



40
YEARS
1980 - 2020



2020 - 2021

RESOURCE CATALOG & PLANNING GUIDE

THE NATIONAL ENERGY EDUCATION DEVELOPMENT PROJECT



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I have been impressed with the quality of the activities and how well the students enjoy them.

5th grade teacher, OK

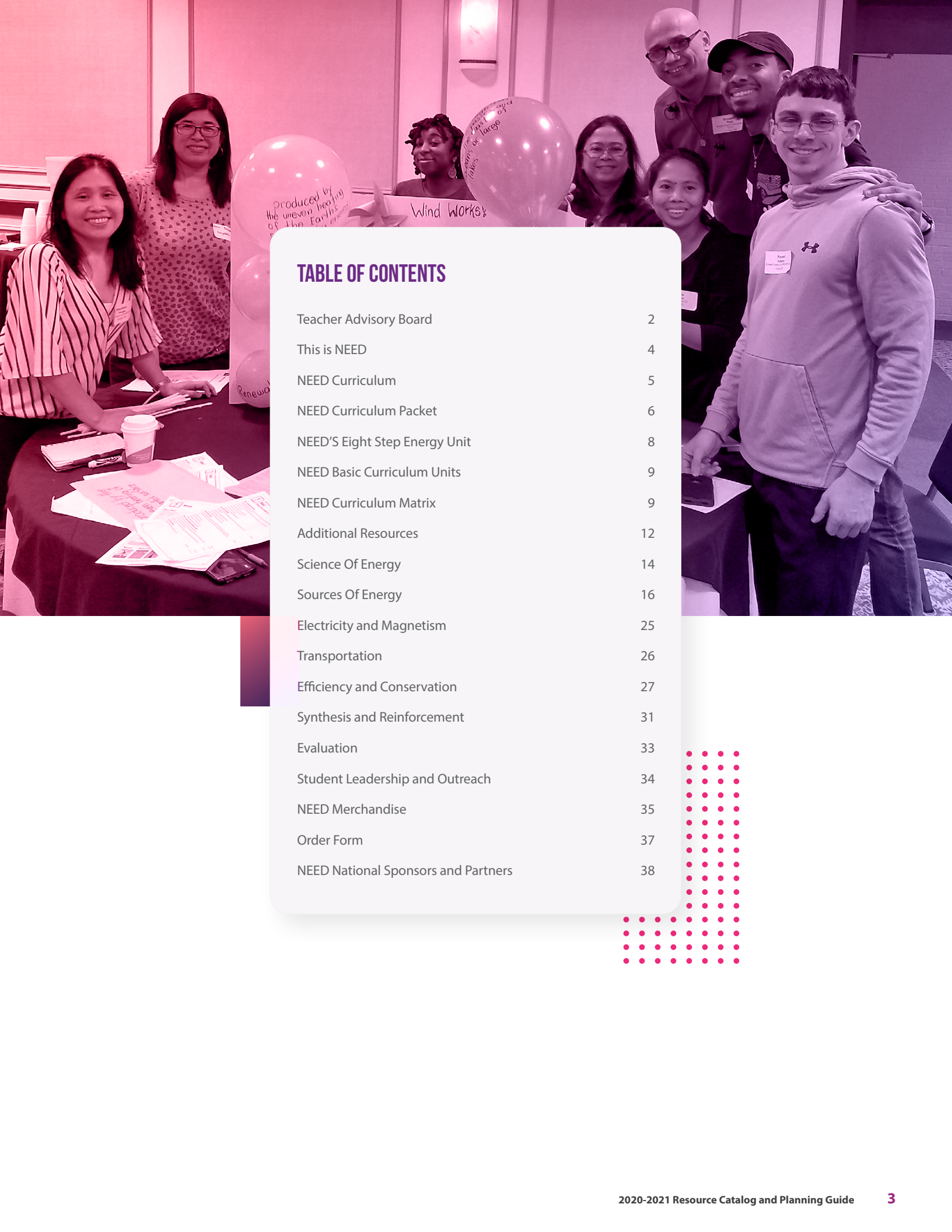


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THIS IS NEED

PUTTING ENERGY INTO EDUCATION

The NEED Project provides innovative K-12 educational materials, in-person and virtual 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, support the Next Generation Science Standards, and are correlated to all state science standards and the Common Core State Standards. For more information on curriculum correlations, visit www.NEED.org/educators/curriculum-correlations/.

Activities are available at all grade levels and are even used in technical schools, community colleges, and universities. Modules and materials embody NEED's Kids Teaching Kids pedagogy by encouraging students to teach others. The NEED Project relies on a Teacher Advisory Board to ensure that all curriculum materials work in the classrooms, 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.

PROFESSIONAL DEVELOPMENT

The National Energy Education Development Project conducts workshops and professional development programs throughout the year to meet the needs of school districts and individual teachers. Workshops and PD can be conducted both in-person or virtually. These training programs provide comprehensive energy information and introduce educators to NEED materials and other energy education resources. Information about upcoming conferences, workshops, and other events is available on NEED's website, 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. Educators delve deeply into how to teach energy and how to implement NEED programs in the classroom. Graduate credit is available for teachers 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/educators/national-energy-conference-for-educators/.

STUDENT LEADERSHIP AND OUTREACH

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 wise energy decisions. The Kids Teaching Kids approach works.

In 2021, the 41st Annual NEED Youth Energy Conference and awards program will give students more opportunities to learn about energy and to explore energy in STEM (science, technology, engineering, and math). The annual June conference will have students from across the country working in groups on an Energy Challenge designed to stretch their minds and energy knowledge. The conference will culminate with the Youth Awards Ceremony recognizing student work throughout the year and during the conference. Visit www.NEED.org/need-students/youth-awards/ for more information.

NEED CURRICULUM



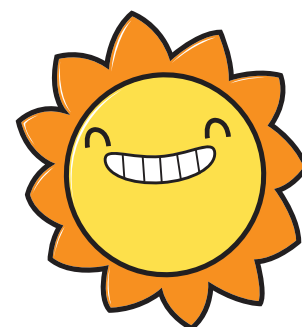
NEED curriculum is developed by our curriculum team and tested and refined by a national Teacher Advisory Board (TAB) that is dedicated to developing and promoting standards-based energy curriculum and training. The curriculum employs a number of strategies for teaching students about energy. Most NEED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



NEED also believes in providing current energy data to our teachers and students. Most statistics and data are derived from the most recent, complete annual data made available by the U.S. Energy Information Administration (EIA) at the time of publishing. 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 an eight-step model to help teachers plan a complete energy unit. Each step of the model is outlined on page 8. NEED has designed Basic Curriculum Units for each grade level that follow this comprehensive model for energy education. For more information on these basic units, see page 9. Educators may easily build their own units that follow this eight-step model. NEED's entire curriculum portfolio is available online. If large quantities of a title are needed, please contact NEED for more information on printed titles and requests for printing.

On pages 10-11 is a matrix of all available NEED materials categorized by NEED's eight-step energy education model and by grade level. Educators may use this list and the curriculum descriptions found within this guide to customize their own energy unit. Pages 12-13 include a list of additional resources that can enhance instruction.



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 2020-2021 NEED Curriculum Packet; e-newsletters; invitations to NEED conferences, workshops, and the Youth Energy Conference and Awards Program; and the opportunity to personalize classroom programs by accessing materials on the NEED website. Teachers can download all curriculum guides and supplemental materials in NEED's library for free from NEED's online store and website. NEED Curriculum Packets are provided by sponsors to all educators who attend NEED workshops. Each packet includes a sampling of NEED's favorite materials. Check out the awesome activities and new additions listed on this page and on page 7!

ENERGY INFOBOOKS

NEED's *Energy Infobooks* are provided in primary, elementary, intermediate, and secondary reading levels. The guides provide background and basic information on the sources of energy, electricity, transportation, conservation and efficiency, and consumption. The Infobooks can be used in the classroom as nonfiction text support for many NEED activities. Class sets of the elementary, intermediate, and secondary versions are available. The primary version of the guide is designed for teachers to read aloud to students. The Infobooks are revised every year to provide complete, up-to-date information. Infobooks are also available on NEED's website as individual factsheets, and as e-publications. Download our new and improved *Energy Infobook Activities* to support these great text-based resources. Head to www.NEED.org/need-students/energy-infobooks/ for digital versions.



ENERGY GAMES AND ICEBREAKERS

This guide contains entertaining games and activities that serve as excellent introductions to an energy unit, or fantastic formative assessment tools to use throughout a unit or as review activities. Games include *Electric Connections*, *Energy Chants*, *Energy Roundup*, *Energy Bingo*, *Energy Web Game*, *Candy Collector*, and more.

SIDEKICK CIRCUITS

Electricity often seems like this magical force; we think about it very little, until we flip a switch and something doesn't turn on. These quick activities were developed to help students understand how electricity flows through a circuit. Circuits provide a pathway for electricity to travel safely into and out of our devices. Students will be introduced to the most basic of DC circuits in *Light-a-Bulb Challenge*. Students are given a few basic supplies and must use those three items to light the bulb. They learn very quickly which parts of the battery are important for current flow and which parts are just along for the ride, so to speak. Once they've mastered the concept of a basic circuit, they will move up to *Sidekick Circuits*, where they must wire their own circuits on our energy sidekicks, using bulbs to illuminate features on the image and adhesive conductive tape to connect the parts of a circuit. Students will enjoy the hands-on challenge and surprise you with their fun designs. Check out page 25 for more electricity and magnetism-focused activities.





ENERGY YESTERDAY, TODAY, AND TOMORROW

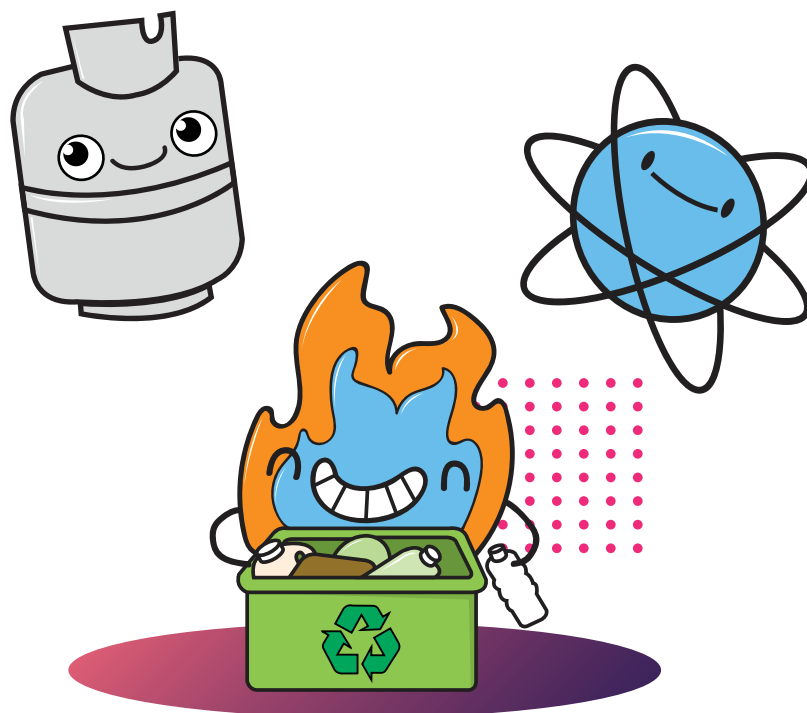
As NEED celebrates 40 years of energy education and kids teaching kids, we remarked at how much energy data has changed. This set of activities will take students on a virtual trip through time as they look at how energy production, consumption, and even conservation has evolved in the past 100 years or so. Activities will allow students to look at the technologies and techniques used for harnessing energy in history, how the energy systems we use today work for us, and what energy consumption might look like as we head into the next 100 years. These activities are great for any multi-disciplinary classroom as they incorporate language arts, math, history, and technology.

H₂OMG!

The energy of moving water is a highly efficient, available, clean resource. Hydropower is our number one renewable source for electricity generation. These lessons are meant to get your students' "big wheels turnin'," as we explore the energy in moving water, both in conventional hydropower of rivers and streams, but also in hydrokinetics, the power of moving waves, tides, and more. Students will get hands-on as they explore how water can do work, design a wave-powered energy generator, and even explore how temperature differences in the ocean can be used to generate electricity! We think these lessons might just be a "dam" good time!

ENERGY ESCAPE

Escape rooms are pretty popular ways to test your problem solving skills as a group. This fun sampler will show you how to use energy content to create your own escape room-style puzzles without having to lock your students (and you) in the classroom! Students will enjoy cracking the codes of these educational puzzles to unlock boxes, suitcases, and bookbags instead. Conducting classes virtually? Don't worry – there are fun hints and tips for how to make these activities work in a virtual setting, too!



NEED'S EIGHT STEP 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 generation, and energy efficiency and conservation. Students learn the forms of energy 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 help students to become familiar with the energy sources used today—their formation, exploration, production, distribution, consumption, and economic and environmental trade-offs. Several units and kits are available that explore specific energy sources. *NEED Energy Infobooks* also provide comprehensive information on the major energy sources at four reading levels.



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* curriculum is available, as well as solar, wind, nuclear, coal, and hydropower units and 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. *Transportation Exploration* and *Energy on the Move* help introduce students to transportation sources and technologies in a fun, hands-on way. Try *Transportation Fuels Enigma* and/or *Transportation Fuels Debate* for two additional, exciting options for introducing transportation and to get your energy unit moving!



STEP FIVE: EFFICIENCY AND CONSERVATION

Students learn how energy is consumed in our lives, about efficient technologies, and ways to conserve energy at home and at school. Check out our new and improved energy efficiency and conservation curriculum materials and kits, available for all grade levels.



STEP SIX: SYNTHESIS AND REINFORCEMENT

Many critical thinking and hands-on activities are available to help support the information the students have learned. Activities for students to teach others what they have learned are also available.



STEP SEVEN: EVALUATION

Most *NEED* activities include evaluation strategies within them, including pre- and post-assessments, rubrics, and project-based tasks. *NEED's* Evaluation website contains several examples of these tools for use in the classroom. One such tool, *NEED's* Question Bank, gives teachers the ability to customize evaluation tools to fit the needs of their energy unit. Also found on the website are *NEED'S Energy Polls*, multiple choice energy knowledge polls, at four grade levels. Visit www.NEED.org/educators/evaluations-assessment/ to download the polls, search for assessment questions, view sample rubrics, and for links to standards correlation information to fuel your planning.



STEP EIGHT: STUDENT LEADERSHIP AND OUTREACH

NEED's Youth Energy Conference and Awards Program rewards students and classrooms for documenting their energy outreach efforts and student leadership. See page 34 or visit www.NEED.org/need-students/youth-awards for more information about the Youth Awards Program and Conference. The deadline for project submissions is April 15, 2021.

NEED BASIC CURRICULUM UNITS

NEED and its Teacher Advisory Board have designed NEED's Basic Curriculum Units at four levels to help new teachers plan for and implement energy units in their classrooms. These units are designed to meet national and state standards for each level by teaching the science of energy, sources of energy, electricity and magnetism, transportation, and efficiency and conservation. Synthesis, reinforcement, evaluation, student leadership, and outreach activities are also included.

A teacher may choose to use the NEED Basic Curriculum Unit as shown below by level. Download each basic unit by visiting www.NEED.org/educators/basic-curriculum-units/. Teachers may also customize the unit by choosing and downloading guides or units that meet the needs of their students, or localized standards and programming. Descriptions of all NEED curriculum guides are contained in this catalog. All titles in NEED's library can be downloaded from NEED's website and online store for free in PDF format. Kit-based guides and infobooks are also available in print. See pages 14-29 for pricing information of printed items, where available.

To access each basic unit and download its components, please visit www.NEED.org/educators/basic-curriculum-units/. If large quantities of a title are needed, please contact NEED for more information on printed titles and print requests.

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 -----→	-----	-----→
	←-----	----- Energy Games and Icebreakers -----→	-----	-----→
STEP ONE: <i>Science of Energy</i>	←-----	----- Energy Infobooks* -----→	-----	-----→
	Primary Science of Energy*	Elementary Science of Energy* EnergyWorks*	Intermediate Science of Energy*	Secondary Science of Energy*
STEP TWO: <i>Sources of Energy</i>	←-----	Energy Games and Icebreakers, Energy Infobooks*, and Energy Infobook Activities -----→	-----	-----→
	Energy Stories and More	Energy in the Balance	Great Energy Debate	Energy Enigma
STEP THREE: <i>Electricity and Magnetism</i>	←-----	Energy Games and Icebreakers, Energy Infobooks*, and Energy Infobook Activities -----→	-----	-----→
	Wonders of Magnets	ElectroWorks	ElectroWorks	Mission Possible
STEP FOUR: <i>Transportation</i>	Transportation Exploration	Transportation Exploration	Energy on the Move	Energy on the Move
STEP FIVE: <i>Efficiency and Conservation</i>	←-----	Energy Games and Icebreakers and Energy Infobooks* -----→	-----	-----→
	Using and Saving Energy	School Energy Inspectors* ←-----	School Energy Experts* Energy Conservation Contract -----→	School Energy Managers* -----→
STEP SIX: <i>Synthesis and Reinforcement</i>	←-----	Energy Games and Icebreakers -----→	-----	-----→
	Primary Energy Carnival	Energy Carnival	Energy Carnival ←----- Energy Jeopardy -----→ ←----- Global Trading Game -----→	
STEP SEVEN: <i>Evaluation</i>	←-----	-----	Question Bank -----→	-----→
	←-----	-----	Energy Polls -----→	-----→
STEP EIGHT: <i>Student Leadership and Outreach</i>	←-----	-----	Youth Awards Program Guide -----→	-----→

Note: The guides with asterisks (*) are also available in print.

NEED CURRICULUM MATRIX

The NEED Curriculum Matrix on the following pages 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 eight-step model. Individual descriptions of the curriculum begin on page 14. 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 such as 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, electricity generation, developing technologies, and related careers are often included as well. Whether using a NEED Basic Curriculum Unit or selecting 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.

	PRIMARY (K-2)	ELEMENTARY (3-5)	INTERMEDIATE (6-8)	SECONDARY (9-12)
INTRODUCTORY ACTIVITIES	Energy Games and Icebreakers Energy Polls	Energy Games and Icebreakers Energy Polls	Energy Games and Icebreakers Energy Polls	Energy Games and Icebreakers Energy Polls
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	All About Coal Energy Games and Icebreakers Energy Stories and More Oil, Natural Gas, and Their Energy* Primary Energy Infobook* Primary Energy Infobook Activities The Sun and Its Energy* Water and Energy* Wind is Energy*	All About Coal Digital Energy Elementary Energy Infobook* Elementary Energy Infobook Activities Energy Expos Energy Games and Icebreakers Energy in the Balance Energy Live! Energy Stories and More Exploring Ocean Energy and Resources U.S. Energy Geography Wind for Schools Wonders of Oil and Natural Gas* Wonders of the Sun* Wonders of Water* Wonders of Wind*	Digital Energy Energy Enigma Energy Expos Energy From the Sun* Energy From the Wind* Energy From Uranium Energy Games and Icebreakers Energy Live! Energy of Moving Water* Energy on Public Lands Exploring Ocean Energy and Resources Exploring Oil and Natural Gas* Fossil Fuels to Products Great Energy Debate H ₂ Educate* Intermediate Energy Infobook* Intermediate Energy Infobook Activities Schools Going Solar Understanding Coal U.S. Energy Geography Wind for Schools	Digital Energy Energy Enigma Energy Expos Energy Games and Icebreakers Energy Live! Exploring Coal Exploring Hydroelectricity* Exploring Nuclear Energy Exploring Ocean Energy and Resources Exploring Oil and Natural Gas* Exploring Photovoltaics* Exploring Wind Energy* Fossil Fuels to Products Great Energy Debate H ₂ Educate* 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 The Science of Electricity Wonders of Magnets	Current Energy Affair ElectroWorks Energy Games and Icebreakers Intermediate Energy Infobook* Intermediate Infobook Activities The Science of Electricity Smart Meters	Current Energy Affair Energy Games and Icebreakers Mission Possible The Science of Electricity Secondary Energy Infobook* Secondary Infobook Activities
STEP FOUR: Transportation	Energy Stories and More Hybrid Buses Transportation Exploration	Energy Expos Energy Stories and More Hybrid Buses Transportation Exploration Transportation Fuels Live!	Energy and Our Rivers Energy Expos Energy on the Move Exploring Hybrid Buses H ₂ Educate* Transportation Fuels Debate Transportation Fuels Enigma Transportation Fuels Live!	Energy and Our Rivers Energy Expos Energy on the Move Exploring Hybrid Buses H ₂ Educate* Transportation Fuels Debate Transportation Fuels Enigma Transportation Fuels Live!

STEP FIVE: <i>Efficiency and Conservation</i>	PRIMARY (K-2)	ELEMENTARY (3-5)	INTERMEDIATE (6-8)	SECONDARY (9-12)
	All About Trash Energy Games and Icebreakers Primary Energy Infobook* Today in Energy Using and Saving Energy	Elementary Energy Infobook* Energy Conservation Contract Energy Expos Energy Games and Icebreakers Energy House Managing Home Energy Use* School Energy Inspectors* Talking Trash Today in Energy	Building Science* Energy Conservation Contract Energy Expos Energy Games and Icebreakers Energy House Intermediate Energy Infobook* Managing Home Energy Use* Museum of Solid Waste and Energy Plug Loads School Energy Experts* Today in Energy Understanding Climate Science*	Carbon, Capture, Utilization, and Storage Chemistry and Energy Efficiency Energy Conservation Contract Energy Expos Energy Games and Icebreakers Energy House Exploring Climate Science* Managing Home Energy Use* Museum of Solid Waste and Energy Plug Loads Saving Energy at Home and School* School Energy Managers* Secondary Energy Infobook*
STEP SIX: <i>Synthesis and Reinforcement</i>	Energy Fair Energy Games and Icebreakers NEED Songbook Primary Energy Carnival This Mine of Mine	Digital Energy Energy Around the World Energy Carnival Energy Fair Energy Games and Icebreakers Energy in the Balance Energy Jeopardy Energy Live! Energy Math Challenge Energy on Stage Global Trading Game Greek Mythology and Energy Mystery World Tour NEED Songbook Primary Energy Carnival This Mine of Mine Yesterday in Energy	Digital Energy Energy Analysis Energy Around the World Energy Carnival Energy Games and Icebreakers Energy Jeopardy Energy Live! Energy Math Challenge Energy on Stage Global Trading Game Greek Mythology and Energy Mystery World Tour NEED Songbook This Mine of Mine Yesterday in Energy	Digital Energy Energy Analysis Energy Around the World Energy Games and Icebreakers Energy Jeopardy Energy Live! Energy Math Challenge Energy on Stage Global Trading Game NEED Songbook
STEP SEVEN: <i>Evaluation</i>	Energy Polls Question Bank	Energy Polls Question Bank	Energy Polls Question Bank	Energy Polls Question Bank
STEP EIGHT: <i>Student Leadership and Outreach</i>	Youth Awards Program Guide	Youth Awards Program Guide	Youth Awards Program Guide	Youth Awards Program Guide

Note: All curriculum is available to download in PDF format from shop.NEED.org.

* Guides with asterisks (*) are also available in print. Please contact NEED for more information on printed titles and print requests.

ADDITIONAL RESOURCES

NEED CURRICULUM

Go to shop.NEED.org to view the guides by grade level or topic. All NEED guides are available as a free PDF download.

AWESOME EXTRAS!

Looking for more resources? Our Awesome Extras page contains PowerPoints, animations, Energy At-A-Glance Fact Sheets, coloring pages, and other great resources to compliment what you are teaching in your classroom! This page is available under the Educators tab at www.NEED.org/educators/awesome-extras/.

NEED NEWS

We feature new curriculum, teacher news, upcoming programs, and exciting resources regularly. To read the latest from the NEED network, visit www.NEED.org and scroll to "News".

ONLINE REGISTRATION FOR WORKSHOPS

NEED offers professional development opportunities that energize teachers and remind them of the fun that is possible in the classroom when teaching about energy. These workshops are offered all over the country. View all of our upcoming events and register online at www.NEED.org/events/.

EVALUATIONS AND ASSESSMENT

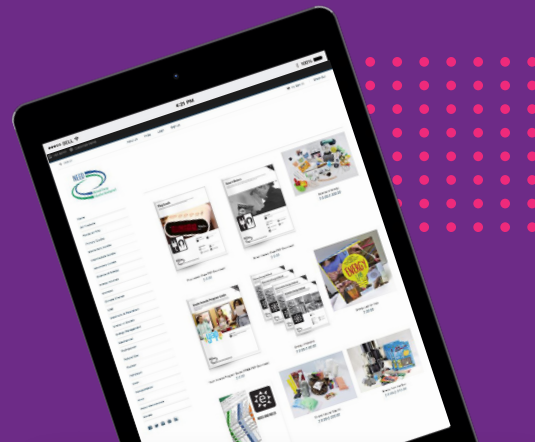
Building an assessment? Searching for standards? Check out our Evaluations page for a question bank, NEED's Energy Polls, sample rubrics, links to standards alignment, and more at www.NEED.org/educators/evaluations-assessment/.

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/.

DISTANCE LEARNING RESOURCES NEW

Many classrooms have made a shift to teaching virtually. NEED has curated a collection of resources to assist teachers as they teach energy in-person, in hybrid settings, in virtual settings, or across distances both asynchronously or synchronously. The Distance Learning page includes links to samples of educational technology; games, puzzles, and energy fair activities; easy hands-on favorites; YouTube videos; and more. Be sure to check out our Teacher-Share-a-Thon page for examples of activities and videos other teachers used successfully. Shoot us an email at info@need.org to share something from your classroom! www.NEED.org/distancelearning



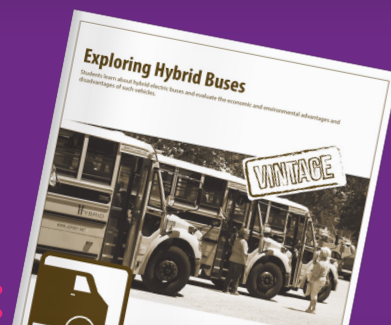
ORDER MATERIALS ONLINE!

SHOP.NEED.ORG

Anemometers and solar cells and light meters-- oh my! Getting your kits (or refills) has never been easier! Check out NEED's official online store at shop.NEED.org.

All titles in NEED's library can be downloaded from NEED's online store. PDFs of the guides are available for FREE download. It's easy as 1 - 2 - 3 - 4.

1. Select "Free PDF Download".
2. Add to your cart.
3. Check out.
4. Check your email for the guide link.



VINTAGE NEED

NEED has been sharing our energy since 1980! And just like fashions and seasons change, curriculum titles come and go as NEED gets older. If you download a book and see this cover, it means this particular title is an oldie, but a goodie. This guide is no longer on NEED's annual update list, but we don't want to say goodbye just yet! And, while data may not be current, the activities inside are still loads of fun. So, download and enjoy because it's okay to kick it old school!

NEED'S SMUGMUG GALLERY

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

On NEED's SmugMug page, you'll find pictures of NEED students learning and teaching about energy. Would you like to submit images or videos to NEED's gallery? E-mail info@NEED.org for more information. Also use SmugMug to find these additional visual resources:

Videos

Need a refresher on how to use Science of Energy with your students? Check out our workshop videos. Also check out our Energy Chants videos! Find some great videos produced by NEED students teaching their peers and community members about energy and energy saving tools.

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, and check out all we've got going on!



Follow us on Twitter. We share the latest energy news from around the country, [@NEED_Project](https://twitter.com/NEED_Project).



Follow us on Instagram and check out the photos taken at NEED events, [instagram.com/theneedproject](https://www.instagram.com/theneedproject).



Follow us on Pinterest and pin ideas to use in your classroom, [Pinterest.com/NeedProject](https://www.pinterest.com/NeedProject).



Subscribe to our YouTube channel for access to video lessons, career profiles, and more! www.youtube.com/user/NEEDproject



Follow us on LinkedIn for information, links to events, and more! [linkedin.com/in/needproject](https://www.linkedin.com/in/needproject)

E-PUBLICATIONS

The NEED Project offers e-publication versions of various guides for classroom use. Guides that are currently available as an e-publication can be found at www.issuu.com/theneedproject.





STEP ONE

SCIENCE OF ENERGY

ENERGY FLOWS

Grades 5-12

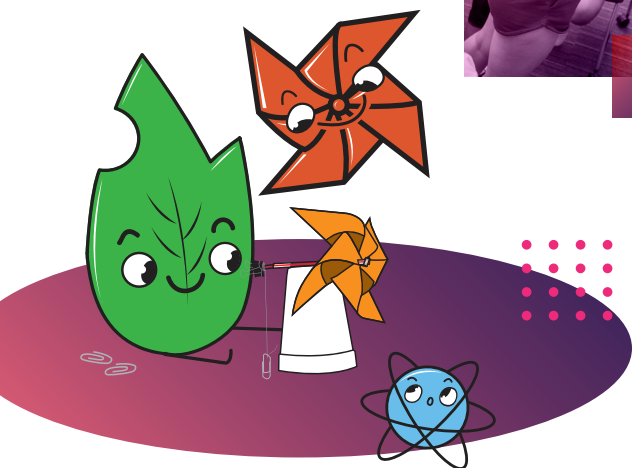
This hands-on activity explains the forms of energy and energy transformations to students. It can be used as a stand-alone activity or a companion activity to the *Science of Energy* Kit.

ENERGY INFOBOOKS

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.

Primary Energy Infobook	\$5.00
Elementary Energy Infobook.....	\$5.00
Class Set of 30 Elementary Energy Infobooks	\$50.00
Intermediate Energy Infobook	\$5.00
Class Set of 30 Intermediate Energy Infobooks.....	\$50.00
Secondary Energy Infobook.....	\$5.00
Class Set of 30 Secondary Energy Infobooks	\$80.00



ENERGYWORKS AND KIT

Grades 4-8

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

The kit includes a Teacher Guide, a class set of 30 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. Prices and information about replacement items can be obtained by calling 1-800-875-5029.

Teacher and Student Guides	\$7.00
EnergyWorks Kit	\$425.00
Class Set of 30 Student Guides	\$140.00



PRIMARY SCIENCE OF ENERGY AND KIT

Grades K-3

This unit includes background information and hands-on experiments to explore the fundamental concepts of energy while practicing their science process skills. 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. 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, instructional masters, and detailed instructions for each activity. The kit also includes 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. Prices and information about replacement items can be obtained by calling 1-800-875-5029.

Teacher and Student Guides	\$6.00
Primary Science of Energy Kit	\$275.00
Class Set of 30 Student Guides	\$65.00



SCIENCE OF ENERGY AND KIT

Elementary Guide (Grades 3-5)

Intermediate Guide (Grades 6-8)

Secondary Guide (Grades 9-12)

This unit provides 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 includes all three leveled guides (elementary, intermediate, and secondary), which include detailed teacher instructions, student instructions for the six stations, laboratory safety procedures, and the equipment necessary to conduct the experiments. The *Science of Energy* Kit is available for sale or rental and works with all three levels of curriculum.

A Class Set of Consumables is available for purchase and contain 8 glow sticks, 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.

Elementary, Intermediate, or Secondary Guides	\$4.00
Science of Energy Kit	\$300.00
Class Set of Consumables	\$50.00



THERMODYNAMICS

Grades 9-12

This unit includes hands-on experiments that explore concepts of thermodynamics. The Teacher Guide contains detailed teacher instructions, a list of materials, answer keys for laboratory experiments, and a sample unit exam, while the Student Guide includes background information and student worksheets. Thermal energy topics covered include: molecular structure, conduction, convection, radiation, specific heat, heat of fusion, and heat of vaporization.



COAL

Grades K-12

Through hands-on, multi-disciplinary activities and background reading, students learn about coal formation and chemical properties, coal mining, the uses of coal, its role in electricity generation, environmental impacts, and careers related to coal mining and electricity generation.

All About Coal (K-5)

Understanding Coal (6-8)

Exploring Coal (9-12)

DIGITAL ENERGY

Grades 5-12

In *Digital Energy* students are tasked with researching an energy topic and creating a digital media presentation that teaches others about their topic. Throughout the project, students will analyze the importance of graphic elements in learning and presenting, and must synthesize the information they read to create their own graphics. *Digital Energy* projects also encourage students to prepare a script, write an assessment for their audience, and facilitate discussion after presenting. This activity is great for differentiated environments and multi-disciplinary classrooms, and can be a great building block after completing *Energy Expos* in your classroom.

ENERGY ENIGMA

Grades 7-12

Students put on their detective hats and research clues to uncover energy facts in *Energy Enigma*. Teams use language arts strategies, critical thinking, and organizational skills to conceal the identity of their energy source while trying to guess which energy sources the other teams represent. Teacher instructions and instructional masters are included. A browser-enabled version is available at shop.NEED.org.

ENERGY EXPOS

Grades 4-12

Students work in groups to develop hands-on exhibits and make presentations to teach others about energy. Expos focus on energy sources, electricity, transportation fuels, and energy conservation. Teacher and student instructions are included in this guide.

ENERGY GAMES AND ICEBREAKERS

Grades K-12

This guide contains entertaining activities to introduce energy, efficiency, and conservation to students, as well as reinforce the information that has already been presented. Activities make wonderful formative assessment tools for use during any energy unit, and can easily be adapted to fit any content.

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.

ENERGY INFOBOOKS

Grades K-12

Energy Infobooks are a great supporting 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.

See page 14 for pricing.

ENERGY INFOBOOK ACTIVITIES

Grades K-12

These guides contain companion activities to the *Energy Infobooks*. They are available on four reading levels that correspond to the infobooks and include teacher guides and answer keys for general energy information, energy sources, electricity, and conservation. Digital versions of the activities can be accessed by visiting www.NEED.org/need-students/games-puzzles-activities/.

ENERGY LIVE!

Grades 4-12

In this amped-up activity, student musical groups write songs and sing about energy sources, electricity, and conservation and efficiency. Audiences learn more from these energy stars as they tell their stories to interviewers out to get the latest energy scoop. Teacher and student instructions are included, along with sample songs and interviews to get students rockin' and rollin'.

ENERGY ON PUBLIC LANDS - VINTAGE NEED

Grades 6-8

Students learn about energy resources found on public lands, and how they are managed by the Bureau of Land Management. This guide includes background information and cooperative learning activities for students to teach others.

ENERGY STORIES AND MORE

Grades K-5

This guide contains a series of stories and hands-on activities that can be used to introduce basic energy concepts and the major energy sources to primary and elementary students.

EXPLORING OCEAN ENERGY AND RESOURCES

Grades 5-12

In this unit, students learn and teach others about the energy and resources found in, under, and near the ocean, such as oil, natural gas, tides, waves, winds, and ocean currents. Students also explore the processes in which these energy sources are retrieved and how we care for the ocean environment, and clean up when accidents happen.

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 instructional masters are included.



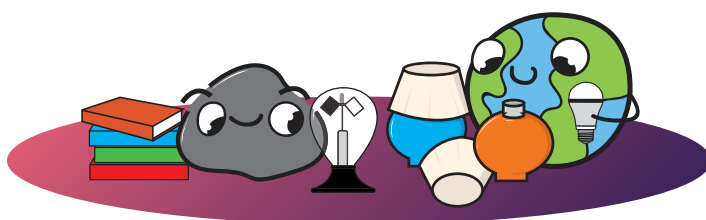
HYDROGEN CURRICULUM

H₂ 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 molecular models, simulate how a fuel cell works, and explore a hydrogen fuel cell car kit. The kit includes a Teacher Guide, a class set of 30 Student Guides, eight sets of electrolysis apparatuses, sodium sulfate electrolyte, molecular modeling materials, fuel cell simulation materials, and a model hydrogen fuel cell car kit with a detailed manual.

Teacher and Student Guides	\$6.00
H ₂ Educate Kit	\$525.00
Class of 30 Student Guides	\$55.00
Class Set of Consumables	\$85.00





HYDROPOWER CURRICULUM

Written at four levels, primary, elementary, intermediate, and secondary students learn about the water cycle, kinetic energy transformations, and electricity. The hydropower curriculum includes background information and hands-on, kit-based activities. Guides are included in the kits, but may also be purchased separately.

WATER AND ENERGY AND KIT

Grades K-2

Primary students are introduced to the forms of energy, properties of water as a solid, liquid, and gas, and the concept of moving water as an energy source through language arts and inquiry-based, hands-on activities. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities.

Teacher and Student Guides	\$6.00
Water and Energy Kit	\$225.00
Class Set of 30 Student Guides	\$60.00
Class Set of Consumables	\$40.00



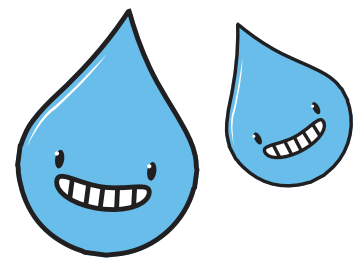
WONDERS OF WATER AND KIT

Grades 3-5

Elementary students learn about the forms of energy, electricity, electrical circuits, properties of water, the water cycle, and how water is used as an energy source through reading, hands-on investigations, and language arts activities. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities.

Teacher and Student Guides	\$6.00
Wonders of Water Kit	\$200.00
Class Set of 30 Student Guides	\$80.00
Class Set of Consumables	\$35.00





ENERGY OF MOVING WATER AND KIT

Grades 6-8

In this unit, intermediate students will develop a comprehensive understanding of energy, electricity, hydropower, and emerging ocean energy technologies through inquiry-based activities and background reading. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities. The kit also includes the materials needed to build six model hydropower turbines.

Teacher and Student Guides	\$6.00
Energy of Moving Water Kit	\$500.00
Class Set of 30 Student Guides	\$85.00
Class Set of Consumables	\$100.00



EXPLORING HYDROELECTRICITY AND KIT

Grades 9-12

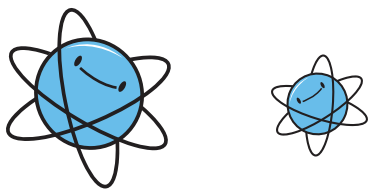
These integrated and inquiry-based activities provide secondary students with a comprehensive study of the scientific, economic, environmental, technological, and societal aspects of hydropower. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities. The kit also includes the materials needed to build six model hydropower turbine generators.

Teacher and Student Guides	\$6.00
Exploring Hydroelectricity Kit	\$450.00
Class Set of 30 Student Guides	\$100.00
Class Set of Consumables	\$175.00



COMING SOON FOR 2020!

NEED has worked with the National Renewable Energy Lab to develop a hydropower unit for Career and Technology classrooms! This unit will explore the “nuts and bolts” of everything related to conventional hydropower and take a deeper dive into career readiness skills. Check shop.NEED.org/collections/hydropower in late 2020 for more information!



OIL & NATURAL GAS CURRICULUM

NUCLEAR ENERGY

Grades 6-12

Through background information and hands-on activities, students will learn the chemistry and physics of the uranium atom, the process of fission, how a nuclear power plant works, the history of nuclear energy, and its role in producing electricity. A culminating assignment at the close of the unit has students researching and preparing for a mock Nuclear Regulatory Commission hearing regarding the building of a new nuclear reactor. The guides each contain detailed teacher guides and instructional masters.

Energy From Uranium (6-8)

Exploring Nuclear Energy (9-12)

U.S. ENERGY GEOGRAPHY

Grades 4-12

This HTML-based 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 multi-disciplinary activity.



OIL AND NATURAL GAS AND KIT

Grades K-12

Through background reading and hands-on activities, students are introduced to oil and natural gas formation, composition and properties, exploration, production, processing, liquefaction, transportation, uses, and careers in the oil and natural gas industries. Students will explore sound waves, take core samples, examine physical properties of the rocks that trap oil and natural gas, and practice recovering fluids from various structures. The kit includes all three leveled guides for primary, elementary, and intermediate/secondary students with detailed teacher instructions, student worksheets, and necessary masters and manipulatives. The kit also includes a set of materials necessary to conduct the activities in a station style format.

Oil, Natural Gas, and Their Energy (K-2)	\$6.00
Wonders of Oil and Natural Gas (3-5)	\$6.00
Exploring Oil and Natural Gas (6-12)	\$7.00
Oil and Natural Gas Kit	\$250.00



FOSSIL FUELS TO PRODUCTS

Grades 7-12

Hands-on activities and background information introduce students to fossil fuels and the processes involved to create many of the products we use daily. Students learn about exploration, production, refining, chemical manufacturing, transportation, marketing, and uses of petroleum, natural gas, and their products in the industrial sector. *Fossil Fuels to Products* is great for upper intermediate students and secondary students and works very well with the *Exploring Oil and Natural Gas* kit shown above.



SOLAR CURRICULUM

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 hands-on investigations and activities. Guides are included in the kits, but may also be purchased separately.

THE SUN AND ITS ENERGY AND KIT

Grades K-2

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 an all-encompassing teacher and student guide and the materials necessary to conduct the activities.

The Sun and Its Energy Guide	\$5.00
The Sun and Its Energy Kit	\$250.00
Class Set of Consumables	\$60.00



WONDERS OF THE SUN AND KIT

Grades 3-5

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 30 Student Guides, and the materials necessary to conduct the activities.

Teacher and Student Guides	\$5.00
Wonders of the Sun Kit	\$325.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



ENERGY FROM THE SUN AND KIT

Grades 6-8

Intermediate students learn about solar energy through investigations that explore radiant energy transforming into thermal energy, kinetic energy, chemical energy, and electricity. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities.

Teacher and Student Guides	\$5.00
Energy From the Sun Kit	\$325.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$40.00



EXPLORING PHOTOVOLTAICS AND KIT

Grades 9-12

Secondary students learn how solar energy is used to generate electricity. Students are introduced to photovoltaic systems, concentrated solar power, and developing solar technologies. Activities explore how photovoltaic cells work and what variables affect their electrical output. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities.

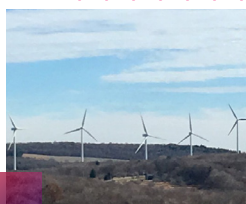
Teacher and Student Guides	\$5.00
Exploring Photovoltaics Kit	\$325.00
Class Set of 30 Student Guides	\$50.00



SCHOOLS GOING SOLAR

Grades 6-12

This guide provides lessons and activities to support and incorporate installed photovoltaic systems and their data into the classroom learning environment. It is an excellent supplement to the solar curriculum shown on pages 21–22.





WIND CURRICULUM

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 are included in the kits, but may also be purchased separately.

WIND IS ENERGY AND KIT

Grades K-2

Students begin to develop an understanding of how wind is formed and used as an energy source through hands-on activities and teacher-supported reading. 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 30 Student Guides, and the materials necessary to conduct the activities, including two KidWind Weightlifter Turbines.

Teacher and Student Guides	\$5.00
Wind is Energy Kit	\$350.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$62.00



WONDERS OF WIND AND KIT

Grades 3-5

Elementary students learn about wind through reading and activities that focus on observation and inquiry. Students will learn to measure wind speed and direction, and will investigate how wind does work and generates electricity. The kit comes with a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities, including one KidWind Weightlifter Turbine and one KidWind Geared Turbine.

Teacher and Student Guides	\$5.00
Wonders of Wind Kit	\$375.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



ENERGY FROM THE WIND AND KIT

Grades 6-8

Intermediate students develop a comprehensive understanding of wind formation, wind energy, and electricity generation from wind through reading, critical thinking activities, hands-on investigations, and engineering challenges. The kit comes with a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities, including two KidWind Geared Turbines.

Teacher and Student Guides	\$5.00
Energy From the Wind Kit	\$550.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



EXPLORING WIND ENERGY AND KIT

Grades 9-12

These hands-on, critical thinking activities help students to develop a comprehensive understanding of the scientific, economic, environmental, technological, and societal aspects of wind energy. Students are challenged to design the optimum blades for a turbine and consider the best place to locate a turbine. The kit comes with a Teacher Guide, a class set of 30 Student Guides, and the materials necessary to conduct the activities, including two KidWind Geared Turbines.

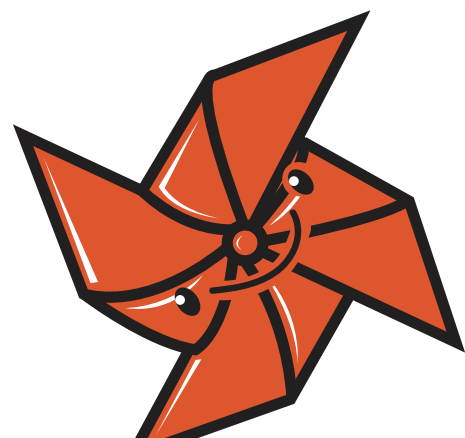
Teacher and Student Guides	\$5.00
Exploring Wind Energy Kit	\$550.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



WIND FOR SCHOOLS

Grades 4-12

This guide provides lessons and data-driven activities to support and incorporate small wind systems into the classroom learning environment. It is an excellent supplement to the wind curriculum shown on pages 23–24.





STEP THREE

ELECTRICITY AND MAGNETISM

COAL, HYDROGEN, HYDROPOWER, OIL AND NATURAL GAS, NUCLEAR, SOLAR, AND WIND

These sources of energy units each include information on electricity generated from the renewable and nonrenewable sources that power our nation. Each source contributes differently to electric power generation and the activities and text within each guide address its generation, delivery to customers, technologies available, and even related careers.

See descriptions of the curricula and kit inclusions on pages 16-24.

CURRENT ENERGY AFFAIR

Grades 6-12

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

ELECTROWORKS

Grades 4-7

This guide includes background information and hands-on experiments that explore the basic concepts of atomic structure and electricity. Center-based experiments on static electricity, batteries, magnets, electromagnetism, and circuits are included.

ENERGY EXPOS

Grades 4-12

Students work in groups to develop hands-on exhibits and make presentations to teach others. Teacher and student directions for exhibits that focus on electricity, energy sources, transportation, and efficiency and conservation are included.

ENERGY GAMES AND ICEBREAKERS

Grades K-12

"Electric Connections" is an activity featured within *Energy 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. This activity and others within this guide help to reinforce energy sources and their contributions to electricity.

ENERGY INFOBOOKS AND INFOBOOK ACTIVITIES

Grades K-12

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

See page 14 for Infobook pricing and availability.

ENERGY STORIES AND MORE

Grades K-5

This guide contains a series of stories and hands-on activities that can be used to introduce basic energy concepts such as electricity to primary and elementary students.

MISSION POSSIBLE

Grades 9-12

Mission Possible is an activity in which students are challenged to develop an energy plan to provide more electricity 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.

SMART METERS

Grades 6-8

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

THE SCIENCE OF ELECTRICITY AND KIT

Grades 5-12

This engineering and design activity tasks students with assembling their own generator model, using magnets, wire, and simple lab items. After assembling the model to specifications and observing its function, students can aim to optimize the design of the model, utilizing fewer or less costly materials to generate a larger amount of electrical output – a real-world challenge for electrical engineers. *The Science of Electricity* can be downloaded individually, but is also found within several of NEED's energy source units including coal, hydropower, and nuclear.

Science of Electricity Model Kit **\$65.00**

WONDERS OF MAGNETS

Grades 1-4

Students explore the basics of magnets and magnetism through background reading and hands-on, center-based experiments.



STEP FOUR

TRANSPORTATION

ENERGY AND OUR RIVERS - VINTAGE NEED

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.

ENERGY EXPOS

Grades 4-12

Students work in groups to develop hands-on exhibits and make presentations to teach others. Teacher and student instructions for exhibits focusing on transportation fuels, and other energy topics are included in this guide.

ENERGY STORIES AND MORE

Grades K-5

This guide contains a series of stories and hands-on activities that can be used to introduce basic energy concepts including transportation to primary and elementary students. For example, 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 each story.

H₂ EDUCATE

Grades 6-12

This intermediate and 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.

See page 17 for kit details and pricing.

HYBRID BUSES - VINTAGE NEED

Grades K-12

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)

Curriculum is fantastic. It is relevant and updated quite frequently.

8-12th grade teacher, TX

TRANSPORTATION FUELS

Grades 2-10

Students of all ages take an interest in transportation. In these guides, students will become familiar with modes of transportation, fuels used for transportation, and emerging technologies in transportation. Student backgrounders, vocabulary and math activities, and hands-on lab activities will help students to develop an understanding of the economic, environmental, and societal impacts of using various transportation fuels to move people and goods, and how they can become educated consumers as they choose how they get around.

Transportation Exploration (2-5)

Energy on the Move (6-10)

TRANSPORTATION FUELS DEBATE

Grades 6-12

Students evaluate the advantages and disadvantages of conventional and alternative transportation fuels in a debate format. Teacher instructions and instructional masters are included to help students develop arguments on the merits of each fuel.

TRANSPORTATION FUELS ENIGMA

Grades 7-12

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

TRANSPORTATION FUELS LIVE!

Grades 4-12

Student musical groups write songs and sing about transportation fuels in this amped up activity. Audiences learn more from these energy stars as they tell their stories to interviewers out to get the latest scoop. Teacher and student instructions are included, along with sample songs and interviews to get students rockin' and rollin'.





STEP FIVE

EFFICIENCY AND CONSERVATION

BUILDING SCIENCE AND KIT

Grades 6-8

This unit teaches the science involved with keeping building occupants healthy and comfortable and the buildings energy efficient. Activities introduce the house as a system as students explore conduction with insulation materials, investigate heat transfer using infrared thermometers, simulate home airflow, and test building performance measures. The kit includes an all-encompassing teacher and student guide, and all of the tools and materials necessary to conduct the activities.

Teacher/Student Guide	\$6.00
Building Science Kit\$525.00



EXPLORING CLIMATE SCIENCE AND KIT

Grades 9-12

In this module, secondary students get a comprehensive look at climate science and changing climate through hands-on, critical thinking activities. Activities explore the basics of carbon molecules, the chemistry and behaviors of carbon dioxide, greenhouse gases and the greenhouse effect, the carbon cycle, ocean acidification, and energy consumption as it relates to carbon dioxide emissions. The kit includes a combination Teacher/Student Guide and all the materials necessary to conduct the activities.

Teacher/Student Guide	\$6.00
Exploring Climate Science Kit\$235.00



CARBON CAPTURE, UTILIZATION, AND STORAGE

Grades 9-12

This guide incorporates informational text and hands-on explorations to teach students about the properties of carbon dioxide. Students also explore existing and developing technologies that allow carbon to be captured from stationary sources, utilized for production, or stored in geologic formations.

CHEMISTRY AND ENERGY EFFICIENCY

Grades 9-12

In this web-based 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. Chemistry and Energy Efficiency can be viewed at www.NEED.org//Files/chemistry/ChemistryHome.html.

UNDERSTANDING CLIMATE SCIENCE AND KIT

Grades 6-8

In the middle school climate unit, students will use apply basic chemistry knowledge to begin to look closely at climate science and changing climate through hands-on, critical thinking activities. Activities explore the basics of carbon molecules, the behaviors of carbon dioxide, greenhouse gases and the greenhouse effect, the carbon cycle, land and sea ice, and energy consumption as it relates to carbon dioxide emissions. The kit includes a combination Teacher/Student Guide and all the materials necessary to conduct the activities.

Teacher/Student Guide	\$6.00
Understanding Climate Science Kit\$225.00





ENERGY EFFICIENCY CURRICULUM

SCHOOL ENERGY INSPECTORS

Grades 3-5

Elementary students are introduced to the basic concepts of energy use and energy efficiency and conservation, using the school setting as the laboratory for developing observations and collecting energy data. Lessons and activities in this unit have been designed in a series to build on one another, providing all the foundations elementary learners need to conduct a guided student energy audit of their classroom learning space. Students are encouraged to teach other classrooms energy saving behaviors and recognize each other for good energy-saving habits. The kit includes a Teacher Guide, a class set of 30 Student Guides, rewards, and the tools and materials necessary to measure and observe energy use.

Teacher and Student Guides	\$6.00
School Energy Inspectors Kit	\$300.00
Class Set of 30 Student Guides	\$65.00



SCHOOL ENERGY EXPERTS

Grades 6-8

Intermediate students are introduced to the concepts of energy, energy consumption, conservation and efficiency, and the economic and environmental effects of consuming energy. Hands-on activities in this unit use the school as a real-world laboratory to measure energy consumption in the school setting, while quantifying costs and impacts to their budget and their local environment. The lessons build upon one another, allowing students to explore heating and cooling, electricity, and lighting, before culminating in a building-wide audit. The kit includes a Teacher Guide, a class set of 30 Student Guides, and the tools and materials necessary to conduct the activities.

Teacher and Student Guides	\$6.00
School Energy Experts Kit	\$375.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



ENERGY CONSERVATION CONTRACT

Grades 4-12

In this outreach activity, students learn about energy conservation and ask their families to sign contracts in which they agree to save energy. Students then calculate the energy savings, and re-evaluate their conservation measures.

ENERGY EXPOS

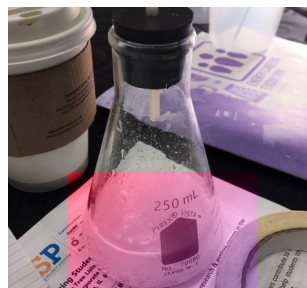
Grades 4-12

Students work in groups to develop hands-on exhibits and make presentations to teach others. Teacher and student directions for exhibits that focus on energy sources, transportation fuels, and energy conservation are included.

ENERGY GAMES AND ICEBREAKERS

Grades K-12

This guide contains entertaining introductory energy activities and games that also reinforce efficiency and conservation measures. Activities include "Energy Chants", "Energy Bingo", "America's Most Wanted Energy Wasters", "Energy Web Game", and more!



Grades 9-12

Teacher and Student Guides	\$6.00
School Energy Managers Kit	\$375.00
Class Set of 30 Student Guides	\$50.00
Class Set of Consumables	\$55.00



Grades 3-12

Managing Home Energy Use

A guide to measuring energy consumption, using audit tools, and implementing conservation practices in the home.

School Energy Experts Teacher Guide

Hands-on activities that empower students in the ways in which we use energy in school buildings. The school becomes a living laboratory as students explore thermal energy transfer, electricity, lighting, and even conduct their own building audits.

NEED
National Energy Education Development Project

NEED
National Energy Education Development Project

Grade Levels:
Intermediate

Subject Areas:

Science	Social Studies
Language Arts	Math
Technology	

NEW!

BLUEPRINT FOR SCHOOL ENERGY TEAMS

This guide is an excellent tool for schools seeking to lower energy related expenses through the formation of a student energy team and the adoption of school-wide energy policies. School leaders and administrators will find a comprehensive plan for getting started and managing ongoing programs while involving their student body. NEED's building operators and Certified Energy Managers can also lead building staff and students in trainings that help make the best use of energy technologies and behaviors.



ENERGY INFOBOOKS

Grades K-12

Energy Infobooks are a great supporting 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. See page 14 for pricing.

PLUG LOADS

Grades 6-12

This unit guides students through an in-depth investigation of electricity consumption by appliances and machines in the school building. Students gather data, calculate energy use and economic and environmental costs over time, and determine ways to reduce consumption. Students also explore phantom or vampire loads and the many operational modes electrical devices employ. Instructional masters are included and digital copies of spreadsheets are available at shop.NEED.org.

SOLID WASTE, ENERGY, AND RECYCLING

Grades K-12

Students learn about solid waste, its relationship to natural resources and energy, and options for handling solid waste including recycling, landfilling, waste-to-energy plants, and incineration.

All About Trash (K-2)

Talking Trash (3-5)

Museum of Solid Waste and Energy (6-12)

TODAY IN ENERGY

Grades K-8

These activities introduce students to the economics of energy use. Choices, trade-offs, and costs are explored using math and critical thinking skills.

USING AND SAVING ENERGY

Grades K-2

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

ENERGY HOUSE

Grades 3-12

In this activity, students learn about efficiency, conservation, and diminishing returns by using various materials to build and insulate a model house and then test its efficiency.





STEP SIX

SYNTHESIS AND REINFORCEMENT

DIGITAL ENERGY

Grades 5-12

In *Digital Energy* students are tasked with researching an energy topic and creating a digital media presentation that teaches others about their topic. Throughout the project, students will analyze the importance of graphic elements in learning and presenting, and must synthesize the information they read to create their own graphics. *Digital Energy* projects also encourage students to prepare a script, write an assessment for their audience, and facilitate discussion after presenting. This activity is great for differentiated environments and multi-disciplinary classrooms, and can be a great building block after completing *Energy Expos* in your classroom.

ENERGY ANALYSIS - VINTAGE NEED

Grades 7-12

This activity emphasizes research and analysis of information in graph format. Activities encourage students to discern energy trends using the Energy Information Administration's raw data and reports and additional graphs within the Teacher Guide. Students will also analyze energy trends based on historical and societal events.

ENERGY AROUND THE WORLD - VINTAGE NEED

Grades 5-12

This guide includes maps and energy information for countries around the globe. Student groups research assigned countries and make presentations to the class that compare the United States' energy use to energy use around the world.

ENERGY CARNIVALS

Grades K-8

NEED's popular carnival games are an excellent way to encourage students and adults to think about energy. *Energy Carnival* contains complete instructions and reproducible masters for carnival games focusing on energy and energy efficiency. *Energy Carnival* is ideal for elementary or middle school students and makes an excellent activity for an energy fair or Earth Day celebration. *Primary Energy Carnival* contains similar games leveled appropriately for students in grades K-3.

Primary Energy Carnival (K-3)

Energy Carnival (4-8)

“It's an awesome resource! I love the activities and more importantly, my students love the activities!”

6th grade teacher, OK

ENERGY FAIR

Grades 1-5

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 website at www.NEED.org/need-students/science-fair-projects/.

ENERGY GAMES AND ICEBREAKERS

Grades K-12

This guide contains entertaining activities to introduce energy, efficiency, and conservation to students, as well as reinforce the information that has already been presented.

ENERGY IN THE BALANCE

Grades 3-5

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

ENERGY JEOPARDY

Grades 4-12

Students will enjoy NEED's spin on the popular trivia game show. Jeopardy categories that help to reinforce your energy unit include: More MPGs, Famous Americans in Energy, Leading Nations, and more. A digital version of the game is available at shop.NEED.org.

ENERGY LIVE!

Grades 4-12

In this amped-up activity, student musical groups write songs and sing about energy sources, electricity, and conservation and efficiency. Audiences learn more from these energy 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 to get students rockin' and rollin'.

ENERGY MATH CHALLENGE

Grades 3-12

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

ENERGY ON STAGE

Grades 4-12

This resource uses plays and poems to reinforce the energy sources and energy conservation. Each play includes an individual teacher guide that has expanded vocabulary and activity extensions.

GLOBAL TRADING GAME

Grades 5-12

In this cooperative learning activity developed by the Ohio Energy Project, students become economic advisors, geologists, international traders, and miners as they analyze their assigned country's resources and needs, then trade resources with other countries to enhance their economic position and environmental quality.

GREEK MYTHOLOGY AND ENERGY

Grades 4-8

This guide provides resource materials and a teacher guide for incorporating Greek mythology into your science curriculum. This innovative interdisciplinary activity focuses on the forms of energy and was developed by Donna Quillen of North Carolina.

MYSTERY WORLD TOUR

Grades 4-8

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 each mystery nation.

NEED SONGBOOK

Grades K-12

Reinforce energy concepts and sing along to NEED's favorite songs, including "The NEED Clap", "NEED students are High-Minded", "E-N-E-R-G-Y", and "What Do You Do With An Energy Waster?"

THIS MINE OF MINE

Grades 2-6

This hands-on set of activities allows students to dig deep as they explore the formation, geology, recovery, and uses of coal, as well as reclamation of mine sites.

YESTERDAY IN ENERGY

Grades 4-8

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





STEP SEVEN

EVALUATION

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. Check out NEED's assessments and evaluation page for more information, example rubrics, and other tools: www.NEED.org/educators/evaluations-assessment/.



ENERGY POLLS

Grades K-12

Use one of NEED's *Energy Polls* prior to beginning your unit and as you close your unit. There are polls on four reading levels—primary, elementary, intermediate, and secondary. Polls can be returned to NEED for analysis. Show us what your students are learning!

Many NEED guides and activities also contain unit exams and suggestions for how to evaluate student performance. Please feel free to modify these suggestions as necessary. Download the basic polls at www.NEED.org/educators/evaluations-assessment/.

QUESTION BANK

Grades K-12

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, multiple choice, and higher order thinking questions are included. You can access the online Question Bank at www.NEED.org/educators/evaluations-assessment/.



CURRICULUM CORRELATIONS

NEED has correlated all materials to meet relevant standards for learning. NEED materials support Next Generation Science Standards, Common Core State Standards for English/Language Arts and Mathematics, and individual state science standards, where applicable. Access the correlations files for the relevant standards by visiting NEED's evaluation page or the correlations page, www.NEED.org/educators/curriculum-correlations/.



This is a great way to get students engaged in their own learning and future.

6-8th grade teacher, IL



STEP EIGHT

STUDENT LEADERSHIP AND OUTREACH

An integral part of NEED's curriculum is the Kids Teaching Kids approach. Students are most authentically assessed when they have to share their knowledge with others. Encouraging students to become leaders in the classroom and school also helps ensure that students are empowered to become good stewards for energy awareness in their communities.

ENERGY OUTREACH OVERVIEW

Step One – Focus!

Effective energy outreach projects allow the whole class to get involved. Set your goals as a group. Identify the group(s) you want to reach with your activities. Do you want to focus on just your school, or do you want to include families, other schools, community leaders, senior citizens, or the whole community? It is also important to select the focus for your activities. Do you want to increase energy awareness, institute a school-wide program, do a community demonstration, correct individual problems, or change community policy? Maybe you've identified several focus points or goals. Make a folder or poster for each goal in your project, and assign committees of students to work on each.

Step Two – Plan it Out!

Student committees should meet to create a plan for each goal. Plans should identify the objectives, activities, estimated time, potential costs, materials needed, and who will be involved with helping to accomplish each goal. Ask students to think outside the box – who can they incorporate from the community? All groups should meet and discuss the plans as a whole class to create a master plan. Identify dates for each task to be completed. Mark dates on a calendar or timeline for the whole class.

Step Three – Work it Out!

Group members should sign up for tasks or select tasks to complete. Assist groups to make sure they have enough manpower to complete their projects. Committee members should work together, meet together, and accomplish their goal(s) to make sure the project is completed. Make sure each group is documenting their activities, taking pictures to share with their community and NEED!

Step Four – Take Pride!

Evaluate the progress of the projects at group meetings and as a class. Ask community members or school partners to evaluate your progress and share in your successes. Summarize your efforts for each goal and the overall master plan.

NOW WHAT?

NEED encourages classrooms who complete energy outreach projects to turn their projects into Youth Awards Projects. The Youth Awards Program for Energy Achievement rewards students for their outreach efforts. Check out the descriptions below, learn more about the program and projects in our *Youth Awards Program Guide*, and visit NEED's Youth Awards website: www.NEED.org/need-students/youth-awards.

YOUTH AWARDS PROGRAM OVERVIEW

The Youth Awards Program for Energy Achievement 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. NEED encourages all schools to participate in Youth Awards by having their students document their energy activities and projects and submit them to NEED for judging.

Students should keep track of their goals, activities, outreach opportunities, and their evaluations of their activities. Students will then create a digital project summarizing their efforts to submit for judging. Students can submit two different types of projects, depending on their engagement in the activities and outreach completed. The deadline for project submissions is April 15, 2021.

RECOGNITION

In 2021, the 41st Annual NEED Youth Energy Conference and Awards Program will give students opportunities to learn about energy and to explore energy in STEM (science, technology, engineering, and math). The annual June conference will have students from across the country working in groups on an Energy Challenge designed to stretch their minds and energy knowledge.

The Youth Energy Conference will be held in Washington, D.C., June 25-28, 2021. The conference culminates with the Youth Awards Ceremony. Winning students whose projects fit the criterion for judging are eligible to attend the ceremony and network with students from across the country! Other projects will also be recognized at the local level for their outstanding efforts in the classroom and community.

YOUTH AWARDS PROGRAM GUIDE

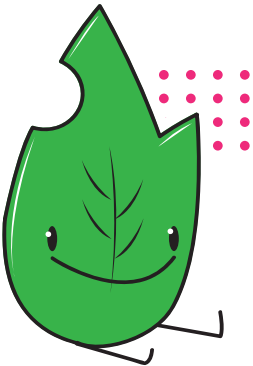
For project descriptions and guidelines, application and submission procedures, and more information about the program and recognition ceremony, be sure to turn to NEED's Youth Awards Program Guide. This guide serves as a handbook to outline the process of engaging your students in energy outreach, leadership, and fun. It also contains templates for student work, project suggestions and tips, and even the judging rubric! Also, check out www.NEED.org/youth-awards. The guide to the program can be downloaded here, as well as photos from past events, previous winning projects, and FAQs. We hope to see you in June!

NEED MERCHANDISE

NEED T-SHIRTS

NEED t-shirts with the NEED 2020-2021 design. Shirts are available in adult sizes S-XXL. Call for availability.

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



POLAR BEAR AND FISH BUTTONS

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

- Polar Bear Button \$0.50
- Fish Button \$0.50

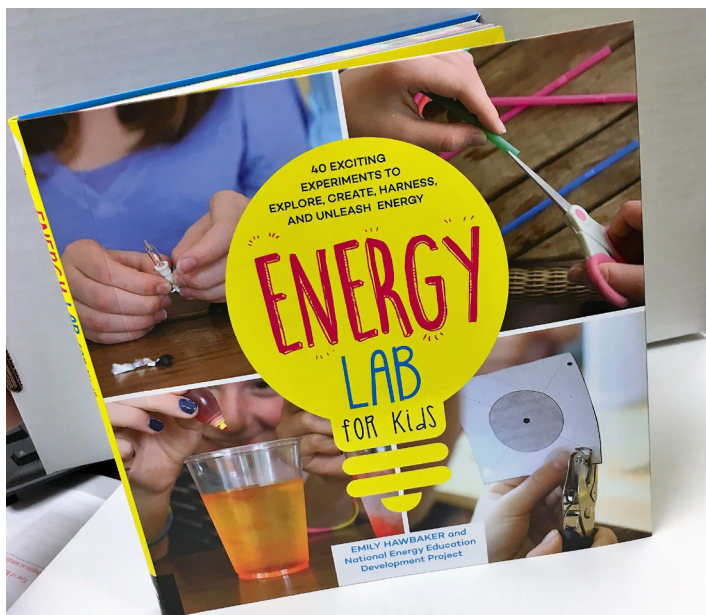
(Riddles can be found online at www.NEED.org)



“Always amazing, great resources!”

K-8th grade teacher, RI





ENERGY LAB FOR KIDS

Prepared by Emily Hawbaker and the expert team at The NEED Project, the lab activities in this book will let you explore almost everything about energy - what it is, how we find it, how we use it, and how we can save it. Written for at-home or classroom energy explorations, this guide works well for all ages, but is geared especially for elementary and middle school students.

Energy Lab for Kids Book..... **\$20.00**



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.

Tote **\$12.00**



NEED PENS

NEED pens are made from recycled plastic with NEED information imprinted on the shaft.

Pen..... **\$1.50**



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.

Pencil..... **\$0.50**

ORDER MATERIALS ONLINE!

SHOP.NEED.ORG

Anemometers and solar cells and light meters-- oh my! Getting your kits (or refills) has never been easier! Check out NEED's official online store at shop.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 e-mail info@NEED.org, or call 1-800-875-5029.

ORDER FORM

THE NEED PROJECT

8408 Kao Circle Manassas, VA 20110

Order Online at shop.NEED.org

Fax Order Form To: 1-800-847-1820

For Questions Call: 1-800-875-5029

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Did you attend a NEED workshop?

☐

Yes

☐

No

If so, please give the location: _____

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Independent Petroleum Association of New Mexico

Jackson Energy

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Kansas Corporation Energy Commission

Kansas Energy Program – K-State Engineering Extension

Kansas Corporation Commission

Kentucky Office of Energy Policy

Kentucky Environmental Education Council

Kentucky Power–An AEP Company

Kentucky Utilities Company

League of United Latin American Citizens – National Educational Service Centers

Leidos

LES – Lincoln Electric System

Linn County Rural Electric Cooperative

Llano Land and Exploration

Louisiana State University – Agricultural Center

Louisiana State Energy Office

Louisville Gas and Electric Company

Midwest Wind and Solar

Minneapolis Public Schools

Mississippi Development Authority–Energy Division
 Mississippi Gulf Coast Community Foundation
 National Fuel
 National Grid
 National Hydropower Association
 National Ocean Industries Association
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