



ENERGY CAREERS EXCURSION

Activities Inside:

- Career Excursion
- Soft Skills Soiree
- Company Design Challenge
- Personality Party
- Energy Industry Guess Who?

Grade Levels:

Elem Elementary

Int Intermediate

Sec Secondary

Subject Areas:



Science



Technology



Engineering



Math



Language Arts



Public Speaking



National Energy Education Development Project



TEACHER INFORMATION

Background

What do you want to be when you grow up? Some of us still don't know! We start asking kids at a very young age and record their ideas each year as they start with a new teacher. Some kids have a strong calling, from early childhood, pulling them in a certain direction. Others change their minds rapidly and often. One thing is for certain students often have a tough time understanding just how many different career opportunities and paths exist in the world around them. The list is much broader and more diverse than doctor, lawyer, teacher, the President, and firefighter.

The energy industry employs around 6.5 million Americans, according to recent data and studies. This number of jobs and opportunities is only expected to grow and change as our energy needs change. No matter what affinities our students may have towards a subject area, they all possess the ability to be good co-workers and productive employees. The activities in this sampler aim to help students understand career opportunities in energy-related fields, while also identifying the soft skills and personality traits that make them stand out in workplace environments.

As students progress through the sampling of activities, they will first get a glimpse of a few of the various jobs in the energy industry, and how many of them might just have cross-over into other industries. Students will then begin to identify and practice their soft skills to develop an elevator pitch about themselves. Students will then form a start-up company to look at how they might staff and complete an engineering and design task from the top-down perspective, all the while looking closely at teamwork and continuing to refine their soft skills. Students then take turns role-playing different workplace personalities to identify how they could help or hinder in performing a task. Finally, students have some fun with a NEED take on the popular game, "Guess Who?".

Check out NEED's energy source guides for more specific and detailed profiles of energy industry careers, as well as career games and process activities. NEED looks forward to adding to this information as we edit each year. Check out the following resources to get started:

Exploring Oil and Natural Gas

Fossil Fuels to Products

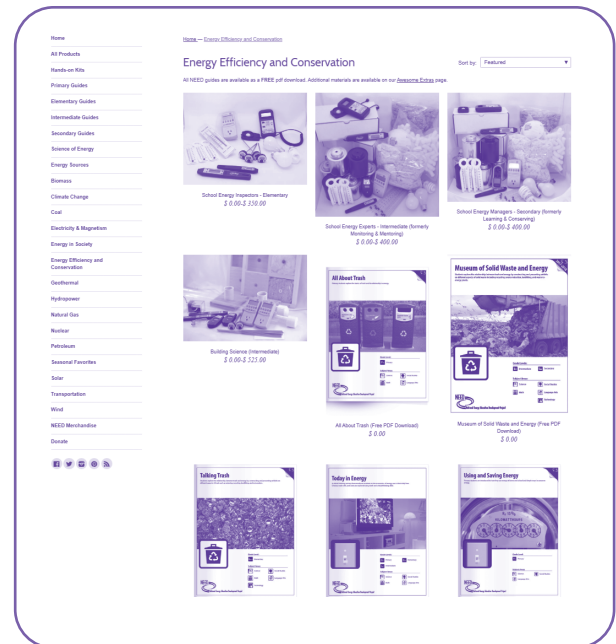
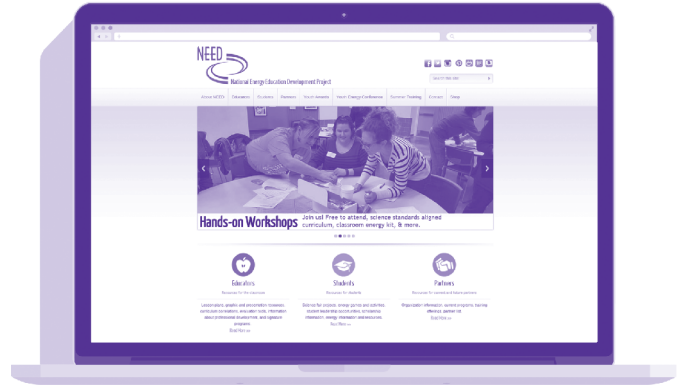
Exploring Coal

Understanding Coal

All About Coal

Building Science

School Energy Managers





MATERIALS

The table below contains a list of materials needed to complete the activities in this suite. Many of the materials can be found in a common lab setting, or easily procured from a grocery, craft, or home improvement store. Refer to the activity instructions for more specifics about each item. Contact NEED if you have any questions or difficulty locating a certain item.

ACTIVITY	MATERIALS NEEDED
<i>Career Excursion</i>	<ul style="list-style-type: none">▪ Computer with internet access▪ Art supplies (optional)
<i>Soft Skills Soiree</i>	<ul style="list-style-type: none">▪ Timer or watch
<i>Company Design Challenge</i>	<ul style="list-style-type: none">▪ Newspaper▪ Cereal boxes or chipboard▪ Books▪ Masking tape▪ Scissors
<i>Personality Party</i>	<ul style="list-style-type: none">▪ Cups▪ Rubber bands▪ String▪ Cardstock▪ Scissors
<i>Energy Industry Guess Who?</i>	<ul style="list-style-type: none">▪ Cardstock, 3 colors▪ Manilla folder (legal size if available)



CAREER EXCURSION

The activities featured in this lesson are found in similar formats within other NEED guides at shop.NEED.org.

- *Exploring Coal*
- *Understanding Coal*
- *All About Coal*
- *Exploring Oil and Natural Gas*

Grade Levels

Elementary, grades 3-5

Intermediate, grades 6-8

Secondary, grades 9-12

Time

- 1-3 class periods, depending on the activities selected

Background

This activity aims to help students become acquainted with careers that might exist in the energy industry, and even beyond. A baseline list of careers is provided. Students can be assigned a career or select a career from the list, and research and prepare one of the suggested formats to display information about the career chosen. Ultimately, students should share their findings with each other as a museum walk, in classroom presentations, through a class website, or even through game play, so that students can become acquainted with types of careers available in the energy industry, similarities to other industries/crossover, skills sets required, even how quickly they can expect to make their first million (wishful thinking).

Objective

- Students will be able to describe possible careers available within the energy industry.

Materials

- Computer with internet access
- Copies of handouts, as needed
- Art supplies (optional)

Preparation

- Preview the list of careers and the procedure below. Decide if you will pre-assign or allow students to select their own careers.
- Look over the activity suggestions and prepare copies or digital access for the selected item(s). The trading card is the least robust item, while the résumé and the LinkedIn™ template are more detailed. Decide if you will adapt or add to the requirements. If you prefer students to complete the activity digitally, set up the templates for them to be able to complete and submit their work online.
- Prepare a list/add to the list of sites students can access for their research.
- Gather examples of trading cards, résumés, and LinkedIn™ profiles that might help students to complete their work.

Procedure

1. As an introduction to careers in energy and science, ask students what they think of when they hear “scientist.” Have students do a quick drawing/scene or write a descriptive paragraph to showcase what a scientist might look like, might act like, might do each day, and where they might work. Have students show their drawings to each other or read their passages. Are there any similarities or differences? Are there any stereotypes that might have crept in? Make it a point to address these stereotypes or areas where gaps in gender, age, and race might exist. Ask students how adding more diversity to a workplace could improve it. Provide examples where you might be able to. Ask students what characteristics of a job or workplace might be desirable or undesirable.
2. Show students the *Energy Industry Career List*. Explain that, as a part of your energy unit, students will each explore a different career in the energy industry, a very important STEM field, to show students what options might be possible for their future in this constantly changing industry. Read the top section of the list together.

3. Depending on the age and abilities of your students, you may opt to just cut students loose to peruse the list and pick a career they have an interest in. You may also opt to discuss the list and how it is broken down. For younger students, it may be helpful to help them select or pre-select a career.
4. Explain to the students that they will be researching their career and creating some form of career-oriented handout or digital design to show off their research and explain their career to the class.
5. Show the class the templates and give instructions for using research to fill in the template of your choosing, be it the networking template, résumé, or trading card. You may opt to allow students to complete their choice of template. They may need to be creative and make a character who might work in that field, or they may use their own name and personality. Explain how students will showcase their work when complete, and when their work must be submitted.
6. As necessary, explain to students that résumés are used to market yourself to employers and let them know, without meeting you, what you might be able to accomplish. Explain that LinkedIn™ is an example of an internet networking tool that allows workers to show off what they've done, connect them with others in their industries and beyond, and that it can often help place them into new or advanced positions.
7. Give the class time to present or explore each other's work and learn about the various careers in the energy industry. Conduct a class discussion about the similarities and differences between jobs in the field, in the office, and in both settings, and how these jobs might compare to similar jobs in other industries. Ask students to write about the career they might be most interested in based on what they've learned from their classmates.

Additional Resources

- Career One Stop - <https://www.careeronestop.org/>
- Science Buddies - <https://www.sciencebuddies.org/science-engineering-careers>
- U.S. Department of Labor, Bureau of Labor Statistics Student Page - <https://www.bls.gov/k12/>
- USA.Gov - <https://www.usa.gov/jobs-careers>
- Workforce Solutions - <http://www.wrksolutions.com/for-individuals/career-exploration>
- Workforce Solutions, When I Grow Up Lessons - <http://www.wrksolutions.com/for-individuals/career-exploration/when-i-grow-up>

Extensions

- Create a classroom “LinkedIn” website for students to network with each other. Post a discussion board and require that students ask each other questions about their careers, share articles or news stories about their jobs, or engage in other discussion.
- Where possible, seek out energy industry professionals, or folks in similar careers as those assigned to your students. Ask students to interview the professionals and share their interviews with the class.
- Hold a career day in the classroom. Invite professionals to come speak with and network with the class. Ask students to share their findings with the professionals and ask them questions.



ENERGY INDUSTRY CAREER LIST

Ever wonder what career opportunities exist for you? The list below relates to opportunities in energy related fields. In fact, the energy industry employs over 6.5 million people. According to the U.S. Department of Labor's Bureau of Labor Statistics, these jobs aren't expected to decline much in the next decade or more, with many reports suggesting lots of growth. They also report that energy efficiency and "green energy jobs" like solar installer, environmental scientists, health scientists, and wind turbine technician are among the fastest growing fields with a greater median annual wage than other occupations.

The energy industry includes much more diversity in job types than engineer, technician, and electrician. These jobs can exist in public, private, or not-for-profit companies. Explore the list and links provided by your teacher. You might be surprised to find that many of these careers could be applicable in vastly different companies. This list is just a start, and the list could expand greatly based on the goals of the company, the energy sources involved, or the technologies used! The list is separated by careers that might keep you out of the traditional office setting, in a plant, in a lab, outdoors, or **in the field**; careers that will have you on most days **in the office**; and careers that might offer a mix of the two, **hybrid**. As always, it's important to consider that with each career and employer, the scenario can change. Talk to the experts and do your research!

In the Field

Electrician
Mechanic
Welder
Plumber/Pipefitter/Steamfitter
Construction
Equipment or Plant Operator/Technician
Driller
Operating Engineer
Service Unit Operator
Machinist
Maintenance/Repair
Geoscientist
Safety Inspector
Service Technician
Installer
Hazardous Materials Removal/Cleanup
Biologist/Microbiologist
Soil Scientist
Hydrologist
Chemist
Certified Energy Manager/Building Specialist
Radiation Scientist
Research Scientist
Lineworker
Drone Pilot
Driver
Surveyor

In the Office

Accountant
Financial Analyst
Computer System Analyst
Data Scientist/Analyst
Attorney
Human Resources Specialist
Economist
Software Developer
Information Technology & Security
Energy Trader
Meteorologist
Communications/Public Relations
Marketing/Promotions
Corporate Relations
Community Engagement
Estimator
Manager
Transmission System Operator
Dispatcher/Distributor
Account Manager
Business Development

Hybrid

Engineer
▪ Industrial
▪ Mechanical
▪ Electrical
▪ Nuclear
▪ Civil
▪ Computer/Software
▪ Petroleum & Natural Gas
▪ Mineral
▪ Geophysical/Geological
▪ Materials Science
▪ Environmental
▪ Chemical
▪ Marine/Ocean
▪ Building Automation Systems
▪ Lighting
Project Manager
Health Physicist
Architect
Salesperson
Training Coordinator
Geospatial Information Systems
Emergency Medical Technician
Nurse/ Physician
Reliability Specialist/Engineer
Consultant



RÉSUMÉ TEMPLATE

First and Last Name

Address, City, State, Zip
Phone number and E-mail address

Employment Objective

Brief one- or two-sentence statement describing the ideal or desired employment position for this applicant.

Experience

Most recent relevant job related to desired position

Company Name, City, State

Responsibilities

Skills Acquired

Month/year range in this position

Next most recent relevant job related to desired position

Company Name, City, State

Responsibilities

Skills Acquired

Month/year range in this position

Third employment position, may or may not be relevant

Company Name, City, State

Responsibilities

Skills Acquired

Month/year range in this position

Education

Graduate School (if applicable)

City, State

Degree attained and date

Major

Anything else relevant, such as awards, honors, distinctions, or research area(s)

Years Attended

College or Trade School

City, State

Degree attained and date

Major/minor

Anything else relevant, such as awards, honors, or distinctions

Years Attended

High School

City, State

Year Graduated

Relevant classwork or focus

Years Attended



CAREER NETWORKING TEMPLATE





_____ | _____

Current _____
Past _____
Education _____

Summary

Specialties

- _____
- _____
- _____

Education

Experience

- _____
- _____
- _____
- _____



TRADING CARD TEMPLATE

NAME: _____

JOB TITLE: _____

I work as a: _____

At work I am responsible for: _____

I am good at: _____

Fun facts about me: _____



SOFT SKILLS SOIREE

Grade Levels

Elementary, grades 3-5

Intermediate, grades 6-8

Secondary, grades 9-12

Time

▪ 1 class period

Background

We've all had that one co-worker – the one who doesn't listen, or the one that has terrible communication skills, or the one who never pitches in on team projects. Well, maybe we've got a few of *THOSE* co-workers. This activity hopes to introduce students to the skills and traits that make a good worker – no matter what industry or job type a student may enter. In fact, these skills, often called soft skills, are important skills for everyone – garbage collectors, CEOs, food servers, accountants, radio hosts, and even video gamers! Folks with no job experience can win over a future employer by having the right attitude and strong soft skills. Students will be grouped in small groups to try and solve a challenge. They will identify skills and traits that were helpful in solving the challenge, and brainstorm things about themselves that might be helpful in working with a team. They will then use these skills and ideas to create a 30 second elevator pitch about themselves.

Objective

- Students will be able to describe the traits and skills that are essential to being a good worker and team player.

Materials

- Timer

Preparation

- Prepare a copy of the *Soft Skills Checklist* for display, or prepare copies for the class.
- Search and preview example videos of student-friendly elevator pitches, and how-to clips.
- Prepare an open space for completing the human knot activity.

Procedure

1. Ask students to brainstorm a list of qualities they might want in a partner for a group project. Go over the list as a class. Ask them how they might adjust their answers if they were thinking about a principal and teachers in a school. What might make them good co-workers; a good boss?
2. Put students into small groups of 5 to 10 students. You may opt to do this as an entire class if you wish. Have the groups stand in a circle facing each other. Explain that they will reach out to shake hands with other players, and each hand should hold the hand of a different person in the group. They are making a human knot!
NOTE: Alternative examples of team building-style challenges could be used in place of the human knot if students are not able to appropriately complete the human knot.
3. Explain to the groups that they now have to figure out how to untangle their bodies without letting go of each other's hands. Give a time limit but avoid giving prizes or excessive praise for groups who finish first. The point is to work together; for some groups, success will be measured differently than others.
4. After the time has expired, ask students to return to their seats and jot a list of observations. Have them try to make a list of two helpful things that their group or group members did to solve the challenge. Have them make a list of two unhelpful things that their group or group members engaged in that made the task more challenging or frustrating. Ask the class to share examples if you feel comfortable doing so without alienating students.

5. Display and discuss the *Soft Skills Checklist*. Discuss the list items and give examples where necessary. Ask students to identify some of the items on the list that might have been involved in untying their knots. Have students make a list of their top 3 soft skills.
6. Explain to the class that we often find new opportunities based on chance or brief interactions with others. In most situations, a person may not have a ton of time to talk with you, and they may often suffer from a short attention span. For this reason, showing good soft skills and being able to engage in a quick discussion, short stories, or share about themselves are often just as important as having background knowledge and expertise. A future employer will more than likely wish to see evidence of a few of these skills and showing command of these can translate into future opportunity that might not have existed before.
7. Show the class examples of an elevator pitch. Explain that they are each in the running for the student of the year award at school! Each student will need to create a 30 second (maximum) pitch or speech that they could give if they saw the voting committee in the hallway, at recess, in the elevator, or in the lunch line.
8. Give students time to work on their pitches and practice for each other. Ask for volunteers to share theirs with the class. Discuss as a class how this might come in handy for snagging a future job, scholarship, position on the team, etc.

Extensions

- Assign a pair of students to each soft skill on the list. Ask the pair to act out the soft skill the wrong way and a better way, as if they are in a working environment.
- Invite other adults to the classroom to hear student pitches and give feedback.
- Have students video their elevator pitch to practice and self-edit.



SOFT SKILLS CHECKLIST

<p>Good communicator</p>	<p>Strong handshake</p>	<p>Good work ethic</p>	<p>Motivated</p>
<p>Good time manager</p>	<p>Good listener</p>	<p>Flexibility</p>	<p>Team worker</p>
<p>Problem solver</p>	<p>Critical thinker</p>	<p>Negotiator</p>	<p>Self-confident</p>
<p>Patient</p>	<p>Uses technology wisely</p>	<p>Self-starter</p>	<p>Solutions-oriented</p>



COMPANY DESIGN CHALLENGE

Background

This activity helps students hone their soft skills and also look closely at other skills that might be beneficial when running a company or in a working environment. Much like a real-world job, students will be assigned to small working groups who must design the best piece of “furniture” that holds as many books as possible and is competitive in the market of other groups of furniture makers. As a group, they must also identify the jobs and skills that are essential to running their business while successfully completing the design challenge. By the end of the challenge students can hopefully identify that companies are made up of many different types of jobs. On many occasions, some essential occupations may be less obvious than others. Our ideal job or career might be working for a company or solving a task that you may not have expected. Additionally, running a company allows you to see things from a different perspective than just working for a company. Students may begin to develop a deeper, multifaceted understanding of what makes an employee most beneficial to an organization.

Objectives

- Students will be able to work through the steps in the design process, designing, testing, and redesigning a model for optimal results.
- Students will work together as a team to create a business and identify the skills, jobs, and tasks required to structure a company.

Materials

- 8-10 Sheets of newspaper per group
- 1 Piece of cereal box or chipboard per group
- Several identical text books, or alternative “weights”
- Rolls of masking tape
- Scissors

Preparation

- Gather materials from the list above, or alternative materials as you see fit. It may also be helpful to ask students to contribute materials from their own recycling/trash at home. Alternatively, you could make this a “found” materials challenge rather than providing each group with the same number of items.
- Preview the procedure on the next page and assemble your own prototype table.
- Designate an area of the room as the “official testing zone” where groups test out their designs. It may be helpful to provide a few extras of the books/weights to groups so they can perform preliminary tests.
- Make copies of the *Designers Challenge Worksheet*, as needed.
- Assemble a panel of “judges” from the major furniture designer. These can be former students, other teachers, parent volunteers, etc.

Grade Levels

Elementary, grades 3-5
Intermediate, grades 6-8
Secondary, grades 9-12

Time

- 1-3 class periods

✓ Procedure

1. Split students into groups of 3-5.
2. Explain the challenge to students: Your team is competing for a bid to become the next big designer for a major furniture designer. Your team must form a start-up company and design the best table that competes with other companies vying for the bid. In order for your company to get the bid, you must not only build the best table, you must also create materials to advertise or market your company and its design. Each company's table must be made from the same materials (newspaper, cardboard, tape), and each group will be given the same set amount of seed materials. The table must be at least 8 inches tall and hold at least one heavy book. More books can be added to determine the best table.
3. Show students your prototype if you desire. You may also provide some initial strategies for good design with the provided materials.
4. Assign the companies the tasks below. Tasks can be completed on the challenge worksheet or submitted in alternative formats.
 - Create an operations plan.
 - Identify the critical positions and roles within your company. Assign or interview for each job within your group. Create a job description for each role.
 - Identify any rules or guiding principles by which your company will abide.
 - Create a plan for how you will complete each step in the process, and how much time and person power to allot to each – from designing, to staffing, etc.
 - Determine your company's marketing/advertising strategy.
 - Create a company name
 - Create a company slogan
 - Create a commercial and/or flyer
 - Decide your strategy for sharing about your design.
 - Create your design.
 - Brainstorm how you can make the strongest table that will get the attention of the major furniture designer.
 - List the materials will you use, and how much of each.
 - Draw designs and work as a team to select the design you will use.
 - Create. Test. Adapt. Retest. Arrive upon a final model to show to the panel.
 - Submit your final design.
 - Present your company and plans, collateral, and design to the panel.
 - Undergo testing at the "official testing zone."
5. Encourage students throughout the design and planning phases. Check the groups' planning sheets, and check-in on their design challenges, encouraging them to consider various shapes, supports, layers, etc.
6. Welcome students and the panel together for a final submission session, where groups showcase their designs and strategies. Help groups test their models by adding books. Encourage other groups to give positive feedback to those testing.
7. Ask each student to write about their experience starting a company and evaluate their successes and challenges. Ask students to explain and provide reasoning for what they would change about the structure of their company, their coworkers, their plans, and their designs, to become more successful or maintain a level of success. What soft skills were essential? What roles were essential?
8. As a class, debrief some of the successes and challenges experienced by the various companies. Did the company with the winning design always have the best company? How can each employee contribute to the success or the failure of the organization?

Extensions

- For older students, or larger groups, you may incorporate costs into the challenge. Have students determine the cost at which they might sell their structure.
- Have students prepare as if they are presenting on the show Shark Tank. Groups should prepare elevator pitches for their company. The panel will now be the "sharks" and students can enter into deals based on their pitches and designs.



DESIGNERS CHALLENGE WORKSHEET

Company Name _____

Company Employees

Name _____, Title: _____

Job description:

Name _____, Title: _____

Job description:

Name _____, Title: _____

Job description:

Name _____, Title: _____

Job description:

Name _____, Title: _____

Job description:

Operations Plan & Schedule:

Marketing & Advertising:

Slogan: _____

Strategies:

Design Notes & Plans:



PERSONALITY PARTY

Background

This fun activity incorporates team building and role play to help students reflect on what it might be like to work with one another. In this activity, students will be assigned to small groups. Each group member will pick a personality party card, for which they must assume the personality trait. They will work together to complete a team building task but may *only* act in a manner that represents their selected personality trait. By the end students will hopefully understand that in every group, folks assume different roles. Sometimes, those roles and their associated personalities can make things tricky. By exploring these types of traits in a safe way, students may see how they might be the best team member for school group work, and eventually in their future careers.

Objectives

- Students will be able to identify how various personality traits can help or hinder the completion of a collegial task.
- Students will be able to work through a challenge, designing a procedure and solving problems as they work.

Materials

- Cardstock
- 6 Cups per group (paper or plastic, all the same size)
- Rubber bands
- String
- Scissors

Preparation

- Print the *Personality Party Cards* on cardstock. Make enough copies so each group has a set. If you wish to expand the group size to 6, we have included a blank card to incorporate an extra personality. Choose to discard or incorporate this as needed.
- Fold the cards on the dotted line so that one side reads “Personality Party” and the other lists the personality and its description.
- Cut the cards apart and clip sets together or place each set into an envelope or bag.
- Preview the procedure below. Test out the cup stacking challenge or watch a video by searching “cup stacking rubber band.”
- Assemble the string tools students will use in the cup stacking team building activity. Cut one 18” string per student. Tie 4-5 strings onto the rubber band so that they are equally spaced and are still as close to 18” as possible, while tightly knotted. (You could also have students assemble the strings for you.)
- Gather the materials and set up stations for each group.

Procedure

1. Split students into groups of 4-5.
2. Give each group a set of cards, cups, and a string tool (strings tied to a rubber band).
3. Ask each student to draw a card from the stack, read it, but keep it secret. Explain that in their group, this card now describes their personality. As a group, they will solve a challenge, but with each individual role playing their personality card.

Activity personality traits adapted from Workforce Solutions.

Grade Levels

Elementary, grades 3-5

Intermediate, grades 6-8

Secondary, grades 9-12

Time

- 1 class period

4. Explain the challenge. Tell students they must work together as a team to take all of their cups out of the stack and restack them into a pyramid of 3 - 2 - 1 using ONLY the tool provided. They may NOT use their hands to pick up, shift, or move the cups.
NOTE: For younger or less adroit students, it may be helpful to conduct the activity on the floor rather than the table. Additionally, frustration can also be reduced by starting with the cups placed out, but not in a stack.
5. Give students one minute to consider how their new role might approach this group challenge.
6. Ask the groups to begin role playing, but first, they should strategize as a group. Tell the class you will give them the signal to begin.
7. Give students a few minutes to tackle the challenge while assuming the roles on their cards. Remind students they should be acting out the personality on their cards.
8. As students complete the challenge, ask them as a group to see if they can identify their fellow group members' personalities.
9. Have a class discussion and itemize the possible negative and positive aspects of each personality in a group work setting. Ask students how you might combat the negatives to make the group more in sync. Discuss how in some working environments or groups, individuals might alter their personalities. What might be some reasons for this alteration? Why might it be a struggle to have a group of 5 strong leaders? Why might it be a struggle to have 5 cheerleaders?

Extensions

- Adapt the string stacking challenge to make different stacking shapes, adding more cups, or incorporating a timer.
- Ask groups to redistribute their personality cards to attempt a different personality.
- Ask students to create their own appropriate personality cards based on observations working with groups in school, sports, or otherwise.



PERSONALITY PARTY CARDS



Personality Party

KNOW IT ALL:

Someone who has all the answers and knows how to solve every problem. This person often doesn't receive suggestions from others well and does not respond to feedback of any kind. Sometimes this person is easily annoyed with those that have different ideas and also those that have NO ideas.



Personality Party

CHEERLEADER:

Someone who is always positive and supportive of others. This person likes to achieve the desired outcome and will provide encouragement to stay focused. Although this person wants everyone to feel great about their work, sometimes this person clashes with others because their positivity is not well-received.



Personality Party

GROUCH:

Someone who is annoyed about most things and brings their bad mood to every task. This person is annoyed by people and by tasks, and often finds something negative to say about any task, project, or even success. This person is not necessarily pushy or loud, and perhaps will contribute to group work, but they will let you know they are unhappy about it.



Personality Party

LEADER:

Someone who is comfortable tackling any task, even if they are not the most familiar with it. This person enjoys directing others and figuring out where each team member could be helpful. This person likes to pitch in, check in on others, and occasionally is challenged by others with leadership behaviors. Sometimes leaders may butt heads with others if they feel their ideas are being challenged.



Personality Party

PROCRASTINATOR:

Someone who understands exactly what to do but works better pushing the task off until later. This person often works better under pressure or time constrictions but will also pass their work or tasks off to others until they feel the pressure to take part. This person is not lazy or incapable, but may exhibit a lot of stress when they are feeling pressure to get involved.



Personality Party



ENERGY INDUSTRY GUESS WHO?

Background

This fun, low-tech activity helps students to become acquainted with a few interesting jobs in the energy industry. Students will play against each other, like they do in the classic Hasbro game, with the goal to identify their opponent's energy career before their opponent can identify theirs. For an added, more personalized challenge, have the students make their own job cards and at-a-glance sheets to play the game.

Objectives

- Students will be able to describe possible careers available within the energy industry.

Materials

- Cardstock, 3 colors
- Manilla folder (legal size if available)

Preparation

- Prepare copies of the cards so that each set of partners would have 3 sets of cards. Copy the sets in 3 different colors (for example, white, yellow, and green.) Cut the cards and assemble into decks of 9 cards by color.
- Gather folders to serve as partitions between the game players. Stand the folders up with the binding in the center. If you prefer, you may also make your own customized partitions.
- Prepare a copy of the at-a-glance sheet for each student.

Procedure

1. Pass out the at-a-glance sheets and ask students to read up on the nine energy jobs provided. This can also be assigned as homework. You can opt to allow them to use it during game play or remove it.
2. Split students up. The game can be played one-on-one, or team of two versus another pair. Larger groupings may complicate game play.
3. Provide each opponent pair with their 3 decks of cards, each a different color, and their partition. Instruct the pair to stand up their partition so that when they lay out their cards, their opponent can not see what they do.
4. Instruct the pair to have one colored stack (the white stack, for example), shuffled and off to the side, face down. This will be their community pile.
5. They should each select their color deck. They should then lay out all nine cards face up, in 3 rows of 3, making sure they can not see their opponent's cards around the partition.
6. Each player should draw a card from the community pile and keep it a secret. This will be their assigned career identity. They should lay this card closest to them, so they don't forget their identity.

For more fun takes on popular games with an energy focus, check out the following guides from shop.NEED.org:

Energy Games and Icebreakers

Energy Carnival

Primary Energy Carnival

Grade Levels

Elementary, grades 3-5

Intermediate, grades 6-8

Secondary, grades 9-12

Time

- 1- 2 class periods

7. Explain that each player must try and guess their opponent's career identity by asking yes or no questions. If the question and the answer eliminate a career option for the opponent, they should flip the card over on their side. Players will take turns asking questions and answering their opponent's questions truthfully in a yes or no fashion. If you think you know your opponent's identity, you must still ask in a yes or no format. Let players know if they may consult their at-a-glance sheets during the game.
8. Ask the teams to keep score and play the best of 3 games.

Extensions

- Have students create their own cards and at-a-glance sheets for their assigned or selected careers in the *Career Excursion* activity. Create a much larger game from this class set.
- Ask students to brainstorm how they might digitize this game or make it more interesting.



ENERGY INDUSTRY GUESS WHO? AT-A-GLANCE

<p>Solar Installer</p>	<ul style="list-style-type: none"> ▪ Assembles and mounts solar arrays and associated electrical equipment, maintains and repairs equipment as needed. Works: <ul style="list-style-type: none"> ▪ In homes and businesses ▪ Outdoors and sometimes at taller heights Musts: <ul style="list-style-type: none"> ▪ HS diploma, drivers license, able to climb a ladder, experience with power tools Certifications: <ul style="list-style-type: none"> ▪ None, but some technology or electrical background is helpful
<p>Power Plant Operator</p>	<ul style="list-style-type: none"> ▪ Runs, maintains, monitors, and adjusts equipment and controls needed to generate electricity or stop generating electricity (boilers, turbines, pumps, controls, etc.) Works: <ul style="list-style-type: none"> ▪ In a power plant ▪ With other individuals, organizations, and different sites to coordinate power in the region Musts: <ul style="list-style-type: none"> ▪ HS diploma, but college degree or additional training is helpful, apprentice training (often provided by facility), problem solving skills, proficiency with charts, graphs, computers, and meters, ability to focus for long periods of time Certifications: <ul style="list-style-type: none"> ▪ Can be attained while employed, specific to the type of power plant
<p>Energy Trader</p>	<ul style="list-style-type: none"> ▪ Purchases and sells electricity or other energy resources to make a profit based on current data, predict pricing of energy resources Works: <ul style="list-style-type: none"> ▪ In an office Musts: <ul style="list-style-type: none"> ▪ Strong math analysis skills, college degree in business, finance, an energy field, or meteorology, ▪ Problem solving skills, proficiency with charts, graphs, computers, negotiating skills Certifications: <ul style="list-style-type: none"> ▪ Special financial certificates or a master's degree can be helpful
<p>Lineworker</p>	<ul style="list-style-type: none"> ▪ Installs, maintains, and repairs electrical lines and systems Works: <ul style="list-style-type: none"> ▪ Above and underground, in homes, businesses, or outdoors (often high off the ground) Musts: <ul style="list-style-type: none"> ▪ HS diploma is preferred, on-the job training, comfortability with heights or underground settings, problem solving skills, independent and team work skills, knowledge of electrical and building codes, ability to handle power and hand tools, safety and caution in work place Certifications: <ul style="list-style-type: none"> ▪ One-year electrical repair may be helpful, apprenticeship hours, electrical license may be required
<p>Petroleum Geologist</p>	<ul style="list-style-type: none"> ▪ Studies rock and earth layer data to discover oil and natural gas, estimate amounts of resources, and prepare strategy for removal Works: <ul style="list-style-type: none"> ▪ In an office and in the field Musts: <ul style="list-style-type: none"> ▪ College degree, strong math and physics skills, ability to read and interpret charts, graphs and maps/gps data, ability to work as a team

<p>Wind Turbine Technician</p>	<ul style="list-style-type: none"> ▪ Installs, inspects, maintains, operates, and repairs wind turbines <p>Works:</p> <ul style="list-style-type: none"> ▪ Outdoors or in the field <p>Musts:</p> <ul style="list-style-type: none"> ▪ HS diploma, technical school or on-the-job training, comfortability with heights and confined spaces, physically able to climb, experience with power tools and measurement instruments, safety and caution in workplace <p>Certifications:</p> <ul style="list-style-type: none"> ▪ Technical schooling program
<p>Certified Energy Manager</p>	<ul style="list-style-type: none"> ▪ Manages an organization or building's use of energy, promotes responsible use of resources, monitors utility consumption and determines reduction plans and installations based on data <p>Works:</p> <ul style="list-style-type: none"> ▪ In a building and occasionally outdoors <p>Musts:</p> <ul style="list-style-type: none"> ▪ College degree or experience in energy systems, knowledge of HVAC systems and electrical systems, strong math, observation, analysis, teamwork, writing, and presentation skills, ability to use hand-held tools <p>Certifications:</p> <ul style="list-style-type: none"> ▪ Certified Energy Manager (CEM) through AEE, LEED and Green Building Council certifications are helpful
<p>Nuclear Engineer</p>	<ul style="list-style-type: none"> ▪ Researches, develops, and plans procedures for maximizing generation from nuclear fission, monitors instruments and systems, reports on productivity, schedules important plant events (repairs, construction, etc.), advises on safety and corrective actions <p>Works:</p> <ul style="list-style-type: none"> ▪ In a power plant or office <p>Musts:</p> <ul style="list-style-type: none"> ▪ College degree and co-op experience, strong analysis, communication, math, and problem-solving skills, continual on-site training, safety and caution in the workplace, knowledge of current laws and practices. <p>Certifications:</p> <ul style="list-style-type: none"> ▪ Professional engineering certificate and operator licensing may be required over time
<p>Pipefitter</p>	<ul style="list-style-type: none"> ▪ Constructs, maintains, assembles, and installs piping systems in HVAC systems, power plants, labs, or outdoors to transport liquid or gas materials <p>Works:</p> <ul style="list-style-type: none"> ▪ Indoors or outdoors in the field, depending on job assignment <p>Musts:</p> <ul style="list-style-type: none"> ▪ HS diploma, on-the-job training, ability to use welding and necessary tools, ability to interpret blueprints and maps, strong problem solving and analysis skills, strong focus, safety and caution in the workplace, knowledge of current regulations, dexterity in hands and knowledge of metals and their properties <p>Certifications:</p> <ul style="list-style-type: none"> ▪ Vocational training and licensing may be required



ENERGY INDUSTRY GUESS WHO? CARDS

Solar Installer	Power Plant Operator	Energy Trader
Lineworker	Petroleum Geologist	Wind Turbine Technician
Certified Energy Manager	Nuclear Engineer	Pipefitter



YOUTH ENERGY CONFERENCE AND AWARDS

The NEED Youth Energy Conference and Awards gives students more opportunities to learn about energy and to explore energy in STEM (science, technology, engineering, and math). The annual June conference has students from across the country working in groups on a Energy Challenge designed to stretch their minds and energy knowledge. The conference culminates with the Youth Awards Ceremony recognizing student work throughout the year and during the conference.

For More Info: www.youthenergyconference.org

YOUTH AWARDS PROGRAM FOR ENERGY ACHIEVEMENT

All NEED schools have outstanding classroom-based programs in which students learn about energy. Does your school have student leaders who extend these activities into their communities? To recognize outstanding achievement and reward student leadership, The NEED Project conducts the National Youth Awards Program for Energy Achievement.

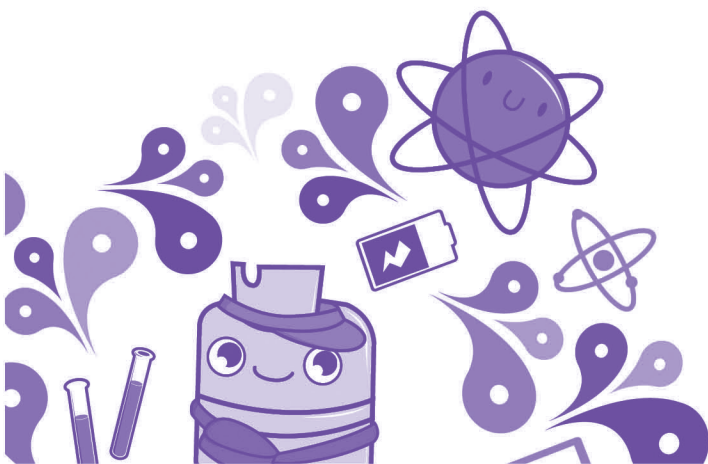
Share Your Energy Outreach with The NEED Network!

This program combines academic competition with recognition to acknowledge everyone involved in NEED during the year—and to recognize those who achieve excellence in energy education in their schools and communities.

What's involved?

Students and teachers set goals and objectives and keep a record of their activities. Students create a digital project to submit for judging. In April, digital projects are uploaded to the online submission site.

Want more info? Check out www.NEED.org/Youth-Awards for more application and program information, previous winners, and photos of past events.



AWESOME EXTRAS!

Our Awesome Extras page contains PowerPoints, animations, and other great resources to compliment what you are teaching!

www.NEED.org/awesomextras

SOLAR AT A GLANCE

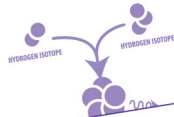


WHAT IS SOLAR?

Solar energy is radiant energy that is produced by the sun. Every day the sun radiates, or sends out, an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time!

NUCLEAR FUSION

The process of fusion most commonly involves hydrogen isotopes combining to form a helium atom with a transformation of matter. This matter is emitted as radiant energy.



PHOTOVOLTAIC CELLS

Photovoltaic comes from the words photo meaning "light" and volt, a measurement of electricity. Sometimes photovoltaic cells are called PV cells or solar cells for short. These are the four steps that show how a PV cell is made and how it produces electricity.

1

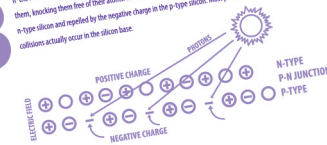
A slab (or wafer) of pure silicon is used to make a PV cell. The top of the slab is very thinly diffused with an "n" dopant such as phosphorus. On the base of the slab a small amount of a "p" dopant, typically boron, is diffused. The boron side of the slab is 1,000 times thicker than silicon, and the boron has one less. These dopants help create the electric field that motivates the energetic electrons out of the cell created when a light strikes the PV cell. The phosphorus gives the wafer of silicon an excess of free electrons; it has a negative character. This is called n-type silicon (n = negative). The n-type silicon is not charged—it has an equal number of protons and electrons—but some of the electrons are not held tightly to the atoms. They are free to move to different locations within the layer. The boron gives the base of the silicon a positive character, because it has a tendency to attract electrons. The base of the silicon is called p-type silicon (p = positive). The p-type silicon has an equal number of protons and electrons; it has a positive character but not a positive charge.



Where the n-type silicon and p-type silicon meet, free electrons from the n-layer flow into the p-layer.

3

If the PV cell is placed in the sun, photons of light strike the electrons in the p-n junction and energize them, knocking them free of their atoms. These electrons are attracted to the positive charge in the n-type silicon and repelled by the negative charge in the p-type silicon. Most photon-electron collisions actually occur in the silicon base.



4

A conducting wire connects the p-type silicon to an electrical load, such as a light or battery, and then back to the n-type silicon, forming a complete circuit. As the free electrons are pushed into the n-type silicon they repel each other because they are of like charge. The wire provides a path for electrons to move away from each other. This flow of electrons is an electric current that can be used to power a load. The circuit from the n-type to the p-type silicon, in addition to the semi-conductor circuit, consists of a top metallic grid or other electrical contact to collect electrons.

TOP SOLAR STATES



Energy Sources Materials

All NEED curriculum is available for free download.



Newsletters

- Intermediate Activity: Crunch the Numbers-Energy in the U.S. November/December 2002
- Primary Activity: Dichotomous Key of the Energy Sources January/February 2003
- Primary/Elementary Activity: Energy Source Webquest January/February 2003
- Primary Activity: Energy Source Puzzles September/October 2004
- Energy Source Sudoku April/May 2005
- Primary/Elementary Activity: Energy Picture September 2006
- Energy Analysts: Linda Doman, International Energy Analyst, U.S. Department of Energy, Energy January 2009
- Q&A: Ann Randazzo, Executive Director of the Center for Energy Information, Intermediate and Secondary Activity

Energy At A Glance

Solar (small) (large)



Exploring Wind Energy

History of Wind Energy

Year	Event
1888	First wind turbine in the U.S.
1930s	First modern wind turbine in the U.S.
1950s	First large-scale wind turbine in the U.S.
1970s	First modern wind turbine in the U.S.
1980s	First large-scale wind turbine in the U.S.
1990s	First modern wind turbine in the U.S.
2000s	First large-scale wind turbine in the U.S.

Why Wind Energy?

- Clean, renewable energy source
- No air pollution, CO₂, SO₂
- Quiet, safe, and reliable
- Reduces dependence on fossil fuels
- Reduces dependence on foreign oil
- Renewable
- No toxic waste

Vertical-Axis Turbines

- Compact
- Can be installed in urban areas
- Can be installed in areas with low wind speeds
- Can be installed in areas with low wind speeds
- Can be installed in areas with low wind speeds
- Can be installed in areas with low wind speeds

Modern Wind Turbines



Wind Farms



Offshore Wind Farms



Installed Wind Capacities





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Escambia County Public School Foundation
Eversource
Exelon
Exelon Foundation
Exelon Generation
First Roswell Company
Foundation for Environmental Education
FPL
The Franklin Institute
George Mason University – Environmental Science and Policy
Gerald Harrington, Geologist
Government of Thailand–Energy Ministry
Grayson RECC
Green Power EMC
Greenwired, Inc.
Guilford County Schools–North Carolina
Gulf Power
Harvard Petroleum
Hawaii Energy
Houston LULAC National Education Service Centers
Illinois Clean Energy Community Foundation
Illinois International Brotherhood of Electrical Workers Renewable Energy Fund
Illinois Institute of Technology
Independent Petroleum Association of New Mexico
Jackson Energy
James Madison University
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
Linn County Rural Electric Cooperative
Llano Land and Exploration
Louisiana State University – Agricultural Center
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
National Renewable Energy Laboratory
NC Green Power
Nebraskans for Solar
New Mexico Oil Corporation
New Mexico Landman's Association
NextEra Energy Resources
NEXTracker
Nicol Gas
Nisource Charitable Foundation
Noble Energy
North Carolina Department of Environmental Quality
North Shore Gas
Offshore Technology Conference
Ohio Energy Project
Oklahoma Gas and Electric Energy Corporation
Oxnard Union High School District
Pacific Gas and Electric Company
PECO
Pecos Valley Energy Committee
People's Electric Cooperative
Peoples Gas
Pepco
Performance Services, Inc.
Petroleum Equipment and Services Association
Permian Basin Petroleum Museum
Phillips 66
Pioneer Electric Cooperative
PNM
PowerSouth Energy Cooperative
Providence Public Schools
Quarto Publishing Group
Prince George's County (MD)
R.R. Hinkle Co
Read & Stevens, Inc.
Renewable Energy Alaska Project
Resource Central
Rhoades Energy
Rhode Island Office of Energy Resources
Rhode Island Energy Efficiency and Resource Management Council
Robert Armstrong
Roswell Geological Society
Salal Foundation/Salal Credit Union
Salt River Project
Salt River Rural Electric Cooperative
Sam Houston State University
Schlumberger
C.T. Seaver Trust
Secure Futures, LLC
Seneca Resources
Shell
Shell Carson
Shell Chemical
Shell Deer Park
Shell Eco-Marathon
Sigora Solar
Singapore Ministry of Education
Society of Petroleum Engineers
Sports Dimensions
South Kentucky RECC
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U.S. Department of Energy–Wind for Schools
U.S. Energy Information Administration
United States Virgin Islands Energy Office
Volusia County Schools
Western Massachusetts Electric Company - Eversource