

ENERGY Education newsletter

January/February 2005



Gear up for National Engineers Week

National Engineers Week (NEW), February 20-26, is a great opportunity to introduce students to the world of engineering and to help them start learning about how engineers turn ideas into reality. During this week, community groups, colleges and schools across the U.S. celebrate the achievements of engineers.

The focus of NEW is on raising public awareness of engineers' positive contributions to our quality of life. Engineers Week programs also stress the importance of technical education and help students identify careers in many related fields. For ideas on introducing engineering activities into the classroom, visit the

NEW Web site, www.eweek.org, and click on the "K-12" link. The site offers information, ideas and activities to students as well as teachers.

Classroom Engineering Activities

Two new classroom activities are designed for middle and high school students. One challenges teams of students to design a device – with inexpensive, readily available materials – to drop a cup of water. The team that spills the least water wins! The second activity, "Powering Your Cell Phone," is designed to explain where the battery comes from and how it works.

More hands-on engineering activities are available in the Web site's archives, which go back to 1990. These projects are designed for a range of grade levels. They introduce engineering as a problem-solving profession and cover topics such as buoyancy, batteries, wetlands and micro-processing.

Opening the World of Engineering to Girls

February 24 is Introduce a Girl to Engineering Day. This area of the NEW site offers a downloadable information packet that answers questions on encouraging girls in science and math, explains what components to include in an out-of-school engineering program for girls, and shows how parents can support girls' learning about engineering.

For middle-school girls, the Web site offers "Three Cheers for Engineers," a student brochure reprinted from *Girls' Life* magazine. This colorful, downloadable brochure presents an overview of the engineering professions as well as some experiments related to engineering concepts. A link to the Women in Engineering Organization offers opportunities to learn about what women engineers are doing in a wide range of industries.

From Forensics to Fabrics

Boys as well as girls will be surprised to learn about the wide variety of careers open to engineers. Inviting practicing engineers into the classroom is a great way to introduce students to some of these career possibilities. The NEW Web site suggests ways of connecting with engineers in your area.

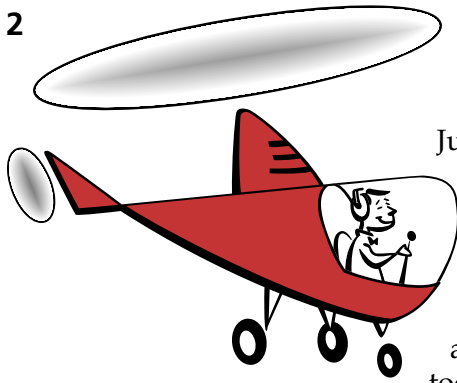
Students can also read online about engineers working in fields as diverse as forensics and textile arts. Click on "New Faces of Engineering" in the NEW site to reach the "Meet the Engineers" section. Here students can meet Julie Pfau, a computer engineer whose job takes her all over the world, and Celeste Baine, a biomedical engineer with an interest in

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- Electric Operating Companies:
- Ohio Edison
 - The Illuminating Company
 - Toledo Edison
 - Metropolitan Edison
 - Pennsylvania Electric
 - Penn Power
 - Jersey Central Power & Light



Come Tour a Coal-Fueled Plant! **Take FirstEnergy's New Virtual Tour and See Power Being Made**

Jump on board the FirstEnergy Helicopter! Your ticket for our virtual tour is at www.firstenergycorp.com/education – and there's plenty of room for everyone. This is a special type of whirly-bird, too – it flies through steel walls and right inside the complex machinery that makes electrical power out of a barge of coal.

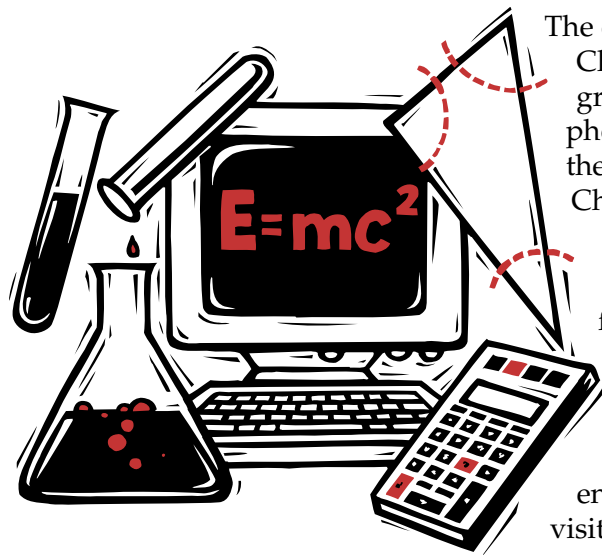
On your tour you will visit the scrubbers that FirstEnergy has developed to help

protect the environment, and you will see how the plant's fly ash by-product becomes a component of concrete, grouting and roofing shingles. Finally, you will trace the distribution process that brings power to homes, businesses and industries.

It all happens by computer! We welcome you and your students to the amazing world of coal-fueled electric generation. No reservation necessary – just click on through to our Web site and begin your tour.

Math and Science Opportunities Coming Your Way

Considering applying for a FirstEnergy Math, Science and Technology Education Grant for the 2005-2006 school year? Now is the time to start planning. These grants of up to \$500 support classroom projects and teacher professional development initiatives that deal with mathematics, science and technology. We welcome applications from educators and youth group leaders in our service areas and the communities where we have facilities. For more information, visit our Web site, www.firstenergycorp.com/education, and click on "educational grants."



The deadline for entries in the fourth Igniting Creative Energy Challenge is February 19. The contest is open to students in grades K-12 with science projects, essays, stories, artwork, photographs, music, music video or Web site projects on the theme Igniting Creative Energy. For more information, visit the Challenge Web site, www.ignitingcreativeenergy.org.

The Science in Space Challenge, presented by NASA and Pearson Scott Foresman, invites teachers to submit student ideas for science and technology investigations to be carried out on a Space Shuttle mission or on the International Space Station. One entry each from grades K-6 and 7-12 will be selected, and teachers and students will follow along via TV or the Internet as the investigations are performed. The deadline for entries is June 3, 2005. For entry forms and more information, visit www.scottforesman.com/hot.

Gear up for National Engineers Week

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the design of roller coasters. Baine is the author of a popular engineering career book.

To help teachers gear up for Engineers Week, NEW offers a range of posters,

videos, stickers and promotional items. Visit the "Product Catalog" area of the site for a full list of these items and to place an order. For free bookmarks to download and print out, click on "K-12" and go to the teacher section. To contact NEW by phone, call 703-684-2852.

The Cutting Edge

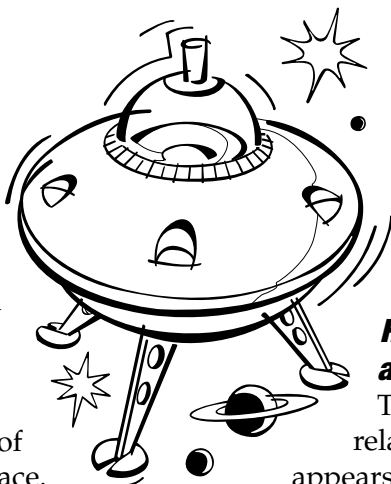
Electric-Powered Space Flight

Europe's unmanned probe, SMART-1, has broken a record by becoming the slowest spacecraft to reach the moon. Yet this 13-month trip is an important milestone in space travel, since it demonstrates the effectiveness of electric propulsion in space. SMART-1 is propelled by plasma thrusters that throw electrically charged atoms (in this case xenon nuclei) out the back of the engine. The thrust is too low to launch a rocket into space, but once there a probe can travel for months at a time, running up to 20 times more efficiently than conventional chemical rockets. Because they can run for longer periods and at greater efficiency than chemical rockets, electric-powered space probes could actually be faster over a long mission than conventional craft. For example, an electric-powered mission to Pluto could take just seven years, while a conventional rocket would take 20.

The Economist, November 20, 2004

The Future Is Clear

Scientists at the Tokyo Institute of Technology have developed a transparent semiconductor material out of indium gallium zinc oxide. Transistors made from this material are 10 times as conductive as the silicon transistors used in today's liquid-crystal displays. In addition, the transistor can be deposited on a plastic substrate at room temperature. A plastic substrate cannot be used with silicon transistors because the high temperature at which the silicon must be deposited would melt the plastic. Researchers hope



to use the new transistors to create flexible computer displays, to integrate displays into car windshields and for a host of specialty applications.

Science News Online,
November 27, 2004

Hubble Focuses on a Young Galaxy

The Hubble Space Telescope has relayed pictures of a galaxy that appears to be the youngest ever seen. Named 1 Zwicky 18, the young galaxy is one of 30,000 nearby galaxies catalogued by Swiss astronomer Fritz Zwicky in the 1930s. Until recently, however, astrophysicists have had little information about 1 Zwicky 18, and they now estimate that it may be only 500 million years old. The galaxy in which Earth is situated is 12 billion years old, or over 20 times the age of 1 Zwicky 18. In fact, complex life already existed on Earth at the time the newly photographed galaxy began active star formation.

BBC News, December 7, 2004

Hydrogen Station

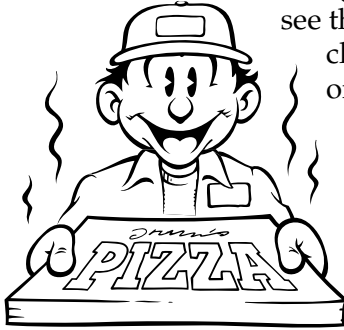
A filling station in Washington, DC is now offering hydrogen as well as the usual selection of gasoline and diesel. Drivers can choose between liquid hydrogen, chilled to nearly 300 degrees below zero, and gaseous hydrogen. Shell Oil has joined with General Motors to bring hydrogen to the nation's capital, but few cars are yet equipped to use the fuel. Only General Motors' own fleet of fuel cell cars, which are currently being test driven, are likely to pull up to the pump.


The New York Times, November 11, 2004





Visit our website at
www.firstenergycorp.com/education


Educational Resources Available




 The Federal Reserve Bank of New York offers **comic-style educational booklets** (up to 35 copies free) for students from upper elementary grades through high school. Topics range from foreign trade to consumer credit. To see the full list of booklets and to order classroom copies, visit www.ny.frb.org/education/index.html.


 For instructions from the New Mexico Solar Energy Association on **making a solar oven out of a pizza box**, visit www.nmsea.org/Curriculum/4_6/pizza_box_oven/pizza_box_ovens.htm.


 Free high school **lesson plans on energy resources** are available on the American Geological Institute's Web site at www.agiweb.org/earth-comm/.


 Students with **questions about science** will find answers at <http://science.howstuffworks.com>. The site gives clear answers to questions like, "How does nuclear radiation work?"





 **Online physics game "Collision Physics"** is just one of the resources available on the Yucca Mountain Youth Zone Web site of the U.S. Department of Energy: www.ocrwm.doe.gov/youth/games.htm.


 To order Underwriters Laboratories' free **electrical safety video for grades 4-6**, visit www.vpw.com/educational. This site offers schools a range of educational videos at no charge.

 The Nuclear Energy Institute provides **resources for teachers and students** at its Web site, www.nei.org/scienceclub/index.html. Students will find explanations of nuclear energy topics and ideas for projects. For teachers, the site offers lesson plans and links.

 ARGUS is a non-profit project of the Association of American Geographers designed to provide **high-quality teaching materials at low cost**. For information about their CD of 190 units on U.S. geography topics and other teaching materials, visit www.aag.org/ARGUS/ARGUS.html.

 Scientists at Los Alamos National Laboratory bring **important math ideas to elementary school classrooms** through Mega Mathematics. Visit www.c3.lanl.gov/mega-math for activities that introduce topics such as the four-color theorem, graphing and the mathematics of knots.

 A **coloring book on geothermal energy** is available free from the International Ground Source Heat Pump Association at www.igshpa.okstate.edu/educational_outreach/home.html. Teachers are invited to download the file and make photocopies for the classroom.

 The Math Forum at Drexel University and the Textile Museum **bring geometry, social studies and art together** by exploring the symmetry and pattern of oriental carpets. For more information, go to <http://mathforum.org/geometry/rugs>.

"To invent, you need a good imagination and a pile of junk."

– Edison

