



Excellence in Education

FirstEnergy Supports Math, Science and Technology Teachers

FirstEnergy is committed to excellence in education. That's why for many years we have offered the FirstEnergy Math, Science and Technology Education Grants to teachers. Winning educators draw on their grants to make their bright ideas into classroom reality. This financial support helps students gain an understanding of topics essential to their development into productive, well-employed citizens. That's why the real winners of these grants are the students, who, as adults, will make the future brighter for all of us.

Here are a few examples of the creative projects that FirstEnergy has supported:

Green Chemistry

Ruffing Montessori School in Cleveland Heights, Ohio, has made a commitment to adopt a "Green Curriculum," and the school's seventh- and eighth-grade students experience this approach when they build and test a working model of a fuel-cell car. The school's science teacher, Cary Seidman, has designed a chemistry unit that starts by teaching the fundamentals of electrolysis. Students then use this knowledge when they build the car, which uses reversible fuel cell technology,



and conduct a series of experiments. Finally, the students demonstrate their cars to kids in lower grades.

Celebrating Science

Students and their families will celebrate science together at Family Science Night at Central Elementary School in Beaver Falls, Pennsylvania. Slated for spring of 2009, Family Science Night will fill the school's gymnasium and cafeteria with hands-on science activities, divided into color-coded areas for physical, life, earth and space science and technology.

Participants will move from one area to another, spending half an hour at each of four different stations. High school and college students assigned to different stations will help with the activities, which include experiments with electricity and magnets.

Considering Alternatives

Alternative energy sources are the focus of study for fifth graders at Lanes Mill Elementary School in Brick, New Jersey. Assistant Principal Allison McConnell and teachers Noeline Carter and Raymond Giordano have designed a project that helps students to understand the concept of a carbon footprint and how to reduce it. Groups of students investigate alternative energy sources and build models that demonstrate those sources at work. They collaborate to create "How to Go Green at Home," a brochure to share with family and the community at large. The project culminates in a family fun night entitled "Going Green: A-Z."



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- 2 2008-2009 FirstEnergy Mathematics, Science & Technology Education Grant Recipients
- 3 The Cutting Edge
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FirstEnergy
 Community Initiatives Dept.
 76 South Main Street
 Akron, Ohio 44308
 (330) 384-5022

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

2 2008-2009 FirstEnergy Mathematics, Science & Technology Education Grant Recipients

Ohio

Akron

Linda L. Ward
Miller South School for the Visual
and Performing Arts

Aurora

Nancy Tyrrell & Jackie Skeels
Leighton Elementary School
"Solar Powered Car"

Cleveland Heights

Cary Seidman
Ruffing Montessori School
"Integrating Fuel Cell Technology with
a Lab-Based Physical Science Course"

Concord

Kim Walczak
Melridge Elementary School
"Inquiry-Centered Electrical Science
Materials for Grade 5"

East Liverpool

Steve Ullom
East Liverpool Christian School

Mantua

Teresa Moon
Crestwood High School
"Constructing Mathematical Concepts"

Parma Heights

Jason Weaver
Valley Forge High School
"As the Genecons Turn"

Springfield

Thomas Nash
Northeastern High School
"Using Graphing Calculators
to Teach Physics"

Tallmadge

Justin Christopher
Tallmadge Middle School

Warren

Amy Domino & Beth Haring
Lordstown Elementary School
"Science Explosion Days"

Youngstown

Lori Crofford
P. Ross Berry School
"Energy Consumption
in the Home"

Pennsylvania

Beaver Falls

Paula Weischedel
Central Elementary School
"Family Science Night"

Birdsboro

Lois F. Wenzel
Birdsboro Elementary Center
"Let's Learn About Our World"

Douglassville

Amy D. Hicks
Amity Intermediate Center
"Making an ElectricITY"

Douglassville

Elaine Meinhart
Amity Intermediate Center
"Investigating Solar Energy"

Douglassville

Jacqueline Pallas
Amity Intermediate Center
"Space Exploration: What We Can Learn
About Here on Earth"

Lebanon

Beryl Stoddard
Union Canal Elementary
"Solar Power"

Pittsburgh

John Schaefers
Ingomar Middle School
"Hearing Infrared Light!"

Punxsutawney

Jeffrey Kuntz
Longview Elementary
"Project Earth: Teaching Key
Environmental Concepts Using
Picture Books"

Reading

James F. Dowling
Reading Muhlenberg Career
& Technology Center
"Alternative Wind Power and the
Energy Efficient Home"

Towanda

Marcy Higley
St. Agnes School
"What's for Dinner?"

Towanda

Theresa Knapp
St. Agnes School
"Recycling the School's Cafeteria Waste –
A School-Wide Composting Project"

New Jersey

Brick

Allison McConnell, Noeline Carter
& Raymond Giordano
Lanes Mill Elementary School
"Erasing Our Carbon Footprint"

Brookside

Pam Obremski
Mendham Township Elementary School

Hopatcong

Carmela Catizone
Durban Avenue School



A New Type of Solar Cell

Today's solar cells use visible or ultra-violet radiation, but Steven Novack, a scientist at the Idaho National Laboratory, hopes to generate power from infra-red light. Infra-red is not powerful enough to work the way visible and ultraviolet light work – by knocking electrons free from atoms and creating direct current. Instead Novack's approach is to use infra-red to make electrons vibrate within a metallic crystal lattice and thus generate alternating current. The unsolved problem is how to make a rectifier – a device that converts alternating into direct current – small enough to work at the high speed at which the current oscillates. Once that problem is overcome, the potential is enormous, as all hot objects give off infra-red.

The Economist, August 21, 2008

Power from Osmosis

Statkraft, a Norwegian utility company, is building a prototype power plant that harnesses osmosis to produce clean, renewable energy. The plant uses seawater and fresh water separated by a membrane. The fresh water creates pressure as it enters the seawater via the membrane. This pressure is converted into energy. Scientists estimate that the technology could produce 1,600 terawatt hours of power a year worldwide.

www.aftenposten.no, October 3, 2008

Crops from the Desert

The Sahara Forest Project, which has demonstration projects in Tenerife, Oman and the United Arab Emirates, brings concentrated solar power together with seawater evaporation to create lush farms in desert regions. Mirrors focus the sun's rays to generate heat that creates steam and runs turbines. The electricity these turbines generate runs seawater evaporators and pumps damp, cool air through greenhouses filled with crops. Fresh water is used to water the crops and to clean the solar mirrors. Without this technology, farms in dry regions



pump groundwater, thus lowering the water table and making it saline.

The Guardian, September 3, 2008

Flying on Solar

Spring 2009 is the target date for the first flight of Solar Impulse, a solar-powered airplane. A project of Swiss adventurer Bertrand Piccard, the plane has a wingspan of 200 feet and carries 12,000 photovoltaic cells generating around 6,000 watts. The plane weighs 3,400 pounds, a quarter of which comes from lithium batteries that store power for night flight. Piccard, who spent 19 days aloft in a hot-air balloon in 1999, hopes to fly a solar plane around the world in 2011.

National Geographic, September 2008

Commuting by Pod Car

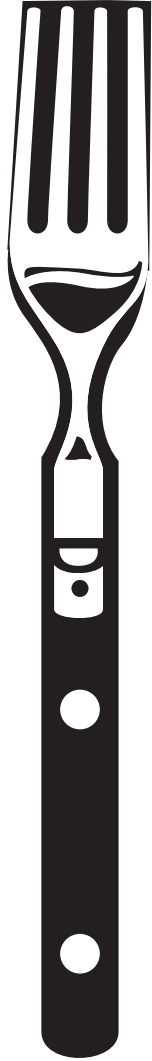
The city of Ithaca, which experiences daily rush-hour gridlock, is a possible test-site for pod cars. The computer-driven electric cars run on a monorail-like loop with stops at major destinations. Pod cars are electric, with power supplied either by batteries in the car or through the rail, and carry around four passengers, depending on the design. At each station, commuters summon the car like an elevator and type in their destination. A trip would cost 50 cents to \$1.50. Because the cars are light and do not make unnecessary stops, the system is more energy-efficient than conventional cars, buses and trains. Built above the city's roads, the system avoids street-level congestion.



The New York Times, September 21, 2008

Visit our Web site at
www.firstenergycorp.com/community/education

Educational Resources Available



⚡ For resources on **solar power**, including a short video of kids working with a solar car, an introductory essay and discussion questions, visit www.teachersdomain.org, a website of the WGBH Educational Foundation. Type “Solar Car” into the search engine box to find the video.

⚡ “Wet or Dry Magic Fork” is one of a number of **ideas for simple, low-cost experiments** offered free by Dow Chemical. Go to www.doweducation.com, click on “Teachers” and then on the appropriate grade level.

⚡ Kids’ pages on the U.S. Food and Drug Administration website offer information on **flu, food safety and other health issues**. Visit www.fda.gov, scroll down to “FDA for you” and click on “kids.”

⚡ Information and classroom activities to mark **one hundred years of water chlorination** are available from the American Chemistry Council. Visit www.science-education.org.

⚡ The National Christmas Tree Association offers **free curriculum for all grade levels** at www.christmastree.org. Click on “teachers” in the red menu bar for curriculum materials and other resources.

⚡ Safety is the theme of **online and printable materials** from the Ohio Department of Public Safety. Go to www.publicsafety.ohio.gov, scroll to the bottom of the page and click on “kids” on the right side of the screen.

⚡ For updates on **energy and environmental issues**, visit the New York Times energy and environment blog at <http://greeninc.blogs.nytimes.com>.

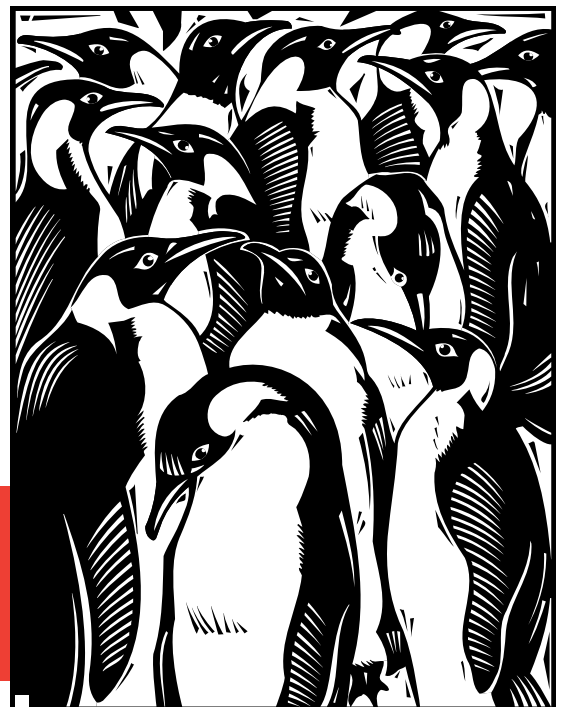
⚡ **Free classroom posters** are available from the Consortium for Ocean Leadership at www.deepearthacademy.org. Click on “materials” to preview materials and to find out how to download or order items.

⚡ Students can experiment with **online physics simulations** from the University of Colorado’s Physics Education Technology project. Visit <http://phet.Colorado.edu>.

⚡ Penguin Science (www.penguin-science.com) is a website sponsored by the National Science Foundation and other organizations. Click on “Education” in the toolbar for a variety of classroom materials related to **penguins and the Antarctic**.

⚡ The **Argonne National Laboratory** offers a number of educational programs. Go to www.dep.anl.gov and click on “K-12 programs” in the menu bar.

⚡ For information on **nuclear energy** in power generation, medicine and other applications, visit the Nuclear Energy Institute website, www.nei.org, and click on “How It Works.”



The ability to ask the right question is more than half the battle of finding the answer.

- Thomas J. Watson