



National Energy Education Development Project



## **2011-2012 RESOURCE CATALOG**

Putting Energy into Education

P.O. Box 10101, Manassas, VA 20108

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**The students we teach have been very positively impacted by the NEED materials and kits! They are so enthusiastic and go home brimming with experiences to share with their families. The hands-on activities lead to long lasting understanding of the concepts.**

— California Environmental Science, Engineering, and Technology Educator



## TABLE OF CONTENTS

Teacher Advisory Board	1
This is NEED	3
NEED Curriculum Packet	4
NEED Curriculum	5
NEED Basic Curriculum Units	6
NEED Curriculum Matrix	6
Science of Energy	9
Sources of Energy	11
Electricity and Magnetism	16
Transportation	17
Conservation and Efficiency	18
Synthesis and Reinforcement	21
Evaluation and Recognition	23
Additional Resources	24
NEED Merchandise	25
Order Form	28
NEED National Sponsors and Partners	29

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# THIS IS NEED

## PUTTING ENERGY INTO EDUCATION

The NEED Project includes innovative K-12 educational materials, teacher and student training programs, evaluation, and recognition. NEED materials and training conferences are designed to provide comprehensive, objective information about energy production and consumption and the major energy sources – how they are used and their impact on the environment, economy, and society. The program emphasizes the development of critical thinking and problem solving skills using inquiry activities that encourage students to consider the trade-offs inherent in energy decisions.

NEED materials have been designed to meet the needs of teachers and students, and are correlated to the National Science Education Content Standards and all state standards. Activities are available at all grade levels and are used in technical schools, community colleges, and universities. Materials incorporate NEED's Kids Teaching Kids approach to education by encouraging students to teach others. The NEED Project has a Teacher Advisory Board to ensure that all curriculum materials are objective, up-to-date, scientifically accurate, and meet the requirements of national and state standards.

NEED works with school districts and teachers across the country to design and implement individualized energy programs to meet their education goals and objectives. In many areas, NEED materials are incorporated into the formal curriculum at many grade levels. NEED tailors programs to meet the specific requirements of individual states, school districts, and teachers. NEED is fortunate to be the education partner for many local, state, and national energy outreach programs.

## NEED MISSION STATEMENT

The National Energy Education Development (NEED) Project is a 501(c)(3) nonprofit education association incorporated in the Commonwealth of Virginia. The mission of NEED 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. Established by Presidential Proclamation in 1980, NEED is a dynamic, engaging, program present in thousands of schools nationwide.

**I love being involved with NEED. The materials are well organized and easy to use. They are informative, useful, and related to each grade level they are prepared for. Thank you for the job you all do. I love being involved in NEED!**

— Tennessee Elementary Educator

## PROFESSIONAL DEVELOPMENT

The NEED Project conducts workshops and professional development programs throughout the year to meet the needs of school districts and individual teachers. These training programs provide comprehensive energy information and introduce educators to NEED materials and other energy education resources. Information about up-coming conferences, workshops, and other events is available on NEED's website at [www.NEED.org](http://www.NEED.org). To discuss hosting a training program, call NEED Headquarters at 1-800-875-5029.

## NATIONAL ENERGY CONFERENCE FOR EDUCATORS

Every summer, NEED conducts a five-day conference for educators—teaching about energy and how to implement NEED programs in the classroom. Graduate credit is available from Virginia Commonwealth University for teachers participating in the program. Registration fee includes lodging (double occupancy), most meals, and materials. For more information, contact NEED at 1-800-875-5029 or visit [www.NEED.org](http://www.NEED.org).

## LEADERSHIP DEVELOPMENT

NEED encourages student energy leadership by sponsoring a Youth Awards Program for Energy Achievement. Students and teachers who coordinate outstanding energy projects are recognized at statewide awards programs and the National Recognition Ceremonies held each June in Washington, D.C.

As students learn about energy during the year, they put their knowledge to good use. Our students are leaders. Since The NEED Project began in 1980, students have been learning and leading others to an understanding of energy in the world. They are teaching the next generation to make good energy decisions. The Kids Teaching Kids approach works. For more information, visit [www.NEED.org](http://www.NEED.org)

# NEED CURRICULUM PACKET



Any educator can become a part of NEED's dynamic network of schools across the nation participating in innovative energy education programs. NEED educators receive a 2011-2012 NEED Curriculum Packet; subscriptions to *Energy Exchange* and *Career Currents* newsletters; invitations to NEED conferences, workshops, and the Youth Awards Program for Energy Achievement; and the opportunity to personalize classroom programs by ordering free curriculum units and supplemental materials using the Order Form on page 28. All curriculum guides are available on NEED's website.

NEED Curriculum Packets are provided by sponsors to all educators who attend NEED workshops. Each packet includes the following materials:

## ENERGY INFOBOOKS

NEED's *Energy Infobooks* are provided on primary, elementary, intermediate, and secondary reading levels. The guides provide resource information on the sources of energy, electricity, transportation, conservation and efficiency, and consumption. The Infobooks are used in the classroom as resources for many NEED activities and class sets of the elementary, intermediate, and secondary versions are available. The primary version is designed for teachers to read to students. The infobooks are revised every year to provide complete, up-to-date information. This year they also include new and improved graphics. The infobooks are also available on NEED's website as individual factsheets.

## ENERGY GAMES AND ICEBREAKERS

This guide contains introductory energy activities and games, including Electric Connections, Energy Chants, Bumper Stumpers, Energy Bingo, and America's Most Wanted Energy Wasters. New in *Energy Games and Icebreakers* is an Energy Web activity focusing on the schools and homes as interconnected energy systems.

## ENERGY POLLS

NEED has developed Energy Polls for pre/post assessment evaluations. Offered at four levels: primary, elementary, intermediate, and secondary. The polls can be taken online! Register your class at <http://edu.NEED.org>. Hard copies of the Energy Polls can also be found in the *Blueprint for Success*.

## BLUEPRINT FOR SUCCESS

This guide was designed to help educators develop effective energy education programs. It provides an outline of a basic energy curriculum unit, and a matrix of all curriculum options. To help teachers plan their own custom energy unit, a brief description about all of NEED's curriculum materials can be found in this resource.

Also included in the *Blueprint for Success* is a sample workplan and suggestions for energy outreach activities to other classes, schools, families, and communities, as well as the *Youth Awards Program Guide and Application Form*.

## ENERGY ENIGMA

Students work in groups researching energy sources and energy production and consumption information. Then teams use critical thinking skills to hide the identity of their energy source while trying to guess which energy sources the other teams represent.

## ENERGY IN THE BALANCE

This activity introduces elementary students to the advantages and disadvantages of the major energy sources through a series of critical thinking, charting and graphing activities.

# NEED CURRICULUM

NEED Curriculum is developed by a national Teacher Advisory Board (TAB) that is dedicated to developing and promoting standards-based energy curriculum and training. The curriculum employs a number of strategies for teaching students about energy. Most NEED modules are inquiry-based, using a Kids Teaching Kids approach. Activities that are not inquiry based are highly engaging and interactive, helping students develop critical thinking skills. NEED strongly believes in integrating energy education across all subject areas including science, technology, engineering, mathematics, language arts, and social studies.

NEED also believes in providing the most recently reported energy data available to our teachers and students. Most statistics and data are derived from the U.S. Energy Information Administration's Annual Energy Review that is published in June of each year. Working in partnership with the EIA, NEED includes easy to understand data in our curriculum materials.

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 6) 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 7-8 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, Upper Elementary/Intermediate, and Secondary Science of Energy, and EnergyWorks.

## STEP TWO: SOURCES OF ENERGY

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

## STEP THREE: ELECTRICITY AND MAGNETISM

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

## STEP FOUR: TRANSPORTATION

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

## STEP FIVE: EFFICIENCY AND CONSERVATION

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

## STEP SIX: SYNTHESIS AND REINFORCEMENT

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

## STEP SEVEN: EVALUATION

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

NEED's *Energy Polls* are available at four grade levels on pages 19-31 of the *Blueprint for Success*. The polls are also available online at <http://edu.NEED.org/>.

## STEP EIGHT: RECOGNITION

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

# NEED BASIC CURRICULUM UNITS

## ORDERING NEED BASIC CURRICULUM UNITS

The Teacher Advisory Board has designed NEED's Basic Curriculum Units at four levels to help new teachers implement energy units in their classrooms. These units are designed to meet the National Science Education Standards for each level by teaching the science of energy, sources of energy, electricity and magnetism, transportation, and conservation and efficiency. Synthesis, reinforcement, evaluation and recognition activities are also included.

A teacher may choose to order the NEED Basic Curriculum Unit as shown below by level, or may customize their unit by choosing any six guides. The guides in italics are not available in print; they are only available to download from the NEED website at [www.NEED.org](http://www.NEED.org). Descriptions of all NEED curriculum guides are in the *Blueprint for Success* in the NEED Curriculum Packet. To place an order for guides, use the order form on page 28.

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

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

## NEED CURRICULUM MATRIX

The NEED Curriculum Matrix is designed to assist teachers in planning an individualized energy unit.

All NEED curriculum guides are listed by grade level, and by where the majority of information in the material fits into NEED's recommended Energy Education Steps. 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 pieces of any energy education unit. Written at four levels – primary, elementary, intermediate, and secondary, these student readers have in-depth information on the major energy sources, electricity, transportation, and conservation.

Subject specific guides like the wind and nuclear modules have more extensive separate student backgrounders on the subject. Information in these guides include how the source is formed, how we harness energy from the source, and how we use the energy source to meet our needs. Information on historical uses of the source, developing technologies, and related careers are often included as well.

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.

# NEED CURRICULUM MATRIX

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



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

\* The guides with asterisks (\*) are not available in print

All curriculum is available to download in .pdf format from [www.NEED.org](http://www.NEED.org).

# STEP ONE

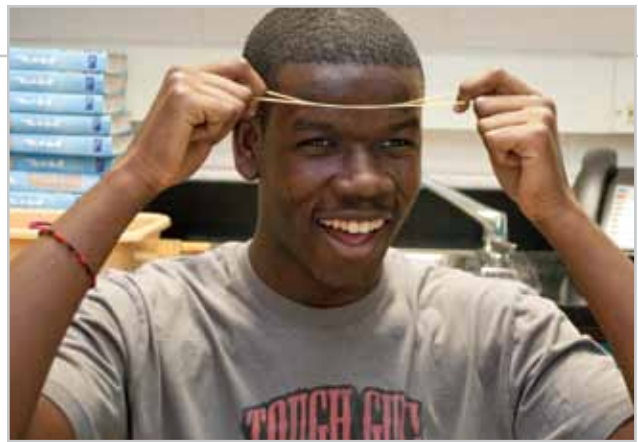
## SCIENCE OF ENERGY

### ENERGY FLOWS Grades 5-12

Online Only

This hands-on activity explains forms of energy and energy transformations to students. It can be used as a stand-alone activity or a companion activity to the Science of Energy Kit.

Levels: Elementary, Intermediate, Secondary



### ENERGYWORKS AND KIT Grades 4-8

The *EnergyWorks* guides include background information and hands-on experiments explore motion, light, sound, heat, growth, and powering technology. Teacher demonstrations are also included.

The kit comes with a Teacher Guide, a class set of Student Guides, and most of the equipment necessary to conduct the experiments. Replacement parts can be purchased separately so that the kit can be used for many years. A price list is available at [www.NEED.org](http://www.NEED.org), or by calling 1-800-875-5029.



Levels:	Elementary Intermediate
Grades:	4-8
Teacher and Student Guide	\$ 6.00
EnergyWorks Kit	\$ 400.00
3-Week Rental of EnergyWorks Kit	\$ 150.00
Class Set of 30 Student Guides	\$ 60.00

### PRIMARY SCIENCE OF ENERGY AND KIT Grades 1-3

This guide includes background information and hands-on experiments to explore the fundamental concepts of energy. Students explore the science of motion, heat, sound, and light with a series of simple activities that incorporate both English and metric measurements, using safe student thermometers, balances, rulers, measuring tapes, beakers, and graduated cylinders. Primary students learn to make observations, measure, record results, compare and contrast, categorize, make predictions, analyze and graph results, and draw conclusions.

The Primary Science of Energy Kit includes a comprehensive, step-by-step Teacher Guide with background information on the energy topics covered, masters, and detailed instructions for each activity; a class set of 30 Student Guides; and the materials needed for the students to conduct the experiments. Replacement parts can be purchased separately so that the kit can be used for many years. A price list for replacement parts is at [www.NEED.org](http://www.NEED.org), or can be obtained by calling 1-800-875-5029.



Levels:	Primary Elementary
Grades:	1-3
Teacher and Student Guide	\$ 5.00
Primary Science of Energy Kit	\$ 300.00
Class set of 30 Student Guides	\$ 50.00

## SCIENCE OF ENERGY AND KIT

### Elementary/Intermediate Guide (Grades 4–8)

### Secondary Guide (Grades 9–12)

These guides include background information and hands-on experiments to explore the different forms of energy and how energy is transformed from one form to another. Groups of students master six stations, then teach others about the energy transformations at their stations. Teacher demonstrations are included to introduce the unit. Reinforcement activities are also included. The stations include equipment to teach transformations focusing on kinetic and potential energy, heat, light, motors, batteries, and electromagnetism.

The kit comes with BOTH Elementary/Intermediate (6th grade reading level) and Secondary (9th grade reading level) Guides that have detailed teacher instructions with demonstrations, student instructions for the six stations, laboratory safety rules, and the laboratory equipment necessary to conduct the experiments. The Secondary Guide has more detailed scientific explanations of the experiments. The Science of Energy Kit is available for sale or rental.

A Class Set of Consumables contains 8 lightsticks, 8 handwarmers, 1 jar of calcium chloride, 10 balloons, 1 toy car, 10 rubber bands, 1 set of nails and wires, 1 solar cell, 1 live wire, and 1 candle. Replacement parts can be purchased separately so that the kit can be used for many years. A price list for replacement parts is available at [www.NEED.org](http://www.NEED.org) or by calling 1-800-875-5029.



<b>Levels:</b>	Elementary Intermediate Secondary
<b>Grades:</b>	4-8, 9-12
<b>Elementary/Intermediate or Secondary Guide</b>	\$ 3.50
<b>Science of Energy Kit</b>	\$ 400.00
<b>3-Week Rental of Science of Energy Kit</b>	\$ 150.00
<b>Class Set of Consumables</b>	\$ 35.00

## THERMODYNAMICS

### Grades 9–12

Online Only

Teacher and Student Guides to hands-on experiments that explore concepts of thermodynamics, including molecular structure, conduction, convection, radiation, specific heat, heat of fusion, and heat of vaporization.

**Levels:** Secondary



### NADA SCIENTIFIC

The NEED Project is pleased to work with NADA Scientific as a source for many of its hands-on kit components. NADA has components from NEED kits and much more.

Visit [www.nadascientific.com](http://www.nadascientific.com) to learn more about the tools and equipment available from NADA.

# STEP TWO

## SOURCES OF ENERGY

### ENERGY ENIGMA

Grades 7–12

Students research clues to uncover energy facts in *Energy Enigma*. Teams use reading, brainstorming, and organizational skills to hide the identity of their energy source while trying to guess which energy sources the other teams represent. Teacher instructions and masters are included. A browser-enabled version is available at [www.NEED.org](http://www.NEED.org).

Levels: Intermediate, Secondary

Energy Enigma \$ 2.50

### ENERGY EXPOS

Grades 3–12

Online Only

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

Levels: Elementary, Intermediate, Secondary

### ENERGY INFOBOOK ACTIVITIES

Grades K–12

Online Only

These guides are companion student activity books for the *Energy Infobooks*. They are available on four reading levels to correspond to the infobooks and include Teacher Guides and answer keys.

### ENERGY INFOBOOKS

NEW UPDATES AND GRAPHICS!

Grades K–12

*Energy Infobooks* are the resource for many NEED activities and include an introduction to energy, information on major sources of energy, new technologies, energy conservation, electricity, climate change, and other energy information. They are available on four reading levels and are revised and updated annually.

Levels: Primary, Elementary, Intermediate, Secondary

Primary Infobook \$ 2.50

Elementary Infobook \$ 2.50

Class Set of 30 Elementary Infobooks \$ 50.00

Intermediate Infobook \$ 2.50

Class Set of 30 Intermediate Infobooks \$ 50.00

Secondary Infobook \$ 3.00

Class Set of 30 Secondary Infobooks \$ 60.00

### ENERGY IN THE BALANCE

Grades 3–5

This activity introduces elementary students to the advantages and disadvantages of the major energy sources through a series of critical thinking, charting, and graphing activities.

Levels: Elementary, Intermediate, Secondary

Energy in the Balance \$ 2.50

### ENERGY ON PUBLIC LANDS

Grades 5–8

Online Only

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

Levels: Elementary, Intermediate

### ENERGY STORIES AND MORE

Grades K–5

This guide contains a series of stories and hands-on activities for primary teachers or upper elementary students to use to introduce basic energy concepts and the major energy sources to primary students.

Levels: Primary, Elementary

Energy Stories and More \$ 3.50

### FOSSIL FUELS TO PRODUCTS

Grades 7–12

Online Only

Students learn about exploration, production, refining, chemical manufacturing, transportation, marketing, and uses of petroleum, natural gas, and their products in the industrial sector.

Levels: Intermediate, Secondary

### GAMES and ICEBREAKERS

Grades K–12

*Games and Icebreakers* offers entertaining activities to introduce energy sources to students and to reinforce energy information presented. Activities can be adapted for many grade levels.

Levels: Primary, Elementary, Intermediate, Secondary

Games and Icebreakers \$ 2.50

### GREAT ENERGY DEBATE

Grades 6–12

Students evaluate the advantages and disadvantages of the major energy sources in a debate format. Each student group represents one of the energy sources and develops arguments on the merits of its energy source over the other energy sources. Teacher instructions and transparency masters are included.

Levels: Intermediate, Secondary

Great Energy Debate \$ 2.50





## HYDROPOWER CURRICULUM

Grades K-12

The hydropower curriculum includes background information and hands-on kits at primary, elementary, intermediate, and secondary levels. Guides may be purchased separately and are included in the kits.



### WATER AND ENERGY AND KIT

Primary

Primary students are introduced to forms of energy, properties of water as a solid, liquid, and gas, and the concept of moving water as an energy source through reading and hands-on activities. The kit comes with a Teacher Guide, a class set of science notebooks designed specifically for this unit, and the materials necessary to conduct the activities.



### WONDERS OF WATER AND KIT

Elementary

Elementary students learn about forms of energy, electricity, electrical circuits, properties of water, and how water is used as an energy source through reading, hands-on investigations, and language arts activities. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities.



### ENERGY OF MOVING WATER AND KIT

Intermediate

Intermediate students will develop a comprehensive understanding about energy, electricity, hydropower, and emerging ocean energy technologies. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities, including those needed to build six model hydropower turbines.



### EXPLORING HYDROELECTRICITY AND KIT

Secondary

Secondary students develop a comprehensive understanding about electricity, hydropower, and ocean energy technologies. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities, including those needed to build six model hydropower turbines.

Set of Guides (Any Level)	\$ 5.00	Levels:	Primary
Water and Energy Kit	\$ 150.00		Elementary
Wonders of Water Kit	\$ 150.00		Intermediate
Energy of Moving Water Kit	\$ 400.00		Secondary
Exploring Hydroelectricity Kit	\$ 350.00		
Class Set of 30 Student Guides (Any Level)	\$ 50.00	Grades:	K-12

## H<sub>2</sub> EDUCATE AND KIT Grades 6–12

Intermediate and secondary students are introduced to hydrogen as an important energy carrier both as a fuel for distributed generation and as a transportation fuel. Students conduct experiments in electrolysis, learn about atomic structure and the periodic table, make element models, simulate how a fuel cell works, learn what a hydrogen economy may look like through a cooperative learning jigsaw activity, and explore a hydrogen fuel cell car kit. The kit includes a Teacher Guide, class set of Student Guides with backgrounders, eight sets of electrolysis apparatus, sodium sulfate electrolyte, element modeling materials, fuel cell simulation materials, and a model hydrogen fuel cell car kit with detailed manual.



Levels:	Intermediate Secondary
Teacher and Student Guide	\$ 6.00
H <sub>2</sub> Educate Kit	\$ 500.00
Class of 30 Student Guides	\$ 50.00

## LIQUEFIED NATURAL GAS: LNG Grades 5-12

Online Only

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

Levels: Elementary, Intermediate, Secondary

## MARINE ENERGY Grades 7–12

Online Only

Students construct topographical maps of the U.S. that shows the major land and underwater formations. Students also conduct hearings on the development of energy resources and/or minerals in offshore areas.

Levels: Intermediate, Secondary

## NUCLEAR ENERGY Grades 6-12

Through background information and hands-on activities students will learn the chemistry and physics of the uranium atom and fission, the history of nuclear energy, and its role in producing electricity. A culminating assignment at the end has students researching and preparing for a mock Nuclear Regulatory Commission hearing regarding the building of a new nuclear reactor. The guides each contain a teacher section with lesson plans and reproducible masters.

Levels: Intermediate, Secondary

Energy from Uranium (Intermediate) \$3.50

Exploring Nuclear Energy (Secondary) \$3.50

## OCEAN ENERGY Grades 5-8

Online Only

In this activity, students learn and teach others about sources of energy found in and under the ocean such as tides, waves, winds, and ocean currents.

Levels: Elementary, Intermediate

## U.S. ENERGY GEOGRAPHY Grades 4-12

Online Only

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.

Levels: Elementary, Intermediate, Secondary

**The NEED workshop was one of the best science education workshops I have ever attended. The activities were very focused toward increasing my knowledge of energy and increasing my ability to effectively teach my students with excellent hands-on activities. To the creators of the NEED curriculum, my congratulations on a job well done.**

— Massachusetts General Science Educator

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. Guides may be purchased separately and are included in the kits.



**THE SUN AND ITS ENERGY AND KIT**

**Primary**

Primary students are introduced to solar energy with a read-aloud book and classroom-based activities. Students will learn that the sun’s energy produces light, transforms to heat, powers the water cycle, produces wind, and that solar cells convert radiant energy into electricity. The kit includes a Teacher Guide and the materials necessary to conduct the activities.



**WONDERS OF THE SUN AND KIT**

**Elementary**

Elementary students develop a basic understanding of solar energy through background reading and classroom activities. Hands-on activities demonstrate solar energy transformations into kinetic energy, thermal energy, chemical energy, and electricity. The kit includes a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities.



**ENERGY FROM THE SUN AND KIT**

**Intermediate**

Intermediate students learn about solar energy transformations through investigations that explore solar energy transforming into thermal energy, kinetic energy, chemical energy, and electricity. The kit includes a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities.



**EXPLORING PHOTOVOLTAICS AND KIT**

**Secondary**

Secondary students learn how solar energy is used to generate electricity. Students will read about photovoltaic systems, concentrated solar power, and developing solar technologies. Students will investigate how photovoltaic cells work and what variables affect their electrical output. The kit includes a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities.

Teacher and Student Guide (Any Level)	\$ 5.00	Levels:	Primary
The Sun and Its Energy Kit	\$ 200.00		Elementary
Wonders of the Sun Kit	\$ 350.00		Intermediate
Energy from the Sun Kit	\$ 350.00		Secondary
Exploring Photovoltaics Kit	\$ 350.00	Grades:	K-12
Class Set of 30 Student Guides	\$ 50.00		



## WIND CURRICULUM

### Grades K-12

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. Guides may be purchased separately and are included in the kits.



Geared Turbine    Basic Turbine    Weightlifter Turbine



### THE WIND IS ENERGY AND KIT

#### Primary

Primary students begin to develop an understanding of how wind is formed and used as an energy source. Students will learn to measure wind speed and direction, and investigate how wind can do work. The kit comes with a Teacher Guide, a class set of science notebooks designed specifically for this unit, and the materials necessary to conduct the activities, including two KidWind Weightlifter Turbines.



### WONDERS OF WIND AND KIT

#### Elementary

Elementary students learn about wind through reading and activities that focus on observation and inquiry. Students will learn to measure wind speed and direction, they will investigate how wind does work, including the ability to lift materials and generate electricity. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities, including one KidWind Weightlifter Turbine and one KidWind Basic Turbine.



### ENERGY FROM THE WIND AND KIT

#### Intermediate

Intermediate students learn about wind formation, wind energy, and electricity generation from wind through reading, critical thinking activities, and hands-on investigations. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities, including two KidWind Basic Turbines and a geared nacelle to convert one turbine to a geared turbine.



### EXPLORING WIND ENERGY AND KIT

#### Secondary

Secondary students develop a comprehensive understanding about wind formation, wind energy, and electricity generation from wind through reading, critical thinking activities, and hands-on investigations. The kit comes with a Teacher Guide, a class set of Student Guides, and the materials necessary to conduct the activities, including two KidWind Basic Turbines and a geared nacelle to convert one turbine to a geared turbine.

Teacher and Student Guide (Any Level)	\$ 5.00	Levels:	Primary
Wind is Energy Kit	\$ 250.00		Elementary
Wonders of Wind Kit	\$ 300.00		Intermediate
Energy from the Wind Kit	\$ 425.00		Secondary
Exploring Wind Energy Kit	\$ 425.00		
Class Set of 30 Student Guides (Any Level)	\$ 50.00	Grades:	K-12



# STEP THREE

## ELECTRICITY AND MAGNETISM

### CURRENT ENERGY AFFAIR

Grades 6-12

Online Only

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

Levels: Intermediate, Secondary

### ELECTROWORKS AND KIT

Grades 4-7

This guide includes background information and hands-on experiments to explore the basic concepts of atomic structure and electricity. Included are center-based experiments on static electricity, batteries, magnets, electromagnetism, and circuits. The kit comes with a detailed Teacher Guide, a class set of Student Guides, and most of the equipment necessary to conduct the experiments. The materials not included in the kit are readily available in the classroom or at home.



Levels: Elementary  
Intermediate

Teacher and Student Guide	\$ 5.00
ElectroWorks Kit	\$ 350.00
3-Week Rental of Kit	\$ 150.00
Class Set of 30 Student Guides	\$50.00

### ENERGY STORIES AND MORE

Grades K-5

This guide contains a series of stories and hands-on activities for primary teachers or upper elementary students to use to introduce basic energy concepts including electricity to primary and elementary students.

Levels: Primary, Elementary

Energy Stories and More \$ 3.50

### GAMES AND ICEBREAKERS

Grades K-12

Electric Connections is an activity featured in *Games and Icebreakers*. First, students individually estimate and rank the yearly production of electricity for the nation's top ten energy sources. In groups, students compare their responses, and rank the energy sources as a group. Finally, students compare their rankings with actual production figures.

Levels: Primary, Elementary, Intermediate, Secondary

Games and Icebreakers \$ 2.50

### MISSION POSSIBLE: ENERGY TRADE-OFFS

Online Only

Grades 7-12

Mission Possible is an activity in which students are challenged to develop an energy plan for a growing country. Students consider the advantages and disadvantages of the energy sources available for them to use so that they can increase electricity production while maintaining environmental quality and quality of life.

Levels: Intermediate, Secondary

### WONDERS OF MAGNETS

Grades 1-4

Background information and hands-on experiments to explore the basics of magnets and magnetism.

Levels: Primary, Elementary

Wonders of Magnets \$ 3.50

### ENERGY INFOBOOKS AND INFOBOOK ACTIVITIES

Grades K-12

*Energy Infobooks* have extensive information on electricity. *Infobook Activities* have student worksheets to accompany the electricity factsheets. All four levels of the *Energy Infobooks* are in the NEED Curriculum Packet. They are revised and updated annually.

Levels: Primary, Elementary, Intermediate, Secondary

See page 11 for pricing.



# STEP FOUR

## TRANSPORTATION



### ELEMENTARY TRANSPORTATION FUELS INFOBOOK

Grades 4–6

Students explore conventional and alternative transportation fuels such as petroleum-based fuels, ethanol, electricity, biodiesel, compressed natural gas, and propane. Student backgrounders and suggested activities are included.

Levels: Elementary, Intermediate

Elementary Transportation Fuels Infobook \$ 2.50

### ENERGY EXPOS

Online Only

Grades 4–12

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

Levels: Elementary, Intermediate, Secondary

### ENERGY STORIES AND MORE

Grades K-5

Primary and elementary students learn about the formation of petroleum in Under The Sea, drilling for oil in Into Deep Water: Drilling for Oil and Gas, and about the oil embargo of 1973 in A Car Trip for Carlos. Supplemental activities are included along with suggestions for students to illustrate the stories, or turn them into plays, to share with other classes or the community.

Levels: Primary, Elementary

Energy Stories and More \$3.50

### FOSSIL FUELS TO PRODUCTS

Online Only

Grades 7–12

Students learn about exploration, production, refining, chemical manufacturing, transportation, marketing, and uses of petroleum, natural gas, and their products in the industrial sector.

Levels: Intermediate, Secondary

### H<sub>2</sub> EDUCATE

Grades 6–12

This intermediate/secondary unit introduces students to hydrogen as an important energy carrier for the future, both as a fuel for distributed electricity generation and as a transportation fuel.

Levels: Intermediate, Secondary

Teacher and Student Guide \$ 6.00

See page 13 for kit details and prices.

### TRANSPORTATION ENIGMA

Online Only

Grades 7–12

Students research clues to uncover energy facts about transportation fuels in this cooperative learning activity. Teams use reading, brainstorming, and organizational skills to hide the identity of their transportation fuel while trying to guess which fuels the other teams represent. Teacher instructions and masters are included.

Levels: Intermediate, Secondary

### TRANSPORTATION FUELS DEBATE

Grades 6–12

Students evaluate the advantages and disadvantages of conventional and alternative transportation fuels. Teacher instructions and masters are included.

Levels: Intermediate, Secondary

### TRANSPORTATION FUELS INFOBOOK

Grades 7–12

Students explore conventional and alternative transportation fuels such as petroleum-based fuels, ethanol, electricity, biodiesel, compressed natural gas, and propane. Student backgrounders and suggested activities are included.

Levels: Intermediate, Secondary

Transportation Fuels Infobook \$ 2.50

### TRANSPORTATION FUELS ROCK PERFORMANCES

Grades 4–12

Online Only

Student rock bands write songs and sing about alternative 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.

Levels: Elementary, Intermediate, Secondary



# STEP FIVE

## EFFICIENCY AND CONSERVATION

### BUILDING BUDDIES AND KIT Grades 2–3

Primary students are introduced to basic concepts of energy use and conservation, beginning with activities focused on home energy use and extending to school energy use and conservation measures. Students monitor outdoor weather conditions, record indoor and outdoor temperatures, and evaluate their energy conservation behaviors daily. Individual students and classrooms are recognized for energy-saving habits and being good Building Buddies. The kit includes a Teacher Guide, class set of Student Guides, certificates, and the materials necessary to conduct the activities.



Teacher and Student Guide	\$ 5.00
Building Buddies Kit	\$ 175.00
Class Set of 30 Student Guides	\$ 50.00

Levels: Primary  
Elementary

### CLIMATE CHANGE Grades K–12

Online Only

With four separate books for primary, elementary, intermediate and secondary students, our new climate change curriculum addresses current concerns about climate change. Students will understand why we use the sources we 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.

Levels:	Intermediate, Secondary
Understanding Climate Change	6-8
Exploring Climate Change	9-12

### ENERGY CONSERVATION CONTRACT Grades 4–12

In this outreach activity, students ask their families to sign contracts in which they agree to save energy at home and on the road for a one month period, then calculate the energy savings.

Levels:	Elementary, Intermediate, Secondary
Energy Conservation Contract	\$ 1.50

### ENERGY EXPOS Grades 4–12

Online Only

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

Levels:	Elementary, Intermediate, Secondary
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### ENERGY HOUSE Grades 4–8

Online Only

In this activity, students insulate a cardboard box house with a variety of insulating materials, learning about energy conservation, energy savings, and diminishing returns.

Levels:	Elementary, Intermediate
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### LEARNING AND CONSERVING AND KIT Grades 9–12

Secondary students learn about energy consumption and conservation by reading utility meters and utility bills, comparing EnergyGuide labels, and exploring electric nameplates. Students conduct comprehensive surveys of the school building and school energy consumption—gathering, recording, and analyzing data, and monitoring energy usage. Students work in groups to develop comprehensive energy management plans for the school that include suggestions for retrofits, systems management, and conservation practices. The kit includes a Teacher Guide, class set of Student Guides, and the materials necessary to conduct the activities.



Levels: Secondary

Teacher and Student Guide	\$ 6.00
Learning and Conserving Kit	\$ 300.00
Class Set of 30 Student Guides	\$ 50.00

## MONITORING AND MENTORING AND KIT

### Grades 4–6

Elementary and intermediate students are introduced to methods of measuring energy usage, determining costs, and quantifying environmental effects through a series of activities that includes reading electric and natural gas meters, EnergyGuide labels, and electric nameplates. Students conduct surveys of the school building and school energy consumption—gathering, recording, and analyzing data, and monitoring energy usage. The kit includes a Teacher Guide, class set of Student Guides, and the materials necessary to conduct the activities.



Teacher and Student Guide	\$ 6.00
Monitoring and Mentoring Kit	\$ 350.00
Class Set of 30 Student Guides	\$50.00

Levels:	Elementary, Intermediate
Grades:	4-6

## PLUG LOADS

### Grades 6–12

This unit guides students through an in-depth investigation of electricity usage by appliances and machines in their school building. Students gather data and calculate energy consumption and economic and environmental costs over time.

Levels:	Intermediate, Secondary
Plug Loads	\$ 2.50

## NEED AND NIAGARA CONSERVATION

The NEED Project and Niagara Conservation have partnered to create the Home Energy



Efficiency Kits provided in this curriculum. For over 30 years, Niagara Conservation has provided the highest-quality water and energy conservation products and award-winning efficiency services. A worldwide industry leader today, Niagara's mission is to promote the efficient, sustainable use of the Earth's resources without sacrificing product performance or appearance. For more information visit [www.niagaraconservation.com](http://www.niagaraconservation.com).

## SAVING ENERGY AT HOME AND SCHOOL AND KIT

### Grades 3–12

Elementary, intermediate, and secondary students learn about energy sources and energy efficiency through classroom activities. Hands-on activities cover energy sources, lighting, insulation, weatherization, electricity use, and water heating. Students and families install measures from the Home Energy Efficiency Kits corresponding to the lessons learned in the classroom and discuss their own energy use. The kit includes a Teacher Guide, class set of Student Guides, class set of Energy Savers Booklets, radiation cans, lab thermometers, insulation materials, an incandescent light bulb, a compact fluorescent light bulb (CFL), Kill-A-Watt meter, and a class set of 30 Home Energy Efficiency Kits (Flow meter bag, hot water gauge, bathroom sink aerator, refrigerator thermometer, roll of Teflon tape, nightlight, outlet and switch plate gaskets, low-flow showerhead, thermostat temperature guide, kitchen sink aerator, and CFL).



Levels:	Elementary Intermediate Secondary
Grades:	4-8

Set of Guides	\$ 6.00
Saving Energy at Home and School Kit (Includes 30 Home Energy Efficiency Kits)	\$ 800.00



The Saving Energy at Home and School Kit comes with 30 Home Energy Efficiency Kits allowing students to implement energy saving measures at home.





**SCHOOL ENERGY SURVEY**

Grades 9-12

Online Only

Students conduct a comprehensive energy audit of their school.

Levels: Secondary

**SOLID WASTE ENERGY AND RECYCLING**

Grades K-12

Students learn about solid waste and its relationship to natural resources and energy. Students learn about options for handling solid waste including recycling, landfilling, and burning of waste. Nonfiction backgrounders and activities for students are included for students at each level.

Levels: Primary, Elementary, Intermediate, Secondary

All About Trash (K-2) Online Only

Talking Trash (3-5) Online Only

Museum of Solid Waste and Energy (6-12) \$3.00

**TODAY IN ENERGY**

Grades 1-4

Online Only

This primary and elementary activity introduces students to the concepts of choice, trade-offs, and costs, using math and critical thinking skills.

Levels: Primary, Elementary

**USING AND SAVING ENERGY**

Grades K-1

Introduces students to basic concepts of energy use and conservation at home in a read-aloud format and suggested activities.

Levels: Primary

Using and Saving Energy \$ 5.00

**FOR ADMINISTRATORS AND FACILITIES STAFF**

**BLUEPRINT FOR SCHOOL ENERGY TEAMS**

Online Only

This guide provides a seven step approach to help schools and/or districts develop and implement their own energy management plan.

Levels: Primary, Elementary, Intermediate, Secondary

**ENERGY MANAGEMENT GUIDE FOR SCHOOLS**

Online Only

This guide is designed to lead school leaders through developing and implementing an ongoing school-wide energy plan. The plan will promote energy efficiency through education and reduce energy consumption at school.

Levels: Primary, Elementary, Intermediate, Secondary

# STEP SIX

## SYNTHESIS AND REINFORCEMENT

### BLUEPRINT FOR SUCCESS

Grades K-12

This guide includes a workplan and suggestions for energy outreach activities to other classes, schools, families, and communities, as well as the Youth Awards Guide and application form.

Levels: Primary, Elementary, Intermediate, Secondary

Blueprint for Success \$ 2.50

### CARBON CAPTURE AND STORAGE

Online Only

Grades 9-12

This guide introduces students to a coal technology to help mitigate climate change by capturing carbon dioxide at power plants and storing it in deep geologic formations. Hands-on activities help students understand the concepts involved in carbon capture and storage.

Levels: Secondary

### ENERGY ANALYSIS

Online Only

Grades 7-12

This activity emphasizes research and analysis of information in graph format to discern energy trends using the Energy Information Administration's Energy Perspectives publication and a Teacher Guide with additional graphs.

Levels: Intermediate, Secondary

### ENERGY AND OUR RIVERS

Grades 6-12

This module examines how energy sources are transported along the nation's rivers. Hands-on science and social studies activities encourage students to think about the importance of rivers as modes of transportation.

Levels: Intermediate, Secondary

Energy and Our Rivers \$ 3.50

### ENERGY AROUND THE WORLD

Online Only

Grades 5-12

This guide includes maps and energy information for 60 countries. Student groups research assigned countries and make presentations to the class.

Levels: Elementary, Intermediate, Secondary

### ENERGY CARNIVALS

Grades K-12

NEED's popular carnival games are an excellent way to encourage students and adults to think about energy. The Energy Carnival contains complete instructions for ten carnival games including Energy Pictionary, the Wheel of Energy, Top Five, Energy Knockdown, Energy Taboo, and more. The Carnival is ideal for elementary or middle school students and makes an excellent activity for an energy fair or Earth Day celebration. The *Primary Energy Carnival* contains nine games appropriate for students in grades K-3.

Levels: Primary, Elementary, Intermediate, Secondary

Primary Energy Carnival (K-3) \$ 5.00

Energy Carnival (4-12) \$ 5.00

### ENERGY FAIR

Online Only

Grades 1-5

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

Levels: Primary, Elementary

### ENERGY IN THE BALANCE

Grades 3-5

This activity introduces elementary students to the advantages and disadvantages of the major energy sources through a series of charting and graphing activities.

Levels: Elementary

Energy in the Balance \$ 2.50

### ENERGY JEOPARDY

Online Only

Grades 4-12

Students enjoy NEED's spin on the popular game show. Jeopardy categories include More MPGs, Famous Americans in Energy, Leading Nations, and more.

Levels: Elementary, Intermediate, Secondary

### ENERGY MATH CHALLENGE

Online Only

Grades 3-12

The *Energy Math Challenge* strengthens students' math and critical thinking skills while increasing their knowledge of energy. Students work individually and in teams to solve energy math problems.

Levels: Elementary, Intermediate, Secondary





## ENERGY ON STAGE

Grades 4–12

Plays and poems on energy sources and energy conservation, with individual teacher guides that have expanded vocabulary and extensions.

Levels: Elementary, Intermediate, Secondary

Energy On Stage \$ 3.50

## EXPLORING ENERGY

Online Only

Grades 4–6

This guide contains articles and hands-on explorations on energy-related topics such as composting, solar cooking, refrigeration, microwaves, and the greenhouse effect.

Levels: Elementary, Intermediate

## GAMES AND ICEBREAKERS

Grades K–12

*Games and Icebreakers* offers entertaining activities to introduce energy, efficiency, and conservation to students, as well as reinforce the information that has already been presented.

Levels: Primary, Elementary, Intermediate, Secondary

Games and Icebreakers \$ 2.50

## GLOBAL TRADING GAME

Online Only

Grades 4–12

In this activity developed by the Ohio Energy Project, students become economic advisors, geologists, and miners as they learn about their assigned country's resources and needs, then trade resources with other countries.

Levels: Elementary, Intermediate, Secondary

## GREAT ENERGY ROCK PERFORMANCES

Online Only

Grades 4–12

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 included, along with twelve sample songs and interviews.

Levels: Elementary, Intermediate, Secondary

## GREEK MYTHOLOGY AND ENERGY

Online Only

Grades 4–8

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.

Levels: Elementary, Intermediate

## MYSTERY WORLD TOUR

Online Only

Grades 4–8

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

Levels: Elementary, Intermediate

## NEED SONGBOOK

Online Only

Grades K–12

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?

Levels: Primary, Elementary, Intermediate, Secondary

## THIS MINE OF MINE

Online Only

Grades 2–6

This activity, developed by the Ohio Energy Project, allows students to explore the formation, geology, recovery, and uses of coal, as well as reclamation of mine sites.

Levels: Primary, Elementary, Intermediate

## YESTERDAY IN ENERGY

Online Only

Grades 4–12

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.

Levels: Elementary, Intermediate, Secondary



# STEPS SEVEN and EIGHT

## EVALUATION AND RECOGNITION



### ENERGY POLLS

Grades K–12

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 NEED's *Energy Polls* prior to beginning the unit. There are polls on four reading levels – primary, elementary, intermediate, and secondary. The polls are found in the *Blueprint for Success* as well as online at <http://edu.NEED.org>. We recommend that you use the web-based polls if you have internet capability; the results will be tabulated for you, and you can compare pre- and post-poll results for your students. For more information about the online polls, email NEED at [info@NEED.org](mailto:info@NEED.org). If you choose to use the paper version, please forward your results to [info@NEED.org](mailto:info@NEED.org).

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

**Levels:** Primary, Elementary, Intermediate, Secondary

**Blueprint for Success** \$ 2.50

### ONLINE QUESTION BANK

Grades 1–12

Online Only

NEED's Online Question Bank gives teachers the ability to customize evaluation tools for their energy units. There are questions 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. You can access the *Online Question Bank* at [www.NEED.org](http://www.NEED.org).

**Levels:** Primary, Elementary, Intermediate, Secondary

### YOUTH AWARDS PROGRAM FOR ENERGY ACHIEVEMENT

Grades K–12

NEED recognizes the hard work that students are putting in to teach others about energy and make a difference in their communities. Teachers are encouraged to lead their students in documenting their efforts and submitting a portfolio of their work to NEED. Awards are given out on national and state levels, at four grade levels (primary, elementary, intermediate, and secondary) along with special categories for Rookie of the Year and Special Projects.

Step-by-step instructions and an application form to participate in the Youth Awards Program for Energy Achievement can be found in the *Blueprint for Success*. More information is available online at [www.NEED.org](http://www.NEED.org).

**Levels:** Primary, Elementary, Intermediate, Secondary

**Blueprint for Success** \$ 2.50

**2012 Youth Awards Conference Registration** \$ 550.00

**The material fosters critical thinking. With this skill, students can solve questions on state tests rather than just memorizing certain facts that may or may not be on the exam.**

— New York High School Environmental Science Educator





# ADDITIONAL RESOURCES

## ENERGY EXCHANGE AND CAREER CURRENTS NEWSLETTERS

NEED publishes two newsletters. *Energy Exchange* is published to keep teachers and partners informed about new curriculum materials, current energy issues, and opportunities available for teachers and students. *Career Currents* is published to provide students with information about a variety of careers in the energy industry. The newsletters are distributed to all NEED teachers, partners, and sponsors. The latest addition of each newsletter and archived editions are available on the NEED website at [www.NEED.org](http://www.NEED.org).

## NEED'S SMUGMUG 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](mailto: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.

## 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.

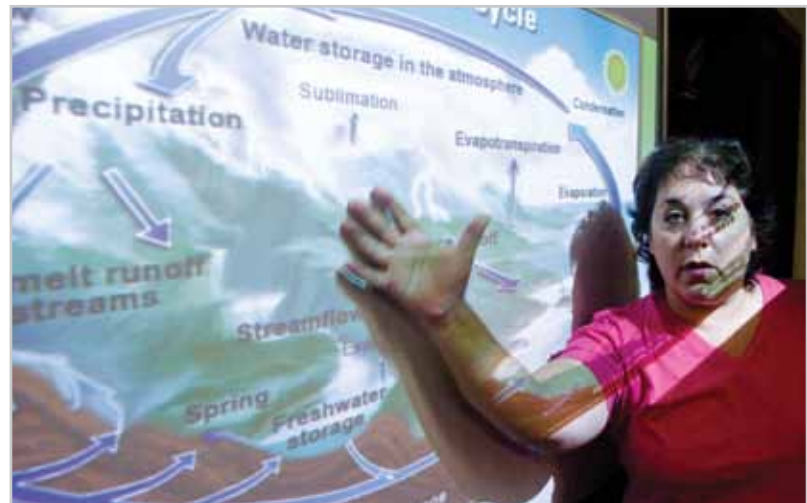
## NEED ANNUAL REPORT

NEED's Annual Report gives summaries of the best state and national Youth Awards projects for 2010–2011, as well as information about The NEED Project and our state programs.

Annual Report

Upon Request

Online at [www.NEED.org](http://www.NEED.org)



# NEED MERCHANDISE



## NEED BIKE BOTTLES

NEED bike bottles are 20-ounce, BPA free, biodegradable, white bottles with teal pop-up spouts and the NEED logo on the side.

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Bike Bottle	\$ 3.00
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## NEED T-SHIRTS

NEED t-shirts are teal, heavyweight shirts with the NEED 2011-2012 logo on the front and the energy icons on the back. Adult sizes small, medium, large, x-large, and xx-large are available.

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T-Shirt (S, M, L, XL)	\$ 12.00
T-Shirt (XXL)	\$ 15.00



## NEED TOTE BAGS

NEED totes are large, sturdy, carry-alls made with 100% post-consumer recycled PET. The NEED logo is printed on the outside pocket.

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Tote	\$ 12.00
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### NEED SWITCH PLATE COVERS

NEED switch plate covers are removable vinyl stickers to remind students to turn off the lights.

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Single Switch Plate Cover	\$ 2.50
Double Switch Plate Cover	\$ 3.00



### NEED STROBES

NEED strobes are flashing gold lightbulbs with the NEED Project website on the front, as shown to the right, and an on/off button on the back.

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Strobe	\$ 2.00
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### NEED PENS

NEED pens are made from recycled cardboard and green recycled plastic with NEED information imprinted in green on the cardboard shaft.

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NEED Pen	\$ 1.50
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### NEED PENCILS

NEED pencils demonstrate thermal to chemical energy transformations! It only takes a few seconds for the thermal energy from your hand to change the color of the pencil. NEED information is imprinted in black. Pencil colors vary.

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Pencil	\$0.50
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### FLICKER CHECKERS

Spin the Flicker Checker and discover whether the fluorescent lights in your school have magnetic or electronic ballasts.

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Flicker Checker	\$ 2.00
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# NEED MERCHANDISE

## POLAR BEAR AND FISH BUTTONS

Polar Bear and Fish Buttons for those who can figure out the answers to the riddles.

Polar Bear Button	\$ 0.50
Fish Button	\$ 0.50

(Riddles are online at [www.NEED.org](http://www.NEED.org))

## ADDITIONAL NEED MERCHANDISE

Did you attend a workshop or see a piece of merchandise online, but don't see it listed in the catalog? NEED merchandise varies throughout the year and is not always included in the catalog. For questions about additional merchandise email [info@NEED.org](mailto:info@NEED.org), or call 1-800-875-5029.



**I love being able to intelligently direct other teachers to the NEED website for materials they can use. And of course, the curriculum materials are outstanding; I use them as my “text book” for my entire energy unit, about four or five months long.**

— Indiana High School Educator





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National Energy Education  
Development Project