy Booklist

Looking for cross-curricular connections, or extra background reading for your students? NEED'S booklist provides an extensive list of fiction and nonfiction titles for all grade levels to support energy units in the science, social studies, or language arts setting. Check it out at www.NEED.org/booklist.asp.

E-Publications

The NEED Project now offers e-publication versions of various guides for in-classroom use. Go to www.NEED.org.

Social Media

Stay up-to-date with NEED. "Like" us on Facebook! Search for The NEED Project.

Follow us on Twitter. We share the latest energy news from around the country, @NEED_Project.

Read the latest from the NEED family in our blog! Visit it at www.NEED.org.



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.

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 project the poll and have 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 is completed.

Procedure

Direct 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 class. 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. A | 8. A |
| 2. A | 9. C |
| 3. A | 10. C |
| 4. C | 11. B |
| 5. C | 12. C |
| 6. B | 13. A |
| 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. A | 16. D |
| 7. C | 17. C |
| 8. D | 18. C |
| 9. B | 19. D |
| 10. A | 20. A |

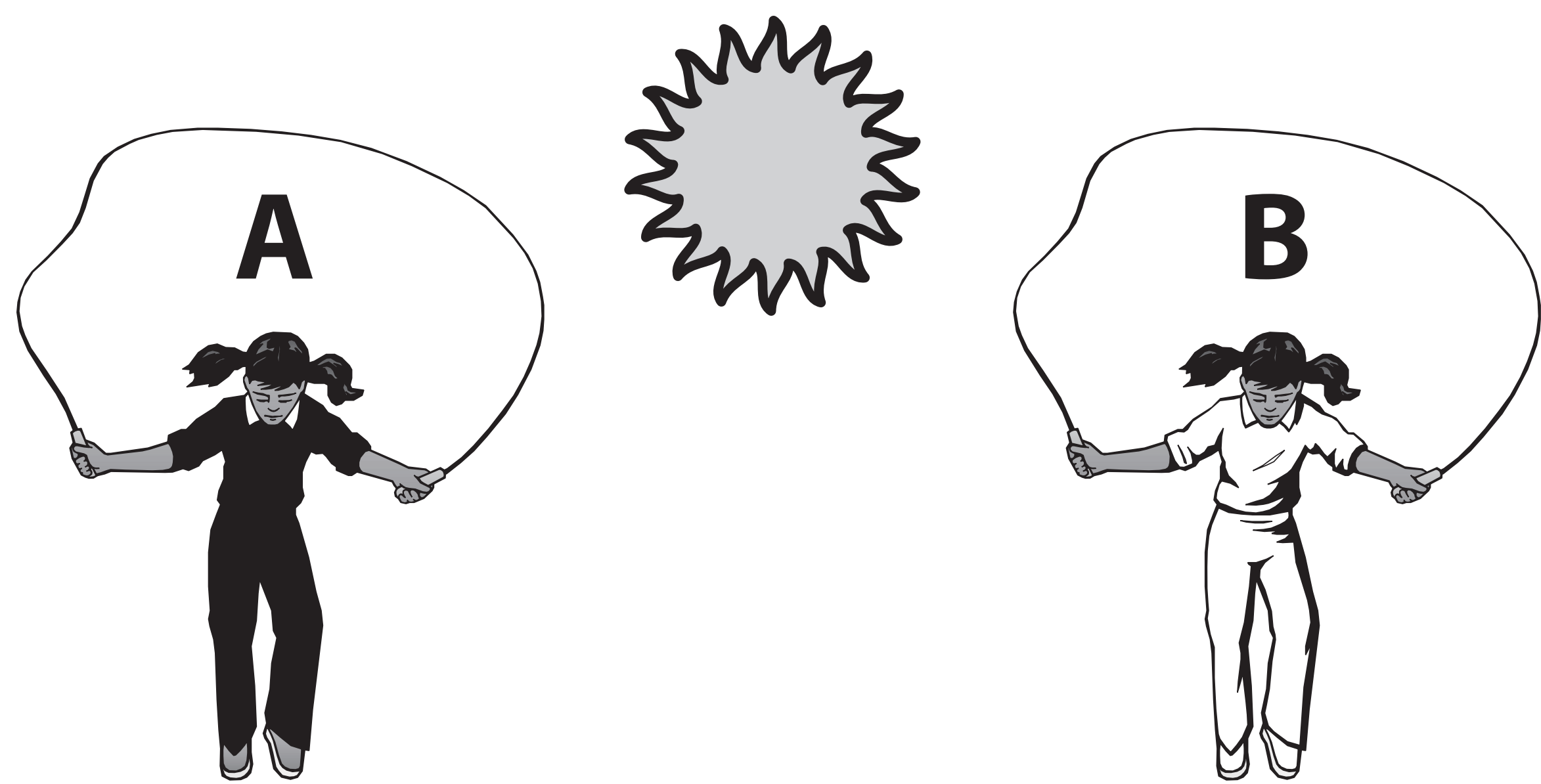
SECONDARY Answer Key

- | | |
|-------|-------|
| 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

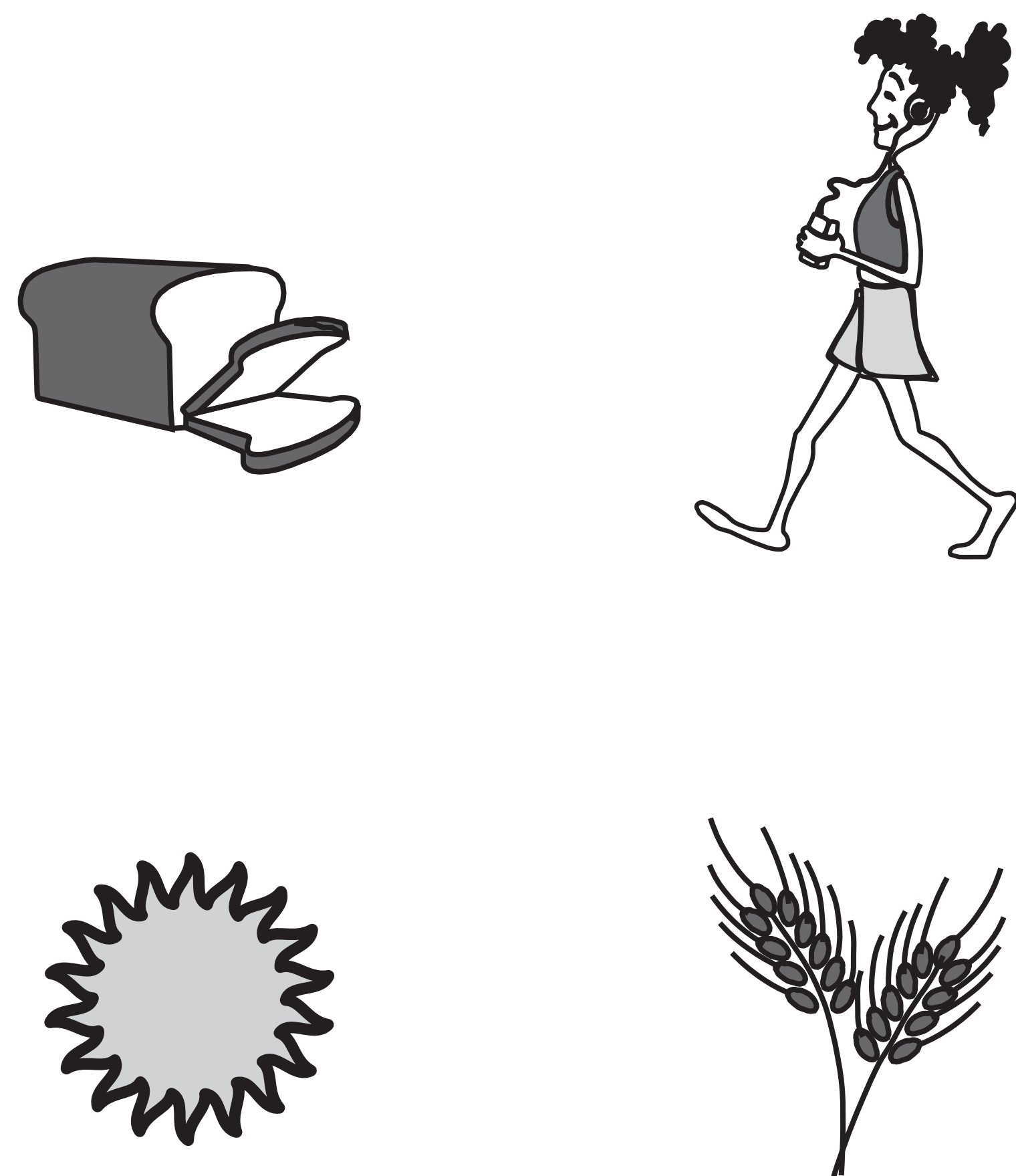
Science of Energy

1. Which child would feel hotter?



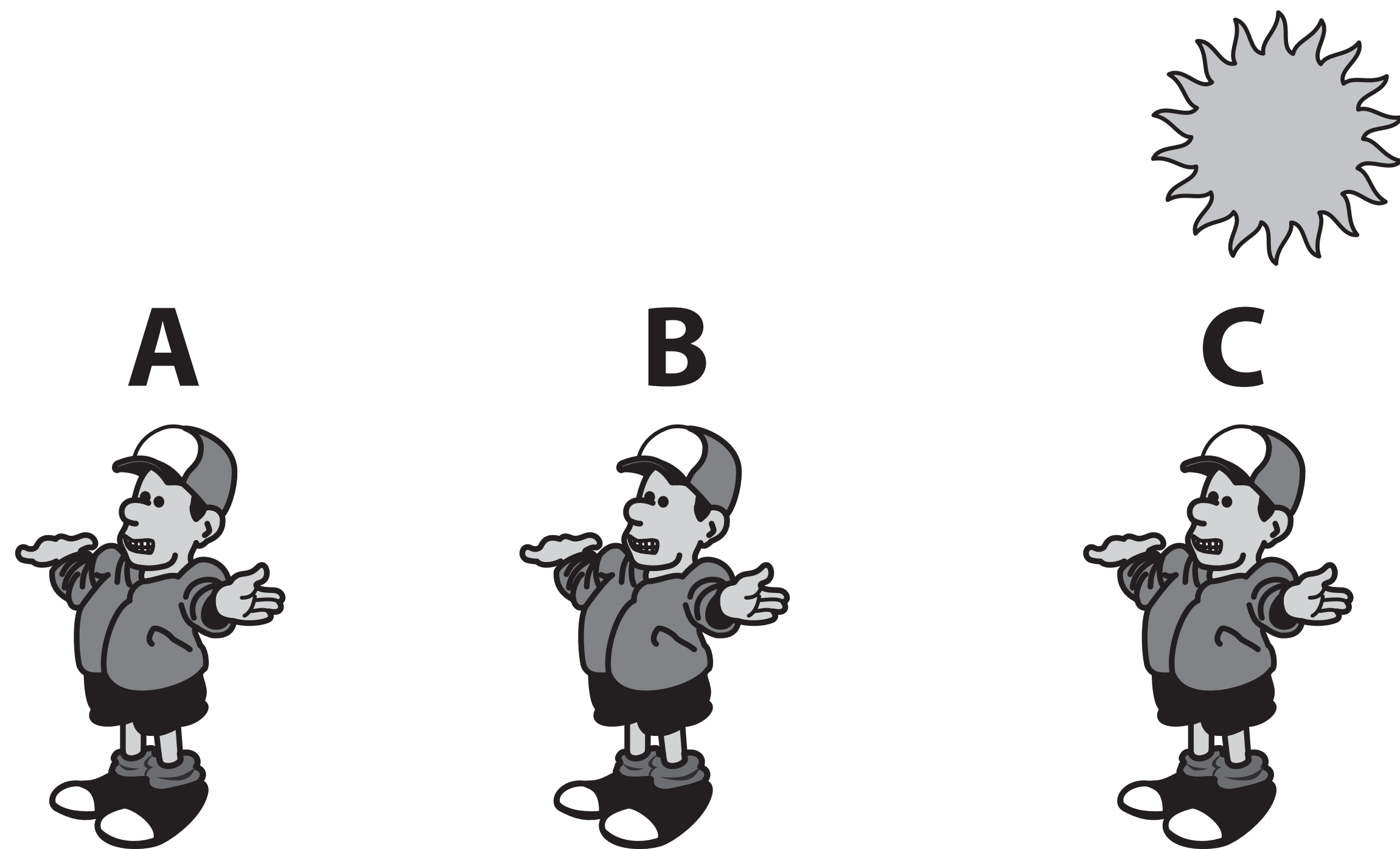
- a A
- b B

2. What order shows the flow of energy through the food chain?



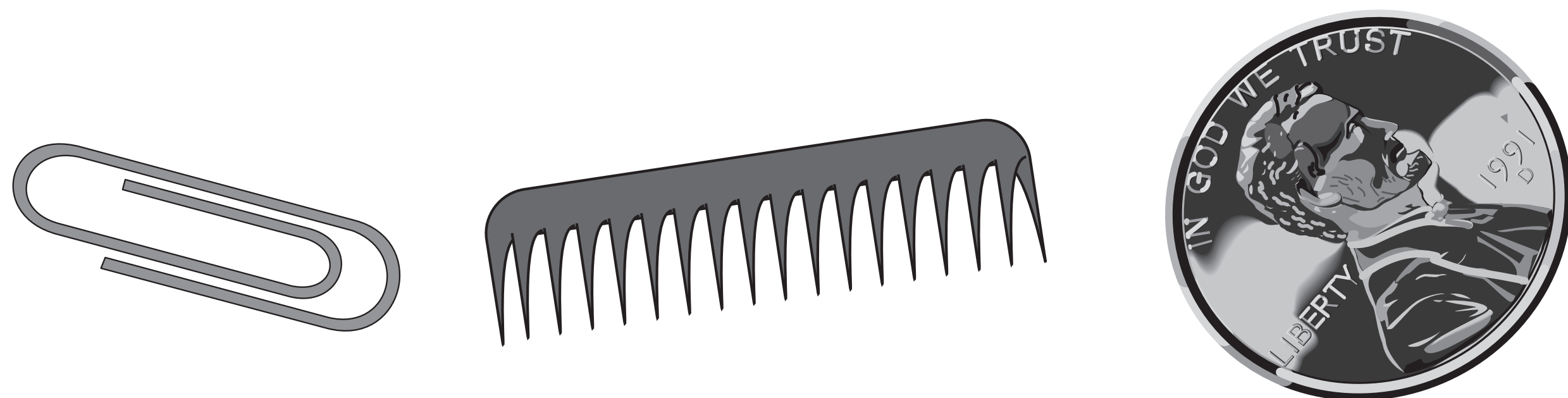
- a Sun, Wheat, Bread, Girl
- b Sun, Bread, Wheat, Girl
- c Bread, Wheat, Sun, Girl

3. Which boy who would have the longest shadow?



- a A
- b B
- c C

4. Which object would a magnet attract?



- a The Penny
- b The Comb
- c The Paper clip

Primary Poll

Sources of Energy

5. Which energy source is renewable?

- a Coal
- b Propane
- c Solar

6. Which energy source 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 Biomass
- b Hydropower
- c Geothermal

10. Which energy source makes the most electricity?

- a Propane
- b Petroleum
- c Coal

Electricity

11. What is electricity?

- a Moving Atoms
- b Moving Electrons
- c Moving Wires

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

Primary Poll

Saving Energy

13. Which is a way to save electricity?

- a Use a fan instead of air-conditioning to cool your house
- b Open the windows when you turn on the air-conditioning
- c Leave the lights on when you leave the room for just a few minutes

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

- a Ride the school bus
- b Walk to school
- c Have an adult drive you to school

Opinion

Tell us if you agree with these statements.

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

- a No, I don't agree.
- b I agree some.
- c Yes, I agree.

2. Learning about energy is fun.

- a No, I don't agree.
- b I agree some.
- c Yes, I agree.

3. I know a lot about energy.

- a No, I don't agree.
- b I agree some.
- c Yes, I agree.

4. I like to do activities about energy.

- a No, I don't agree.
- b I agree some.
- c Yes, I agree.

Primary Poll

Leadership

How much do you like doing these school activities?

1. Work in a group.

- a I don't like to.
- b I like to some.
- c I like to a lot.

2. Follow directions.

- a I don't like to.
- b I like to some.
- c I like to a lot.

3. Help others in my group.

- a I don't like to.
- b I like to some.
- c I like to a lot.

4. Listen to my teacher.

- a I don't like to.
- b I like to some.
- c I like to a lot.

5. Help with classroom activities.

- a I don't like to.
- b I like to some.
- c 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 heat source. What kind of heat transfer is taking place?

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

Elementary Poll

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 replaced by nature.
- c They do not produce pollution.
- d They can be replaced by nature in a short time.

8. In the United States, which energy source produces the most 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

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

Elementary Poll

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?

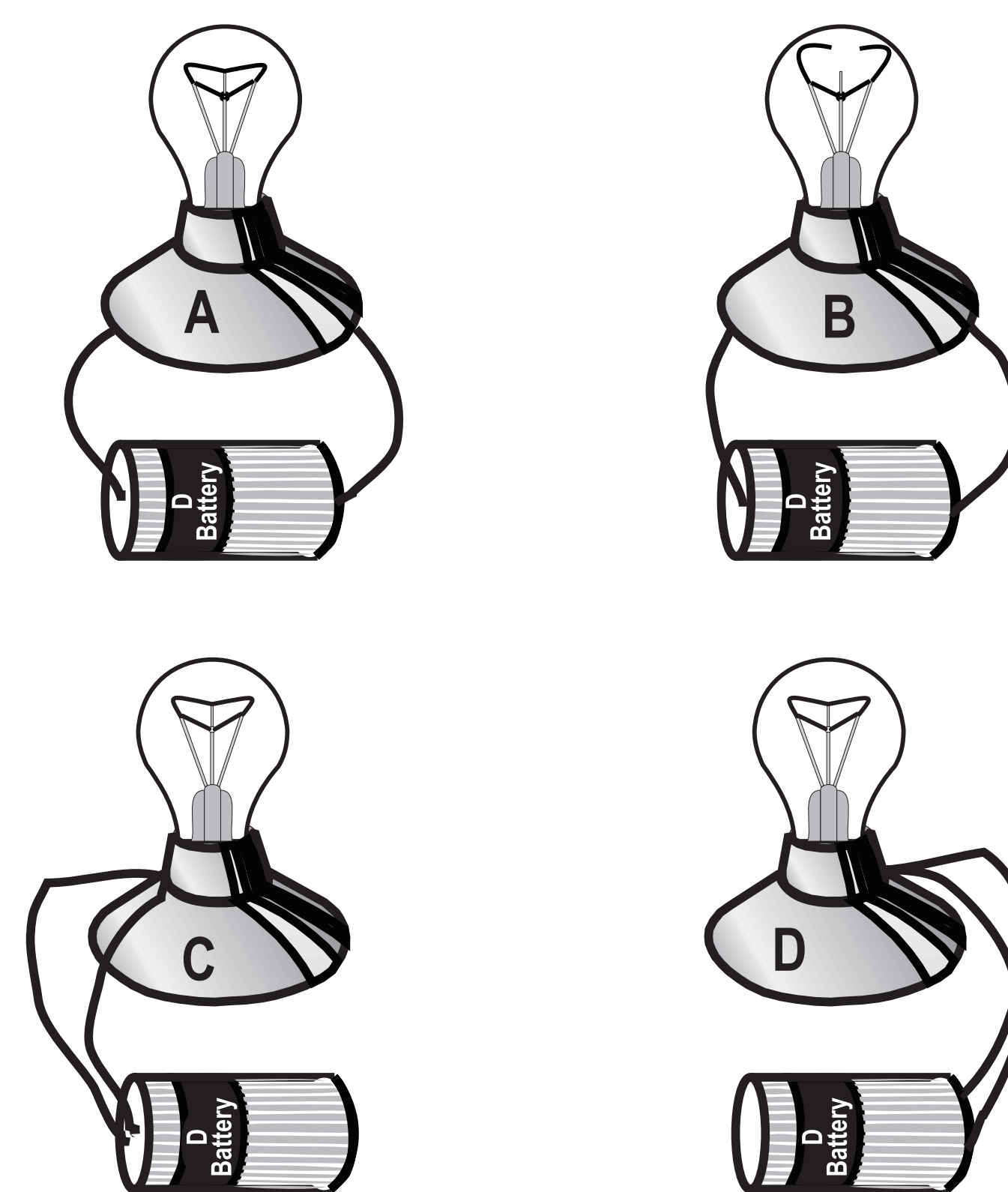
- a Ampere
- b Volt
- c Kilowatt-hour
- d Watt

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



Elementary Poll

Efficiency /Conservation

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

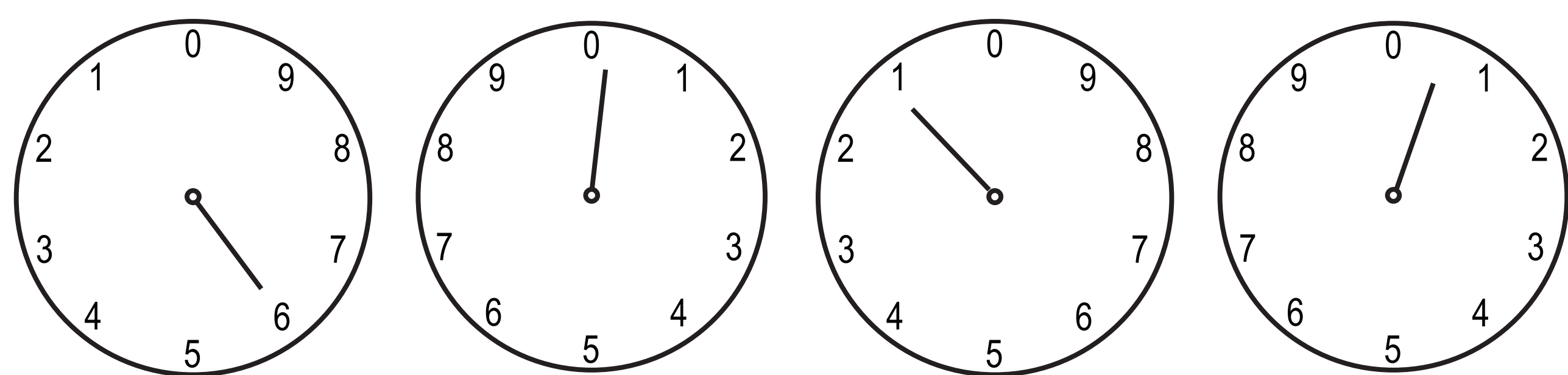
- a Lighting
- b Keeping food cold
- c Washing and drying clothes
- d Heating and cooling rooms

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 pictured below?

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



Opinion

Fill in 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	

Elementary Poll

Leadership

Below are some activities you may do at school. Fill in 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 All of the Above

- 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 Motion
 - b Sound
 - c Thermal
 - d All of the Above

- 4. All natural energy transformations can be traced back to which form of energy?**
 - a Motion
 - b Chemical
 - c Nuclear
 - d All of the Above

- 5. Electrical energy can be produced from which form(s) of energy?**
 - a Motion
 - b Chemical
 - c Radiant
 - d All of the Above

- 6. Molecules are farthest apart in which state of matter?**
 - a Gas
 - b Solid
 - c Liquid
 - d Fluid

Intermediate Poll

Sources of Energy

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

- a Natural Gas
- b Petroleum
- c Uranium
- d Coal

8. In the United States, what source of energy do we use the most 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 radiant energy from the sun?

- 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 (neutral), how many electrons are in its energy levels?

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

14. A transformer adjusts which measure of electricity?

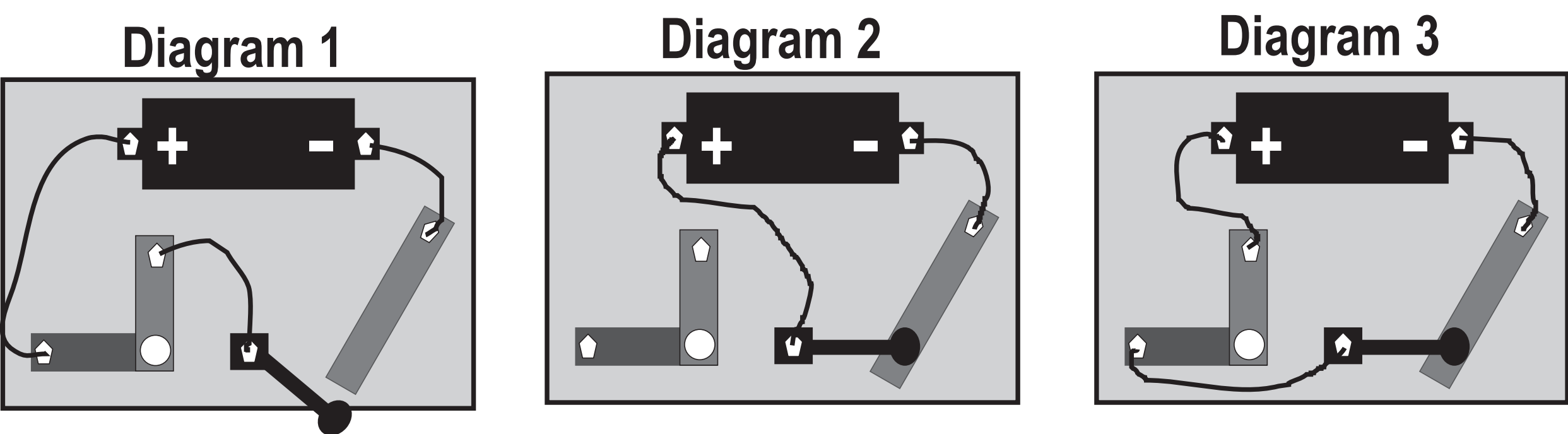
- a Wattage
- b Amperage
- c Voltage
- d Circuitry

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

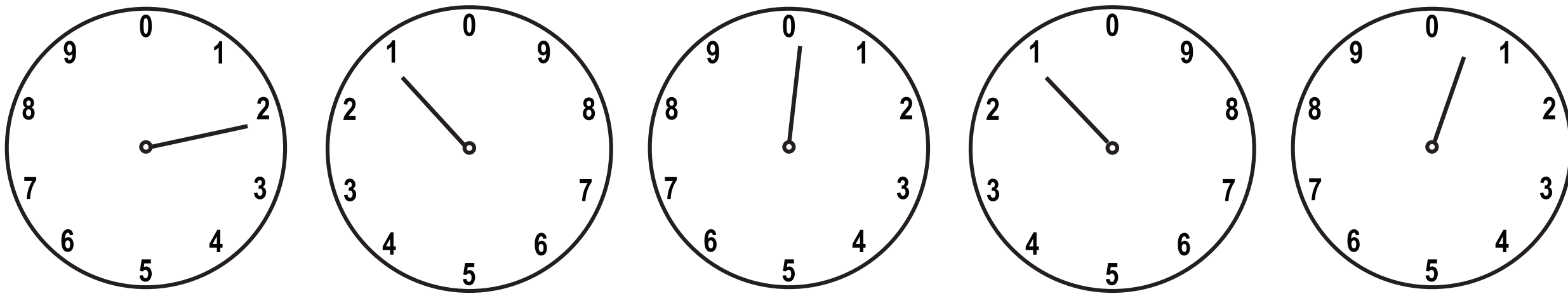
17. An incandescent bulb converts 10% of the energy it uses into light and 90% into which form of energy?

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

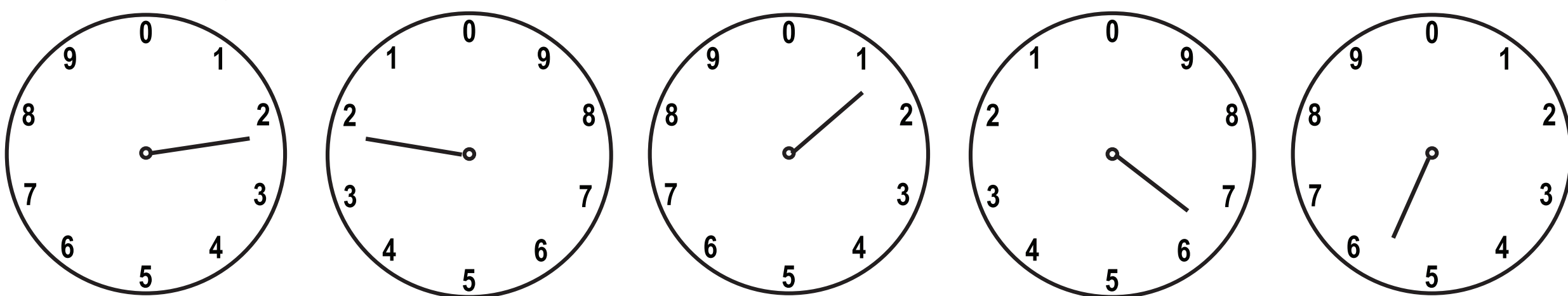
18. Looking at the meters below, how much energy was used in January?

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

On January 1, the electric meter looked like this:



On January 31, the electric meter looked like this:



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

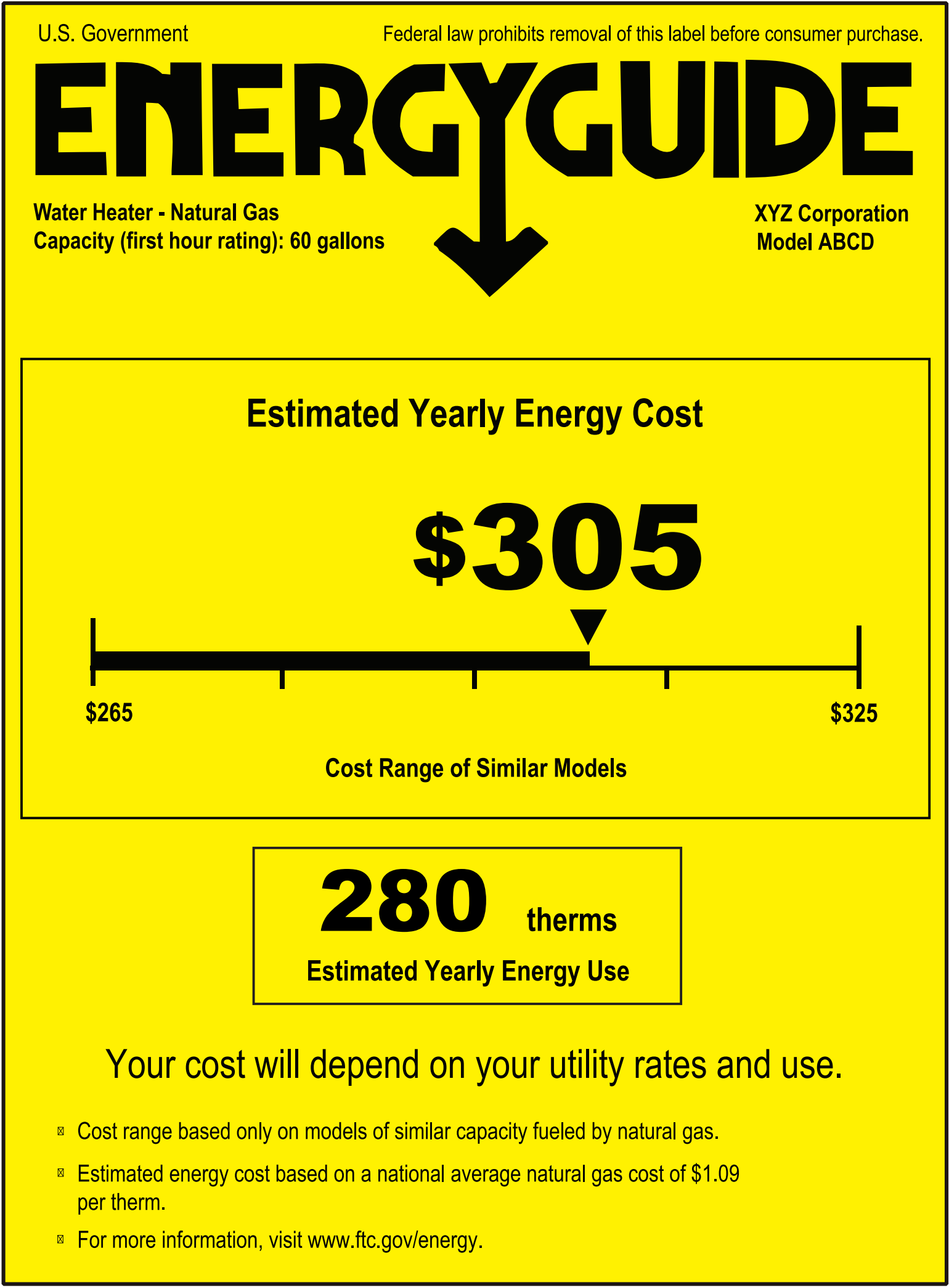
- a Operating appliances
- b Heating water
- c Refrigerating food
- d Heating and cooling rooms

Intermediate Poll

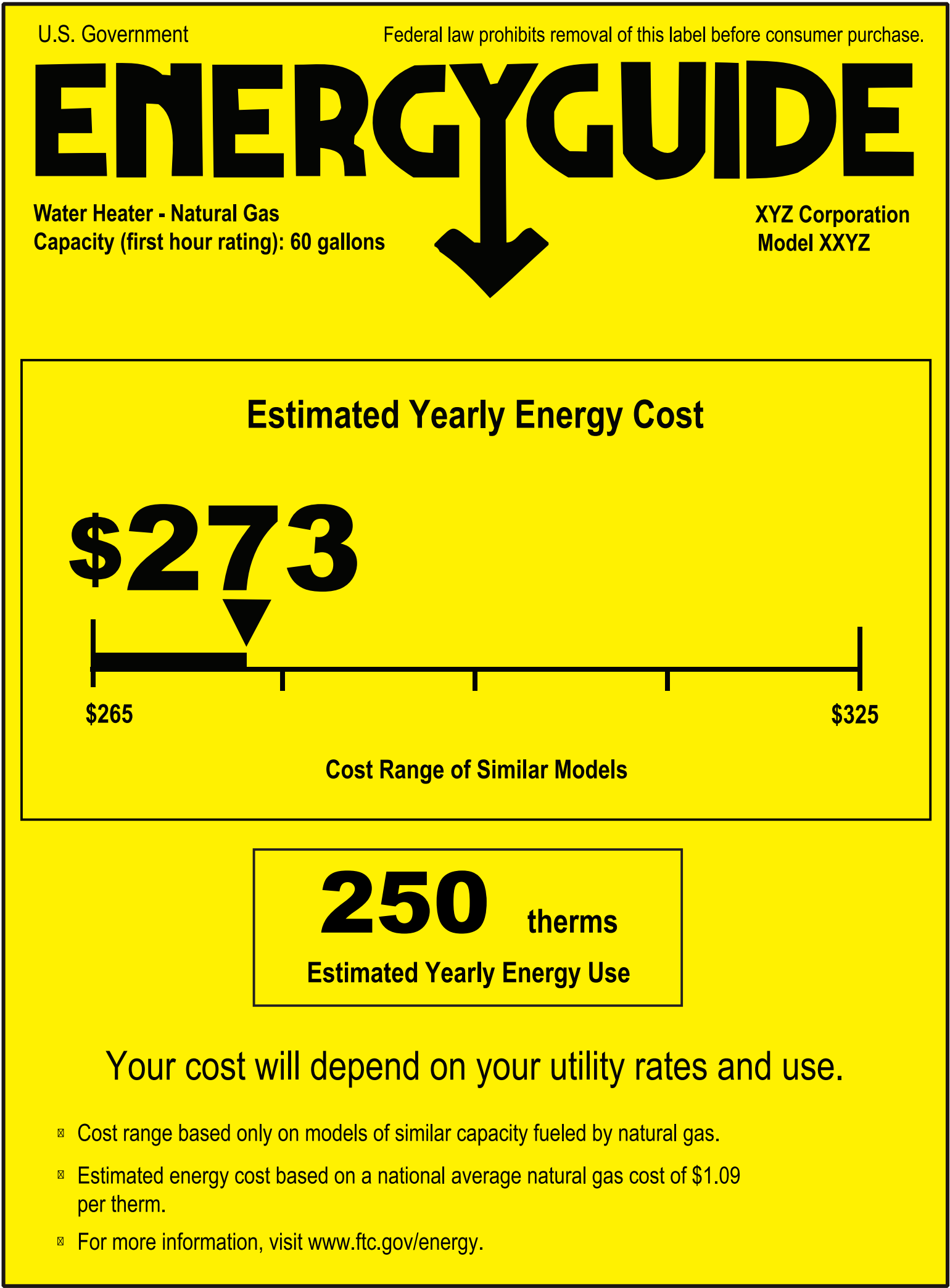
20. Look at the EnergyGuide labels below. Which is the correct statement?

- 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.

Appliance A



Appliance B



Intermediate Poll

Opinion

Fill in 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 would consider a career that involves energy.

Strongly Disagree				Strongly Agree
1	2	3	4	5

3. I know a lot about energy.

Strongly Disagree				Strongly Agree
1	2	3	4	5

4. Energy is important to our lifestyle.

Strongly Disagree				Strongly Agree
1	2	3	4	5

5. Learning about energy can be fun.

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 is 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. Fill in 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

Motion
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 a 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

All of the Above

Secondary Poll

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 radiant energy from the sun?

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

Electricity

13. Almost 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.

Secondary Poll

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

Fill in 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 would consider a career that involves energy.

Strongly Disagree				Strongly Agree
1	2	3	4	5

3. I know a lot about energy.

Strongly Disagree				Strongly Agree
1	2	3	4	5

4. Energy is essential to our country’s economy.

Strongly Disagree				Strongly Agree
1	2	3	4	5

5. Learning about energy can be interesting.

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 is 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. Fill in 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: Student Leadership and Outreach

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 set 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.

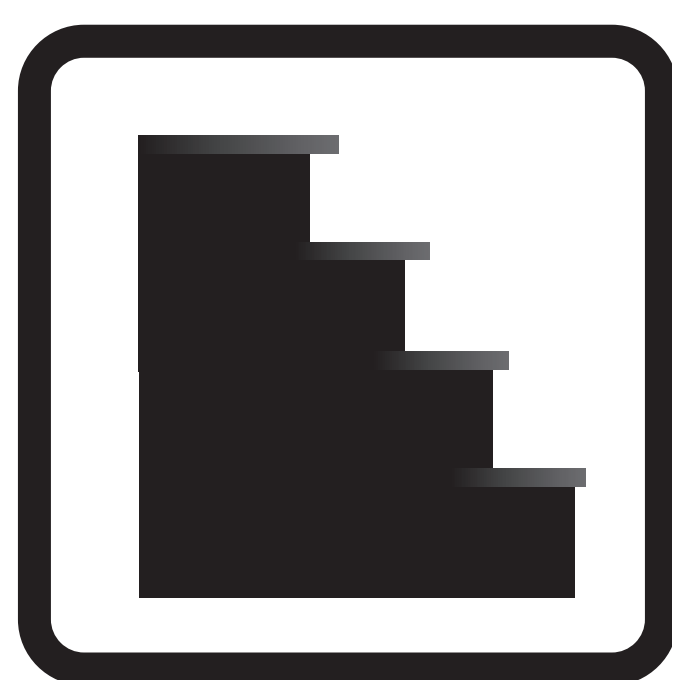
All of the people who are assigned to a particular project will become the working committee for that goal. The committee should meet to appoint a chairperson and discuss the details of the workplan. The chairperson should make sure that deadlines are met and call meetings if problems arise. The group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



Youth Awards Program for Energy Achievement

Background

NEED encourages all schools to participate in the Youth Awards Program for Energy Achievement by having their students document their energy activities and projects and submit them to NEED by April 15, 2015.

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 binder or portfolio that highlights their goals, activities, outreach opportunities, and their evaluation of the activities. Students will use this binder or portfolio to help them create a digital project to submit for judging. In April, projects should be uploaded to the online submission site. Projects will be judged on the state level, with state winners advancing to the national competition. Projects submitted after the due date of April 15th will not be judged.

The Youth Awards Program culminates with the National Recognition Ceremonies, held in Washington, D.C., June 26-29, 2015. For more information about the Youth Awards Program, go to www.NEED.org/Youth-Awards.

Turning Your Energy Outreach Program into a Youth Awards Project

■ Gather Documentation

- Take photos of the outreach and projects 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 project.

■ Fundraising (Optional)

You may need to raise money for your project or to attend the 2015 National Recognition Ceremony. 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.

About the Program and Projects

NEED's Youth Awards Program for Energy Achievement encourages all students and classrooms to get involved in energy outreach. Depending on the level of engagement in energy activities and outreach in the community, projects may be submitted in one of two categories. Please refer to the descriptions below to decide which type of project to submit.

Youth Awards Signature Project

- Multi-faceted outreach project that is student-driven
- Covers several energy content areas and activities
- Completion of a 15-slide digital slideshow that showcases goals of projects, activities completed, and results achieved
- Projects are uploaded to the Youth Awards Project submission web site
- Projects will be judged at the state and national levels with the opportunity to attend the National Recognition Ceremonies in June
- Special recognition may be given to projects that excel in one the following areas:
 - o Exemplary community energy education
 - o Energy engineering and design
 - o School energy efficiency

Youth Awards Foundations Project

- Single activity outreach project that is student-driven
- Focuses on a limited content area or set of activities
- Completion of a 4-slide digital slideshow that showcases the goals and results of the project
- Projects are uploaded to the Youth Awards Project submission web site
- Projects will be recognized at the local level for outstanding efforts in the classroom and the community

Complete Your Project

Obtain a loose leaf binder or keep a digital file in which to compile all of the activities, work samples, photos and videos you collect along the way as you work through your project. Use these items to help create your digital slideshow in PowerPoint or other similar software. Your slideshow must be able to be saved as a PDF for uploading once complete. Make sure your slides follow the following format. A sample template is available at www.NEED.org/Youth-Awards.

Slide 1:

- School name
- Project title
- Advisor's name
- Summary of the project that emphasizes the activities, one to two paragraphs in length

Slide 2+:

- Project reporting information including your well-defined goals and activities.
 - Refer to the Outline and Information Planner and the Rubric for Evaluation to help organize slideshow.
 - Use the outline to help you report about each project goal. Fill out one outline per goal.
- Back-up documentation
 - Include documentation following each goal that highlights the activities. This includes, but is not limited to: photos, work samples, etc.
 - Reporting and documentation is limited to the slide limits set for each type of project. Projects with excess slides will not be considered in judging.
 - Signature Projects – 15 slide maximum
 - Foundations Projects – 4 slide maximum

Optional Video Submission:

Groups may elect to submit video documentation with their submissions. Videos will be considered but are not required, and will be displayed throughout the National Recognition weekend and on the NEED web site.

- Videos should be no longer than three minutes
- Videos should be created and uploaded to YouTube for hosting
- A link to the video must be shared when completing application information on the Youth Awards Project submission web site
- Programs should ensure students have completed their school's media release documentation, if necessary

Submit Your Project:

The deadline for projects is April 15, 2015. Projects must be uploaded to the Youth Awards Project submission web site by that date. Projects may then be reviewed for state awards and the national competition. Call NEED at 1-800-875-5029 for more information on the judging procedures.

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 also an awards category for Rookie of the Year at all grade levels.

National Recognition Ceremony

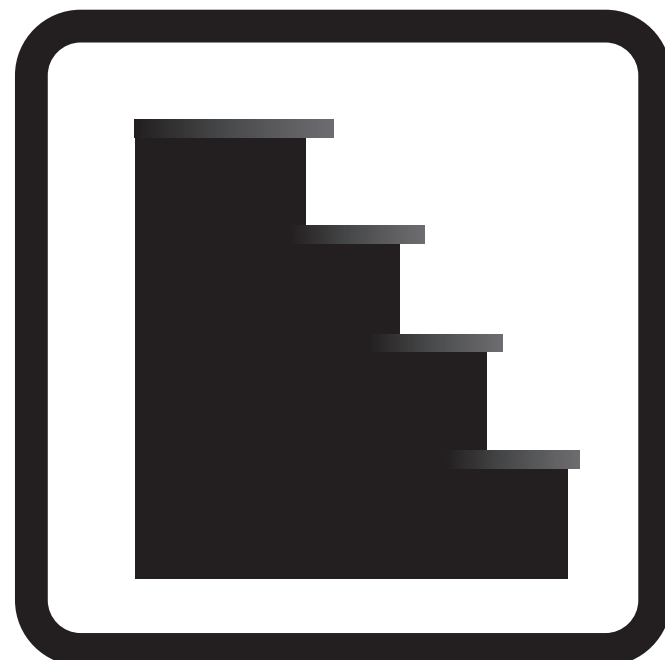
Signature program participants are eligible to attend The NEED Project's National Recognition Ceremony on June 26-29, 2015. This four day conference is organized and staffed by NEED student leaders to recognize outstanding teachers and students nationwide. Delegates receive recognition for their projects, learn about new NEED activities, share ideas, and 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, a tour of Washington, D.C., and other special events. Some sponsorship may be available for schools. Call the NEED office for availability.

Categories for National 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, Community Colleges and University Groups, etc.)
- NEED also recognizes Rookie of the Year schools at the state and national levels, and special recognition may be given to schools with an exemplary community education project, energy engineering and design project, or school energy efficiency project.

Online Resources

To see last year's winning projects and photos from the 2014 National Recognition Ceremonies, visit www.NEED.org/Youth-Awards.



Rubric for Evaluation

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 seven 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. Signature projects should have multiple goals. Foundations projects should have one goal.

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 deepening energy content knowledge
- incorporate scientific process thinking and skills
- include opportunities for data collection and analysis
- include school/community service
- have far-reaching/long-term results
- be well organized
- be creative and fun

Energy Content of Project and Resources (0-25 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. Activities should be inclusive of NEED curricula and utilize community partners to make the project a success.

Student Leadership (0-15 points)

The panel will review your activities to determine the extent to which the students took ownership and demonstrated leadership in the activities. Depending on the grade level and independence of learners, students will:

- determine goal(s)
- manage activities
- document progress
- create Youth Awards Project submission

Community Education and Involvement (0-15 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? The panel will look for evidence of:

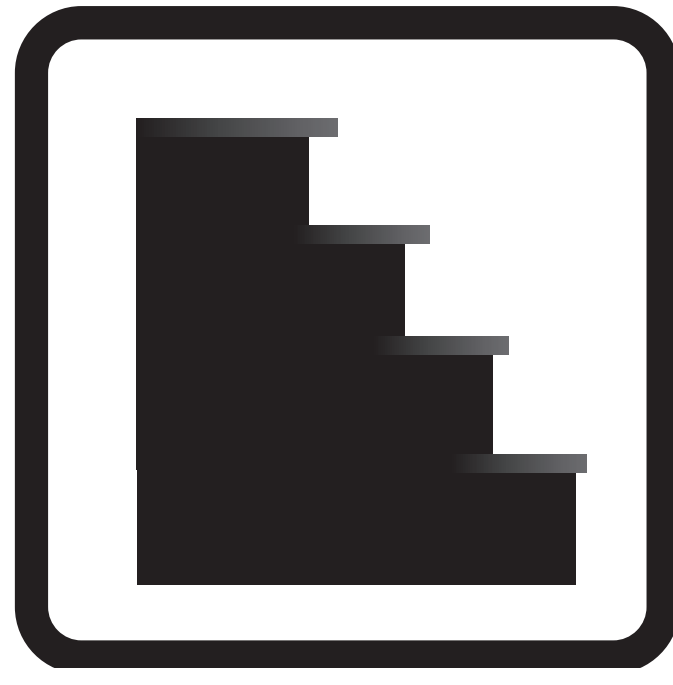
- level of interaction with the community
- shared energy content or knowledge

Evaluation Methods (0-5 points)

The panel will review your evaluation methods. Did your activities meet your project goals? What evidence is present to show goals were met?

Documentation (0-10 points)

The panel will review your documentation. Tell us what you learned and what you have accomplished. Use the PowerPoint format to demonstrate your observations, results, and successes.



Sample Project Ideas

Activity Ideas

ENERGY AWARENESS ACTIVITIES

Within Your School

- Conduct classroom activities—*Energy Expos*, *Energy Enigma*, *Energy Carnival*, 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/or 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.
- Share stories from *Energy Stories and More* with 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 from *Energy on Stage*, or a song from *Energy Rock Performances* 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 or closed-circuit 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.
- Create a social media campaign to encourage others to make a change.

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 or poster 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 Outline and Information Planner

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

ACTIVITIES AND TASKS

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.

ENERGY CONTENT AND RESOURCES

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

STUDENT LEADERSHIP

- 4 student leaders were assigned
- 1 student coordinated the giveaways and incentives
- 2 students ran the expo sign-ups
- 1 student hung up posters with helpers
- 1 student was in charge of invites and thank-you's
- 4 students led the expo

EVALUATION

1. Evaluated the project with completed student-created 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

Outline and Information Planner

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

GOAL # _____

ACTIVITIES AND TASKS

ENERGY CONTENT AND RESOURCES

STUDENT LEADERSHIP

EVALUATION

NEED Youth Awards Program For Energy Achievement

Required Application Information Planner

State: _____ School Name: _____

Students should fill out this form with the help of a teacher and use this information when completing online submission of the application and project. Projects must be submitted online by April 15, 2015. Contact NEED at 1-800-875-5029 with any questions.

PROJECT LEVEL		PROJECT TYPE		CHECKLIST	
_____	Primary (K-2)	_____	Signature (15 slide maximum)	_____	Application: information compiled and entered online
_____	Elementary (3-5)			_____	Digital project is submitted and contains
_____	Junior (6-8)	_____	Foundations (4 slide maximum)	_____	project summary
_____	Senior (9-12)			_____	school name and leader names
_____	Independent and Special Category			_____	reporting of goals
_____	First Time Entry			_____	documentation (photos, etc.)
				_____	fits within the slide requirements
				_____	video link has been provided (optional)

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 Web site	
Project Advisor	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 Advisor (Area Code)		Hours Spent on Project Collectively	

THE FINE PRINT

As the project advisor and student director(s), we declare that the project submission has been 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 4 or 15 slides, as applicable. Participants acknowledge that submission, materials, and other documentation provided may be displayed at www.NEED.org.

Project Advisor Signature

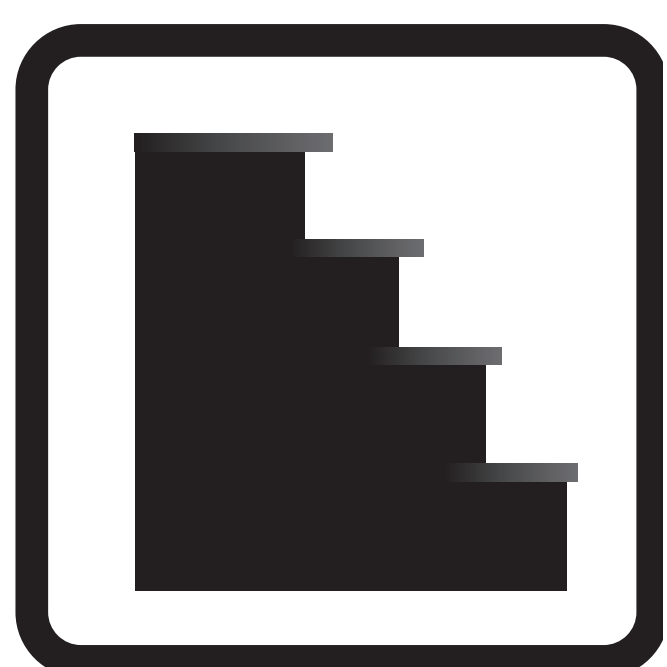
Student Director(s) Signature(s)

Project Advisor Printed Name

Student Director(s) Printed Name(s)

Date

Date



Integrated Energy Unit Planner

Primary selected CONTENT areas (SS, LA, M, etc.)

Describe the TOPIC, CONCEPT, or “BIG IDEA”:

Describe how this topic connects or relates to ENERGY:

Describe how other content areas can contribute to or integrate with the selected TOPIC:

Social Studies:

Math:

Language Arts:

Science:

Technology/Creative Arts:

Describe how the topic can be related to the students’ communities, families, or their lives:

Describe how the topic can be related to potential careers:

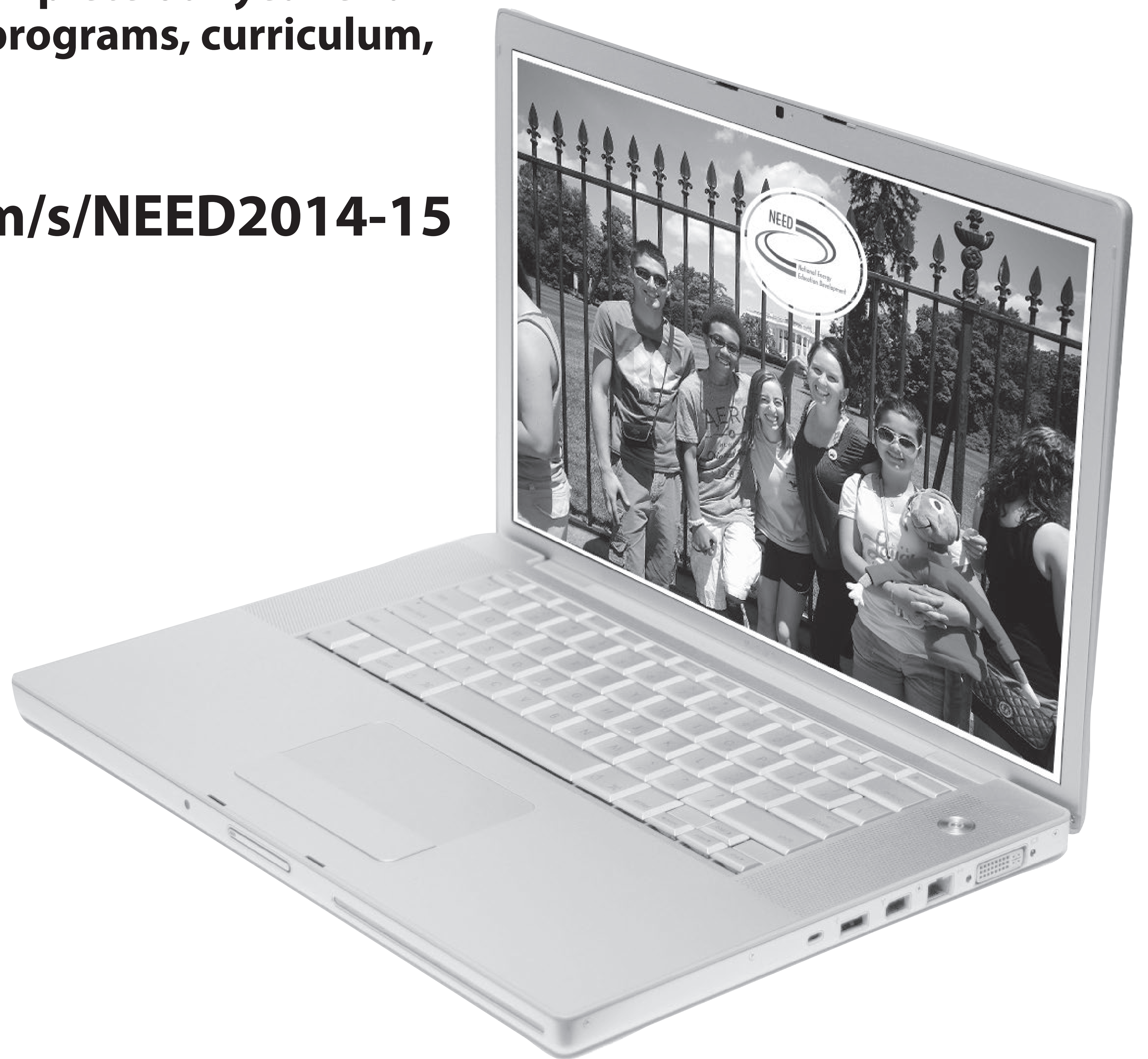
Describe how the topic can involve or incorporate the whole school or community:



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.surveymonkey.com/s/NEED2014-15





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Miller Energy
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Mojave Environmental Education Consortium
Mojave Unified School District
Montana Energy Education Council
NASA
National Association of State Energy Officials
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
NRG Energy, Inc.
NSTAR
OCI Enterprises
Offshore Energy Center
Offshore Technology Conference
Ohio Energy Project
Oxnard School District
Pacific Gas and Electric Company
Paxton Resources

PECO
Pecos Valley Energy Committee
Petroleum Equipment Suppliers Association
Phillips 66
PNM
Read & Stevens, Inc.
Rhode Island Office of Energy Resources
River Parishes Community College
RiverQuest
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