

## **Building Energy-Efficient Homes**

Today's home-building practices reflect decades of learning and experience in saving our planet's limited resources – especially lumber and energy. The field of "whole-building design" integrates many different approaches to keeping a house warm in the winter and cool in the summer.

### **Straw-Bale Wall Construction**

An unusual home-building technique is straw-bale wall construction. It was revived in a cooperative project between the U.S. Department of Energy, the U.S. Department of Housing and Urban Development and the Navaho Nation. The method was developed in the early twentieth century by settlers in northwest Nebraska. They built houses of straw – and many of these have now withstood earthquakes, blizzards and the harsh winds of the Great Plains for a century. Straw-bale houses provide great soundproofing as well as staying cool in the summer.

The project's demonstration house used about 300 bales of straw, which were placed on a foundation and "skewered on rebar pins like giant shishkabobs." Structural mortar cemented the bales together.

### **Conventional Home Construction**

Demonstration projects aside, however, most of the homes built in the near future will appear to be traditional structures, whether they are designed to be energy-efficient or not.

The federal government's EnergyStar program helps builders achieve 30 percent more efficiency in heating, cooling and

water heating than even the best houses of ten years ago could do. These results are achieved through tight construction, tight ducts, improved insulation, high-performance windows, and energy-efficient heating and cooling equipment. Some of the new practices are:

- **Value-Engineered Framing.** Use of 2x6 studs, spaced 24" on center, reduces lumber and labor cost and facilitates installation of insulation without energy-draining air spaces.
- **Air Sealing.** Air infiltration can add 30 percent to heating or cooling costs, as well as causing problems with moisture, noise, dust, pollutants and insects. Tight construction means that all joints, holes and seams are sealed as the house is built.
- **Duct Insulation.** In a conventional forced-air system, up to 30 percent of the heating or cooling is lost through the ducts. Energy-efficient air distribution systems have adequate – but not over-large – ducts, which are as smooth, short and straight as possible.

Here are some Web sites that offer more information about energy-efficient building techniques and practices:

- [www.homeenergy.org](http://www.homeenergy.org)
- [www.eren.doe.gov](http://www.eren.doe.gov)
- [www.energystar.gov](http://www.energystar.gov)
- [www.njenergystarhomes.com](http://www.njenergystarhomes.com)
- [www.eeba.org](http://www.eeba.org)
- [www.southface.org](http://www.southface.org)
- [yosemite1.epa.gov](http://yosemite1.epa.gov)
- [www.kn.pacbell.com/wired/bluewebn](http://www.kn.pacbell.com/wired/bluewebn)

- 1 **Building Energy-Efficient Homes**
- 2 **It's Watt You Know**
- 2 **Knowing About Energy**
- 3 **The Cutting Edge**
- 4 **Educational Resources**

FirstEnergy Corp.  
Community Support 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

## ***It's Watt You Know***

### ***Electrical Safety Contest for Grades 6 - 8***

FirstEnergy cares about kids and safety. That's why we created our new contest for students in grades 6 - 8. Designed with the guidance of the FirstEnergy Educational Advisory Councils, the contest's goal is to be rewarding, educational – and fun.



Our purpose is to provide teachers with a forum for discussing the importance of working and playing safely around electrical equipment, both indoors and out. After all, it's "watt" students know about electricity that will keep them safe, especially as they play outside in the summer months.

The student teams will work together to create messages about electrical safety for kids their age. Teams can exercise their creativity and experiment with multi-media formats such as music, videos, Web sites, photographs, artwork, stories and essays. Entries must be postmarked by April 21, 2003.

How does the contest work? Up to two teams from each school district can compete for three sets of prizes – for Ohio, Pennsylvania and New Jersey schools. Prizes include an E-Bike Workshop for your district, savings bonds for your students, and FirstEnergy Math, Science and Technology Education Grants for the teacher's classroom activities. All student team members will receive certificates and a commemorative gift.

Special prizes are available for outstanding entries, and a list of winners will be posted on [www.firstenergycorp.com/education](http://www.firstenergycorp.com/education) on May 16th. The contest poster and entry form is also available on the Web site. Get involved in the electrical excitement!

## ***Knowing About Energy***

A recent study revealed that only 12 percent of American adults could pass a basic quiz on energy. How would your students do on questions such as these?

- How is most of our electricity generated?
- Is gas mileage rising or falling?
- What is the fastest-growing sector of the economy with regard to energy consumption?

The National Energy Education Development Project (NEED), [www.need.org](http://www.need.org), offers a wide range of information and programs to help future generations of Americans be better informed than their parents. The NEED newsletter, *Energy Exchange*, offers this list of web sites to help your students get started:

[www.need.org/infobooks.htm](http://www.need.org/infobooks.htm). NEED's energy sources fact sheets  
[www.eia.doe.gov/kids](http://www.eia.doe.gov/kids). The Energy Information Administration's Kid's Page  
[www.energy.gov/kidz/kidzone.html](http://www.energy.gov/kidz/kidzone.html). The Department of Energy's Kids Zone  
[www.awea.org](http://www.awea.org). The American Wind Energy Association  
[www.acf-coal.org](http://www.acf-coal.org). The American Coal Foundation  
[www.nei.org](http://www.nei.org). The American Nuclear Institute  
[www.hydro.org](http://www.hydro.org). The National Hydropower Association  
[www.ases.org](http://www.ases.org). The American Solar Energy Society  
[www.propanecouncil.org](http://www.propanecouncil.org). The Propane Education and Research Council  
[www.biomass.org](http://www.biomass.org). The American Bioenergy Society  
[www.geotherm.org](http://www.geotherm.org). The Geothermal Energy Association  
[www.api.org](http://www.api.org). The American Petroleum Institute  
[www.ngsa.org](http://www.ngsa.org). The Natural Gas Supply Association

## Seeing the World in a New Light

Scientists predict that before long light bulbs will become museum pieces as light-emitting diodes (LEDs) take over everyday lighting. Designers are drawn to the creative possibilities of LEDs, but their major advantage lies in their superior efficiency. An Energy Department study predicts that the widespread use of LEDs by 2025 could cut electricity use by 10 percent and save consumers \$100 billion. Already in use in traffic lights, they consume 80 percent less power than a bulb and have the safety advantage of fading gradually rather than suddenly burning out. Using LEDs in vehicle brakes offers another safety feature: They light up fractions of a second faster than incandescent bulbs, allowing a shorter stopping distance. *New York Times, February 11, 2003*



## Solar Power Becomes Flexible

Spherical Solar of Cambridge, Ontario, has developed a flexible material for harnessing solar power. Conventional solar cells are constructed on a rigid silicon base, but the new technology uses instead a layer of tiny silicon beads sandwiched between thin layers of aluminum foil and sealed on both sides with plastic. Each bead acts as a solar cell, absorbing sunlight and converting it into electricity, while the aluminum foil provides electrical contacts. The resulting fabric looks like denim and promises to allow solar power generation on buildings with curved and complex surfaces.

*www.newscientist.com, February 15, 2003*

## New and Improved Optic Fibers

Optic fibers have already revolutionized communications – and now they promise more efficiency and additional applications. Phillip Russell, a scientist at the University of Bath, England, has developed photonic crystal fibers (PCFs) that allow light to pass more effectively. The new fibers work similarly to peacocks' feathers, where the strands of feather are so close together that certain light wavelengths (corresponding to certain colors) are strongly reflected while others are absorbed. A PCF consists of narrow fibers arranged in a honeycomb lattice so fine that light can pass only down the length of the fiber. Light passing through conventional optic fibers has to be amplified approximately every 80km, which can be a problem in some environments, such as on the ocean floor. PCFs allow light to pass ten times

farther without amplification, making them more cost-effective.

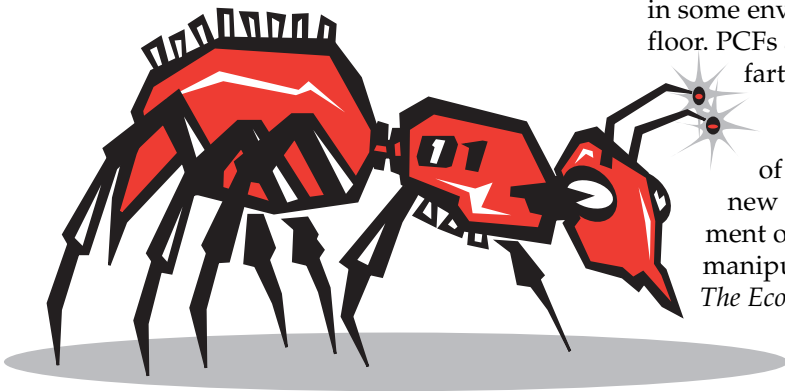
In addition, the high intensities of light passing through PCFs offer new applications, such as the development of "optical tweezers" that can manipulate single molecules.

*The Economist, February 22, 2003*

## Spider-Bots - Explorers of the Future


Researchers at NASA's Jet Propulsion Laboratory have developed a micro robot with antennas and six legs. Small enough to fit in the palm of your hand, the tiny robot is designed for exploration in terrain where traditional wheeled rovers can't move around. Future versions – which may have 8, 12 or as many as 50 legs – are planned for exploration on distant planets as well as comets, asteroids or the moon. On Earth they could assist in investigating hazardous material sites or in taking soil samples in inaccessible areas.


*Science and Children, February 2003*




Visit our website at  
[www.firstenergycorp.com/education](http://www.firstenergycorp.com/education)


## Educational Resources Available


 Fact sheets on saving energy in home building projects, such as **Increased Insulation and Air Sealing**, are available from the U.S. Environmental Protection Agency. Call the EPA's toll-free Energy Star Hotline at 1-888-STAR-YES (1-888-782-7937).


 Fact sheets on energy-saving topics for the building trades, such as **Caulking and Weatherstripping** and **Moisture Control in Homes** are available from the Energy Efficiency and Renewable Energy Clearinghouse (EREC), P.O. Box 3048, Merrifield, VA 22116, or call 1-800-DOE-EREC (1-800-363-3732).

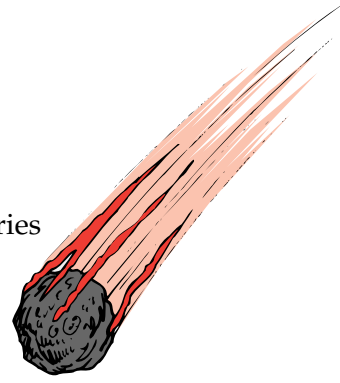



 **Food science and home economics** students will find a range of information and resources at [www.exploratorium.org/cooking/index.html](http://www.exploratorium.org/cooking/index.html). For example, a section on eggs offers a kitchen lab, science of eggs, a discussion area and a virtual visit to an organic egg farm.


 For **geometry problems and quizzes** and an introduction to Incan geometry, visit <http://agutie.homestead.com/files/index.html>. This site is well suited to advanced math students who enjoy working at their own pace.

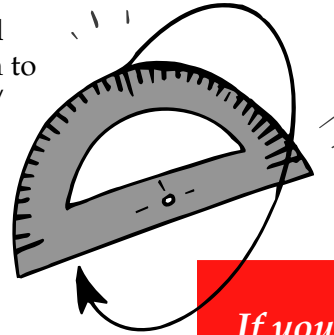
 To address **National Science Content Standard A: Science as Inquiry**, direct your students (and their science questions) to these web sites:  
[www.ajkids.com](http://www.ajkids.com)  
[www.yahooligans.com](http://www.yahooligans.com)

 Planetary Science Research Discoveries offers educational material on the latest NASA-sponsored research about **planets, meteorites and other solar system bodies**. Visit [www.psr.d.hawaii.edu](http://www.psr.d.hawaii.edu).



 Kids can learn **how a fuel cell works** and try virtual electrolysis at [www.tryscience.org](http://www.tryscience.org). Click on "experiments" and then on "try it online."

 The National Institutes of Health Office of Science Education has published its latest **Curriculum Supplement Series**. The series is free to science teachers and consists of field-tested material that is consistent with National Science Education Standards. To request copies or download the materials, visit <http://science-education.nih.gov/supplements>.



*If you want different ideas, ask different questions.*

*- Anonymous*