



Clean Energy Education Program

Program Guide 2024-2025

A note from the Clean Energy Education Program partners...

The **Clean Energy Education Program** is a STEM-based program that helps bring exciting and engaging energy curriculum to the classrooms of North Carolina teachers.

This new program, which is aligned with North Carolina State Science Standards, is offered [by NC GreenPower](#) and combines educator professional development, hands-on classroom activities, and classroom mini-grants to enhance the experience of all students and expose them to the energy field and STEM. All K-12 schools are invited and encouraged to apply for this opportunity! Participating schools are invited to take part in energy education workshops where they will receive STEM kits for their classroom. Classroom kits will engage students in the science of energy and how energy impacts their life daily.

Schools will receive

- Professional development for a team of educators.
- Hands-on classroom kits on energy transformations, renewable energy, and energy efficiency.
- Materials to conduct an energy fair for your community.
- The opportunity to apply for a classroom supply mini-grant.
- An educational energy audit for students with one of NEED's Certified Energy Managers.

Teachers and students engage in science, technology, engineering and mathematics activities in the classroom while learning fundamental principles of energy use and conservation. Students learn best when engaged in inquiry learning — and the activities and explorations included in the program allow them to think, explore, share, and develop a profound respect for energy and the world around them.

We know that teaching others helps us learn as well, and the Kids Teaching Kids philosophy woven throughout The NEED Project curriculum helps keep students of all learning styles engaged and excited to learn. The lessons and projects in this program are designed to allow students to teach their peers as well as their local community.

Welcome to the Clean Energy Education Program!

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Contact Information for Questions or Assistance:

Program Website www.ncgreenpower.org/clean-energy-education-program

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For Program questions, Energy Fair, and All others:

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The Partners

NC GreenPower (www.ncgreenpower.org)

Formed by Advanced Energy in 2003, NC GreenPower is a nonprofit whose mission is to expand public knowledge and acceptance of cleaner energy technologies to all North Carolinians through local, community-based initiatives. Since NC GreenPower's inception, donors have supported more than 1,125 local renewable energy and carbon offset projects, producing 1.07 billion kilowatt-hours of green energy and mitigating nearly 123,800 tons of greenhouse gases. In 2015, NC GreenPower launched Solar+ Schools to support solar photovoltaic installations at K-12 schools. Contributions to NC GreenPower are tax deductible.

The National Energy Education Development (NEED) Project (www.need.org)

The mission of The National Energy Education Development (NEED) Project is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government leaders, and community leaders to design and deliver objective, multi-sided energy education programs. The NEED Project is dedicated to developing innovative energy education materials and training programs for teachers and students. Launched by Congressional Resolution in 1980, the NEED serves over 65,000 classrooms in the United States and around the globe.

What is the Clean Energy Education Program?

The **Clean Energy Education Program** is "STEM project-based," combining classroom activities with a school energy audit by students, a student-run energy fair, and a STEM Challenge.

1. Select a team of science and/or technology teachers to implement the program. It is recommended that no fewer than two teachers participate – to provide support for each other and to reach the most students. Consider selecting a career and technology teacher and a science teacher, for example.
2. Participate in three one-day professional development sessions for educators in October, December, and February.
3. Work with students, faculty, parents, and community members to plan and implement an energy-focused STEM project in your community. This project is to be completed and submitted by April 20, 2025.
4. Host an Energy Fair at your school for the local community. This Energy Fair will include an Energy Carnival and hands-on energy lessons for your school community. Schools will be provided an Energy Fair Kit that will include all needed resources for the Energy Fair.
5. Work with NEED to plan for the Educational Energy Audit experience for a select team of students. NEED's Certified Energy Manager will work with a group of students to survey the school building and make recommendations for increasing energy conservation in the school.
6. Share about your program via your school and community communication networks and social media. Good platforms for sharing include PTA newsletters, community newsletters, social media platforms, and local news channels.
7. Execute the STEM project and create a presentation, video, and/or student performance about the project and its results. Submit the project for review by April 20, 2025. Participation from all schools is required.
8. Complete teacher and student evaluations and submit to NEED no later than June 15, 2025.

What Resources Does the School Receive?

The Clean Energy Education Program includes:

1. Three one-day teacher trainings (substitute reimbursement and travel for out-of-town educators)
2. A cash grant to support the school's STEM and energy-focused project
3. Curriculum and hands-on kits to teach about:
 - the science of energy and energy transformations
 - renewable energy
 - energy efficiency and conservation
4. A Clean Energy Education Program Energy Fair Kit to host an Energy Fair and Carnival at your school
5. Access to educational energy audits

The Curriculum and Hands-on Kits

NEED curriculum and kits for the program will be showcased throughout the workshop. The website for program resources for CEEP is www.ncgreenpower.org/clean-energy-education-program. All curriculum guides are found online at www.need.org.

Standards Correlations and Support

All NEED curriculum supports and is correlated to relevant national standards and state standards. For correlations documents for NGSS, CCSS, and North Carolina State Science Standards, visit www.need.org/curriculumcorrelations.

Curriculum Guides

We have chosen from over 150 teacher and student guides for teaching the science of energy, sources of energy, electricity and transportation, and efficiency and conservation. All guides can be downloaded or ordered from NEED for supplementing the unit, if time permits.

Hands-on Student Kits

The program will include selections from NEED's hands-on classroom kits. All teachers will receive the *Science of Energy* Kit, and either a solar or wind education kit. Schools that participate in an energy audit will receive an energy management kit.

The Guide to Teaching about Energy

This program encourages students to learn about energy through direct engagement – discovering and applying energy knowledge to the energy choices and challenges we all face, both now and in the future. This guide to teaching about energy was created to provide the background and foundation components for the successful completion of the program. Most of the resources referenced within the guide will be provided to participating educators but are also available for download at any time at www.need.org.

Educational Energy Audits

Teams of students and teachers from the schools will work with NEED's Certified Energy Manager on an Educational Energy Audit of their school building. CEMs will work with students for a half day to provide them an authentic learning experience about building performance and school energy efficiency while taking measurements and collecting data about their building energy use. NEED will help schedule your energy audit. To discuss further details of your audit, contact Kimberly Swan, kswan@need.org.



2024-2025 Detailed Program Timeline

| | |
|------------------|--|
| October 9 | CEEP Teacher Training – Raleigh, NC |
| November | <p>All kits and materials received from NEED All kits shipped will be based on selections made at the October training. All kits should be opened, verified, and any questions about materials sent to Rebecca, rlamb@need.org.</p> |
| December | CEEP Teacher Training – Location TBD |
| December | <p>Mini-Grant application opens All participating schools are invited to apply for up to \$500 for additional classroom resources to teach about energy.</p> |
| January | <p>Completed <i>Science of Energy</i> sections, some basic energy sources activities, planning of community project has begun.</p> |
| January | <p>Quick Check - complete online survey (link will be emailed)</p> <ul style="list-style-type: none"> • Completed renewable energy sections and continue work on energy efficiency and conservation • STEM project implementation underway • What additional topics would you like to include in our last training? |
| February | Educational Energy Audits scheduled |
| February | CEEP Teacher Training – Location TBD |
| March | <p>Completed</p> <ul style="list-style-type: none"> • Energy efficiency and conservation activities • Projects and events planning nearly complete/scheduled • Continuous assessment of student activities |
| March | <p>Quick Check & Project Wrap-up – complete online survey (link will be emailed)</p> <ul style="list-style-type: none"> • Finalize/execute STEM projects and Energy Fair • Create presentation to showcase efforts • Share project with administrators, or other partners, and friends for feedback • Prepare program presentation/video/performance for submission |

April 20

Community Project submission

- Submit project presentation/video/performance via program portal
- Have students begin brainstorming how they would present their project at the Clean Energy Education Program Celebration
- Science of Energy, Energy Sources, Electricity, and Energy Efficiency Curriculum continues to be used and assessed

April 30

Projects will be judged & winning schools notified

May

Program Wrap-up

- Print/copy *Student Evaluations* for each student. Once students have completed the evaluations, email evaluations to Kimberly Swan at kswan@need.org
- Complete *Leader Evaluation* and email to Kimberly Swan at kswan@need.org

Sample CEEP Pacing Guide

| | | | | |
|--|---|--|---|--|
| <p>Day 1</p> <p>Unit Introduction</p> <ul style="list-style-type: none"> • Pretest/poll • Preview: unit goals & STEM project • <i>Energy Conservation Contract</i> | <p>Day 2</p> <p>The Science of Energy - Introduction</p> <ul style="list-style-type: none"> • Teacher Demo • Intro to forms of energy & energy transformations • Discuss schedule | <p>Day 3</p> <p>The Science of Energy - Station Investigations</p> <ul style="list-style-type: none"> • Station explorations • Read to understand | <p>Day 4</p> <p>The Science of Energy - Station Investigations</p> <ul style="list-style-type: none"> • Prepare presentations • Students present stations to peers | <p>Day 5</p> <p>The Science of Energy - Station Investigations</p> <ul style="list-style-type: none"> • Students present stations to their peers |
| <p>Day 6</p> <p>Forms and Sources of Energy</p> <ul style="list-style-type: none"> • Review stations • <i>Forms and Sources of Energy</i> | <p>Day 7</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • <i>Energy Roundup</i> • Renewable Energy • Kit-based activities | <p>Day 8</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 9</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 10</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities |
| <p>Day 11</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 12</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 13</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 14</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities | <p>Day 15</p> <p>Energy Sources Activities</p> <ul style="list-style-type: none"> • Renewable Energy • Kit-based activities |
| <p>Day 16</p> <p>Introduction to Saving Energy</p> <ul style="list-style-type: none"> • Students read to gain background knowledge about energy consumption | <p>Day 17</p> <p>Introduction to Using Audit Tools</p> <ul style="list-style-type: none"> • Students learn how to use monitoring tools | <p>Day 18</p> <p>School Building Survey</p> <ul style="list-style-type: none"> • Students analyze their school's energy systems | <p>Day 19</p> <p>Saving Energy at School</p> <ul style="list-style-type: none"> • Survey reflection • Brainstorm possible changes • Students brainstorm ideas for STEM projects | <p>Day 20</p> <p>Planning Day</p> <ul style="list-style-type: none"> • Students begin organizing ideas for their STEM projects • Plan for Energy Fair |
| <p>Day 21</p> <p>Saving Energy at Home</p> <ul style="list-style-type: none"> • Explore home applications of building survey | <p>Day 22</p> <p>Saving Energy at Home</p> <ul style="list-style-type: none"> • <i>Energy House</i> | <p>Day 23</p> <p>Saving Energy at Home</p> <ul style="list-style-type: none"> • Revisit <i>Energy Conservation Contract</i> | <p>Day 24</p> <p>Review and Wrap-up</p> <ul style="list-style-type: none"> • <i>Energy in the Round</i> • <i>Energy Web</i> | <p>Day 25</p> <p>Review and Wrap-up</p> <ul style="list-style-type: none"> • Posttest/poll • <i>Energy Carnival</i> |
| <p>Day 26</p> <p>Wrapping up STEM Projects & Energy Fair Activities</p> | <p>Day 27</p> | <p>Day 28</p> | <p>Day 29</p> | <p>Day 30</p> |



- The planning sequence on the previous page for your Clean Energy Education Program Unit provides a sample sequence to use. Due to the time frame of this project, lessons are expedited. You may wish to delve deeper into these topics and investigations and allow more time for planning and executing your STEM project and Energy Fair, should time allow. Time for the Educational Energy Audits, school visits, and field trips has not been included above.

- If you wish, you can plan your own sequence below based on your familiarity with the topic or your time constraints. It is suggested you thoroughly review materials before planning. Digital copies of all NEED Curriculum Guides can be found online at www.need.org/shop.
 - Essential elements of the unit include: pre/posttests, *Science of Energy*, renewable energy sources, and energy efficiency activities.
 - Include time in your sequencing for the Educational Energy Audit of the school.
- All NEED materials have been aligned to relevant national and state standards. Download standards correlation spreadsheets and information at www.need.org/curriculumcorrelations.

My CEEP Planning Guide

| | | | | |
|---|--------|--------|--------|--------|
| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| Day 6 | Day 7 | Day 8 | Day 9 | Day 10 |
| Day 11 | Day 12 | Day 13 | Day 14 | Day 15 |
| Day 16 | Day 17 | Day 18 | Day 19 | Day 20 |
| Day 21 | Day 22 | Day 23 | Day 24 | Day 25 |
| Day 26 | Day 27 | Day 28 | Day 29 | Day 30 |
| Wrapping Up STEM Projects  | | | | |

CEEP Recommended Pacing Lesson Guide

Day 1: Unit Introduction

Activity: Introduce students to energy and the goals of the unit through a pretest and a contract.

Objective: Students will commit to saving energy at home and school by creating their own pledge.

Materials: [Energy Conservation Contract](#), NEED Energy Polls (www.need.org/evaluation)

Procedure: Direct students to assess their knowledge of energy prior to the unit by taking the NEED *Energy Poll* as a pretest. Discuss with them that they will be learning about energy – everything from the science of energy, to how we use energy, to how we should save energy. Preview the unit with students and what their desired outcomes should be. Tell them they will be working together as a group to create a community outreach project to share with others what they have learned. Assign the *Energy Conservation Contract* activities to students and ask them to pledge with their families to make a commitment to saving energy over the next 30 days. They will revisit their ratings and pledges at the close of the unit. **It may be helpful to assign the survey portions of the activity to students as a home activity, prior to this session. If you choose to do this, you can help students determine their conservation ratings in a group and devise a pledge for their family.

Day 2: The Science of Energy - Introduction

Activity: Introduce students to the science of energy through demonstrations and discussions.

Objective: Students will identify and describe the forms of energy and examples of each. Students will be able to identify basic transformations of energy between forms.

Materials: Teacher Demonstration (*Science of Energy* Kit)

Suggested Handouts: *Forms of Energy, Energy Transformations* ([Science of Energy](#))

Procedure: Perform the teacher demonstration from the *Science of Energy* Kit. While students are shaking the jars of sand, go over potential and kinetic energy and their respective forms. Have students give other examples of each form of energy, other than those listed on the handout. Once the forms have been introduced, revisit the jars of sand from the demonstration and discuss. Ask students why there was a temperature change. (*Motion energy was transformed into thermal energy due to friction as the sand was shaken.*) Outline the Law of Conservation of Energy using the *Energy Transformations* handout. Discuss that, no matter what, energy is never destroyed – it simply changes form, and most energy transformations begin with the sun. Encourage students to think of other simple energy transformations and draw them out. Outline the schedule for completing the *Science of Energy* stations and put students into groups.

Day 3-5: The Science of Energy - Station Investigations

Activity: Students investigate stations and use inquiry process skills to learn about energy transformations within various systems. Each station will take approximately 20-30 minutes.

Objective: Students will understand that energy does not disappear, but changes from one form to another.

Materials: [Science of Energy](#) Kit and additional materials listed within guide.

Procedure: Organize students into groups. Following the guide in the curriculum, move students through stations.

After each investigation, the group should reflect on what they observed by answering the questions, “What happened at the station? What energy transformations did you observe?” These questions should be provided to students so that they can refer back to them as they write their conclusions. Students should be encouraged to use evidence to support their thinking. They should read “What Was Happening?” and reflect with their group to confirm their thinking or change their misconceptions.

Day 6: Forms and Sources of Energy

Activity: Make connections between the various forms of energy and the related sources that allow us to harness their energy through a transformation or series of transformations.

Objectives: Students will identify the 10 sources of energy and the forms of energy stored or delivered by each source. Students will also be able to differentiate between renewable and nonrenewable resources. Finally, students should be able to list the chief sources of energy the U.S. consumes for energy and how the energy is harnessed.

Materials: Flashlight from *Science of Energy* Teacher Demonstration; Motors, batteries, and alligator clips from *Science of Energy* Station 6

Suggested Handouts: *Forms and Sources of Energy* ([Science of Energy](#))

Procedure: Begin by reviewing the station investigations and all of the energy transformations students witnessed. Explain to students that energy transformations are what allow us to turn energy into something useful. Motion can be transformed into electrical energy. Chemical energy can be transformed into motion energy. In the U.S. we use a variety of sources to power our lives. Each of those sources relies on a transformation of energy. Have students complete the *Forms and Sources of Energy* worksheet and discuss. What do students notice about the sources of energy we use for most of our energy?

Ask students where they think electricity comes from. Ask them to explain how electricity is generated. Many students may be unable to do so. Show the class the *hand-powered flashlight*. Ask students to describe what they see and diagram it. Switch on the flashlight and demonstrate it to students. Slowly tip it back and forth, and ask students to focus on the LED inside the flashlight every time it is tipped. What do they see? They should observe the LED flashing brighter as the magnet passes through the coil of wire. Ask students what is making the LED flash inside the flashlight.

Show students the motors and batteries they worked with when they did the activities in *Science of Energy* Station 6. What makes a motor run? What do all motors have in common? What do the flashlight and the motor have in common? Explain to students that motors and generators are made of the same parts, but the inputs and outputs are different. A motor takes electricity and transforms it into rotational motion; a generator takes rotational motion and transforms it into electricity.

Day 7-15: Energy Sources Activities

Teachers will select a renewable energy unit to use with their students.

**Each kit is individually designed as a one-two week unit. Teachers are encouraged to examine each kit and activities carefully and choose which lessons will best meet their objectives and students' needs. Teachers can also use this time to explore nonrenewable sources of energy through various activities or whole units.*

Activity: Students will investigate energy from various sources.

Objectives: Students will understand how renewable and nonrenewable resources are being used to generate energy and, more specifically, electricity.

Materials: Solar or wind kit, copies of activities for students, *Energy Roundup* supplies ([Energy Games and Icebreakers](#))

Procedure: Examine the kits you received and the list of suggested resources below. Choose the activities you wish to explore with students. Gather materials and make copies or project the activities you choose to explore. Open the mini-unit on sources of energy by playing the game *Energy Roundup* with the class.

Suggested Resources Renewable Energy

| Sources of Energy | NEED Resources |
|--------------------------|--|
| Solar (kit-based) | The Sun and Its Energy (K-2) Wonders of the Sun (3-5) Energy from the Sun (6-8) Exploring Photovoltaics (9-12) |
| Wind (kit-based) | Wind is Energy (K-2) Wonder of Wind (3-5) Energy from the Wind (6-8) Exploring Wind Energy (9-12) Your Future in Wind Energy (CTE) |
| Energy Sources | Energy Infobooks (K-12) Energy in the Balance (3-5) Great Energy Debate (6-12) |

Day 16: Introduction to Saving Energy

Activity: Students are introduced to energy consumption, conservation, and efficiency. After brainstorming ways they use energy, students read more information to gain a foundation before conducting energy audits.

Objective: Students will be able to list how energy is used at home and school.

Materials: [School Energy Efficiency and Conservation kit](#)

Reading: Student Informational Text (Student Guide)

Science Notebooks: Students should list ways that they use energy in the classroom and at home as they read.

Optional: Make copies of the graphic organizers in the Student Guide, and have students record their notes on the organizers.

Procedure: Students can complete the reading individually or as a jigsaw. Make sure to discuss and highlight main ideas and supporting details that students picked out from their reading.

Day 17: Introduction to Using Audit Tools

Activity: Students learn how to use various energy management tools. Once they have read the directions, students should be allowed to gather informal data around the classroom and/or building.

Objective: Students will understand how to operate tools and measure to collect data about energy usage.

Materials: Tools from the [Energy Efficiency and Conservation kit](#) (School Energy Inspectors (3-5); School Energy Experts (6-8); School Energy managers (9-12))

Suggested Handouts: Copies of applicable pages from the student guide.

Science Notebooks: Students draw a diagram of the tool they've been assigned and explain how it works, recording sample data as they go.

Procedure: Break students into groups to learn various monitoring tools/conduct investigations. Students should practice using the instruments and record data.

Day 18: School Building Survey

Activity: Students conduct a *School Building Survey* to further understand how their school uses energy.

Objective: Students will be able to identify how their school uses energy and list ways it could save energy.

Materials: [Energy Efficiency and Conservation kit](#)

Science Notebooks: Students should keep notes about their survey and observations in their notebooks.

Suggested Handouts: *School Building Survey*

Procedure: Break students into groups that will focus on each section of the *School Building Survey*. Have the groups research the answers either by physically looking at the system in question or by talking to your school or district building manager. You may want to invite that person in to talk to your students or ask if your students can email them with questions they cannot answer.

Day 19: Saving Energy at School

Activity: Students share how their monitoring tools work. They also share the results of their investigations and surveys.

Objectives: Students will analyze and interpret their survey data. Students will be able to identify energy-saving measures and behaviors.

Materials: [Energy Efficiency and Conservation kit](#)

Science Notebooks: Students should brainstorm changes that could be made and the part they can play in making the changes happen.

Suggested Handouts: *School Building Survey* data from previous activity, *Findings and Recommendations*.

Procedure: Break students into groups so that each group has a member who surveyed a different part of the building. Students should analyze their data from each investigation and fill in the remainder of their survey sheets from the other group members. As a group, they should brainstorm energy-saving solutions for each part of the building, based on the group's data. They can record their findings on the *Findings and Recommendations* handout.

Day 20: Planning Day

Activity: Students design and implement a STEM challenge project that will share their newfound energy knowledge with some component of the community.

Objective: Students will be challenged to participate in/create a project that showcases what students have learned and incorporates science, technology, engineering, and mathematics principles to demonstrate an energy concept and how energy functions in a system. Students will identify ways that they can help inform the public and inspire changes to be made. Students will be able to identify and explain energy-saving measures and behaviors for the school and home.

Materials: Materials may vary based on student ideas.

Science Notebooks: Students should begin to brainstorm plans and sketch ideas.

Suggested Handouts: *STEM Project* worksheets (Program Guide, pages 18-20)

Procedure: Discuss the project parameters with students and what they have learned about so far. Begin to brainstorm and plan ideas as a class or in groups.

Day 21-23: Saving Energy at Home

Activity: By analyzing their own living and workspaces, students apply what they have learned to making energy changes in their personal lives at home.

Objective: To identify how their actions affect energy consumption at home and school. Students will be able to identify energy-saving measures and behaviors for the home.

Materials: [Energy Conservation Contract](#), [Energy House](#), [Managing Home Energy Use](#)

Science Notebooks: Students should use their notebooks to reflect on what they have learned about saving energy in the classroom and apply it to the home environment.

Procedure: Students will be applying what they have learned so far to their home environment. Students are encouraged to involve their families in these activities! Students should revisit their *Energy Conservation Contract* activity from Day 1. They should rate their homes again and evaluate their pledge to decide if they should revise or add to their current energy-saving behaviors. Students can build an energy-efficient house and test its efficiency using *Energy House*. Save your Energy Houses for your Energy Fair as a display item!

Day 24-25: Review and Wrap-up

Activity: Students review what they've learned and revisit their commitments to being energy savers.

Objectives: Students will identify and describe the forms of energy and examples of each. Students will explain how renewable and nonrenewable resources are being used to generate energy and power our lives. Students will be able to identify and explain energy-saving measures and behaviors for the school and home.

Materials: Materials will vary based on the activities selected.

Procedure: Use this time to review with your students and tie all the pieces together. This is also an excellent time for evaluation of student knowledge. This can be done in many ways. A few suggested activities to use that are all-encompassing and fun include: *Energy in the Round* and *Energy Web* (both are found in *Energy Games and Icebreakers*), as well as [Energy Carnival](#). See the list of recommended extensions for other classroom activities to use, should you have more time for your unit, or need extra activities. Use the review activities as extra games in your energy fair!

Day 26-30: STEM Projects & Planning Your Energy Fair

Activity: Students work together to outline and organize their STEM project and community event.

Objectives: Students will be challenged to participate in/create a project that showcases what students have learned and incorporates science, technology, engineering, and mathematics principles to demonstrate an energy concept and how energy functions in a system. Students will identify ways that they can help inform the public and inspire changes to be made. Students will be able to identify and explain energy-saving measures and behaviors for the school and home.

Materials: Materials may vary, based on student ideas.

Suggested Handouts: *Community Project* worksheets (Program Guide, pages 18-20)

Procedure: Use this time to plan and prepare your event and project with your students. Review your plans from previous activities and planning time and adapt where necessary. Sample rubrics are provided in this Program Guide to use for assessing student knowledge, application, and project goals.

Recommended Extension and Culminating Activities

- [Energy Carnival](#) (grades 3-8) and [Primary Energy Carnival](#) (grades K-2) – Students play or lead fun and exciting carnival-style games to reinforce or review content or teach others.
- [Energy Expos](#) (grades 3-12) – Students work in groups to develop exhibits and make presentations on sources and conservation.
- [Energy Flows](#) (grades 5-12) – Students learn about the forms of energy, how energy is converted from one form to another, and how energy flows through systems, by creating their own energy flows.
- [Infobook Activities](#) (grades K-12) – These guides at each level serve as a companion to the *Energy Infobooks* and contain reinforcement activities about the forms and sources of energy.
- [Great Energy Debate](#) (grades 6-12) – Students evaluate the advantages and disadvantages of the major sources of energy in a debate format.
- [Energy Stories and More](#) (grades K-5) – A series of stories and activities to introduce and reinforce concepts of energy.
- [Current Energy Affair](#) (grades 6-12) – Students create television news broadcasts to report on the major areas of electric power generation.
- [Mission Possible](#) (grades 9-12) – Students are challenged to develop an energy plan for a growing country. This math-based activity incorporates spreadsheets and teaches students to consider the environmental and economical costs and benefits associated with producing electricity today.
- [Global Trading Game](#) (grades 5-12) – Students become economic advisors, geologists, and miners as they learn about their assigned country's resources and needs, then trade resources with other countries.
- [Energy Enigma](#) (grades 7-12) – Student teams research clues to uncover energy facts about different sources while trying to hide the identity of their own source. Teams use brainstorming, organizational, and analytical skills to play.
- [Understanding Climate Science/Exploring Climate Science](#) (grades 6-12) – Students will understand why we use the sources we do and how their use is impacting the world.
- [Energy Math Challenge](#) (grades 3-12) – Strengthen your students' math and critical thinking skills while also reinforcing their knowledge of energy.
- [Energy Live!](#) (grades 3-12) – Students form rock bands and write songs to perform about energy sources, electricity, and efficiency and conservation.
- [Energy Jeopardy](#) (grades 3-12) – What is FUN, Alex? Students review energy topics through team play in an online or paper format.
- [Stock It Up! Energy Storage Sampler](#) (grades 3-12) – This curriculum sampler provides an introduction for students to explore the different ways energy can be stored and the technologies behind energy storage.
- [Energy Careers Excursion](#) (grades 3-12) – These activities make excellent additions to any energy unit and are great for reinforcing soft skills and career-ready skills.
- [Electric Vehicles and the Grid](#) (grades K-12) – The activities in this sampler are designed to introduce your students to EVs, electricity storage, and the grid system as a whole. Students will begin to identify the challenges our transportation and electric grid systems will need to overcome in order to enable a shift towards more renewable-powered EVs.
- [Reliably Smart](#) (grades 3-12) – This guide provides information and activities related to the electric power grid and the smart things associated with it. Students learn how electricity is generated, transmitted, and distributed and how smart meters and the Internet of Things tie into managing the electricity we use.

Science Notebooks

Science notebooks are places for students to record their thinking. Throughout the unit, and in many NEED materials, you will see that students are encouraged to record their thoughts, observations, data, and conclusions in a notebook format. If you currently use science notebooks or journals, you may have your students continue using them.

There are many different looks to science notebooks, ways to use them, and ways to assess them. You may choose to have your students use more of a hybrid model, where they incorporate or tape worksheets into their notebooks for certain activities, and for others they use their own design. Over the course of this unit, pages may get ripped, folded, or spilled on, and this is okay – it is a sign of a real scientist at work!

Below is a general rubric you can use to assess students' work in their science notebooks, or as a basis to design a rubric to meet your specific needs.

| | Understanding of Concepts | Scientific Inquiry | Presentation |
|----------|--|--|--|
| 4 | Students demonstrate thorough understanding of concepts through pictures, writing, and verbal communication. | Students are able to follow all steps of the scientific process independently: predict/hypothesize, observe/record data, and draw more complex conclusions related to their data. Students show higher-level thinking by asking pertinent questions. | Handwriting is legible. Pictures are realistic and include labels. All parts of the assignment are complete. |
| 3 | Students demonstrate sound understanding of concepts through pictures, writing, and/or verbal communication. | Students are able to predict/hypothesize, observe/record data, and draw a basic conclusion with some teacher support. Students begin to ask their own questions. May include some teacher support. | Handwriting is legible. Pictures are realistic and have labels for some items. All parts of the assignment are complete. |
| 2 | Students demonstrate a basic understanding of concepts, fewer major misconceptions remain. | Students require teacher support and/or are able to do two of the following independently: predict/hypothesize, observe/record data, and draw conclusions. Students need prompting to think of their own questions. | Words and/or pictures may be hard to decipher at times. Pictures are present but are missing labels. The notebook has some missing components. |
| 1 | Students demonstrate confusion about concepts. Many misconceptions remain. | Students do not follow the scientific process independently and require significant support to do the following: predict/hypothesize, observe/record data, and draw conclusions. Students are uncomfortable asking questions. | Words and/or pictures are hard to decipher. They may not be connected to the investigation. The notebook has many missing components. |

STEM Project Assignment

Assignment: Create a project that will challenge students to explore an energy concept in-depth. Student work should help others learn about energy, analyze energy consumption, and inspire positive change using the materials and content you have covered in your unit. Students should document their work and will work together to create and submit a project to showcase their participation and results, as well as how they shared their individual work with others.

Challenge Examples:

- **Energy Efficiency Blackout**
 - Students learn about energy efficiency and conservation
 - Use tools to establish a baseline energy consumption for a series of “Fridays” and determine an average consumption for that day of the week
 - Conduct a blackout (or several), on “Fridays,” school-wide
 - Design and implement an energy savings plan for other days of the week
 - Measure savings during blackouts and from energy savings plan measures
 - Present findings at a community event

- **Energy House Design**
 - Students learn about sources of energy and energy efficiency and conservation
 - Design and create models of energy-efficient homes that employ new knowledge and showcase energy sources working as a system in a comfortable home (solar, wind, geothermal, natural gas, efficient technologies)
 - Showcase models at a community event

- **Wind Turbine Challenge**
 - Students learn about wind energy and turbines
 - Design and create the best turbine blades
 - Test/showcase blades at a community event, determine whose blades generate the most electricity

- **Electricity Generation Design Challenge**
 - Students learn about energy, energy transformations, and electricity generation
 - Students design and build the best generator model using a set of materials
 - Students design and build the best accessory to generate electricity from another source (attach generator to a student-created turbine)
 - Test/showcase designs at a community event, determine whose model generates more electricity

STEM Project Brainstorm Page

Group Members:

STEM Challenge Concept:

The idea we like best and why:

What will we need to create our project?

What is our plan?

Teacher Signature for Idea Approval: _____

STEM Project Planning Page

| Steps to Implement Plan | Who is in Charge | Our Deadline |
|-------------------------|------------------|--------------|
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Teacher Signature for Plan Approval: _____

Sample STEM Project Rubric

| | Research and Planning | Design and Construction | Evaluation and Teamwork | Application of Energy Concept(s) |
|----------|---|--|--|--|
| 4 | Evidence of thorough research exists in addition to the completion of experimental trials to test design ideas. | In addition to meeting project goals, construction was neat and of high quality, showing evidence of innovation. | Team effectively evaluated all aspects of the design process and worked together to problem-solve and make improvements to improve their design. | Project successfully applies many energy concepts. |
| 3 | Several research questions were asked and answered effectively, with some evidence of research and planning. | Most or all project goals were met and design is functional. Quality of construction shows. | Team evaluated their design together, but improvements or enhancements to their process and design were modest or not present. | Project applies more than one energy concept successfully. |
| 2 | Minimal evidence that research or planning was undertaken or considered. | Some project goals were met, but design is not fully functional or construction is flawed. | Minimal evaluation and teamwork was evident and led to no improvement in design. | Project applies just one energy concept successfully. |
| 1 | No evidence of research or planning that led to design and construction. | Many of project goals were not met. Construction is sloppy and design does not meet the needs of the challenge. | Team did not evaluate their project or work/and or did not make any improvements to their design. | Project does not show evidence of application of content. |

Sample Community Energy Fair/Event Rubric

| | Understanding of Energy | Understanding of Efficiency and Conservation | Application of Learning | Project Effectiveness | Student Leadership in Activities |
|----------|---|--|--|---|--|
| 4 | Students communicate an awareness of a variety of ways that energy is generated and consumed. | Students clearly showcase a wide variety of efficiency and conservation tactics. | Students demonstrate understanding that they affect energy systems in their daily choices. | Students' project helps others analyze their energy usage and encourages ways to bring about meaningful change. | It is evident that students took ownership of planning goals, carrying out activities, involving the community, and reporting of their work. |
| 3 | Students communicate awareness of 3-4 ways that energy is generated and consumed. | Students identify/demonstrate 3-4 efficiency and conservation tactics. | Students demonstrate understanding that they use energy. | Students' project helps people become aware of their energy usage. | Student leadership is evident in most of the project |
| 2 | Students communicate awareness of 1-2 ways energy is generated and consumed. | Students identify/demonstrate 1-2 efficiency and conservation tactics. | Students demonstrate some understanding that they affect energy systems. | Students' project informs people about energy. | Student leadership is evident in part of the project. |
| 1 | Students are unable to communicate how energy is generated and consumed. | Students are unable to demonstrate or identify methods for reducing consumption. | Students are unclear that their actions affect energy systems. | Students' project is unclear or confusing as to how it relates to energy and/or energy conservation. | Project is unable to show student leadership and student work to achieve goals. |