



Buildings for the 21st Century

Fall 2000

News You Can Use

Office of Building Technology, State and Community Programs

New High-Performance Building Keeps Zion Visitors Comfortable

Although summer temperatures at Zion National Park in southern Utah can soar above 110°F, park visitors are staying cool in the new visitor center, dedicated on May 26. Instead of conventional air conditioning, the visitor's center uses passive downdraft cooltowers, which use much less energy. By replacing energy-intensive building components with energy-efficient ones, this new high-performance building will reduce energy use by over 70 percent (compared to a standard building design) without sacrificing comfort.

Buildings energy experts from the National Renewable Energy Laboratory and BTS helped incorporate cutting-edge technologies into the Zion Canyon Visitor Center complex, at the heart of the park's new shuttle-bus transportation system. More than 2.5 million people visit the canyon each year, and many will pass through this attractive model of energy-efficient design. Signage and brochures inform park visitors about the complex's energy-efficient features.

The National Park Service and DOE project team applied principles of sustainable design to the visitor center, using daylighting, insulation, a Trombe wall, optimized shade overhangs, cooltowers, natural ventilation, thermal mass flooring, energy-efficient landscaping, and a state-of-the-art, energy-management computer.

Window placement for daylighting uses natural light while minimizing glare and heat gain in the summer. When more light is needed, the building's computer adjusts electric lights to provide just the right amount of additional light. Only energy-efficient fluorescent lamps and high-intensity discharge lamps are used in the building.

The building's computer also controls natural ventilation to maximize comfort while minimizing energy costs. The computer opens the clerestory windows to exhaust hot air. When this ventilation is not enough, the computer activates the passive downdraft cooltowers.

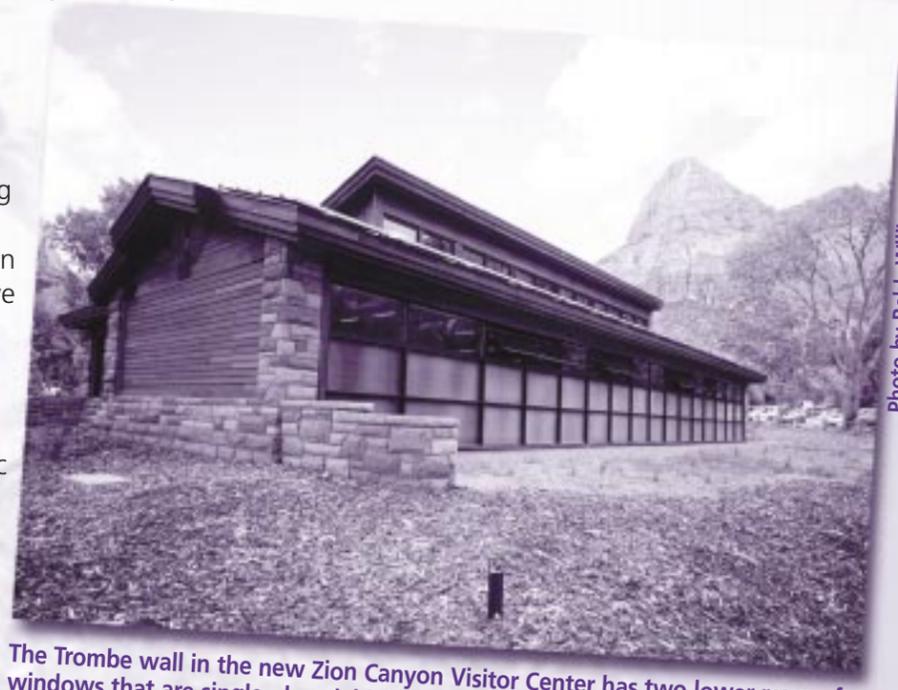
These energy-efficient features are expected to save about \$16,000 per year in energy costs for the 7,600-ft² (706-m²) visitor center. Photovoltaic panels on the south roof meet approximately one-third of the electrical load and save another \$1,000 per year.

For more information, visit the BTS High Performance Buildings Web site at www.eren.doe.gov/buildings/highperformance/.



Each cooltower generates 5,000 cubic feet of airflow per minute into the building, using only a one-half horsepower pump for water circulation.

Photo by Robb Williamson, PIX 09160



The Trombe wall in the new Zion Canyon Visitor Center has two lower rows of windows that are single-glazed, high-transmittance, patterned glass. Above the windows, the length and position of the overhangs, dictated by the latitude and climate of Zion, shade the wall during hot summer months.

Photo by Robb Williamson, PIX 09256



PAGE 2

The Clean Energy Incentives Program gives Maryland consumers a tax break.



PAGE 3

Rebuild America and Native American tribes partner for sustainability.



PAGE 4

Ohio weatherization program delivers results.

ENERGY STAR® Clothes Washers Offer Choices

Competition is heating up in the market for super-efficient clothes washers carrying the ENERGY STAR® label, and consumers are the winners. Sears, the ENERGY STAR Retail Partner of the Year for 1999, recently unveiled its new Kenmore® clothes washer in New York City and Des Moines, Iowa. And Maytag's front-loading Neptune washer is impressing consumers in a DOE demonstration in Massachusetts.

"Through one simple action—purchasing an energy efficient appliance—American consumers can take another positive step forward in our joint efforts to protect the environment, cut energy costs and help reduce pollution," commented Secretary Bill Richardson when he named Sears the ENERGY STAR Retail Partner of the Year. Sears sold more than 750,000 appliances carrying the ENERGY STAR label in 1999. The new Kenmore Elite washer promises to help the company carry out its pledge to sell more than one million energy efficient appliances in 2000.

The Kenmore Elite washer, manufactured by Whirlpool, combines traditional top-loading design with a new approach to washing action that exceeds ENERGY STAR criteria for saving energy and water. Rather than immersing laundry in a bath of water and churning it with a central agitator, the new Calypso Wash Motion technology uses a wash plate to lift and bounce clothes through a waterfall of soapy water. Eliminating the agitator leaves more room for clothes and the waterfall design flushes dirt and



The new Kenmore Elite washing machine uses this wash plate to lift and bounce clothes through a waterfall, flushing dirt from the clothes, and saving energy and water.

particles from the clothes, which never sit in dirty wash water. This new approach is gentle and effective, and requires about half the water of a traditional washer. The new machine can reduce energy use by 65 percent, saving the typical family about \$100 per year, according to tests.

Tests of Maytag's ENERGY STAR-labeled Neptune front-loading washer are designed to show consumers in a Boston suburb how the machines use 40 percent less water and 65 percent less energy than conventional top-loading washers. "Boston experiences serious water quality and scarcity issues, which result in some of the highest [water] rates in the nation," said John Tomlinson, the residential program manager at Oak Ridge National Laboratory, who manages the consumer tests for DOE. After several months of measuring the baseline energy and water use of their own machines, the 66 residents at the Summit Terrace condominiums in Reading, Mass., received new ENERGY STAR-labeled Neptune washers and dryers. Researchers from the residential program have been monitoring energy and water demands since the new machines were installed. Final results will be reported in October.

According to Maytag, the Neptune washer has conserved 4.9 billion gallons of water and

429 kilowatts of electricity since its introduction in 1997. Those savings represent a lifetime supply of drinking water for 700,000 people and enough power to light 1.3 million homes for one year. The Neptune also reduces drying time by extracting up to 30 percent more water during the spin cycle. Overall, the Neptune washer can save an average family nearly \$100 a year on utility bills.

Photos courtesy of Kenmore

Standards Save Energy

Millions of energy-efficient refrigerators, water heaters, air conditioners and dishwashers are saving 390 trillion Btu of energy each year, thanks to DOE's Appliance Efficiency Program. In 1987, Congress passed a law that mandated national energy efficiency standards for most major household appliances. As a result, DOE's Appliance Efficiency Program issued standards that went into effect between 1988 and 1993. Since then, the energy saved is equivalent to the output of about seven 500-MW coal-fired power plants.

Since implementation of the original standards, DOE, as instructed by Congress, has reviewed and amended the national energy efficiency standards to reflect the highest efficiency levels that are "technically feasible and economically justified" for household appliances. Appliance manufacturers, energy efficiency and environmental advocates, electric utilities and state governments participate in the standards review, a public rule-making process. This process has evolved from a battleground to the give-and-take of a negotiating session. Participants all have different ideas as to what efficiency levels are technically feasible and economically justified. When all parties agree to negotiated standards, the rules tend to be more effective.

Over the years, DOE has conducted reviews and raised the standard efficiency levels for refrigerators, freezers, clothes washers, clothes dryers and dishwashers. Some standards have had a greater impact on energy use than others, but they all add up. The millions of appliances sold that operate at these higher efficiency levels save an additional 250 trillion Btu of energy each year, freeing up the equivalent of about six 500-MW coal-fired power plants.

One of the most significant standards is the required Seasonal Energy Efficiency Ratio for central air conditioners. This rating, similar to the miles per gallon rating for vehicles, results in appliances that more than compensate owners for the higher purchase price through savings on their electric bills.

DOE's Appliance Efficiency Program continues to set higher efficiency levels appropriate to improving technologies. For example, higher efficiency standards for room air conditioners will go into effect this fall. Another negotiated standard to increase efficiency levels for refrigerators is set to go into effect in 2001. Higher efficiency standards for fluorescent lamp ballasts and clothes washers have been agreed to, and new standards are being negotiated for central air conditioners and water heaters.

For more information on standards, visit the BTS Web site at www.eren.doe.gov/buildings/codes_standards/.

DOE Appliance Efficiency Standards for Household Products

- Central air conditioners
- Clothes dryers
- Clothes washers
- Cooking products
- Dishwashers
- Fluorescent lamp ballasts
- Furnaces and boilers
- Electric lamps
- Pool heaters
- Refrigerators and freezers
- Room air conditioners
- Television sets
- Unvented home heating equipment
- Vented home heating equipment
- Water heaters

Maryland Residents Get ENERGY STAR® Tax Break

On June 29, Maryland residents gathered in Bethesda to celebrate Maryland's new Clean Energy Incentive Act. "Maryland's law sets an energy efficiency trend for other states and the federal government to follow," said Secretary Bill Richardson.

Governor Parris Glendening pointed out that the Clean Energy Incentives Act "provides significant tax breaks for Marylanders who make a conscious choice to buy the most energy-efficient appliances, cars and other products on the market." This message was echoed by speakers from DOE, the Maryland Legislature, and the Natural Resources Defense Council. Also attending the celebration were representatives from BP Solarex, Honda Motor Corp., the Maryland Energy Office, the Maryland Public Interest Research Group, Sears Roebuck and Co., the Sierra Club and Toyota Corp.

Although nine other states have enacted tax incentives for the purchase of energy efficient products, Maryland is the first to single out ENERGY STAR®-labeled appliances and exempt them from state sales tax. The tax break began for ENERGY STAR-labeled clothes washers

on July 1. Tax exemptions for ENERGY STAR room air conditioners and refrigerators will be available Jan. 1, 2001, and July 1, 2001, respectively, after updated standards are adopted. (For more on the standards process, see "Standards Save Energy" on this page.)

For more information on the Clean Energy Incentives Program, visit the Maryland Energy Administration Web site at www.energy.state.md.us/.



Assistant Secretary Dan Reicher presents an ENERGY STAR® shirt to Maryland Governor Parris Glendening at an event celebrating Maryland's new Clean Energy Incentive Act.

Photo by Ken Shipp, DOE

Rebuild America, Native American Communities Join Forces

The Rebuild America Program's focus on energy efficiency complements Native American traditions, in which environmental sustainability is highly valued. Many tribes consider the impact on the next seven generations when making decisions. Rebuild America is working with Native American tribes to promote sustainable energy use in their communities.

On May 16, Rebuild America and the Western Region Bureau of Indian Affairs (BIA) hosted the Energy Forum for Native American Tribes, bringing federal agencies and the southwestern tribes together to discuss tribal needs and federal resources. Held at the Yavapai-Apache reservation in Camp Verde, Ariz., the event attracted participants from 14 area tribes and representatives from the departments of Commerce, Agriculture, Health and Human Services, Energy, and BIA. Attendees discussed energy-related tribal needs and possible approaches to meeting these needs.

Bob Gough of the Intertribal Council on Utility Policy described tribal concerns such as the need for affordable energy sources, improving homes, controlling global climate change, and controlling the depletion of natural resources on tribal lands.

He said the tribal council wants to evaluate the impact of energy use on tribal health, cultural resources, quality of life, and the environment as a whole.

Representatives from federal agencies outlined resources available to the tribes. Through the Rebuild America partnership network, DOE offers resources, training, nationwide connections, and access to national labs. Assistance offered by other agencies includes:

- Grants to further economic development through the Department of Health and Human Services
- Funding for projects in community and economic development, housing, and utility service through the Department of Agriculture
- Infrastructure and technical assistance grants to aid in business development and job creation through the Department of Commerce.

Attendees concluded that long-range planning for energy efficiency would have a greater impact than short-term fixes. They agreed that education about energy efficiency is important for students, tribal employees, policymakers and the general population.

In Nevada, the tribal council of the Fallon Paiute-Shoshone Tribes teamed with the Nevada Rebuild America representative to form a Rebuild America partnership. Since the 1930s, these tribes have lived in a quiet community near the town of Fallon. Most homes on the reservation were built between 1968 and 1990. Today, nearly 200 of these homes need rehabilitation, and the price of propane, the major heating source, has risen 50 percent in recent months. These circumstances present to the partnership a challenge and an opportunity to reduce the reservation's energy consumption.



Photo courtesy of D&R International

Sue Keller-Lynch, a homeowner on the Fallon Paiute-Shoshone reservation, looks on as Paul Knight of Rebuild America discusses the results of a blower door analysis.

On June 6 and 7, the tribal council and Rebuild Nevada hosted a workshop that integrated health and energy issues of housing rehabilitation.

Workshop sessions addressed moisture in crawlspaces, elevated radon levels, and asbestos in ceilings and wallboard. The 22 attendees also took part in demonstrations of blower doors, crawl-space examinations, and energy rating software tools. The Rebuild America workshop demonstrated how proper building rehabilitation can improve occupant health while reducing energy use.

Currently, Rebuild America has partnerships with the Rosebud Sioux (Rosebud, S.D.), the Lower Brule Tribe (Lower Brule, S.D.), the Yavapai-Apache (Camp Verde, Ariz.), the Affiliated Tribes of Northwest Indians (Lynwood, Wash.), Havasupai (Grand Canyon, Ariz.) and Fallon Paiute-Shoshone Tribes (Fallon, Nev.).

For more information, visit the Rebuild America Web site at

www.eren.doe.gov/buildings/rebuild/.

Photo courtesy of D&R International



Representatives from Rebuild and the Fallon Paiute-Shoshone Tribes tour reservation homes to survey energy use and identify energy efficiency improvements.

Lawrence Berkeley Leads High-Performance Research in California

In California this summer, high electricity consumption caused rolling blackouts and made headline news. A joint state-federal research effort aimed at reducing commercial building energy consumption may help avoid such electricity shortages in the future. The three-year, \$13 million research effort is funded by BTS and the California Energy Commission (CEC), and managed by Ernest Orlando Lawrence Berkeley National Laboratory. Industry, utility and academic partners will help develop high-performance commercial buildings systems.

New buildings today are more efficient than ever, thanks in part to DOE's building energy standards. However, commercial building owners spend nearly \$100 billion each year on energy in the United States. BTS and CEC hope to reduce that figure by increasing the energy efficiency of commercial buildings.

The program aims to reduce commercial building electricity use by 22 percent in California by 2015. This proposed reduction in energy use would save ratepayers \$2.4 billion each year and reduce carbon emissions by 2,260,000 tons each year.

The research program will use integrated building design approaches to optimize the selection and operation of energy-efficient technologies and systems. Berkeley Lab researchers will work with a team of 12 subcontractors, and industry partners will participate and cost-share the effort to develop and deploy energy-saving technologies. In each area, the new research projects are designed to extend DOE-supported work.

A unique feature of this initiative is the participation of Pacific Gas & Electric Company (PG&E) to help deploy the products that result from this research. Through training classes and outreach

programs at its Pacific Energy Center, PG&E will help move the R&D results into the marketplace.

The three-year research program has been awarded \$6 million from CEC. BTS will provide about \$2.5 million in matching funds. Total program funding, including private sector in-kind support and PG&E deployment funds, will total more than \$13 million over 3 years.

The program marks a significant milestone in BTS's efforts to cooperate with state governments to develop energy-efficient technologies. This program may lead to other cooperative efforts with states to develop technologies that save money and reduce air pollution.

For more information, contact Stephen Selkowitz at 510-486-4089.

High-Performance Commercial Building Systems Project Partners

Architectural Energy Corp.
Davis Energy Group
Flack + Kurtz
Honeywell

Massachusetts Institute of Technology
Ove Arup & Partners
Pacific Gas & Electric
Portland Energy Conservation, Inc.

Texas A&M University
Silicon Energy
University of California, Berkeley
University of California, San Diego



BTS Meetings, Events & Conference Calendar

Date	Meeting Event Conference	Contact
Oct. 25-28	Energy Efficient Building Association Building for Peak Performance Denver, CO	www.eeba.org/conference/ 953-881-1098
Oct. 25-27	Environmental Technology Expo Atlanta, GA	Debbie Fernandez 920-338-0950 www.aeecenter.org
Oct. 30-Nov. 1	Earth Technologies Forum Washington, DC	www.earthforum.com
Nov. 1-3	EPA Climate Change Partners' Conference Alexandria, VA	www.epa.gov/globalwarming/events/epa/index.html
Nov. 15-17	National Association of Energy Service Companies Annual Conference Palm Springs, CA	Mary Lee Berger-Hughes 202-822-0954 www.naesco.org/conference.htm

Sub-Compact Fluorescent Lamps For Under \$5

Thanks to a DOE partnership with industry, U.S. consumers can now purchase low-cost, highly efficient subcompact fluorescent lamps (sub-CFLs) that will fit into most light fixtures. One 15-watt sub-CFL provides as much light as a 60-watt incandescent bulb, uses 75 percent less energy and lasts up to 10 times longer. The lamp is 4.56 inches long—only one-tenth of an inch longer than a 60-watt incandescent lamp.

Perhaps best of all, the new sub-CFL breaks the \$5 price barrier. The lamp is part of a special procurement project directed by DOE and Pacific Northwest National Laboratory that arranges volume purchases to lower the price of new energy-efficient products. Manufacturers who meet the technical specifications and have the highest scoring bids are selected to supply products to buyers. Through the project, Surya, a lamp manufacturer in India, is producing the sub-CFLs for U.S. distribution by PMI, a California-based company. The lamps cost \$4.95 to \$6.25, depending on quantity ordered and shipping location.

For more information, visit the lab's sub-CFL Web site at www.pnl.gov/cfl.

State Weatherization Programs: Spotlight on Ohio

Ohio's weatherization program has not only reduced energy consumption and consumers' utility bills, but also improved payment behavior, health and safety, the environment, and the economy, according to a recent independent evaluation of the Home Weatherization Assistance Program. The evaluators credited the innovative technical approach used by the Ohio Department of Development's Office of Energy Efficiency for saving an average of \$153 each year in energy charges for each household served. The program has weatherized more than 250,000 homes in Ohio, saving 282 billion Btu and reducing carbon dioxide emissions by 60.3 million pounds each year.

Ohio's \$22 million-per-year program, supported with a combination of DOE funds and oil overcharge funds, uses on-site energy audits to develop recommendations designed to reduce energy costs to low-income households. Recommended improvements can include home utility repairs such as tuning up furnaces, wrapping furnace ducts, installing or replacing storm windows, weatherstripping, window caulking, and insulating attics, walls, floors and water heaters.

Contributing to the success of the program is the Ohio Weatherization Training Center for building industry and energy conservation professionals. The center combines classroom learning with hands-on laboratory instruction and on-site field training to address home health, safety, comfort and energy-affordability. The center has also helped develop utility energy efficiency programs such as WarmChoice for Columbia Gas and Targeted Energy Efficiency for American Electric Power.

Another contributor to the program's accomplishments is the active consumer education program directed by the Ohio energy efficiency office in collaboration with local contractors. A client manual developed by the program—*Do Your Part, Be Energy Smart*—won DOE's Best Energy Education Promotion Award at the State Energy Program Annual Conference in July. This colorful, spiral-bound manual is left with consumers after weatherization work has been completed to help them take full advantage of energy saving possibilities. The energy efficiency office also runs an annual bookmark design competition to raise awareness among students and parents. The Ohio affiliate of the National Energy Education Development program, ranked one of the best in the nation, also promotes awareness of weatherization activities.

The Ohio state program also promotes successful strategies throughout DOE's Chicago Region. This summer, the energy efficiency office organized the Affordable Comfort Conference, in Columbus, Ohio, which drew 1,077 participants from the region. Next summer, the office will organize a conference for more than 400 state and local planners from the region on the latest energy audit and weatherization technologies. And a regional project to "train the trainers" recruits local personnel as peer instructors to expand the number of skills a trainer can offer.

And finally, to help keep a lid on home energy use, the office operates a home energy ratings program in Ohio on a five-star system that encourages the purchase of ENERGY STAR® homes.

For more information, visit the Ohio Department of Development's Web site at www.odod.state.oh.us/.

Dean Redinger of Belmont Community Action Agency works on the duct system of a new high-efficiency heating system at a low-income household in Ohio. The new system replaces a furnace that had a cracked heat exchanger.

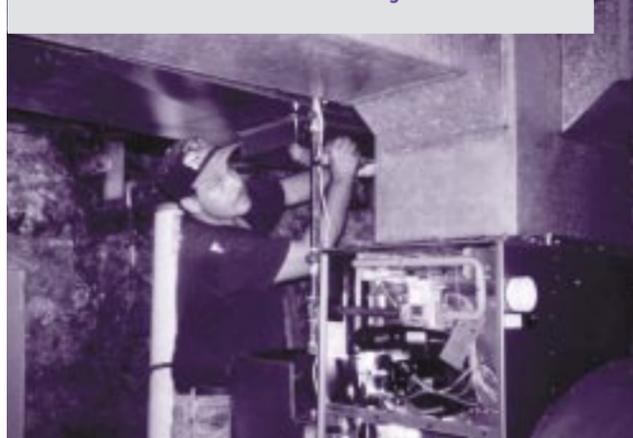


Photo courtesy of Corp. for Ohio Application Development

Calling Young Inventors

Students in the fourth, fifth and sixth grades are invited to enter the Invention Contest for Kids. Students must draw an original energy-saving device and submit a 100-word-or-less description of how it works for a chance to be appointed an EnergySmart Schools Inventor and participate in the EnergySmart Schools Inventor Summit in December. **Entries must be postmarked no later than November 10, 2000.** For entry details, visit the EnergySmart Schools web site at www.eren.doe.gov/energysmartschools/.

Credits

Secretary of Energy
Bill Richardson

Assistant Secretary, Energy Efficiency & Renewable Energy
Dan W. Reicher

Deputy Assistant Secretary for the Office of Building Technology, State & Community Programs
Mark Ginsberg

Technical Monitor
Margo Appel

Managing Editor
Kristin Tromly

The Buildings for the 21st Century newsletter is published quarterly by the Office of Building Technology, State and Community Programs of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

If you would like to make suggestions or contribute articles to the newsletter, please address mail to:

Margo Appel
Office of Building Technology, State and Community Programs
U.S. Department of Energy, EE-40
1000 Independence Avenue, SW
Washington, DC 20585-0121

Or e-mail to:
Margo.Appel@ee.doe.gov.

Office of Building Technology, State and Community Programs

Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy (EE-40)
1000 Independence Avenue, SW
Washington, DC 20585-0121

**PRSRT STD
U.S. Postage
PAID
Permit No. 258
Golden, Colorado**

Forwarding Service Requested

