

# ENERGY EXCHANGE

A publication of the National Energy Education Development Project

AUG-SEPT 2003

## New for 2003-2004

**Call NEED now and renew your membership!  
There are exciting new materials available for the  
2003-2004 school year!**

**1-800-875-5029**

### **NEED INFOBOOKS AND ACTIVITIES**

NEED Infobooks are now available at four levels. There is a new **Primary Energy Flip Book** for K-2 with bold graphics and simple words and sentences for teachers (or older students) to read to our youngest NEED students. More detailed teacher information is included on the flip side of each student page so that teachers can choose the additional information to discuss with the students. This flip book is also a valuable resource for teachers with ESL students. A **Primary Flip Book Activities** booklet is available to reinforce the information in the flip book.

Elementary (3-4), Intermediate (5-8), and Secondary (7-12) Infobooks have been updated with the latest facts and figures from the Energy Information Administration of the U.S. Department of Energy and are included in NEED's 2003-2004 Membership Packet, along with the Primary Energy Flip Book. Corresponding activity booklets are available at all three levels, as well as class sets of the infobooks.

### **TRASH AND ENERGY ACTIVITIES**

To supplement NEED's **Museum of Solid Waste and Energy**, we have developed a **Trash Flip Book** to introduce K-2 students to issues of trash disposal, natural resources, and recycling, and **Trash Talk**, a simplified version of the Museum for Grades 3-5.

### **OCEAN ENERGY**

Included in the 2003-2004 Membership packet is a new activity on ocean energy with background information and hands-on activities to give intermediate students a comprehensive understanding of the energy that is found over, within, and under the ocean. **Ocean Energy** was developed by NEED and printed by the Minerals Management Service, U.S. Department of the Interior.

### **WHAT CAR WILL YOU DRIVE?**

This booklet introduces upper elementary students to alternative fuels, the vehicles available now and what will be available when they are ready to drive.

## 2003 Youth Awards Program

The 2003 Youth Awards Program for Energy Achievement was a real success this year. In June, 437 teachers and student leaders from all over the country gathered in Washington to receive awards at NEED's National Recognition Ceremonies for their outstanding efforts to advance energy education in their schools and communities. The national award winners are as follows:

### **Distinguished Service Awards**

Mary Lou Green—Columbus, NE  
Larry Richards—Eaton, IN

### **Students of the Year**

Brian Bosso—Pensacola, FL  
Mary Mazzaroli—Davis, IL

### **State of the Year**

U. S. Virgin Islands

### **District of the Year**

Jackson City Schools—Jackson, OH  
Project Adviser: Sandra Wilkin

### **Primary School of the Year**

Morrow Elementary School—Morrow, OH  
Project Advisers: Linda Olinger, Christi McEntire,  
and Karen Dumais

### **Elementary School of the Year**

Thaxton Elementary School—Thaxton, VA  
Project Adviser: Viola Henry

### **Junior School of the Year**

Cleveland Middle School —Albuquerque, NM  
Project Advisers: Barbara and Robert Lazar

### **Senior School of the Year**

Greenfield High School—Greenfield, TN  
Project Adviser: Sandra Bethel

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*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.*

*A list of NEED sponsors is available on our website and in our Annual Report.*

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# CALENDAR OF EVENTS

For more information, email [info@need.org](mailto:info@need.org) or call 1-800-875-5029

## July

- 13-18 ILEED Camp KEEP (Kids for Energy and Environmental Protection) – Cantrall, IL
- 21-26 ILEED Camp KEEP (Kids for Energy and Environmental Protection) – Algonquin, IL
- 12-16 NEED National Energy Conference for Educators – Chicago, IL
- 19-23 NEED National Energy Conference for Educators – Galveston, TX
- 21-25 KY-NEED Energy Conference for Educators – Western Kentucky Touring Conference
- 26-30 NEED National Energy Conference for Educators – Denver, CO
- 29-31 Tennessee Energy Education Network Conference
- 29 KY-NEED Workshop – Somerset, KY
- 29-30 MS-NEED Workshops – Jackson, MS

## August

- 2-6 NEED National Energy Conference for Educators – Long Beach, CA
- 15 Summer Energy Education Program – Cape Cod Cooperative Extension and Cape Light Compact – Hyannis, MA
- 21 BP Solar Connection – NEED Workshop – Warrenville, IL

## September

- 15-17 NEED presentation at the National Association of State Energy Officials Conference – Austin, TX

## October – Energy Awareness Month

Plan great NEED programs as part of the U.S. Department of Energy's Energy Awareness Month. NEED will have resources available on the website.

# NEED NEWS

## EnergySmart Schools in Kentucky

Kentucky school officials traveled to Raleigh, North Carolina, on August 6-7, 2003, to visit several high performance schools in the area. The goal of the Kentucky EnergySmart Schools program is to encourage the Kentucky architects and engineers who design and build our schools to use high performance, energy-efficient technologies and designs.

## EnergySmart Schools Resources

The U. S. Department of Energy's EnergySmart Schools program has many resources for teachers and energy managers. For information, contact Blanche Sheinkopf, National Coordinator, via her new email, [sheinkopf@ornl.gov](mailto:sheinkopf@ornl.gov).

## NEED Summer Conferences

They went by water, land, and air - and they had a great time! More than 300 educators participated in the NEED National Energy Conferences for Educators this summer - making it one of the most successful summers to date. Thanks to the support of many longtime sponsors and an ever-expanding list of new sponsors, this group of teachers toured refineries, offshore platforms, solar installations, solar manufacturing facilities, U.S. Department of Energy laboratories and more! What could be better than touring a natural gas drilling site in 100 degree heat? The program was fun, energizing, and as one teacher said "I am so much more interested in energy now that I have attended your conference and I definitely want to take this as far as I can. I have found a new focus with this and my career."

The 2004 conference series will be announced this fall. To hold spaces for one or more teachers, contact NEED at [info@need.org](mailto:info@need.org). Registration is \$800.00 and includes lodging, meals, local transportation, field trips, conference and classroom materials and more fun than you should have in a week!

## New on the NEED Website

New materials and activities have been added to the NEED website just for you! NEED's alternative fuels activities are now available and the energy infobooks have been expanded to new grade levels. Check out the infobook activities too!

# NEED NEWS

## **Saving Energy Really Pays Off In Albuquerque, NM**

Congratulations to Albuquerque Public Schools, Energy Manager Ron Rioux, and NEED Lead Teachers Robert and Barbara Lazar for their efforts to save energy in school! In nine months, 31 schools saved \$292,000.00 on their energy bills. The schools that reduced their energy consumption were reimbursed \$97,000 for their efforts!

## **Teachers Know Their Energy In Wake County, NC**

NEED workshops were very popular in Wake County Public Schools this spring. In February, there was a second workshop that focused on the Science of Energy kit. The presenter, Amy Constant, is a fifth grade teacher and NEED presenter who expertly delivers the training to fifth grade teachers in the district. Since Amy has taught the kit for several years, she advises teachers about how to organize the kit materials into the most effective timeline.

Training on the new third grade Light and Heat Kit was taught by Kitty Rutherford, a national Presidential Award recipient, for the first time in February. This newly developed kit matches the North Carolina Standard Course of Study for Science. Wake County teachers and science specialists worked with NEED to develop the kit activities so that they are sequenced to teach the science concepts for third graders. Special thanks to the Wake County Energy Savers Program, which provided kits for the teachers who attended the workshops.

## **Nebraska Workshop Trains Educators**

Nebraska Public Power District and NEED conducted a workshop June 10-12 in Aurora, Nebraska, to train educators to incorporate energy programs into their classrooms and extracurricular activities. This three-day program covered many aspects of energy and offered graduate credits and continuing education units to participants. The conference included a one-day field trip experience, allowing educators to get an "up-close" view of a variety of energy production sites.

## **Florida Is Full Of Energy**

NEED Lead Teachers Carolyn Wuest and Nancy Stanley conducted workshops in June for Escambia County, FL, for second, third, and fourth grade teachers. Each participating school received a Science of Energy Kit for the second and third grade teachers. All fourth grade teachers can borrow components of the EnergyWorks Kit from the science supervisor as needed.

## **Golfing for NEED in Kentucky**

The Kentucky Oil and Gas Association held a Golf Outing Fundraiser for Kentucky NEED during its annual membership meeting in June 2003. Kim Jenkins, NEED teacher at Harrison County Middle School, along with four of her students, assisted Pam Proctor, Kentucky NEED's EnergySmart School Coordinator, as hosts of the golf outing. The students facilitated a putting contest for the golfers, giving them the opportunity to visit with the NEED students and learn how NEED educates the students at their school.

## **Educators Tour Kentucky Energy Sites**

Twenty Kentucky teachers attended the second annual Kentucky Energy Tour for Educators from July 21-25, 2003. Participants toured energy facilities in Western Kentucky and were introduced to NEED materials. Site visits included a coal-fired power plant, a hydropower plant, a gaseous diffusion plant, a deep coal mine, a surface coal mine, a reclaimed mine site managed by the Kentucky Division of Fish & Wildlife Resources, a coal loading facility and the Land Between the Lakes Homestead, where teachers learned about energy used during the 1800s and early 1900s.

# TEACHER RESOURCES

**www.awea.org:** American Wind Energy Association.

**www.acf-coal.org:** American Coal Foundation.

**www.nma.org:** National Mining Association.

**www.nei.org:** Nuclear Energy Institute.

**www.hydro.org:** National Hydropower Association.

**www.ases.org:** American Solar Energy Society.

**www.propanecouncil.org:** Propane Education and Research Council.

**www.npga.org:** National Propane Gas Association.

**www.biomass.org:** American Bioenergy Association.

**www.geo-energy.org:** Geothermal Energy Association.

**www.geothermal.marin.org:** Geothermal Education Office.

**www.api.org:** American Petroleum Institute.

**www.ipaa.org:** Independent Petroleum Association of America.

**www.ngsa.org:** Natural Gas Supply Association.

**www.ingaa.org:** Interstate Natural Gas Association of America.

**www.fuelcells.org:** Fuel Cells 2000.

**www.eei.org:** Edison Electric Institute.

**www.noia.org:** National Ocean Industries Association.

**www.hmns.org:** Houston Museum of Natural Science – Wiess Energy Hall.

**www.ase.org:** Alliance to Save Energy.

**www.nrel.gov:** National Renewable Energy Lab.

**www.epa.gov:** The U.S. Environmental Protection Agency has many resources for teachers and kids.

**www.eia.doe.gov/kids:** The EIA Kid's Page is updated regularly with new information about energy.

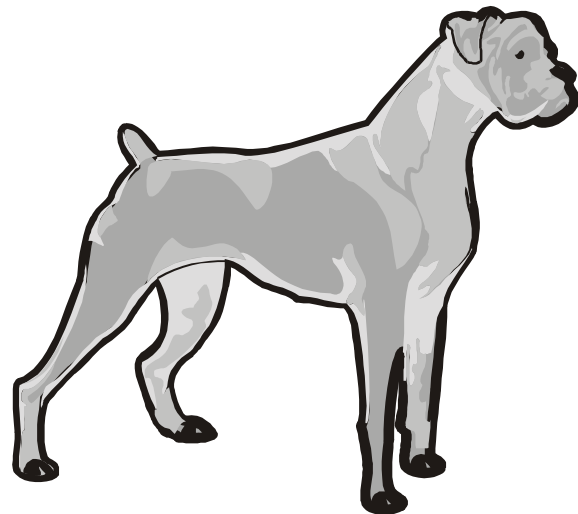
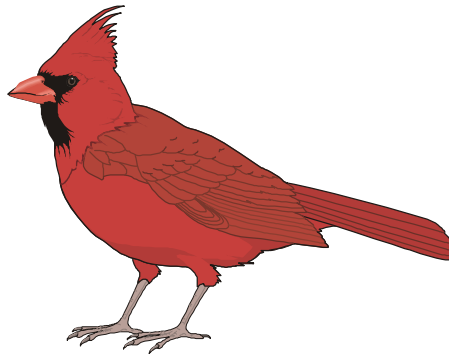
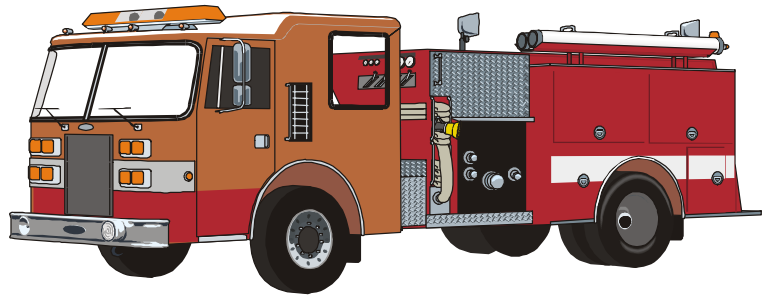
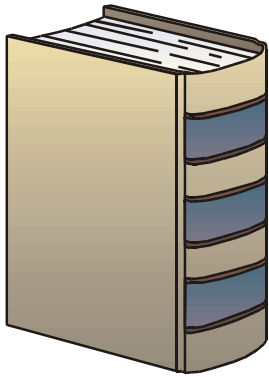
**www.eren.doe.gov:** DOE's Energy Efficiency and Renewable Energy Network.

**www.mms.gov/mmskids:** U.S. Department of the Interior's Minerals Management Service Kids Page.

**www.energy.gov:** The Department of Energy's *EnergySmart Schools Program* has a free CD-ROM available—*Get Smart About Energy*—with resources for teachers.

# PRIMARY ACTIVITY: Sound the Alarm!

**Directions:** Have the students circle the objects that use sound as a warning signal. Discuss each object and other ways sound is used as a warning signal. (From *Primary Flip Book Activities*. See answers below.)



*Possible answers: fire truck's siren warns people to move out of the way; cell phone could warn someone of danger; bird could warn other birds; dog's barking could warn of intruder; smoke alarm signal warns of possible fire.*

# ELEMENTARY ARTICLE: What Can You Do With a Field of Corn?

Corn, like all plants, is full of energy. It gets its energy from the sun. Plants take in light energy from the sun and turn it into sugars. They store the sugars in their roots, leaves, stems, and flowers. The energy in the sugars makes them grow. When people or animals eat the corn, the sugars give them energy.

Corn is a member of the grass family. It is a native grain of the Americas. Corn was first grown by Mayan, Aztec, and Inca Indians more than 5,600 years ago. The Indians chewed the sugar-filled leaves of the corn plant like we chew gum, ate the fresh ears of corn, and ground dried corn into flour for bread.

The Pilgrims might have died during their first winter in the new country if the Native Americans hadn't given them corn. The Native Americans showed the Pilgrims how to grow corn and make it into bread, soup, fried corn cakes, and pudding. Corn was so valuable that early settlers used corn to trade with the Native Americans for food and furs.

Today, the United States and the rest of the world use corn primarily as food for livestock. More than half of the corn in the United States is eaten by animals. And much of the food we eat is from corn. We use corn to make breads, popcorn, cereals, and many other foods. And we eat fresh corn on the cob.

Corn has been used for more than animal feed or food for humans for a long time. The British Parliament tried to get American colonists to turn corn into sugar with the Molasses Act in 1733. Today, we use corn syrup and other corn sweeteners in many foods.

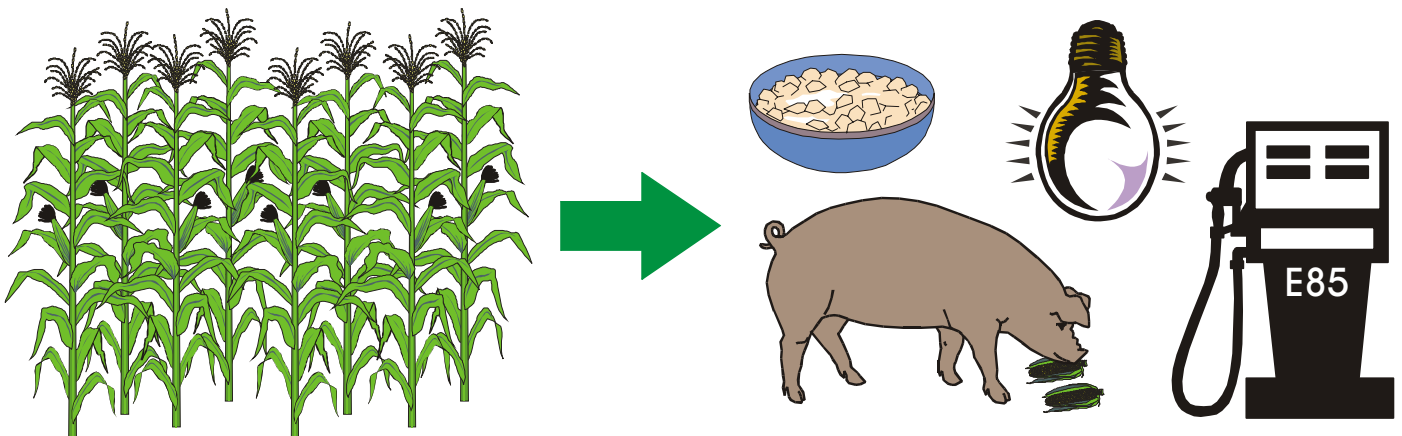
Corn has also been used to make alcohol for many years. Native Americans used corn to make beer before the colonists arrived in America. The 1792 Whiskey Rebellion came about when England tried to tax corn whiskey.

Long before the automobile, corn was being turned into an alcohol fuel called **ethanol**. Henry Ford designed his Model T to run on ethanol. He called it the fuel of the future. Ethanol is now being used as a clean-burning fuel for many cars and tractors. Today, about seven percent of the corn grown in the United States is made into ethanol.

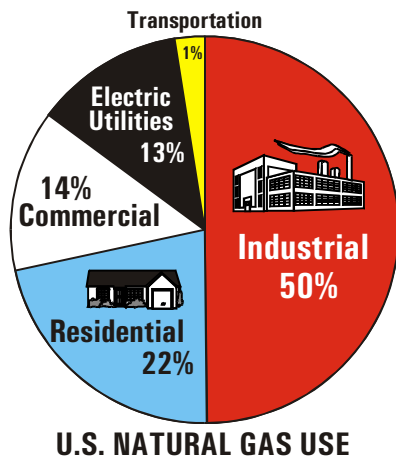
Corn plants and other farm waste can be made into a gas called **biogas**. Biogas is full of energy and can be used to cook food, power lights, and heat homes. We can also compost the plants to make fertilizer for our gardens.

Corn is the biggest crop in the United States and is grown all over the world. Corn can grow at altitudes as high as 12,000 feet and as low as sea level. It can grow in tropical climates that get 400 inches of rainfall a year or in areas that get only 12 inches.

The next time you see a field of corn, think about all of the ways we can use its energy. We can feed animals and feed ourselves. We can turn it into ethanol to power vehicles. We can turn it into biogas to make heat and light. Corn is an amazing plant, full of energy we can use.



# INTERMEDIATE/SECONDARY ARTICLE: Natural Gas in the News



Just about everyone in the United States uses natural gas. It accounts for nearly a fourth of the energy we consume each year. Industry is the biggest consumer, using it as a heat source to manufacture goods and also as an ingredient in thousands of products, such as fertilizer, photographic film, ink, glue, paint, plastics, laundry detergent, and insect repellents. Synthetic rubber and man-made fibers like nylon are also produced with chemicals derived from natural gas.

Homes and businesses are the second biggest users of natural gas. Six in ten homes use natural gas for heating. Many homes also use natural gas water heaters, stoves, and clothes dryers. Commercial buildings use natural gas mainly for indoor space heating.

Natural gas is also increasingly being used to make electricity; natural gas power plants burn cleanly and can be brought on-line quickly, making them responsive to peak demand. Today, natural gas generates about 16 percent of the electricity in the U.S., a figure that is expected to increase.

To a lesser degree, natural gas is becoming popular as a transportation fuel. Natural gas can be used in any vehicle with an internal combustion engine, although the vehicle must be outfitted with a special carburetor and fuel tank.

With such broad consumption of natural gas by people and industries, any marked change in supply or price can produce a significant effect on the economy and on people's lives. Today, many people in the country are concerned that there is a natural gas crisis as demand increases faster than production. Secretary of Energy Spencer Abraham talked about the problem in a recent speech, stating in part:

"Over the last decade, demand for natural gas increased 19 percent to levels that are difficult to sustain under current supply and production constraints. This demand growth has occurred despite improvements in energy efficiencies during the past several years. Even more worrisome, perhaps, is the fact that total natural gas demand is projected to grow 50 percent over the next 25 years. Gas in storage is 32 percent below last year's level and 22 percent below the previous five-year average.

"At its heart, this is not some abstract problem about numbers and percentages like those I just mentioned. It's not just about low reserves or supply-and-demand imbalances. Rather...it's about real people and the real problems they confront when gas prices soar.

"It's about senior citizens, living on fixed incomes, being forced to choose between skyrocketing heating bills or some other of life's necessities. If gas prices this winter are as high as some predict, the average residential winter heating bill for a typical Midwest consumer is expected to be \$915, a 19 percent increase over last year's bill.

"It's also about the men and women who work in gas-intensive businesses and industries. They are worried about the economic uncertainty that high gas prices bring - worries about layoffs, paying the mortgages, or providing for their families. The situation is particularly worrisome in the fertilizer industry, where natural gas accounts for 97 percent of total energy use and less than one percent of it can be switched to some other energy source. Some layoffs have already occurred and several companies have warned about possible production cuts and layoffs should these high gas prices continue. In fact, there is even concern that gas prices could go so high that manufacturers find it more profitable to shut down production and sell their natural gas reserves.

"With all of these potential, real-life consequences, it is our job ... to ensure an adequate supply of natural gas at reasonable prices. This is not just a problem for federal, state, or local governments. This is not a regional problem. It is not just a problem for gas-intensive businesses and industries. It is a national concern that will touch virtually every American."

Federal Reserve Chairman Greenspan told a Senate hearing in July that high natural gas prices and shortages are already having an adverse impact on some industries and that he does not foresee a return to low prices or abundant supplies anytime soon. "Today's tight natural gas markets have been a long time in coming, and distant futures prices suggest that we are not apt to return to earlier periods of relative abundance and low prices anytime soon."

Greenspan told the Senate Energy Committee that it is difficult to assess the impact of higher gas prices on the overall economy, but that high energy prices are expected to cause some industries to lose business to foreign competitors. "We do see the obvious loss of jobs that will go with the inevitable movement of gas producing capacity to foreign shores because it has made us largely uncompetitive in a number of industries in which gas is a critical input," said Greenspan. Otherwise, he said, "you don't see all that much direct economic impact, except in households where you are going to clearly see significantly higher bills as we go into the winter" if tight supplies and high prices persist.

Representatives Richard Pombo (R-CA) and Billy Tauzin (R-LA) are leading an effort to roll back environmental restrictions that they say prevent gas companies from tapping new domestic supplies. The restrictions "threaten our nation's economic health and American jobs, just as our economy is showing signs of recovery," they wrote in a letter to Speaker Dennis Hastert (R-IL). Unless the government takes steps to allow drilling in currently closed or restricted areas, primarily in the West, the nation could become more dependent on foreign energy supplies, the lawmakers said, adding, "Clearly something must be done to balance conflicting government policies that encourage the use of natural gas as a clean-burning fuel but restrict access to plentiful American supplies."

Environmental groups oppose any rollback of environmental restrictions. An article by the Natural Resource Defense Council stated, "Sharp increases in short-term natural gas prices have prompted some to call for more drilling on public lands and fewer environmental safeguards on gas exploration and use... Invading environmentally sensitive federal areas in search of fuel is not the answer: recovery of much of our federal gas reserves is uneconomic, and will be even more so if prices fall."

Secretary of Energy Abraham encouraged Americans to make use of energy efficiency and renewable energy in their homes and businesses. In a speech at the National Renewable Energy Laboratory, he stated, "By incorporating advanced energy efficiency and renewable energy technologies that reduce energy use into building designs, the U.S. building sector is achieving significant results. Individuals can also play an important role in reducing energy usage. Conserving energy in the home saves consumers money today while also helping ensure abundant energy supplies in the future."

In a letter to all 50 of the nation's governors released in July, Secretary Abraham urged state chief executives and their state energy agencies to join the Department's Smart Energy Campaign, a broad-based communications campaign to educate consumers, homeowners and businesses on the need to conserve energy in the wake of low natural gas supplies and rising demand for the popular energy source. Abraham urged each Governor to place the [energysavers.gov](http://energysavers.gov) link on their official websites.

Abraham also announced that the Department of Energy would soon undertake a Natural Gas Data Collection Initiative that will improve the way the Energy Information Administration and the Office of Fossil Energy gather and disseminate information about the use and origin of natural gas supplies in the U.S.

For more information on natural gas issues, go to the U.S. Department of Energy website, [www.energy.gov](http://www.energy.gov) and the Energy Information Administration website, [www.eia.doe.gov](http://www.eia.doe.gov).

## NATURAL GAS PROJECTIONS ENERGY INFORMATION ADMINISTRATION

The Energy Information Administration of the U.S. Department of Energy is charged with providing data analysis and projections on energy sources. Guy Caruso, EIA Administrator, gave the following natural gas projections to the House Committee on Energy and Commerce in June 2003.

**Short Term:** Currently, the natural gas market in the United States is tight, with gas storage levels lagging well behind normal levels. Spot natural gas prices reflect this deficit and the expectation that demand ... remains at a high level relative to domestic natural gas supply capability. The high market prices and strong drilling efforts are expected to ultimately allow gas storage volumes to move closer to normal by the beginning of the next heating season. This expectation, however, is predicated on prices continuing at high levels through the next winter.

**Longer Term:** By 2025 total natural gas consumption is expected to increase to almost 35 trillion cubic feet (Tcf) or 26 percent of U.S. delivered energy consumption. Such a demand level represents an increase of about 52 percent from the expected 2003 level. Domestic gas production is expected to increase more slowly than consumption, rising from 19.5 Tcf in 2001 to 26.4 Tcf in 2025. Growing production reflects increasing natural gas demand and is supported by rising wellhead gas prices, relatively abundant gas resources, and improvements in technologies, particularly for unconventional gas.

# Short Circuits

## Solar Cars Make Gasoline-Free Journey

Twenty college teams qualified for the American Solar Challenge, the world's longest solar car race (2,300 miles), which began July 13th in Chicago, IL and ended in Claremont, CA on July 23rd, using only sunlight for fuel. The race route followed Route 66 as much as possible, with stops in Springfield, IL; St. Louis, MO; Edmond, OK; Amarillo, TX; Tucumcari, NM; Albuquerque, NM; Flagstaff, AZ, and Barstow, CA, before reaching Claremont.

To qualify, each team had to successfully drive its solar car at least 140 miles on a track at an average speed of at least 25 mph. The laps had to be completed in fewer than 8.5 hours. In addition to the qualifying laps, all teams had to undergo rigorous safety and reliability checks at Northwestern University.

"There are few greater challenges a college student can undertake than to design a state-of-the-art solar car, build it from scratch, and race it 2,300 miles," said Energy Secretary Spencer Abraham before the race began. "These are some of our brightest young people, and those who have made it this far have already proven they have the talent, the fortitude and the determination to be a successful scientist or engineer. I wish all the teams the best in this very demanding competition."

Solar cars use photovoltaic cells to convert radiant energy from the sun into electricity and store it in batteries for use when needed. Weather and energy management play important roles in the race. The cars mostly travel at highway speeds and are required to obey local speed limits but, in general, the sunnier the day, the faster and farther the cars can go. Bright days also allow the cars to "fill up" their batteries for cloudy or rainy days.

*In addition to the Department of Energy, other sponsors include DOE's National Renewable Energy Laboratory, BP Solar and EDS.*



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