

# ENERGY EXCHANGE

The National Energy Education Development Project

February 2009

## Youth Awards for Energy Achievement

April 15, 2009 is the deadline for submission of student energy projects to participate in the 2009 NEED Youth Awards for Energy Achievement. Details can be found in NEED's *Project and Activities* and online at [www.need.org/youthawards](http://www.need.org/youthawards). The Youth Awards Conference will be held June 26-29, 2009 at the Hyatt Regency Crystal City in Arlington, Virginia.



Students pose with EIA's Energy Ant in front of the Lincoln Memorial during NEED's Youth Awards weekend.

## NEED National Energy Conference for Educators

### Nashville, Tennessee - July 19-23

The NEED National Energy Conference for Educators is hosted each July to train teachers to incorporate energy programs into their classroom and extracurricular activities. In 2008, over 170 educators participated thanks to the sponsorship of many local, state, and national sponsors. This five-day program covers all aspects of energy education and offers three graduate credits to participating educators. The conference includes a one-day field experience, allowing educators an opportunity to learn about a variety of energy topics. Three graduate hours are offered through Virginia Commonwealth University. Join us in Nashville!

For more information, visit [www.need.org/summertraining](http://www.need.org/summertraining).

## NEED Welcomes New Staff

Lillian Dean joins the national NEED staff as Office Administrator and Accountant. A longtime Virginia resident that grew up in Connecticut, Lillian enjoys working for non-profit organizations. Prior to coming to NEED, she worked for AirServ, which flew personnel, medical supplies and evacuations for remote areas such as South Africa, Chad and Afghanistan. Working there allowed Lillian to travel to Iraq, Jordan and Pakistan. Lillian used to raise and compete Jack Russell Terriers and now enjoys spending time with her grown daughters and biking. Welcome, Lillian!

## NEED Facilitator Training July 9-13, 2009

Expanding on the success of the NEED Facilitator Training in 2007, the 2009 program promises to provide even more opportunities for individuals to improve their NEED facilitation skills and develop their professional and personal knowledge of energy. Selected participants will be asked to lead NEED programs in their local communities. To learn more, contact Rebecca Lamb at [rlamb@need.org](mailto:rlamb@need.org).

## Come See Us at NSTA in New Orleans March 19-22, 2009

NEED will facilitate several workshops and an exhibit at the NSTA National Convention in New Orleans. NEED will also host its annual NEED Teacher Networking Event. If you're attending the conference and/or are willing to help host the NEED exhibit, please let us know. If you are attending the conference and would like to attend the Networking Event, contact Rebecca Lamb at [rlamb@need.org](mailto:rlamb@need.org). Additional details will be sent in March. See you there!

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## The NEED Project

National Energy Education Development  
P.O. Box 10101  
Manassas, VA 20108  
TEL: 1-800-875-5029  
FAX: 1-800-847-1820  
EMAIL: [info@need.org](mailto:info@need.org)  
WEB: [www.need.org](http://www.need.org)

The NEED Project is a 501(c)(3) nonprofit education association providing professional development, innovative materials correlated to the National Science Education Content Standards, ongoing support and recognition to educators nationwide.

### National Staff

Mary Spruillô Executive Director  
Hallie Millsô Curriculum Director  
Keith Etheridgeô Training Director  
Rebecca Lambô Program Director  
Karen Reagorô State Program Director  
Barry Scottô State Program Director  
Amy Constantô Program Associate  
Samantha Forbesô Program Associate  
Melanie Harperô Program Associate  
Vernon Kimballô Program Associate  
Todd Rogersô Program Associate  
Annie Razorô Curriculum Associate  
Cindy Welchkoô Curriculum Associate  
Lillian Deanô Office Administrator  
Wendi Mossô Customer Service



A list of NEED sponsors is available at [www.need.org](http://www.need.org) and in the Annual Report.

*Energy Exchange* is published four times a year by NEED for educators and students, and is available at [www.need.org](http://www.need.org).

NEED welcomes questions, comments, and suggestions. Please contact [info@need.org](mailto:info@need.org).

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# Calendar of Events

## January 2009

- 29 Houston Energy Workshop sponsored by ConocoPhillips - Houston, TX
- 30 Southern LNG Teacher Advisory Group Meeting - Savannah, GA

## February 2009

- 2 Florida Energy Workshop sponsored by ConocoPhillips - Tallahassee, FL
- 4-6 NEED sessions at the Hoosier Association of Science Teachers, Inc. Conference - Indianapolis, IN
- 23-28 NEED at the Renewable Energy Technology Conference and Exhibition - Las Vegas, NV
- 24 High Performance Schools Operations Management Workshop - Georgetown, KY
- 26 High Performance Schools Operations Management Workshop - Cave City, KY
- 26 Kentucky Energy Workshop sponsored by ConocoPhillips - Louisville, KY

## March 2009

- 3 Dallas/Ft. Worth Energy Workshop sponsored by ConocoPhillips - Dallas/Ft. Worth, TX
- 3 Georgia Energy Workshop sponsored by ConocoPhillips - Atlanta, GA
- 5 High Performance Schools Operations Management Workshop - Morehead, KY
- 5 San Francisco Energy Workshop sponsored by ConocoPhillips - San Francisco, CA
- 6 High Performance Schools Operations Management Workshop - London, KY
- 10 Virginia Energy Workshop sponsored by ConocoPhillips - Arlington, VA
- 11 Albuquerque Energy Workshop sponsored by ConocoPhillips - Albuquerque, NM
- 19-22 NEED sessions and exhibit at NSTA National Conference - New Orleans, LA
- TBD Texas Energy Workshops sponsored by EnCana
- TBD Colorado Energy Workshops sponsored by EnCana

## April 2009

- 2 Maryland Energy Workshop sponsored by ConocoPhillips - Annapolis, MD
- 7 Massachusetts Energy Workshop sponsored by ConocoPhillips - Boston, MA
- 15 Illinois Energy Workshop sponsored by ConocoPhillips - Chicago, IL
- 15-16 Energizing Kentucky Conference - Lexington, KY
- 21 North Carolina Energy Workshop sponsored by ConocoPhillips - Raleigh, NC
- 25 Energy WISE Awards Ceremony - Kenton County, KY
- 28 Oklahoma Energy Workshop sponsored by ConocoPhillips - Tulsa, OK

## May 2009

- 4-7 NEED Wind Workshop at Windpower 2009 - Chicago, IL
- 6 PG&E Solar Schools Energy Expo - Stockton, CA
- 5 Detroit Energy Workshop sponsored by ConocoPhillips - Livonia, MI
- 7 Baton Rouge Energy Workshop sponsored by ConocoPhillips - Baton Rouge, LA
- 7 NEED Workshop sponsored by the Society of Petroleum Engineers & OTC - Houston, TX
- 11-13 NEED Hydropower Workshop at the National Hydropower Conference - Washington, DC
- 13 Ferndale Energy Workshop sponsored by ConocoPhillips - Ferndale, WA
- 19 Kentucky NEED Youth Awards Ceremony - Frankfort, KY

## June 2009

- 8-12 Kentucky Energy Tour - Eastern Kentucky Locations
- 26-29 Youth Awards for Energy Achievement - Washington, DC

## July 2009

- 9-13 NEED Facilitator Training - Washington, DC
- 19-23 NEED Energy Conference for Educators - Nashville, TN
- TBD Nuclear Energy Conference for Educators - Charlottesville, VA

Interested in participating in July events? Email [rlamb@need.org](mailto:rlamb@need.org).

## Upcoming Events

Nationwide NEED Hydrogen Workshops coming this spring!  
Colorado, Texas, and Louisiana: NEED Workshops sponsored by EnCana  
Texas: TXU Energy Solar Academy Workshops sponsored by TXU Energy  
California: PG&E Solar Schools Workshops sponsored by PG&E

For additional workshops and upcoming events, visit [www.need.org/calendar.php](http://www.need.org/calendar.php).  
For more information, email [info@need.org](mailto:info@need.org) or call 800.875.5029.

## **RETECH - The Renewable Energy Technology Conference and Exhibition - February 25-27, 2009**

Join us at RETECH! The largest trade gathering of the all-renewable energy industry in the United States, RETECH is an unparalleled opportunity to network with industry leaders and forward-thinking, focused organizations with a global view. The NEED Project is proud to be an official Supporting Organization of RETECH 2009. For more information, visit [www.retech2009.com/?src=need](http://www.retech2009.com/?src=need).

## **Energy Exchange & Career Currents in 2008-2009**

In an effort to keep costs low, and reduce the use of energy resources for printing and mail, NEED will begin delivering its Career Currents and Energy Exchange newsletters electronically. Recipients of the newsletters may elect to receive an email announcing that the newsletters have been posted online. To view the newsletters each month, and to access back issues, visit [www.need.org/newsletters.php](http://www.need.org/newsletters.php). To make sure you can receive email from NEED, set your spam blocker to accept email from need.org.

## **BP's A+ for Energy Launches for 2009**

NEED is pleased to partner with BP for the BP A+ for Energy Program. The program provides \$5,000 and \$10,000 grants to teachers in California, Texas, Indiana, Ohio, Alabama, New Mexico, and South Carolina. Visit [www.aplusforenergy.org](http://www.aplusforenergy.org) to determine eligibility and to apply.

## **ComEd**

The Illinois Energy Workshops and Illinois Solar Schools Workshops were a great success - with over 200 educators participating to learn more about energy, electricity generation, and solar energy. To learn more about the ComEd program visit [www.need.org/ComEd](http://www.need.org/ComEd).

## **4-H Modules**

Did you know that NEED has four modules designed for 4-H and Cooperative Extension? These modules, developed with the support of the U.S. Department of Energy and the National Association of State Universities and Land Grant Colleges, were created to provide lessons and background information on Heat, Light, Motion, and Chemical Energy. To download the modules, visit [www.need.org/whatsnew.php](http://www.need.org/whatsnew.php).

## **Great Seeing You this Fall!**

The NEED staff and partners enjoyed meeting so many great teachers at state science conferences and at the regional NSTA Conferences in fall 2008. NEED facilitated 20 workshops at the conferences and teachers received NEED curriculum materials and resources at the exhibits. NEED thanks Pacific Gas and Electric Company, ConocoPhillips, TXU Energy and the U.S. Minerals Management Service for their partnership at local conferences this fall.

## **ConocoPhillips**

ConocoPhillips is pleased to support NEED's efforts to provide training and resources to classroom teachers. NEED workshops are designed to equip K-12 teachers with tools to improve their students' energy knowledge and encourage classroom dialogue about energy. 2009 marks the second year of ConocoPhillips' partnership with NEED. In 2008, ConocoPhillips and NEED provided training and resources to nearly 1,000 teachers who went on to educate more than 100,000 students about key energy issues that will affect them today and in the future. In 2009, one-day workshops will be hosted in 25 communities in 21 states. To register, visit [www.need.org/conocophillips](http://www.need.org/conocophillips).

## **New Mexico**

In spring 2009, NEED and PNM have partnered to provide New Mexico Energy Workshops in four communities in the state. These workshops will provide educators with classroom resources and hands-on kits designed to teach students about the science of energy and energy resources. All materials are aligned to the New Mexico state standards. To be placed on the recruitment list, please email Wendi Moss at [wmoss@need.org](mailto:wmoss@need.org).

## **Thank You! To the Roswell Climate Change Committee**

The Roswell Climate Change Committee contributed over \$11,000 for teacher training in southeastern New Mexico. The funding will support educators to attend local workshops and the NEED National Energy Conference for Educators in Nashville, Tennessee in July 2009. Special thanks to Mr. Eddie David and Mr. Gerri Harrington for spearheading the local effort.

## **Nuclear Energy Conference for Educators**

Working with Washington and Lee University and the Council on Foreign Relations, NEED has embarked on an expansion of its nuclear education materials. The funds for the nuclear education project have been provided by grant to Washington and Lee University from Mr. H. F. Lenfest, a distinguished alumnus of the University. A four-day training conference in central Virginia will include field trips to local nuclear facilities, networking opportunities with leading nuclear energy professionals and classroom activity sessions with the newly expanded nuclear module. Interested in attending? Email Rebecca Lamb at [rlamb@need.org](mailto:rlamb@need.org).

## **Want to Learn More about Energy from Our Oceans? Check Out the NOIA Activity Books!**

The National Ocean Industries Association, the U.S. Minerals Management Service, and the U.S. Department of Energy sponsored the NOIA Activity Book in partnership with NEED. The Activity Books—perfect for elementary school students—are packaged in class-sets of 30. To request class-sets of the Activity Book, email [info@need.org](mailto:info@need.org).

### Virginia

Thanks to the support of Dominion, three Virginia Energy Workshops will be hosted this spring in Surry, Mineral, and southwestern Virginia. To be placed on the recruitment list, contact Wendi Moss at [wmoos@need.org](mailto:wmoos@need.org).

### Kentucky

Kentucky NEED, in partnership with the Kentucky Department for Energy Development and Independence, is facilitating four regional Energy Management Workshops for Schools on February 24 and 26, and March 5 and 6. Learn more about the one-day events for teachers and administrators by downloading the brochure at [www.need.org/whatsnew.php](http://www.need.org/whatsnew.php).

### Congratulations, Scott!

Congratulations to Scott Burch, NEED teacher from Indiana, who was voted the Best Teacher in Floyd County! Additional congratulations for helping his school to be named an ENERGY STAR® School for two years running. Keep up the great work, Scott!

### Massachusetts

Thanks to the support of the Independent Petroleum Association of America, NEED will facilitate two Massachusetts Energy Workshops in southeastern Massachusetts this spring. To be placed on the recruitment list, contact Wendi Moss at [wmoos@need.org](mailto:wmoos@need.org).

### National Environmental Education Week

National Environmental Education Week (EE Week) is the largest organized environmental education event in the United States. NEED is again a National Partner for EE Week. This year, EE Week is April 12-18, 2009 with the theme of "Be Water Wise!"

New to EE Week this year is a Carbon Footprint Calculator which includes student friendly choices in the following categories: transportation, what you eat, home and school, what you use, and what you throw away.

For more information or to check out your carbon footprint, visit [www.eeweek.org](http://www.eeweek.org).

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## ENERGY STAR®

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Earth Day marks the end of the **Change the World, Start with ENERGY STAR®** campaign for 2008-2009. This campaign focuses on encouraging people to make small changes that make a big difference in the fight against climate change. In addition to Pledging to change at least one light in your home to an ENERGY STAR® qualified one, the Pledge includes everyday actions, such as setting a programmable thermostat and setting your computer to power down when not in use. You can even make a Pledge to purchase an ENERGY STAR® qualified appliance or piece of office equipment.

NEED's goal was to collect enough Pledges to reduce greenhouse gas emissions by 5,198,000 pounds. Our Pledge partners have reduced greenhouse gas emissions by 9,743,003 pounds, surpassing our goal by 87 percent! Of the educational organizations participating in the campaign, NEED currently ranks first for the year, with KY NEED Project a close second. We may have exceeded our initial goal, but there is still time to spread the word, reach more people, collect more Pledges, and make a bigger difference.

Your energy savvy students can make a difference and help change the world by collecting Pledges. If you plan to collect at least 100 Pledges, sign up your school as a second tier Pledge Driver under "National Energy Education Development Project (NEED)." Participating in the campaign can be as small or as big of a project as you want. Some ideas include designing informative posters to display around your school, encouraging teachers and administrators to shut down office equipment at the end of the day, or partnering with an appliance retailer to host an information table and collect Pledges at their store. Becoming involved in the campaign is a great energy club or Youth Awards activity.

For a teacher's guide for the Change the World, Start with ENERGY STAR® campaign, and a link to ENERGY STAR's website to register as a Pledge driver or submit Pledges, visit our home page, [www.need.org](http://www.need.org).

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# Primary/Elementary Activity: Energy and Motion

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## Focus Question

What happens to the motion of an object when it rolls across different surfaces?

### Materials for Each Group

- meter stick or long tape measure
- ramps (can be made of flat cardboard, anything sturdy enough to hold rolling objects)
- books (all the same size) to give the ramps a standard incline
- access to different flat surfaces that objects will roll on (linoleum, carpet, gravel, pavement)

### Materials for Each Student

- small object that rolls (ball, toy car, etc.)
- science notebook

## Prediction

Make a prediction about what will happen when an object rolls across different textured surfaces.

## Procedure

1. Set up the ramp so that the top of the ramp is about four centimeters off the ground.
2. Place the object at the top of the ramp and let go.
3. Record how far the object traveled (measure the distance from the bottom of the ramp to where the object stopped) and record what happened with words. (Did the object roll in a straight line? Curved? Did it roll for a long time or stop suddenly?) Repeat two times for a total of three trials for the surface.
4. Choose another surface to test. Set up your ramp and complete three trials. Record your observations and data for each roll.
5. Continue trying new surfaces. Complete three trials for each surface. Record all results and observations.
6. Compare the results; determine which surfaces allowed your object to travel the shortest and the farthest distance.
7. Compare the similarities and differences between the surfaces.

## Sample Data Table

	Trial 1	Trial 2	Trial 3
Carpet			
Linoleum			
Gravel			

## Conclusion

What affect did different surface types have on the motion of the object?

## Teacher Tips

- Students can share the testing materials (ramp, measuring tools), but each should be allowed to test their own rolling object and keep their own data.
- During the investigation and class discussions ask students the following questions...What is causing the object to begin moving in the first place? Why do you think that is? What is different about this surface than the other surface? Why did the object stop rolling?
- To give your students more surfaces to test, you may want to take them and their investigation tools outside to the playground.

## *Additional Information*

*The Primary Science of Energy teacher guide has further information about motion and the forces that affect it on page 34. Visit [www.need.org/Guides-Title.php](http://www.need.org/Guides-Title.php).*

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# Intermediate Activity: Energy and Motion

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## Focus Question

What energy transformations occur when objects are in motion?

## Materials

- |                              |                                   |
|------------------------------|-----------------------------------|
| * 1 set of happy/sad spheres | meter stick                       |
| * 1 Superball                | 1 cup of hot water (not boiling)  |
| * 1 yo-yo                    | table with hard, flat surface     |
| * 1 toy car                  | science notebook for each student |
| * 1 set of tongs             |                                   |
| * balloons                   |                                   |

\*You can use the materials from Station One in the Science of Energy Kit to complete this investigation.

## Hypothesis

Write a hypothesis about the energy involved in making these objects move.

## Directions

Follow the procedures below. As you observe, focus on the energy transformations occurring. Your recorded observations should include diagrams showing the energy transformations taking place.

## **Happy/Sad Spheres**

### Procedure

1. Examine the two spheres.
2. Drop each sphere from a height of one meter.
3. Record the results. Repeat two times for a total of three trials for each sphere.
4. Compare the results; determine which is the “sad” sphere.
5. Place the sad sphere in hot water for one minute.
6. Using tongs, remove the sphere and drop it from one meter.
7. Record the results.
8. Drop the heated sad sphere multiple times. Observe and record what happens as it cools.

## Conclusion

What energy transformations did you observe with the happy and sad spheres? What affected the results?

## **Yo-yo, Toy Car, and Balloons**

### Procedure

1. Start the object in motion. Record how the object was able to start moving.
2. Observe what happens when the object is in motion. Record your observations.
3. What stops the motion of the object? Record your observations.

## Conclusion

What energy transformations did you observe with the yo-yo, toy car and balloons?

## Teacher Tip

If you do not have the Science of Energy Kit and do not have happy/sad spheres, you can have students investigate the bounce of a variety of balls and analyze why they bounce differently. You will not need to put any of these balls into a cup of hot water.

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## Secondary Activity: Chemical Energy and Electricity

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### Focus Question

What variables affect the ability of an apple battery to produce electricity?

### Materials for Each Group

- \* 1 small zinc nail
- \* 1 large zinc nail
- \* 1 tin wire
- \* 1 thin copper wire
- \* 1 thick copper wire
- \* 1 DC microammeter
- \* alligator clips
- apple
- metric ruler

### Materials for Each Student

science notebook

\*These materials can be found in Station Five of the Secondary Science of Energy Kit.

### Hypothesis

Write a hypothesis about producing electricity using chemical energy.

### Directions

Follow the procedure below. As you observe, focus on the variables that affect the electricity being produced. Your recorded observations should include diagrams.

### Procedure

1. Examine the materials available.
2. Through testing, determine the best combination of wires or nails to produce the most electric current.
3. Record the different combinations chosen and the results of each. Repeat each combination for a total of three trials for each combination.
4. Compare the results. Determine which combination produces the most electricity.
5. Diagram the combination that provided the most electric current.

### Conclusion

What affected the ability of the apple battery to produce electricity? Why?

### Teacher Tip

To extend this investigation, bring in different fruits and vegetables and have students compare the electrical output produced and compare it to the apple battery.

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# Short Circuits

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Photo credit: NREL

## Residential Wind Turbines

Visitors to Washington, DC for President-elect Obama's Inauguration were able to see residential-scale wind turbines on display at the U.S. Botanical Gardens on the Mall. Today's small wind turbine systems are large enough to power an average home and cost about \$30,000.

For more information about residential wind systems, visit [www.awea.org/smallwind](http://www.awea.org/smallwind).

## U.S. Army Will Lease 4,000 Neighborhood Electric Vehicles

The U.S. Army will lease 4,000 Neighborhood Electric Vehicles (NEVs) over the next three years. NEVs are small, low-speed electric vehicles that cannot be driven on highways. The Army plans to use NEVs at its bases for transporting people around the base, as well as for security patrols and maintenance and delivery services. The Army accepted its first six NEVs at Virginia's Fort Myer on January 12, 2009 and will lease a total of 600 NEVs this year. With a full eight-hour recharge, the NEVs can travel 30 miles at a top speed of 25 miles per hour.

For more information, visit [www.army.mil/newsreleases/2009/01/12/15707-army-announces-historic-electric-vehicle-lease/](http://www.army.mil/newsreleases/2009/01/12/15707-army-announces-historic-electric-vehicle-lease/).

## EIA Predicts Energy Prices to Stay Low Throughout 2009

After suffering record-high gasoline and diesel fuel prices in the summer of 2008, motor fuel prices have fallen by fifty percent or more, reaching \$1.69 per gallon for regular gasoline and \$2.45 per gallon for diesel fuel in December 2008. According to the latest projections from DOE's Energy Information Administration (EIA), the slump in fuel prices is expected to continue through 2009, causing the annual average prices for gasoline and diesel fuel to be only \$1.87 and \$2.27 per gallon, respectively. Natural gas prices are also expected to drop from the 2008 average of \$9.13 per thousand cubic feet to only \$5.78 per thousand cubic feet in 2009.

For more information, visit [www.eia.doe.gov/emeu/steo/pub/contents.html](http://www.eia.doe.gov/emeu/steo/pub/contents.html).

## Nominations Open for the 2009 Richard C. Bartlett Environmental Education Award

The Richard C. Bartlett Environmental Education Award is awarded annually by the National Environmental Education Foundation to an outstanding educator who has successfully integrated environmental education into his or her daily education programs. The award is given to a 5th-12th grade educator who can serve as an inspiration and model for others. A \$5,000 cash award is provided for the recipient to continue their work in environmental education. Do you know a teacher who stands out among the rest? If so, please nominate him/her for the 2009 Richard C. Bartlett Award. Nominations will be accepted through February 13, 2009. To learn more or submit your nomination visit [www.neefusa.org/bartlettaward.htm](http://www.neefusa.org/bartlettaward.htm).

