Communications, Marketing, and Outreach Support Capabilities

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OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY

- Articles
- CD-ROMS
- Conferences
- Exhibits
- Fact Sheets
- Market Research
- Meetings
- Posters
- Presentations
- Success Stories
- Web Sites
- Workshops
- (U.S. & International)

Who We Are

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What We Do

The Communications, Marketing, and Outreach Team in the Engineering Science and Technology Division at Oak Ridge National Laboratory (ORNL) is involved in numerous activities for the U.S. Department of Energy (DOE). In addition to providing technical analysis and writing proposals for these activities, our team designs and coordinates exhibits for trade shows, prepares brochures, posters, articles, fact sheets, case studies, web sites, team meetings, joint meetings with other labs, DOE reviews, CD-ROMS, conferences, and international workshops. We are delighted to showcase some of our activities in this booklet.

Building America Program

This program is the reengineering of the American home for energy efficiency and affordability (*http://www.buildingamerica.gov*). We work with the residential building industry to develop and implement innovative building processes and technologies. Our staff provides communications, marketing, and technical support for the DOE program manager, five national teams, and home builders.

GREENTIE

Our team provides support to the Greenhouse Gas Technology Information Exchange (GREENTIE) international directory (*www.greentie.org*). This program encourages 30 + countries to share publicly available information on suppliers of energy efficient and environmentally friendly technologies via the GREENTIE directory. Our ORNL team prepares and maintains the 2,800 U.S. entries in the directory. DOE supports U.S. participation in this international program.

Office of Power Technologies (OPT)

DOE's Office of Power Technologies (*http://www.eren.doe.gov/power/*) established and implemented a communications strategy across all areas of renewable energy (solar, wind, geothermal, and biomass), energy storage, hydrogen, and superconductors. Our team provided technical and analytical support to OPT in the development of key elements in the strategy including an OPT CD-ROM and the OPT web site redesign.

Black and Caspian Sea Environmental Information Center

Our team provides support to DOE's Black and Caspian Seas initiative by facilitating regional planning for oil spill response, leading scientific research initiatives, and providing communications capabilities and information resources through the Black Sea and Caspian Sea Environmental Information Center web site (*http://pims.ed.ornl.gov*).

Drop-in heat pump water heater saves energy

The Drop-In Heat Pump Water Heater (HPWH) is a replacement for conventional 190- or 300-litre (50- or 80-gal) electric water heaters. The new heater differs from other HPWHs in its simplicity and ease of installation. It has the same installation requirements as a conventional heater but consumes only about half of the energy. The cost of the heater is about $500 (US dollars) more than for a conventional 190-litre water heater, but the energy savings can yield a payback period of between two and three years.

Water heating accounts for 12% of all the energy used in buildings, and buildings account for about one-third of all the energy consumed in the United States. Therefore, improving the efficiency of water heating can play a significant role in reducing the nation's demand for energy. Reducing energy consumption also has other benefits including lower atmospheric emissions, reduced costs and improved capacity margins.

About half of all domestic water heaters in the United States are based on electric resistance heating, in which heating elements inside a tank are used to convert electric energy into heat. The most efficient electric water heaters have an efficiency of about 95%, which means that nearly all the electrical energy supplied to these water heaters is converted to heat energy. Consequently, there is very little room for further improvement.

New design raises efficiency

The Drop-In Residential HPWH (see Figure 1) is a new technology that raises the efficiency of water heating to a level not achievable by conventional electric resistance water heaters. Its development was the result of the combined efforts of Enviromaster International, Arthur D. Little, and Oak Ridge National Laboratory (ORNL). Their goal was to develop a drop-in design that looks similar to a conventional water heater and has no additional installation requirements, and this was achieved. The target market for the Drop-In Residential HPWH is the 3-4 million conventional domestic electric water heaters that are replaced annually.

Heat pump water heaters are not new, but they have had only limited success for a number of reasons:

- a reputation for poor reliability;
- additional space requirements;
- high cost, resulting in long payback periods (greater than five years);
- complicated installation, requiring both a plumber and a heating, ventilation, and air-conditioning (HVAC) technician.

Figure 1: The Drop-In Residential Heat Pump Water Heater.

Early designs used oversized components in an effort to match the heating capacity of conventional water heaters, and this led to higher evaporator airflows. Evaporator flow rates of 0.19-0.28 m^3/s (400-600 cfm) meant that the heater needed to be located in either a ventilated space or a large room. These limitations constrained the adoption of early HPWHs as replacement water heaters.

Two manufacturers currently produce "tankless" residential HPWHs. These units are added to existing water tanks and use a pump to circulate water from the tank to a small, wall-mounted heat pump. Tankless heaters are relatively unknown and have not penetrated much of the residential water-heating market.

The drop-in advantage

The Drop-In Residential HPWH is an affordable technology that raises the efficiency of water heating to 240%. The key to this impressive performance is a small heat pump located on the top of the water tank. The heat pump consumes a relatively small amount of electricity to extract heat from the surrounding air to produce hot water.

A conventional electric water heater consumes 13.3 kWh of electrical energy to produce 243 litres (64.3 gal) of hot water - the average daily hot water consumption for a typical U.S. household (see Figure 2). The Drop-In Residential HPWH requires only 4.90 kWh of electrical energy to accomplish the same task. Thus, the drop-in unit saves 8.4 kWh of electricity each day. This estimate assumes that 90% of the electrical energy is converted into thermal energy (4.4×10^7 J or 41,300 Btu) needed to heat water through a 43° C (77° F) temperature change. These energy savings have been validated in the laboratory at the ORNL Buildings Technology Centre.

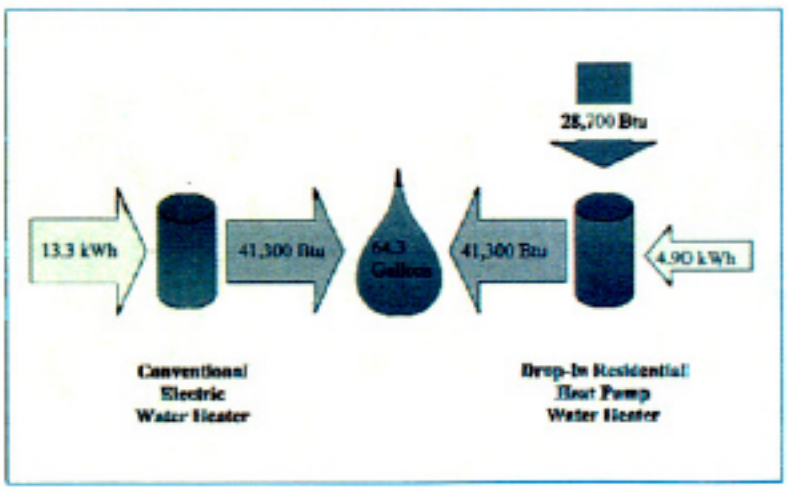

Figure 2: Daily energy use for a conventional water heater compared with that of the drop-in design.

Installation and operation

The Drop-In Residential HPWH is designed throughout to be a full replacement for a conventional electric-resistance water heater. Because small components are used, the evaporator airflow is low enough to permit its installation in a closet, a basement, a garage, or other locations in a house - wherever a conventional electric-resistance water heater can be located.

The new heater uses a 190-litre (50-gal) hot water tank with upper and lower heating elements. A condenser coil is wrapped around the lower portion of the tank before it is insulated and covered. The coil provides most, if not all, of the water heating (see Figure 3). The unit can heat water up to 66° C (150° F) under any typical ambient conditions.

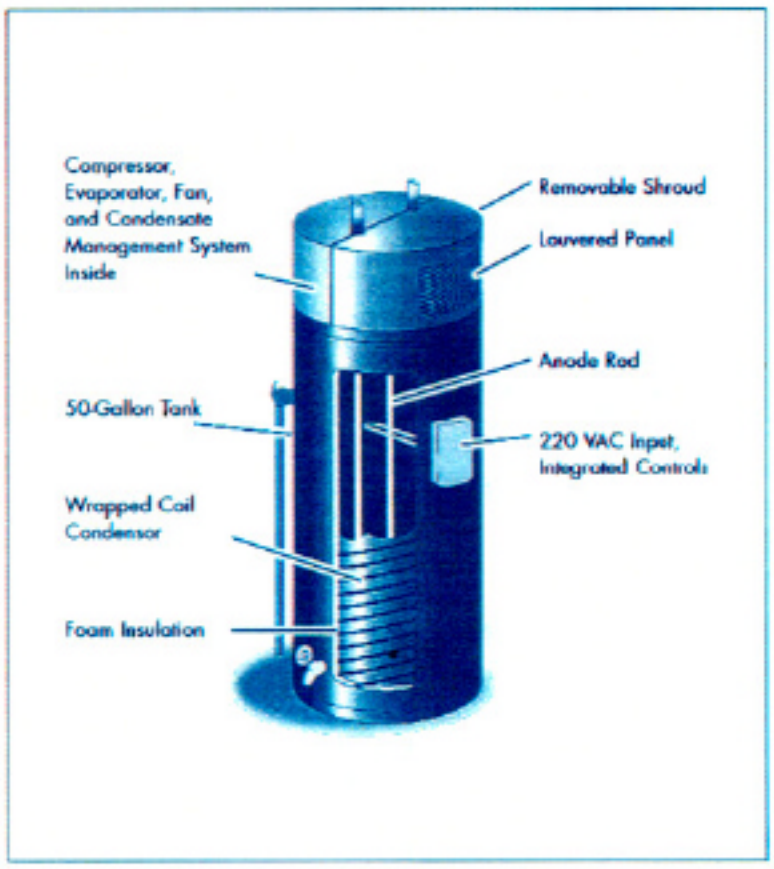

Figure 3: Cutaway view of the Drop-In Residential Heat Pump Water Heater

The drop-in design uses a small, robust, refigerator-like compressor with a capacity of about 1,030 W (3,500 Btu/h) and a small, air-cooled evaporator, both of which are located on the top of the tank. Evaporator air exhausts through the grille at the front of the unit. A microcontroller with four sensors is used to control the source of water heating, whether it is from the wraparound condenser or from the upper or lower heating elements. The microcontroller and its logic determine the best mode of operation, depending on ambient, condensing and evaporating conditions; the setpoint for the water heater; and the acceptable operating conditions for the compressor.

Testing

Accelerated lifetime tests of the drop-in design have shown it to be durable for more than 5,000 compressor cycles. Further tests to subject the design to the equivalent of 10 years' real-world use (7,000 cycles) are continuing.

Major field tests of the Drop-In Residential HPWH are being conducted with a number of utility partners across the United States. In each test, a new, heavily instrumented heater replaced an electric-resistance water heater. Data from units installed in unheated basements in Connecticut and in an unheated garage in Knoxville, Tennessee, are shown in Figure 4. Data were taken during the winter over ambient temperatures that ranged from about -1° to 22° C (31°-72° F), depending on the time of day and the location of the water heater. In Figure 4, the measured daily energy consumption of the drop-in design is compared with the energy consumption of a conventional electric-resistance water heater that has a 90% efficiency (energy factor). The data show that the new design saves from 5-10 kWh of electricity/day, depending on the consumption of hot water. Based on a national average electricity rate of $0.0814/kWh and the data in Figure 4, the drop-in design would produce savings of $130/year for homeowners using about 150 litres (40 gal) of hot water/day and $260/year for those using about 380 litres (100 gal) of hot water/day.

Cost and benefit

The cost of the Drop-In Residential HPWH is currently $750 and this should reduce as manufacturing efficiencies improve and component prices decrease with volume production. However, even at this level, the simple payback period for the heater would be less than three years for families with three or four members. At reasonable and attainable market levels, the drop-in design could reduce US residential building energy consumption by 3%.

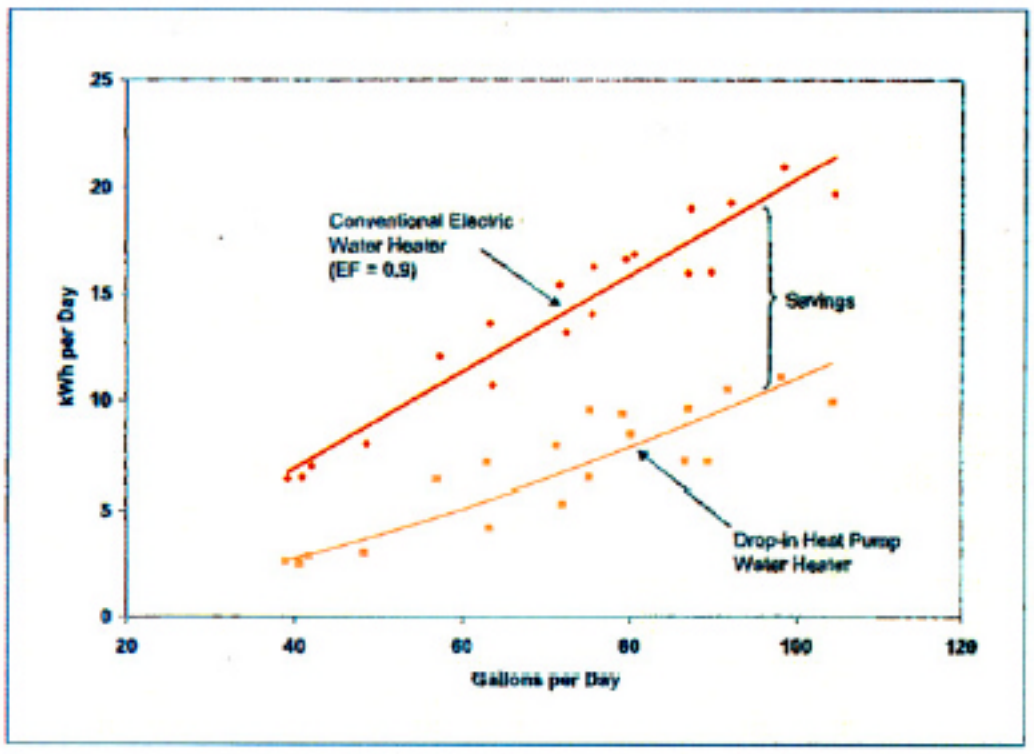

Figure 4: Performance of the Drop-In Residential Heat Pump Water Heater compared with that of a conventional electric-resistance water heater

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COMMUNICATION ACROSS THE BLACK SEA VIA INTERNET TECHNOLOGY

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ABSTRACT: *The U.S. Department of Energy's (DOE's) Office of International Affairs has been joined by an interagency task force to undertake a program in the Black Sea region called the "Black Sea Environmental Initiative." The objectives of the task force are to support the countries of the region to address significant Black Sea environmental issues, including oil spill response and prevention.*

Working with delegates from Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine, DOE and Oak Ridge National Laboratory (ORNL) coordinated a workshop on a regional oil spill emergency response system for the Black Sea on September 14–17, 1999 in Odessa, Ukraine; DOE and the National Academy of Science, Ukraine cosponsored the workshop.

*The "Black Sea Environmental Information Center" Web site was unveiled at the Odessa workshop. Created by ORNL, the Web site (*http://pims.ed.ornl.gov/blacksea*) facilitates information flow and dialog between the countries of the region. The Web site is intended to provide a comprehensive source for information on:*

- *Oil spill cleanup, monitoring, and related commercial technologies*
- *Scientists' requests for research partner*
- *Various countries' laws, regulations, and standards relating to the environmental condition of the Black Sea*
- *Publication of scientific papers and on-line discussions of these issue*
- *Individuals and companies working on Black Sea environmental issues*

The Web site also provides a real time chat capability where meetings are organized. Several meetings among regional officials have been conducted and planning is underway for the first real-time training session, which will be held in the next few months. The Web site also is host to a growing database of historical pollution testing data from research institutes around the Black Sea.

The amount of oil transiting the Black Sea is expected to double over the next 10 years, from the current 1 million barrels per day to more than 2 million. The U.S. Department of Energy's (DOE's) Office of International Affairs has been joined by an interagency task force to undertake a program in the Black Sea region called the "Black Sea Environmental Initiative." The objectives of the task force are to support the countries of the region to address significant Black Sea environmental issues, including oil spill response and prevention. The Black Sea Environmental Initiative fosters cooperative relationships, improved communications, and strengthened environmental management tools for all the stakeholders in the region.

Working with delegates from Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine, DOE and Oak Ridge National Laboratory (ORNL) coordinated a workshop on a regional oil spill emergency response system for the Black Sea on September 14–17, 1999 in Odessa, Ukraine; DOE and the National Academy of Science, Ukraine cosponsored the workshop. The workshop included over 50 participants from:

- Government and port authorities in the Black Sea countries (Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine)
- International oil companies
- International organizations such as the International Tanker Owners Pollution Federation (ITOPF)
- Other U.S. government organizations who are members of the interagency task force, such as the U.S. Department of Defense

The workshop was an important effort by DOE to bring together representatives from the Black Sea region, oil companies, and other organizations to accelerate the dialog on Black Sea environmental issues and to facilitate the creation of a regional capability to respond to oil spill threats on the Black Sea. The first regional follow-up meeting to the Odessa workshop was held in Constanta, Romania in July 2000. This workshop gave countries of the region an opportunity to meet and discuss progress made and current research initiatives presently underway. The progress made by these countries is very impressive. They have completed a draft regional oil spill emergency response contingency plan. Each of the six littoral states is working on national contingency plan and all expect to complete drafts by the first quarter of 2001.

The "Black Sea Environmental Information Center" Web site was unveiled at the Odessa workshop. Created by ORNL, the Web site (*http://pims.ed.ornl.gov/blacksea*) facilitates information flow and dialog between the countries of the region. The site, which is in a stage of rapid development, is dedicated to

providing information and training on environmental issues and problems related to the Black Sea. The Black Sea Environmental Initiative participants and regional Black Sea environmental workshop participants define the content of the Web site and its functionality. The site contains an area where Web site users can post and reply to questions related to the Black Sea environment and can register as a point of contact. A series of training links is provided to help prepare for environmental emergency response situations. Web site visitors also are able to review information provided by the Black Sea states on laws in the Black Sea countries. The site also hosts a chat feature where scheduled meetings can be conducted on-line.

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Currently, 31 years of pollution testing data collected by the Ukrainian Scientific Center of the Ecology of the Sea (UkrSCES) are being loaded onto the Web site. The information will include compiled data, maps, graphic files, and background information on UkrSCES. The data will consist of a catalog of oceanographic data on the Black Sea (including chemistry and pollution), geophysical data, meteorology, and aerology. Data include maps and graphics; statistical evaluation of the data; distribution of the chemical, biological, and geophysical elements; and pollution in various regions of the Black Sea.

This information will be stored in an SQL database and will be accessible from the web site. A portion of the data, maps, and graphic files are already accessible (from the "research" button on the Web site homepage). DOE and ORNL have partnered with the Department of Defense's Partnership for Peace Information Management System (PIMS) to provide the infrastructure necessary to support access to this Web-based information to the Black Sea states. This infrastructure includes satellite uplinks and hardware necessary to support the Black Sea Environmental Information Center Web site.

Six country-specific workshops are planned in each of the countries to facilitate progress on national laws and regulations to protect the Black Sea. Recognizing that each of the six Black Sea countries has a unique legislative system, group of existing laws, and laws in preparation, DOE is planning a separate workshop in each country. The first one was held in Tbilisi, Georgia in June 2000. These workshops focus on legal and legislative issues that are critical to effective oil spill response systems and identify legislative issues essential to regional cooperation on oil spill response. They also cover international agreements.

Participation, collaboration, and cooperation are essential for:

- Policy makers and administrators in government agencies, including federal, state, and municipal government organizations
- Nongovernmental groups and community organizers
- Manufacturing, commercial, industrial, agricultural, transportation, and residential sectors
- Financial institutions
- Citizens likely to be affected by the policies adopted
- Schools who educate tomorrow's decision makers

The Black Sea Environmental Information Center Web site is designed for many audience groups and in the future will customize information retrieval results by audience category.

Statistics on the usage of the Web site confirm positive results from the Black Sea Environmental Information Center Web site. The Web site consistently has attracted users from around the world (over 30 countries) each month, and users from the Black Sea region are finding it a useful tool for communications and information. Later this year, the Web site will be expanded to include information on all the existing petroleum pipelines and proposed additions to the transportation network surrounding the Black Sea.

Hopefully the scientific community will use the Black Sea Environmental Information Center Web site to share information, conduct on-line meetings, and strengthen their own network for collaboration. Discussions are already underway with the Romanian Institute for Marine Research and Development in Constanta, Romania to contribute data and research papers, with NOAA to conduct on-line training exercises, and with the United Nations to collaborate on a biodiversity area of the Web site.

The idea behind all of this activity is to bring people together to work collaboratively to find solutions to the serious environmental challenges faced by the Black Sea. The reduction that has taken place in economic activity around the sea over the past 10 years has provided some relief from the relentless onslaught of man made pollution, but this is only a temporary respite and does nothing to correct already existing problems. It is clearly time to mobilize international resources to support Black Sea countries in their ongoing efforts.

Biography

Ms. Thompson has held several positions at the Department of Energy since 1991, including Deputy Director, Office of Export Assistance and currently heading the Department's Black Sea Environmental Initiative. As part of this initiative, Ms. Thompson is working with the countries of the Black Sea region to develop a regional oil spill response capability to prepare for the increase in oil transport across the Sea.

Before her move to the Energy Department, Ms. Thompson worked at the Department of Commerce where she served as Director, Policy Staff, Capital Goods and International Construction. She was actively involved in multilateral and bilateral trade negotiations, including renegotiation of the GATT Government Procurement Code. She directed the activities of three bilateral Working Groups with the USSR. These working groups focused on trade in oil and gas, construction, and food processing equipment.

Ms. Thompson held other positions in the Department of Commerce, including: director, Capital Goods Division, International Sector Policy; director, Developing Nations Commercial Policy Division; Member, Negotiating Team, U.S.-Mexico Working Group on Electronics; Coordinator, U.S. Joint Economic Commissions for Saudi Arabia, Iran, Egypt and Israel; and, Director, South Asia Staff, Office of Trade Policy.

Ms. Thompson received her B.A. degree in Economics from Winthrop College in South Carolina and her M.S. degree in Economics from Florida State University in Tallahassee. Her Masters thesis examined the relationship between oligopoly theory and antitrust legislation.

Housing

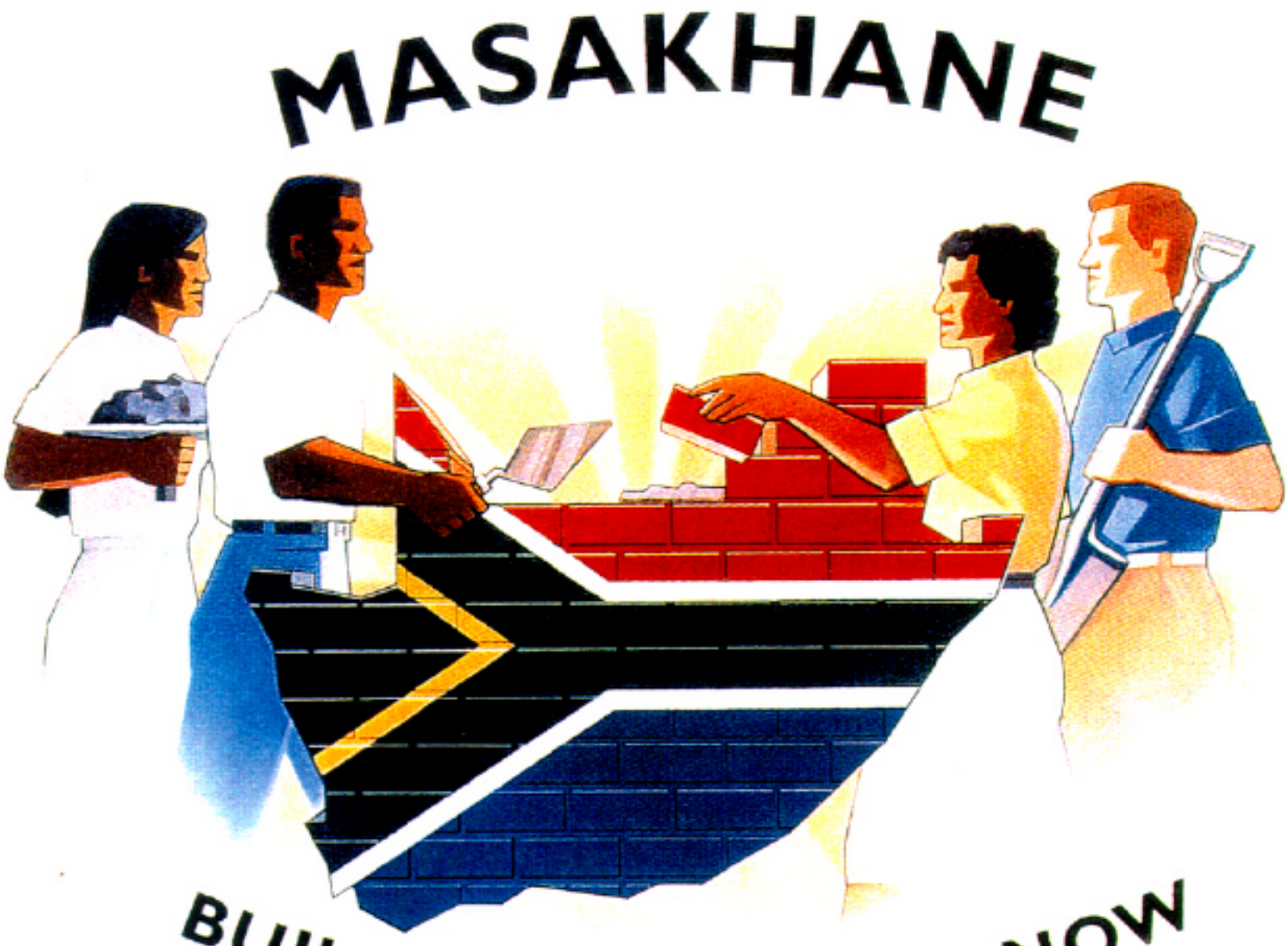
IN SOUTHERN AFRICA

November/December 1995

Behuising

IN SUIDELIKE AFRIKA

November/Desember 1995



Energy efficiency means cheap comfort

By Melissa Voss, Oak Ridge National Laboratory

We have all experienced beautiful but uncomfortable houses. Drafty and cold in winter, blistering hot in summer, and full of the odour of mildew in damp weather, such places are a misery to live in. We try to make them more habitable by installing heaters or air-conditioners, but that just succeeds in making them expensive as well. No such house, regardless of how architecturally pleasing it may be or how little it cost to construct can ever satify its owner. Fortunately, there is an alternative. Energy efficient building techniques allow families to live in comfort and save money at the same time.

Oak Ridge National Laboratory

Strategies for building energy efficiency were pioneered in the high energy cost regions of Europe and North America as a means of reducing the cost of heating and cooling residential and commercial buildings. Efficient building technologies have been further developed as a means of reducing the consumption of fossil fuels in electricity generation and home heating in order to improve air quality. In most cases, minimum standards for energy efficiency are incorporated into building codes, but individual owners can specify more stringent measures if the economics of the case justify them. Energy costs in South Africa are lower than in most of the industrialised world, reducing the economic attractiveness of energy efficiency measures, but they are still worth considering for their positive impact on building comfort. Air quality implications for South Africa, especially in areas that still use coal as a home heating fuel are also very significant.

Thermal comfort has been defined by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) as "that condition of mind which expresses satisfaction with the thermal environment."

Building thermal comfort involves finding the optimum level of the following factors:

- Conductive heat transfer to and from surrounding surfaces. This is the sensation we feel when touching a hot or cold wall, for instance.
- Radiant temperature, or the feeling of warmth we feel when standing in front of a warm surface even though not actually touching it.
- Ambient air temperature, or the temperature of the air in the room.
- Humidity or moisture content of the air in the room.
- Speed of air movement in the room (drafts).

The most significant measures which improve the thermal comfort and energy efficiency of a building are the use of insulation in roofs, walls, and foundations supplemented by the elimination of air leaks, and the use of multi-glazed windows to reduce heat conduction. A savings of 25-35% can be achieved on a conventional residential building by incorporating insulation such as fibreglass or rock wool in the ceiling above the living area. Additional savings of 15-25% can be achieved by adding insulation in the walls, and 10-15% by changing single pane windows to double pane windows. The amount of insulation re-

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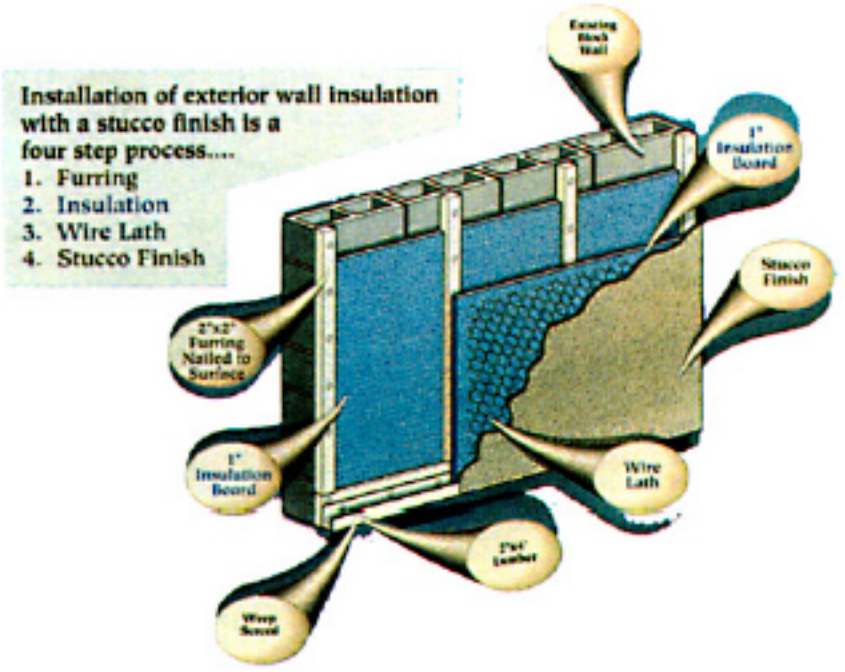

Research centre focuses

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quired depends upon climate, as well as energy costs and what other measures are being used. U.S. practice for climates similar to Johannesburg, South Africa, calls for a 20 centimeter layer of fibreglass insulation in this critical area, which would change the R3 insulation value to R30.

Almost as important as the ceiling treatment is insulation of the walls, especially in windy climates. The type and application of wall insulation depends on the type of construction used in the house. Brick or block walls are the most difficult to insulate because there is no way of incorporating insulating material into the wall itself. However, tests at the Oak Ridge National Laboratory's Buildings Technology Center have shown that significant energy savings and comfort improvement can be obtained by insulating the **exterior** of block walls using expanded polystyrene foam and stucco-like overcoat. This exterior insulation procedure reduces energy use by almost 10% overall in residental buildings and greatly improves comfort by warming the walls. Such exterior insulation is simple and cheap to install and can be even applied to existing houses. A frequently neglected opportunity area is insulation of the foundation. The use of foam under the concrete slab reduces heat transfer and moisture migration through the floor and eliminates potentially serious health-related effects of soil gases. By reducing moisture migration, termites are also kept out of the house.

Even the best insulating techniques will be defeated if air is allowed to leak into the building around window and door frames, down chimneys without dampers, or through porous building materials such as some types of block. The use of caulking and weather stripping is an obvious defence against such invasion. In the case of porous block walls, the exterior insulation technique described above is effective. An important factor in the process of sealing a house is the handling of moisture flows. Moisture trapped in the wrong place causes mildew and the associated musty odours, as well as reducing insulation effectiveness and causing decay of building materials. Vapour barriers can be used to control moisture migration, while intentional ventilation of enclosed but unheated spaces, such as attics and crawlspaces is recommended.

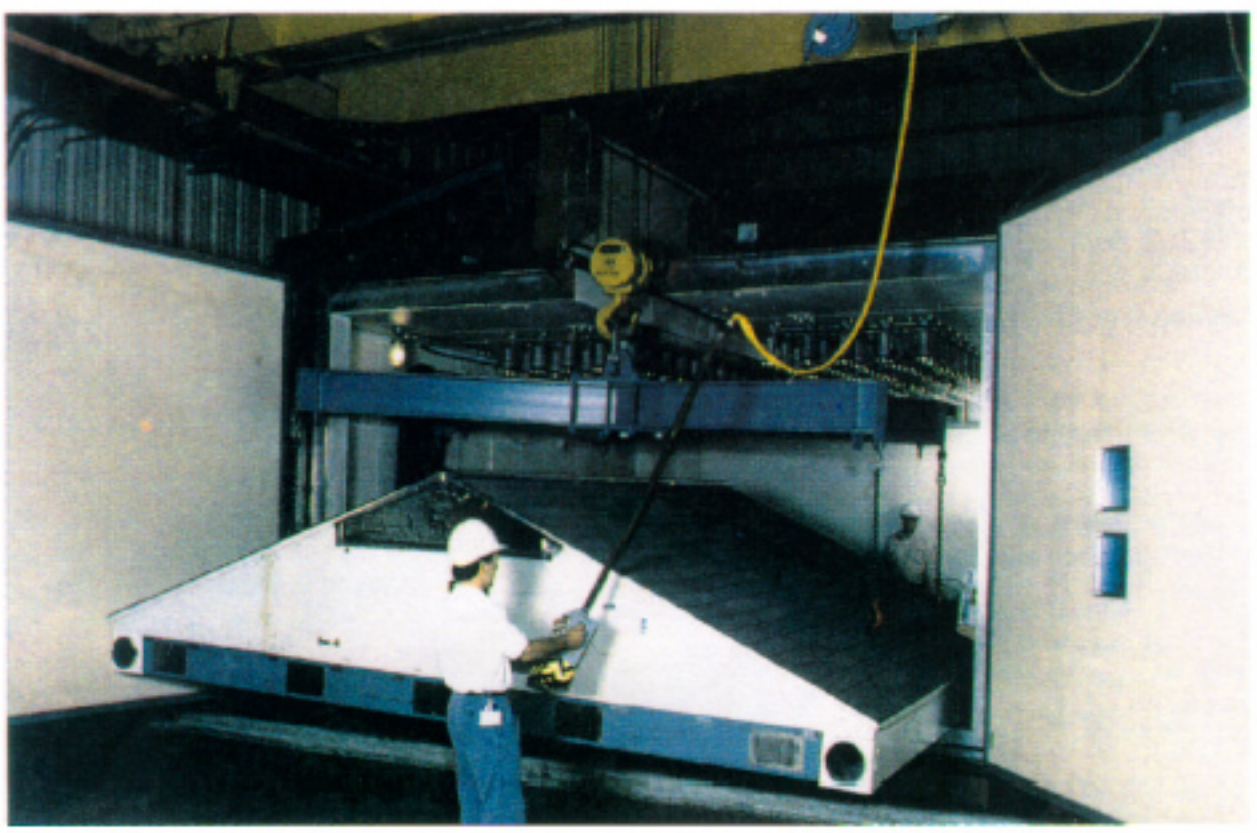
Poorly sealed single pane windows are notorious for conductive losses through the glass as well as for being a source of cold drafts in an otherwise warm house. Windows should be of the multi-glazed type, which use two or more thin plates of glass separated by a sealed air space to reduce thermal leakage. The frames of such windows should not be metal, as that would bypass the advantages of reduced leakage through the glass.

A critical concern of both builders and purchasers of houses is the final cost. A home is easily the largest investment a family is likely to ever make and anything which increases its cost must be carefully scrutinised. Energy efficiency measures, such as the ones described, need not be expensive however.

For instance, U.S. experience indicates that a home with an optimum level of insulation in the roof, walls and foundation, as well as double glazed glass windows and a careful use of sealants and weatherstripping should not cost over 10% more that a similarly built house with no energy efficiency features. Such an investment returns dividends continuously both in reduced costs of energy as well as in owner satisfaction with a comfortable house. Also, as discussed in the following section, the Buildings Technology Center at Oak Ridge National Laboratory continues to develop technology to achieve the benefits of energy efficient design at lower capital cost.

About the Buildings Technology Center

The Buildings technology Center (BTC) at the Oak Ridge National Laboratory in Oak Ridge, Tennessee, is the premier U.S. research facility devoted to the development of technologies



on weather worldwide

that improve the energy efficiency and environmental compatibility of residential and commercial buildings. The BTC is housed in a cluster of six buildings containing state of the art experimental facilities valued at over $6 million U.S. dollars. A permanent staff of 50, supplemented by 10 to 20 guest researchers conducts research to improve the thermal design of building envelopes, develop advanced heating and cooling equipment, and analyse energy performance of existing buildings. In 1989, the U.S. Department of Energy designated the Center a National User Facility, which means that its facilities and staff are available to manufacturers, universities or private individuals world-wide for the conduct of propietary research leading to commercial application of energy efficient products in buildings or their design. To date, more than 200 private users have taken advantage of the facility under 30 separate agreements for this purpose. To further encourage access by potential users, the BTC is installing an Internet link which will allow experiments to be monitored and controlled from anywhere in the world.

The centerpiece test facility for the Buildings Technology Center is the large-scale climate simulator, which is capable of testing near full-size roof modules under weather conditions simulating any climate in the world. Other Center capabilities include:

- A rotatable guarded hot box to test thermal performance of full-size wall sections with windows and doors, as well as floors, skylights, etc.
- Calibrated and instrumented large scale outdoor apparatus for testing the longevity and thermal performance of roofing materials, slab-on-grade thermal performance, and energy and moisture flows through roofs and walls.
- Environmental chambers for the testing of both the indoor and outdoor components of gas-fired or electrically driven building heating and cooling systems under realistic conditions.
- Instrumented test stands and cooling loops for full scale experiments on heat exchangers for absorption refrigeration cycles.
- Test chambers and instrumentation for evaluating the performance of refrigerants that are candidates for replacement of chlorofluorocarbons (CFCs).
- Sensors, data acquisition systems, and models developed to analyse the energy performance of commercial and residential buildings in the field.

The commercially valuable research products of this world class facility are too numerous to list, but some representative examples are:

- A type of cement block wall that can be assembled without any mortar, but which has four times the insulating value of ordinary concrete block walls.
- A commercial flat roof design that keeps itself dry, even if the roof membrane leaks. In addition to extending the life of the roof, this improves energy efficiency, since wet insulation has greatly reduced thermal value.
- Metal stud wall systems for residential and commercial buildings that combine the resistance to termite attack typical of steel components with high insulating values to produce a low cost, long lived, energy efficient building.
- Advanced home refrigerator designs that use no CFCs and that reduce the amount of electricity required for a U.S. standard 18 cubic foot capacity refrigerator by 50% compared to the best units available in 1993. This technology is being extended to the much smaller refrigerators manufactured in India, where 20% annual growth in sales of refrigerators is driving a surge in electric demand.

BTC staff also participate in several International Energy Agency Implementing Agreements such as: the Center for the Analysis and Dissemination of Demonstrated Energy Technologies (CADDET), the Greenhouse Gas Technology Information Exchange (GREENTIE) and the Heat Pump Program.

For further information about the Oak Ridge National Laboratory's Buildings Technology Center, visit our home page on the World Wide Web (http://www.ornl.gov/ORNL/Energy_Eff/btc.html), send an e-mail message to ia8@ornl.gov, or send a fax to 1-423-574-9338. ❑

Main Menu

Generator-Absorber Heat Exchange Technology

- Trade Show
- G A X Overview
- Past, Present, Future
- How G A X Works
- Benefits of G A X
- Start Over

Quit

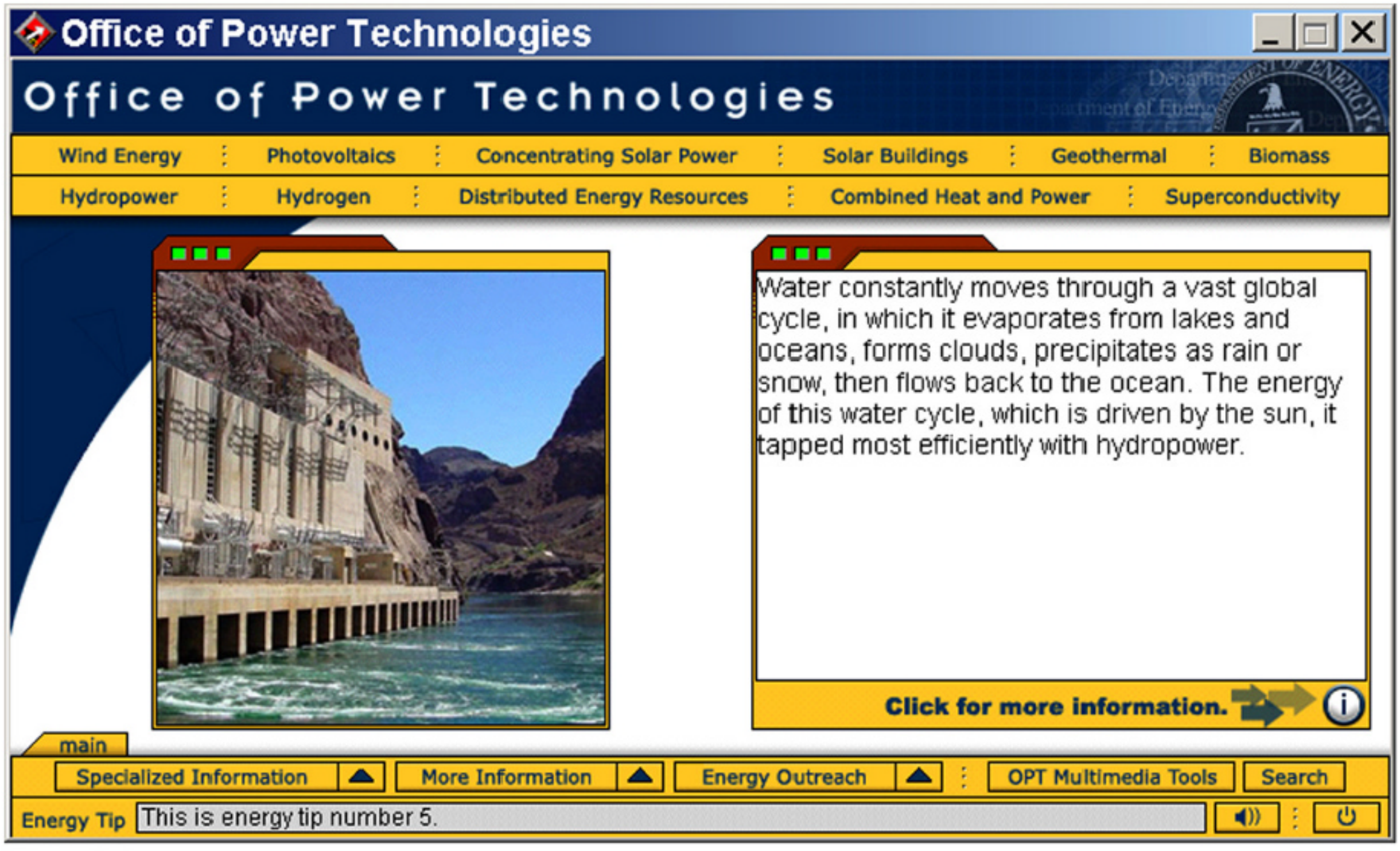
Main Menu

Generator-Absorber Heat Exchange Technology

- Trade Show
- G A X Overview
- Past, Present, Future
- How G A X Works
- Benefits of G A X
- Start Over

Quit

DRAFT


Office of Power Technologies
Office of Power Technologies
Wind Energy
Photovoltaics
Concentrating Solar Power
Solar Buildings
Geothermal
Biomass
Hydropower
Hydrogen
Distributed Energy Resources
Combined Heat and Power
Superconductivity
Water constantly moves through a vast global cycle, in which it evaporates from lakes and oceans, forms clouds, precipitates as rain or snow, then flows back to the ocean. The energy of this water cycle, which is driven by the sun, it tapped most efficiently with hydropower.
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This is energy tip number 5.

PROGRAM

Performance of Exterior Envelopes of Whole BUILDINGS VIII Integration of Building Envelopes

DECEMBER 2–7, 2001

Sheraton Sand Key Hotel
Clearwater Beach, FL

Conference at a Glance

Saturday December 1	Sunday, December 2			Monday, December 3		Tuesday, December 4	
	Continental Breakfast Lobby II, 7:30 a.m. to 8:30 a.m. Registration, Lobby II 7:30 a.m. to 5 p.m.			Continental Breakfast Lobby II, 7 a.m. to 8 a.m. Registration Lobby II, 7 a.m. to 5 p.m. Office, Sand Key Room 7 a.m. to 5 p.m.		Continental Breakfast Lobby II, 7:30 a.m. to 8:30 a.m. Registration Lobby II, 7:30 a.m. to 5 p.m. Office, Sand Key Room 7:30 a.m. to 5 p.m.	
				Principles (A)	Practices (B)	Principles (A)	Practices (B)
	Workshop I	Workshop II	Workshop III	Plenary Session		Session IV	
8:30 am to 10 am	Thermal Mass and Its Effect on Performance, Part I 8:30 to 10 a.m.	Building Failures and Successes in Hot Humid Climate 8:30 to 10 a.m.	High-Performance Windows in Residential and Commercial Buildings 8:30 to 10 a.m.	8 to 10 a.m.		Applied Heat and Moisture Modeling 8:30 to 9:40 a.m.	Wall Durability 8:30 to 10 a.m.
	Break, Lobby II 10 to 10:30 a.m.			Break, Lobby II 10 to 10:30 a.m.		Break, Lobby II 10 to 10:30 a.m.	
	Workshop I	Workshop II	Workshop III	Session I		Session V	
10 am to 12 noon	Thermal Mass and Its Effect on Performance, Part I 10 a.m. to 12 noon	Building Failures and Successes in Hot Humid Climate 10 a.m. to 12 noon	High-Performance Windows in Residential and Commercial Buildings 10 a.m. to 12 noon	Moisture Control Performance Measurements 10:30 a.m. to 12 noon	From the Basement to the Roof 10:30 a.m. to 12 noon	Whole Buildings 10:30 a.m. to 12 noon	Fenestration Practices 10:30 to 11:40 a.m.
	Lunch (on your own) 12 noon to 1:30 p.m.			Lunch (on your own) 12 noon to 1:30 p.m.		Lunch (on your own) 12 noon to 1:30 p.m.	
	Workshop IV	Workshop V	Workshop VI	Session II		Session VI	
1:30 pm to 3 pm	Thermal Mass and Its Effect on Performance, Part II 1:30 to 3 p.m.	An Integrated Systems Design Approach to High-Performance Buildings 1:30 to 3 p.m.	Thermal Integrity in Wood-Framed Houses: the Good, the Bad, and the Ugly 1:30 to 3 p.m.	Moisture Model Inputs 1:30 to 3 p.m.	Wall Design and Building Science 1:30 to 3 p.m.	Reducing Foundation Heat Loss 1:30 to 3 p.m.	Roof Design 1:30 to 2:40 p.m.
	Break, Lobby II 3 to 3:30 p.m.			Break, Lobby II 3 to 3:30 p.m.		Break, Lobby II 3 to 3:30 p.m.	
	Workshop IV	Workshop V	Workshop VI	Session III		Session VII	
3:30 pm to 5 pm	Thermal Mass and Its Effect on Performance, Part II 3:30 to 5 p.m.	An Integrated Systems Design Approach to High-Performance Buildings 3:30 to 5 p.m.	Thermal Integrity in Wood-Framed Houses: the Good, the Bad, and the Ugly 3:30 to 5 p.m.	Moisture Model Validation 3:30 to 5 p.m.	Wall Performance 3:30 to 5 p.m.	Walls I 3:30 to 4:40 p.m.	Green Buildings 3:30 to 5 p.m.
Registration, Lobby II, 6 to 8 p.m.	Open-Bar Reception, Poolside 6 to 8 p.m.			Cash-Bar Reception, Poolside 6 to 8 p.m.		DOE Space Conditioning R&D Plan Discussion Forum 7 to 9 p.m.	

Wednesday, December 5		Thursday, December 6				Friday, December 7	
Continental Breakfast Lobby II, 7:30 a.m. to 8:30 a.m. Registration Lobby II, 7:30 a.m. to 5 p.m. Office, Sand Key Room 7:30 a.m. to 5 p.m.		Continental Breakfast Lobby II, 7:30 a.m. to 8:30 a.m. Registration Lobby II, 7:30 a.m. to 5 p.m. Office, Sand Key Room 7:30 a.m. to 5 p.m.					
Principles (A)	Practices (B)	Principles (A)	Practices (B)				
Session VIII		Session XII					
Walls II 8:30 to 9:40 a.m.	Energy in Buildings 8:30 to 10 a.m.	Low-Slope Roofs 8:30 to 10 a.m.	Mechanical Systems 8:30 to 10 a.m.			ASHRAE's Residential Ventilation Standard 8:30 a.m. to 5 p.m. Air Barrier Workshop 8:30 a.m. to 5 p.m.	Air Barrier Workshop 8:30 a.m. to 5 p.m.
Break, Lobby II 10 to 10:30 a.m.		Break, Lobby II 10 to 10:30 a.m.					
Session IX		Workshop IX	Workshop X				
Walls III 10:30 to 12 noon	Building Durability 10:30 to 11:40 a.m.	Practical Hygrothermal Modeling for Building Enclosure Design 10:30 a.m. to 12 noon	Building Envelopes in Historic Buildings 10:30 a.m. to 12 noon				
Lunch (on your own) 12 noon to 1:30 p.m.		Lunch (on your own) 12 noon to 1:30 p.m.					
Session X		Workshop VII	Workshop VIII	Workshop X			
Fenestration Principles 1:30 to 2:40 p.m.	Building Performance 1:30 to 3 p.m.	Taking the Vital Signs of a Building 1:30 to 3 pm.	Software Tools for Building Envelopes 1:30 to 3 pm.	Building Envelopes in Historic Buildings 1:30 to 3 p.m.	ASHRAE's Residential Ventilation Standard Subcommittee Meetings 1:30 to 5 p.m.		
Break, Lobby II 3 to 3:30 p.m.		Break, Lobby II 3 to 3:30 p.m.					
Session XI		Workshop VII	Workshop VIII	Workshop X			
Attics/Roofs 3:30 to 5 p.m.	Indoor Environment 3:30 to 5 p.m.	Taking the Vital Signs of a Building 3:30 to 5 pm.	Software Tools for Building Envelopes 3:30 to 5 pm.	Building Envelopes in Historic Buildings 3:30 to 5 p.m.			
Dinner, Beachside 6 to 8 p.m. (Bar opens at 6 p.m. Dinner is served at 6:30 p.m.)		HVAC Improvements in Existing Homes 7 to 9 p.m.					

Building AMERICA

U.S. Department of Energy

Energy Efficient, Green, and Sustainable

The U.S. Department of Energy Building America Program is a continuing R&D process, cost-shared, in cooperation with the home construction industry. This process develops system engineered, sustainable, innovative building methods and integrated cost-effective advanced technologies. These innovations can save builders and homeowners millions of dollars in construction and energy costs.

The Benefits

Building America helps home builders:

- Reduce construction costs and waste
- Lower customers' energy bills
- Reduce callbacks and warranty claims
- Offer cost-saving building system trade-offs
- Provide new product opportunities
- Learn from other builders
- Stand out in the marketplace

The Approach

Building America has teams of leading experts in system engineering that offer large volume home builders free technical assistance:

- design reviews
- energy modeling
- specification writing
- training
- on-site consulting

Building Science Consortium

Copper Moon

Pulte Homes – Tucson, Arizona

The Copper Moon House meets Building America and Energy Star® standards. Homeowners will save predicted annual savings compared to standard construction of $150 to $250 on heating, cooling and domestic hot water. With the optional upgrade from a 10 SEER to a 12 SEER air conditioning unit, the predicted annual savings increase by $50 to $70.

Features

- Unvented cathedral attic
- Low-E² spectrally selective windows
- Sealed ducts with mechanical ventilation
- Stack framing
- Blown cellulose wall and ceiling insulation (uniform insulating value; reduces infiltration and exfiltration)
- Air pressure relief to each bedroom
- Combustion safety measures and carbon monoxide detectors
- Reduced sizing of air conditioning equipment
- Heating and cooling bill guarantee

Over 270 builders, manufacturers and others work with the Building America consortia. Nationwide, more than 10,000 energy-efficient houses in 29 states, are testaments to the success of home builders working with Building America Teams.

How Can Builders Work With Building America?

Visit the Building America web site
www.eren.doe.gov/buildings/building_america
for information on events in your area and to get practical information on cutting energy and construction costs.

Contact a Building America Team for free technical assistance:

DOE Program Manager
George James
(202) 586-9472
e-mail: george.james@ee.doe.gov

IBACOS Consortium
Brad Oberg
(412) 768-8664
e-mail: boberg@ibacos.com

Building Science Consortium
Betsy Pettit
(978) 589-5100
e-mail: Betsy@buildingscience.com

Industrialized Housing Partnership
Subrato Chandra
(321) 638-1412
e-mail: subrato@ucf.edu

Consortium for Advanced Residential Buildings (CARB)
Steven Winter
(203) 857-0200
e-mail: swinter@swinter.com

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(303) 384-6101
e-mail: ren.anderson@nrel.gov

Hickory Consortium
Mark Kelley
(817) 491-1888
e-mail: dragon@worldnet.att.com

Outreach Implementation
Pat M. Love
(865) 574-4346
e-mail: lovepm@ornl.gov

Visit other related sites at:

www.pdhnet.org

www.energystar.gov


Efficiency & Renewable Energy
promoting the international exchange of information
HEAT PUMP CENTRE
Your source for the latest heat pumping technology, application, and market information.
www.heatpumpcentre.org
GREENTIE
Your source for information on suppliers and technologies that help reduce greenhouse emissions.
www.greentie.org
PERFORMANCE PIPE
Chevron Phillips Chemical Company LP

Building Cooling, Heating, and Power Fiber Optic Display

Energy Division

The Energy Division is one of 15 research divisions at Oak Ridge National Laboratory (ORNL). The division was established in 1974 to consolidate work on environmental, technological, and regional assessments related to energy development and to conduct research on improving the efficiency of energy use and conversion. Energy Division research expenditures in FY 2000 were $46.6 million.

Our Mission

To provide innovative solutions to energy and related issues of national and global importance through interdisciplinary research, development, and deployment.

- We focus on technology and human systems, with special emphasis on energy and environmental issues,
- Our disciplinary diversity reflects our issue orientation and is the source of our greatest strength—the ability to combine perspectives from among natural, social, and engineering sciences.

Our Values

We, the staff of the Energy Division, have fully embraced the values of concern for people, working together, and challenging goals.

Our mission and uniqueness also compel us to be guided explicitly by the following principles:

- quality,
- creativity,
- intellectual risk-taking,
- teamwork,
- integrity,
- entrepreneurship, and
- diversity.

Our Staff

The Energy Division's emphasis on inter-disciplinary research is reflected in the range of staff expertise. Of the 100.5 scientific and technical staff, 46% are engineers, 10% are physical and life scientists, 31% are social scientists, and 13% are computer and data specialists. The division also employs 17.5 administrative and 17.5 technical support staff and there are currently 120 visiting nonemployees.

Our Collaborations

The Energy Division has strong working relationships with most federal agencies that deal with energy and associated environmental issues. The division also collaborates with research organizations, including universities, non-profits, and other national laboratories. In addition, the division strives to increase partnerships with private industry and state and local governments. To date, nearly 300 organizations have used the division's national user facility, the Buildings Technology Center, under 36 separate agreements.

Our Research

Our research has three focus areas:

1. performing research, development, and deployment (RD&D) to improve the efficiency of *building energy use and delivery technologies*;
2. performing environmental, technological, regional, and policy *analysis and assessments* related to energy production and use; and
3. conducting research on improving the efficiency and safety of *transportation systems and emergency response systems*.

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

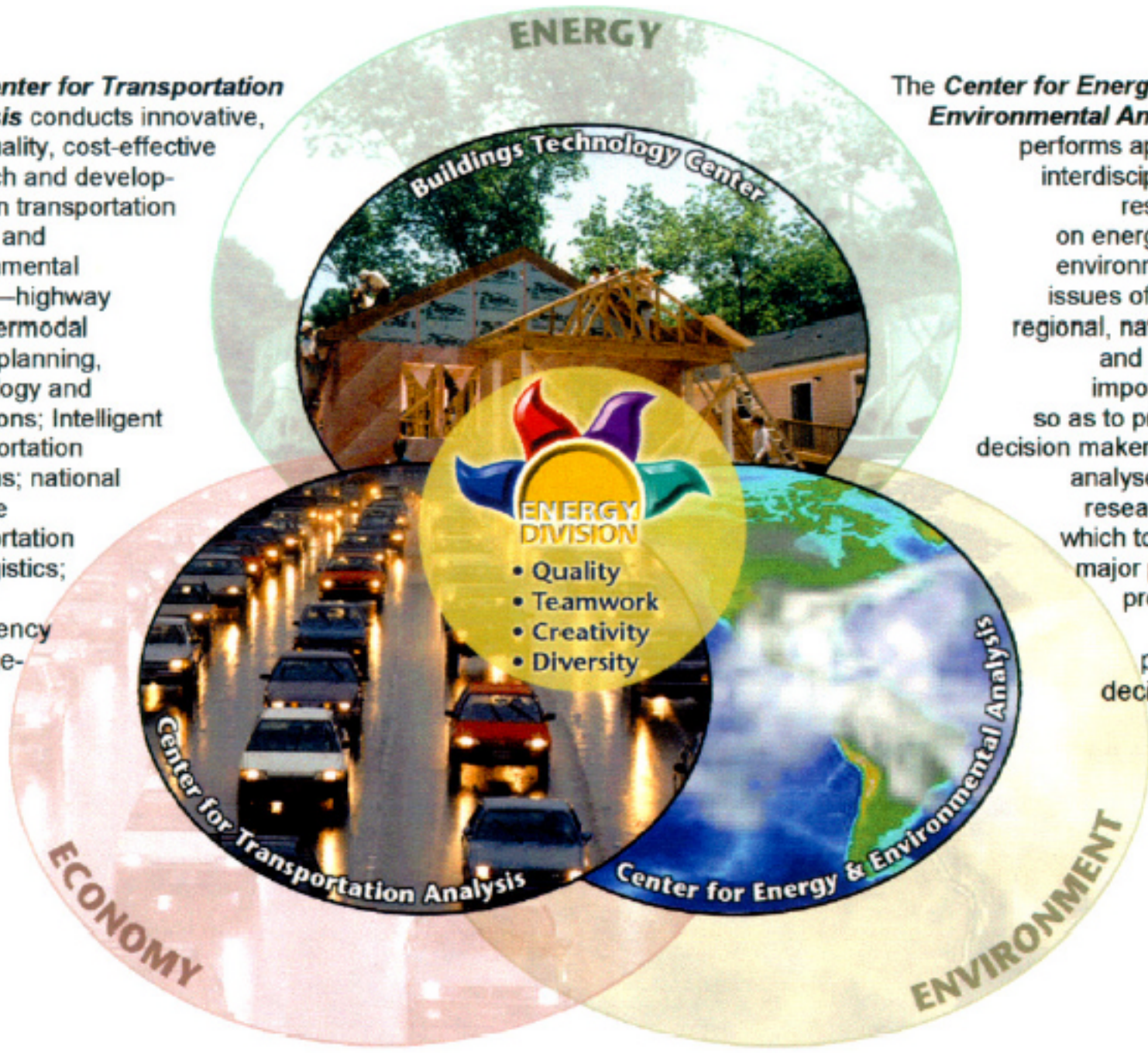
UT-BATTELLE

Our Centers of Excellence

Our research focus areas are reflected in our organizational structure. Each focus area is programmatically administered by a Center of Excellence.

The ***Buildings Technology Center*** identifies, develops, and deploys sustainable and energy-efficient building system technologies by forming partnerships between the U.S. Department of Energy and private industry for technology development, well-characterized laboratory and field experiments, analysis, and market outreach.

The ***Center for Transportation Analysis*** conducts innovative, high-quality, cost-effective research and development on transportation energy and environmental issues—highway and intermodal policy, planning, technology and operations; Intelligent Transportation Systems; national defense transportation and logistics; and emergency management.



The ***Center for Energy and Environmental Analysis*** performs applied, interdisciplinary research on energy and environmental issues of local, regional, national, and global importance so as to provide decision makers with analyses and research on which to base major policy, program and project decisions.

For more information, contact Dr. Robert B. Shelton, Energy Division Director
Oak Ridge National Laboratory, 1 Bethel Valley Road, Building 4500N, Oak Ridge, TN 37831-6187
Phone: 865-576-8176, Fax: 865-574-7671, sheltonrb@ornl.gov,
http://www.ornl.gov/divisions/energy/energy.html

June 2001

Buildings Technology Center

A National User Facility

The Buildings Technology Center (BTC) at Oak Ridge National Laboratory is the premier U.S. research facility devoted to the development of technologies that improve the energy efficiency and environmental compatibility of residential and commercial buildings. Established by the U.S. Department of Energy's Office of Building Technologies, the BTC is a designated "National User Facility," which means that its facilities are available to manufacturers, universities, and other organizations for proprietary and nonproprietary research and development.

The BTC is housed in a cluster of six buildings offering 20,000 square feet of space and state-of-the-art experimental facilities valued at over $6 million. A permanent staff of 50, continually supplemented by 10 to 20 guest researchers, operate the BTC. Annual program expenditures are about $18 million. BTC expertise consists of four groups: Building Envelope Systems and Materials Research, Heating and Cooling Technology, Existing Buildings Research, and Technology Transfer.

A variety of arrangements are available for potential users to access the center. User agreements allow users to work on their projects with BTC staff. Cooperative research and development agreements (CRADAs) enable users to share research costs with the Department of Energy. Work for Others Agreements enable the BTC to carry out proprietary research for full cost recovery. To date, over 250 organizations have used the facility under 36 separate agreements. Users include organizations such as Dow Chemical, Du Pont, Allied Signal, the Association of Home Appliance Manufacturers, the U.S. Environmental Protection Agency, Clayton Homes, Dow Corning, and the National Roofing Contractors Association. Academic institutions such as the University of Minnesota, the Technical University of Denmark, and Tennessee State University have served as partners with the BTC.

For more information, contact the facility manager for the Buildings Technology Center:

James VanCoevering
Oak Ridge National Laboratory
P.O. Box 2008, MS 6070
Oak Ridge, TN 37831-6070

Phone Number: (423) 574-4829
Fax Number: (423) 574-9338
E-mail: v25@ornl.gov

You can find additional information on the BTC's Home Page at the Internet address: http:// www.ornl.gov/ORNL/Energy_Eff/btc.html

Buildings Technology Center

Technology Transfer

The mission of the Technology Transfer group is to relay the results of the research and development being performed at the Buildings Technology Center (BTC) to a variety of audiences to encourage cooperative agreements and increased use of energy efficient and environmentally safe building technologies.

The Technology Transfer group provides customized information on:

- current and past research and development conducted at the BTC,
- how to conduct cooperative research at the BTC, and
- how to arrange a tour of the BTC.

The group also directs an international building envelope conference featuring over 150 presenters; hosts exhibits at the International Air-Conditioning, Heating, and Refrigerating Exposition; and promotes a kiosk that after entering zip code and house characteristics, recommends the most cost-effective type and amount of insulation for a homeowner .

The Technology Transfer group markets energy-efficient building technologies through numerous media, including kiosks, CD-ROMs, the Internet, conferences and displays, published articles, and targeted mailings.

By participating in International Energy Agency programs, the group promotes U.S. technologies internationally while facilitating cooperative research among experts in various countries.

Networking with private industry, other national laboratories, universities, and building associations, along with strong leadership from the Department of Energy, is the key success of BTC Technology Transfer.

For more information, contact the BTC Technology Transfer manager:

Pat M. Love
Oak Ridge National Laboratory
P.O. Box 2008, MS 6070
Oak Ridge, TN 37831-6070

Phone Number: (423) 574-4346
Fax Number: (423) 574-9331
E-mail: pml@ornl.gov

ORNL/CON-351

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OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

A Study of Changes in Foundation Insulation Levels in the United States

Jeffrey E. Christian
Melissa K. Voss

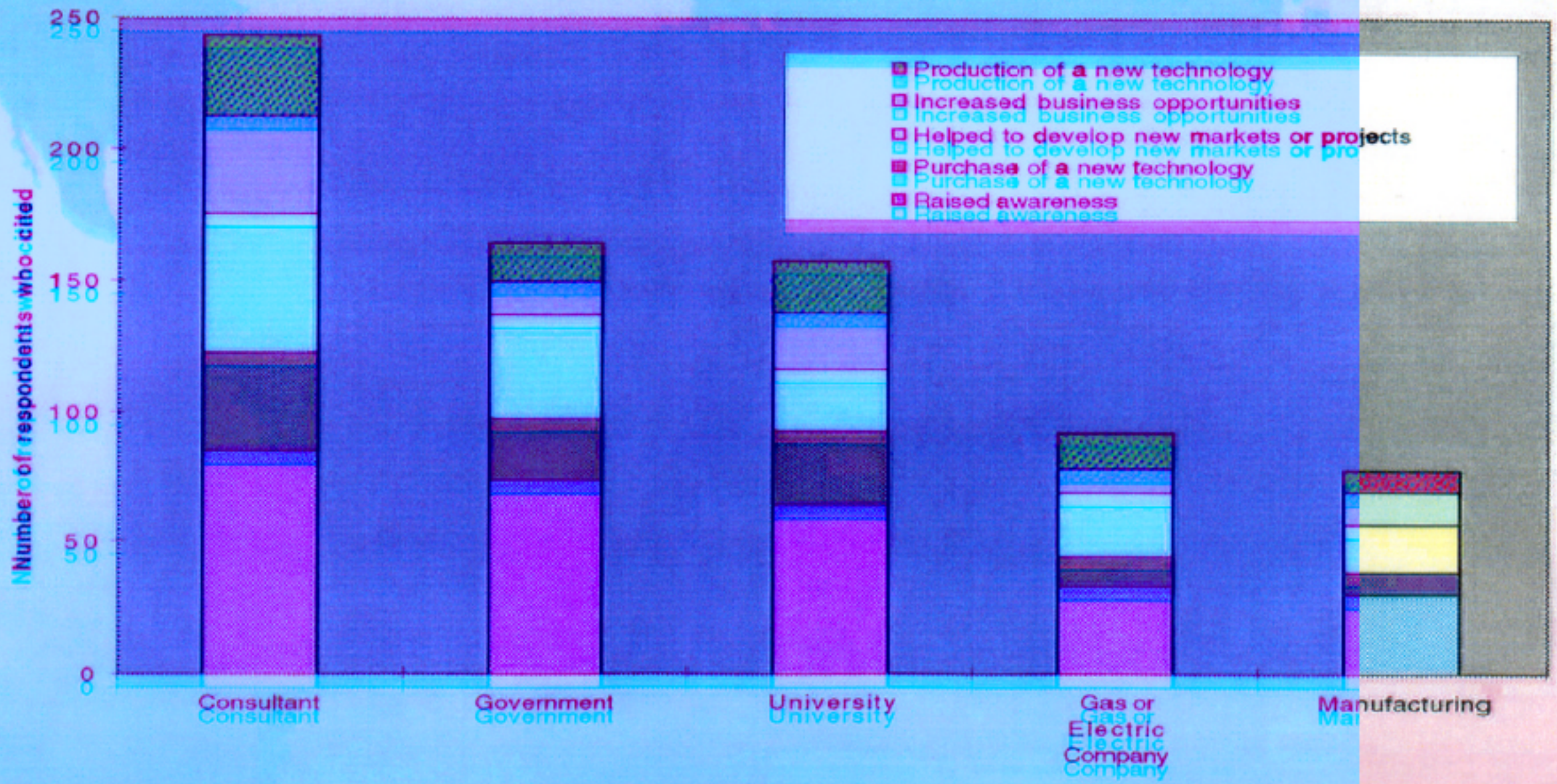
MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

Abstract

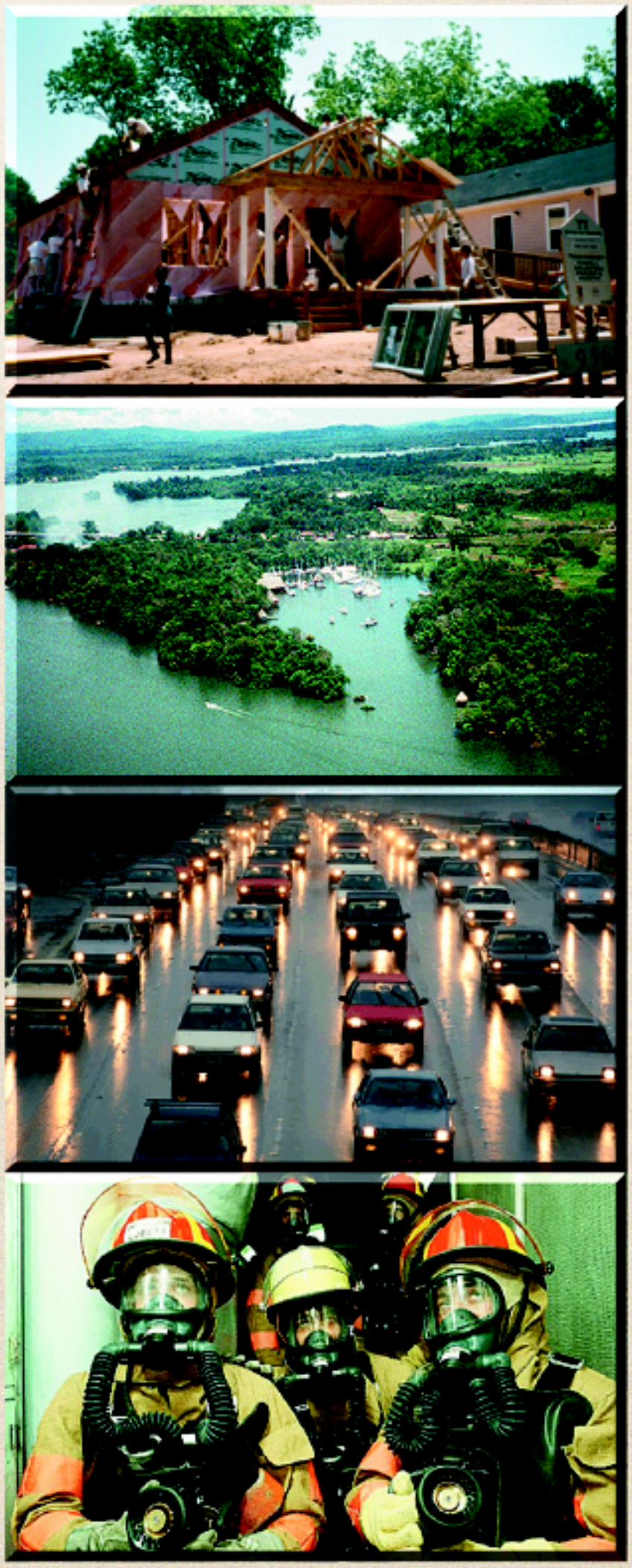
For almost 10 years the U.S. Department of Energy (DOE) has sponsored a small research effort with the objective of working with the building industry to see that cost-effective foundation insulation levels are installed in all U.S. buildings. One of the first discoveries in 1983-84 was that less than 5% of the existing buildings had foundation insulation and less than 30% of new construction included foundation insulation. After producing foundation handbooks, actively working with energy code and standards groups (ASHRAE and Council of American Building Officials: Model Energy Code Committee), conducting field experiments, and developing computer models for predicting energy savings has any measurable progress been made toward the fulfillment of this DOE objective? Also, in order to derive maximum energy savings impact for this ongoing research activity, market feedback of progress toward attainment of the objective is needed. Using the network of building experts available to the Building Thermal Envelope Systems and Materials program, a short mail survey was developed, administered, and results analyzed. This study concludes that foundation insulation usage on new residential buildings has increased from 1982 levels of around 25% to 1992 levels of around 50%. Government handbooks and recent changes in local enforced codes and standards are identified as major contributors to this improvement. Progress has been made but more is needed to capture the remaining 40% of the foundations that should be insulated. Several issues are reported as obstacles that need to be overcome to capture the remainder of the foundation market.

U.S. CADDET Energy Efficiency Activities -Newsletter survey results

Benefits of CADDET Newsletter by Type of Subscriber



CADDET IEA OECD



Energy Division
Advisory Committee Meeting

November 15 – 17, 1999

Oak Ridge National Laboratory
ENERGY DIVISION
ornl

Building AMERICA
U.S. Department of Energy

U.S. DOE Building America Program
Discussions of Collaboration
with ORNL Moisture R&D Team

September 10, 2001
Garden Plaza Hotel
Oak Ridge, Tennessee

8 a.m.	Continental breakfast	
8:30 a.m.	Welcome	Bob Shelton, Director Energy Division, ORNL
8:40 a.m.	Introductions	Jeff Christian, Director Buildings Technology Center, ORNL
8:50 a.m.	Speaker	Ed Pollock, Office Director Building Research and Standards, DOE-HQ
9 a.m.	*What potential moisture related problems do Building America teams foresee?*	George James, Program Manager Building America, DOE-HQ Teams BSC - Joe Lstiburek CARB - Steven Winter Hickory - Mark Kelley IBACOS - Brad Oberg Industrialized Housing - Subrato Chandra
10:30 a.m.	*How can we help?*	Arun Vohra, Program Manager Materials and Structures, DOE-HQ ORNL/BTC Overview - André Desjarlais Materials Properties - Ken Wilkes Modeling & Field Experiments - Achilles Karagiozis
12 p.m.	Lunch	
1 p.m.	Discussion of where we can collaborate and what we can do to support the Building America effort	Round Table
3:30 p.m.	Break	
4 p.m.	Bus Ride with Talk	Jeff Christian
4:30 p.m.	Tour of the Buildings Technology Center	Jeff Christian
6 p.m.	Bus to Habitat House, Lenior City	Ed Vineyard
7 p.m.	Bus to Dinner (Calhouns, Lenior City)	

Supporting the

Department of Energy's Implementation of the *National Energy Policy* in the Black and Caspian Seas

- **Encouraging environmental stewardship as energy resources are developed through formative engagement**
- **Facilitating regional planning for oil spill response**
- **Leading scientific research initiatives**
- **Providing communications capabilities and information resources through the "Black Sea and Caspian Sea Environmental Information Center"**

http://pims.ed.ornl.gov/

OAK RIDGE NATIONAL LABORATORY

UT-BATTELLE

Energy Efficiency & Renewable Energy

Developing & Deploying Clean, Energy-Efficient Technologies & Practices

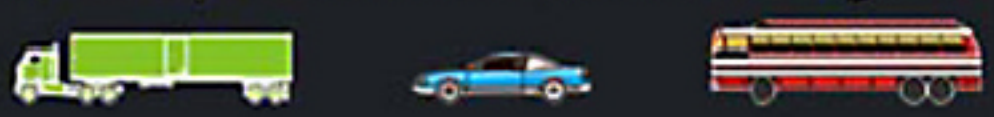
ORNL performs research & development to advance:

Building Technologies

Industrial Technologies

Power Technologies

Transportation Technologies



Energy Efficiency & Renewable Energy

promoting the international exchange of information

HEAT PUMP CENTRE

Your source for the latest heat pumping technology, application, and market information.

www.heatpumpcentre.org

GREENTIE IEA OECD

Greenhouse Gas Technology Information Exchange

Your source for information on suppliers and technologies that help reduce greenhouse emissions.

www.greentie.org

CADDET IEA OECD

energy efficiency

Your source for information on new, cost-effective, energy-saving technologies.

www.caddet-ee.org

OAK RIDGE NATIONAL LABORATORY

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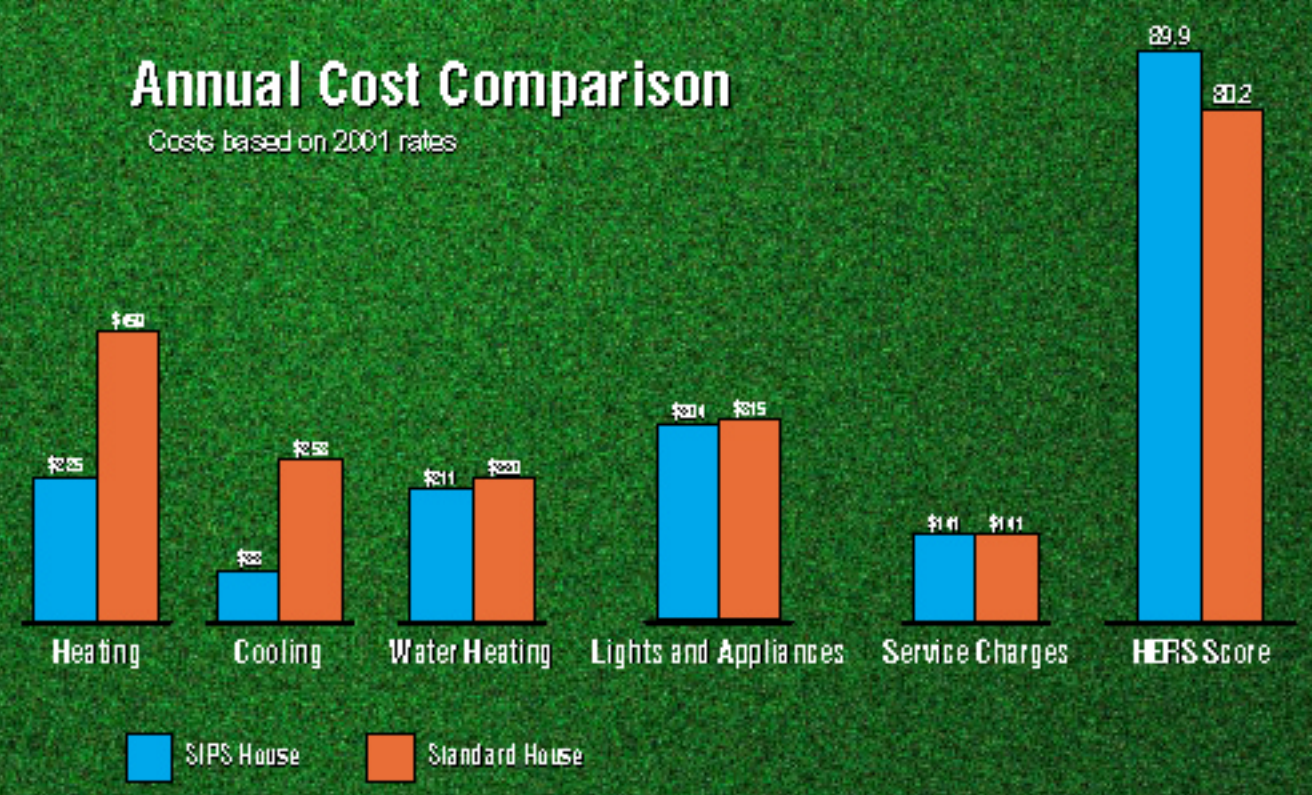
I Have A Dream House

This energy-efficient house, a collaborative effort led by the APA - The Engineered Wood Association; The Structural Panel Association; Southface Energy Institute and the Georgia-Pacific Corporation, is located in Atlanta's Martin Luther King, Jr., Historic District, two blocks from Dr. King's boyhood home.

Tests by the U.S. Department of Energy's Building America Program indicate that this house, compared to an average Atlanta house of the same size, will use 57% less energy for heating and cooling.

These efficiency and environmental features result from the use of structural insulated panels (SIPs); other engineered wood building materials; and energy-efficient windows.

The house meets the criteria for EPA's Energy Star Program and the Department of Energy's Building America Program, a private/public partnership providing energy solutions for producing housing recommending cost-effective, energy-efficient features that save more than 50% in heating and cooling costs each year.



Building AMERICA
U.S. Department of Energy

Communication Across the Black Sea via Internet Technology

Melissa Voss Lapsa
Energy Division
Oak Ridge National Laboratory

Ettore Majorana Centre
Erice, Sicily
August 18, 2000

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

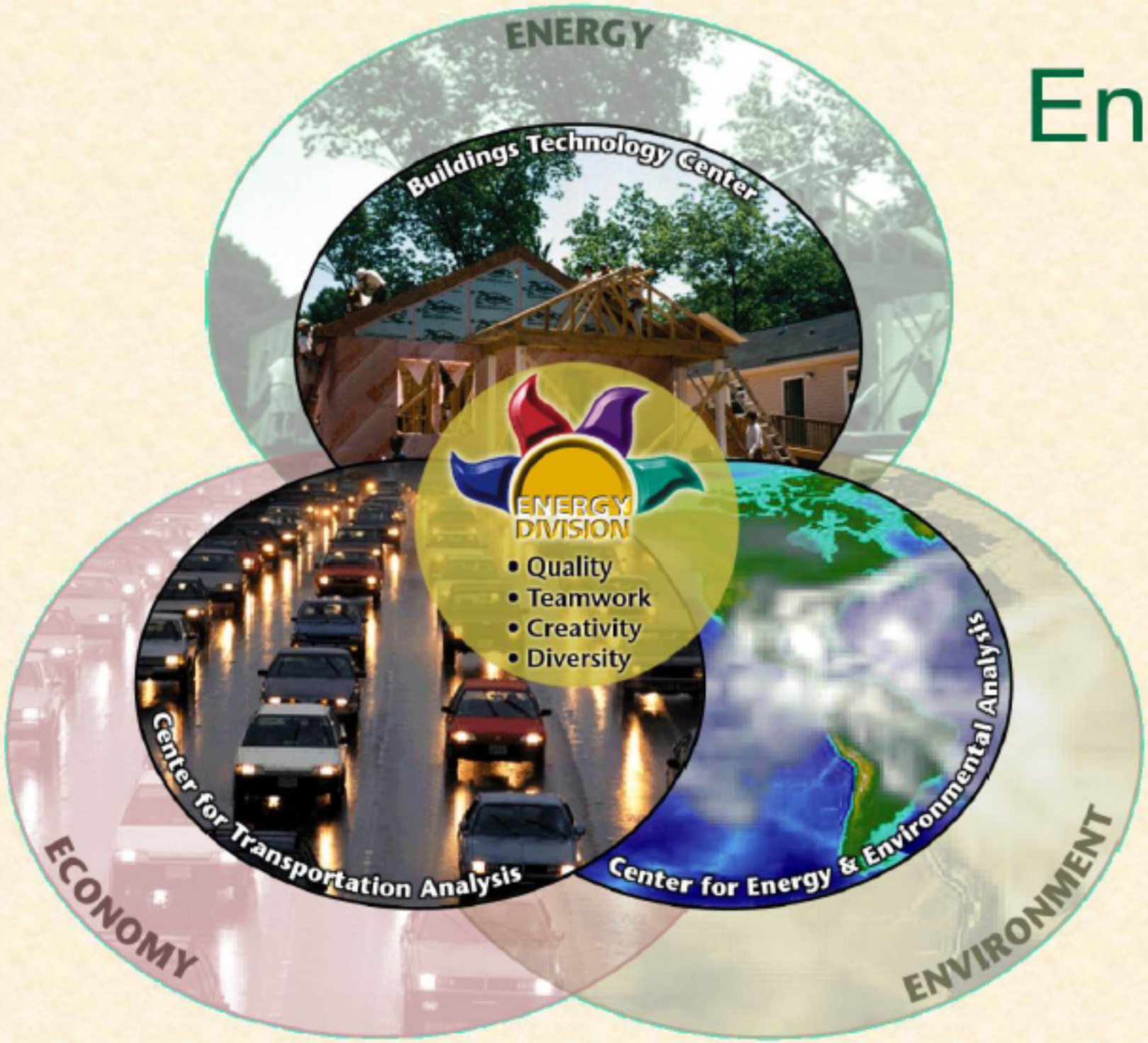
UT-BATTELLE

2002

Residential Energy Sciences Network Conference

Pat Love
Oak Ridge National Laboratory

March 5, 2002



Energy Division Overview

Robert B. Shelton,
Director

June 14, 2001

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

UT-BATTELLE

Climate change initiatives

News from the United Kingdom

UK studies have shown that it is possible to use existing, cost-effective technologies to reduce carbon emissions by 20%, while maintaining current levels of economic activity and comfort. The UK's Climate Change Programme uses three main drivers to encourage UK business to reduce its carbon emissions:

- **Climate Change Levy (CCL)**. This tax on the use of energy by UK businesses and public organisations is expected to raise around GBP 1 billion in its first year (where GBP is the Great Britain pound). The money will be used to reduce employers' National Insurance contributions by 0.3%. It will also provide support for energy efficiency and renewable energy initiatives.
- **Enhanced Capital Allowances (ECAs)**. This scheme gives businesses a 100% first-year tax allowance on the cost of selected energy-efficient plant and machinery.
- **Energy Efficiency Best Practice Programme**. This initiative provides free guidance on practical ways of reducing energy consumption. Since 1989, it has stimulated UK energy savings worth around GBP 650 million/year and created the UK's largest library of independent energy-efficiency information. The Programme's approach is now being used elsewhere in the world.

Sources of further information:
CCL: www.hmce.gov.uk/notices/ccl1.htm
Products eligible for ECAs: www.eca.gov.uk
Energy Efficiency Best Practice Programme: www.energy-efficiency.gov.uk

Initial promotion by CADDET pays dividends

News from the United States of America

For the past 13 years, CADDET has successfully promoted energy-efficient and renewable energy technologies. This is reflected in the energy and costs savings, reduced pollution and improved economic strength achieved by countries around the world.

One particular success story in the USA involves a novel integrated heating, ventilation and air-conditioning piping system. This technology, called Ultimate Comfort System, uses the existing pipes that deliver hot water to showers and taps to provide hot water for heating. It also uses the pipes that supply water to mandatory fire sprinkler systems to circulate chilled water for air-conditioning. This removes the need for individual room heating and cooling systems in hotels, motels and similar multi-occupancy establishments.

When this approach was used in a Montana motel, electricity consumption fell by 74% (see CADDET Results Brochure No. 200 (1995)). This technology has since been used in similar establishments elsewhere in the USA.

In 2000, this CADDET-promoted technology was licensed to PowerCold, a major corporation developing and selling new energy-saving technologies, and now has the potential to be used in hundreds of buildings across the world in the next few years. For example, a Marriot hotel chain franchisee is negotiating to use this technology in some of its hotels in the United Kingdom.

For more information please phone +1 403 653 4440 or visit www.ultimatecomfortsystems.com

Cool new Web site

News from the European Union

The Energy+ project is an initiative involving the European Commission and several national energy and environment agencies. Its purpose is to promote the development and use, throughout the European Union, of refrigerator-freezers that are highly energy efficient.

The project brings together retailers, institutional buyers (housing organisations, holiday parks, etc) and supporters (including consumer and environmental associations) that are eager to purchase and/or promote the most energy-efficient, four-star refrigerator-freezers on the market. By aggregating user demand, the project reinforces current market trends towards more energy-efficient appliances.

Energy+ appliances use 75% or less of the energy consumed by equivalent appliances that meet minimum Class A requirements under the European energy-labelling scheme.

Energy+ now has its own Web site which:

- lists the retailers, institutional buyers and supporters involved in the project;
- gives details of Energy+ specifications;
- answers some of the most frequently asked questions about refrigerator-freezers, their energy use and associated environmental issues.

The Web site is available in English, French, German, Finnish, Italian and Portuguese.

For more information please visit www.energy-plus.org

Success Story

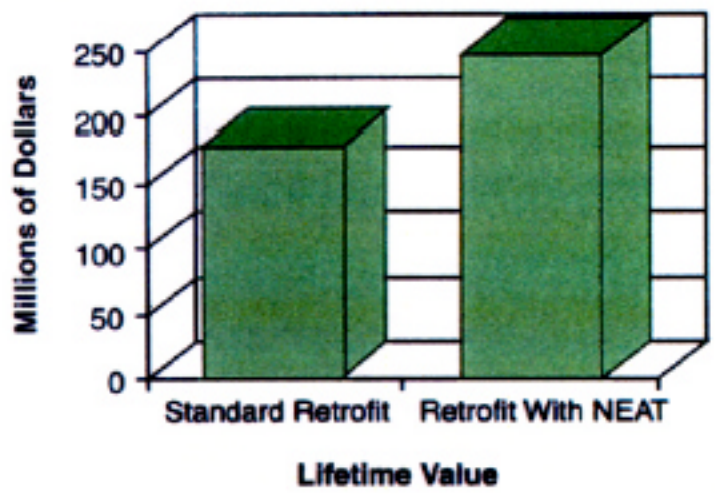
Office of Energy Efficiency and Renewable Energy

The National Energy Audit (NEAT)

A user-friendly, advanced computer audit, the National Energy Audit (NEAT) has been developed by the Existing Buildings Research Program at Oak Ridge National Laboratory's (ORNL's) Buildings Technology Center for the U.S. Department of Energy's (DOE's) Weatherization Assistance and Existing Buildings Programs. The computer program is designed for use by State agencies and utilities to determine the most cost-effective retrofit measures for single-family homes to increase the energy efficiency and comfort levels. A user inputs data on building characteristics, including its type of heating and cooling systems, which NEAT uses to produce a prioritized list of cost-effective, energy efficiency measures. The measures are customized for each home. The output also includes an estimated dollar value for the projected energy savings, savings-to-investment ratios, and a list of the quantities of materials necessary to perform the recommended retrofit.

Since 1976, heating and cooling costs have been reduced for low-income people by improving the efficiency of their homes through the DOE's Weatherization Assistance Program. The retrofit measures were normally selected from a standard list of primarily building envelope measures. In 1985, the DOE's Existing Buildings Program began conducting field tests to determine the benefits of selecting the most cost-effective measures when retrofitting. This was done by using innovative techniques such as a blower-door, which determines if air-sealing is necessary in a house. Results of field tests in Wisconsin, New York, and North Carolina have demonstrated average heating cost savings of 25% through NEAT and its measure selection strategies, compared to 18% previously obtainable.

Projected Extra Savings in Energy Costs for 80,000 Homes Retrofitted with NEAT



NEAT has been introduced to audiences nationwide through eight presentations during the 1993 fiscal year. Training on the use of NEAT was provided to representatives of over 43 states at a recent national workshop. Although only formally introduced during the summer of 1993, the program is already being used by agencies throughout twenty states. During 1995, NEAT will be used by approximately 500 local agencies in 30 states to make retrofitting decisions for more than 80,000 low-income dwellings. Based on the field tests, savings from the use of NEAT rather than standard approaches will save approximately $70 million more in energy costs over the lifetime of the retrofits performed this year. The cost to the DOE for developing the computer program is approximately $2 million to date, providing a benefit/cost ratio of 35:1 (not counting future retrofits).

Sources:

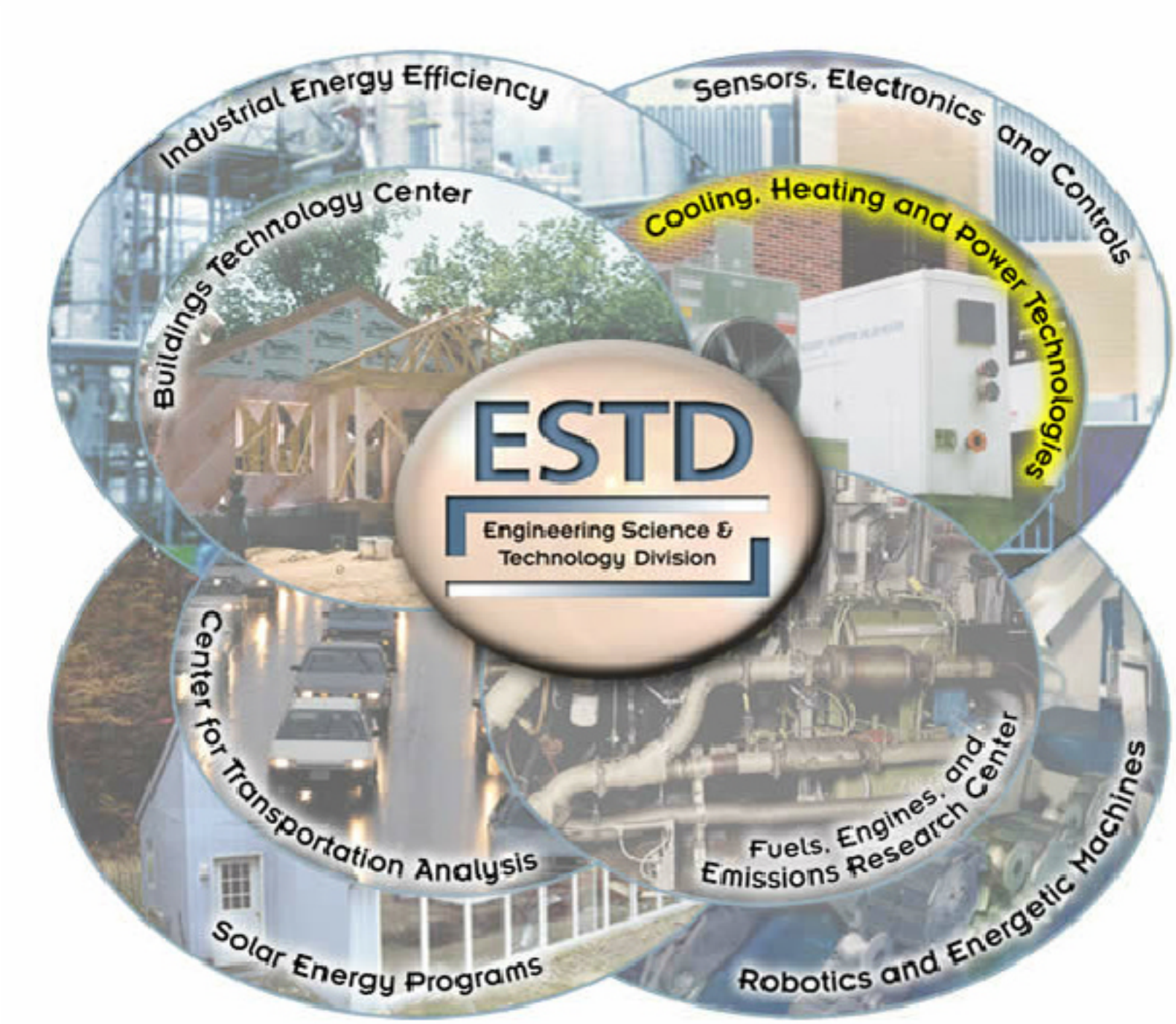
Brown, M.A., Berry, L.G., and Kinney, L.F, "Weatherization Works: Final Report of the National Weatherization Evaluation," ORNL/CON-395, September 1994.

Sharp, T. R., "The North Carolina Field Test: Field Performance of the Preliminary Version of an Advanced Weatherization Audit for the Department of Energy's Weatherization Assistance Program," ORNL/CON-362, June 1994.

Ternes, M.P., Hu, P.S., Williams, L.S., and Goewey, P., "The National Fuel End-Use Efficiency Field Test: Energy Savings and Performance of an Improved Energy Conservation Measure Selection Technique," ORNL/CON-303, March 1991.

Engineering Science and Technology Division

Oak Ridge National Laboratory



Research Areas

- Industrial Energy Efficiency
- Buildings Technology Center
- Center for Transportation Analysis
- Solar Energy Programs
- Sensors, Electronics, and Controls
- Cooling, Heating and Power Technologies
- Fuels, Engines, and Emissions Research Center
- Robotics and Energetic Machines

Cooling, Heating, and Power for Buildings

Reduce energy cost • Improve power reliability • Increase energy efficiency • Improve environmental quality

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A New Perspective on Energy

Integrated systems for cooling, heating and power (CHP) for buildings incorporate multiple technologies for providing energy services to a single building or to a campus of buildings. Electricity to such buildings is provided by on-site or near-site power generators using one or more of the many options: internal combustion (IC) engines, combustion turbines, miniturbines or microturbines, and fuel cells. In CHP systems, waste heat from power generation equipment is recovered for operating equipment for cooling, heating, or controlling humidity in buildings, by using absorption chillers, desiccant dehumidifiers, or heat recovery equipment for producing steam or hot water. These integrated systems are known by a variety of acronyms: CHP, CHPB (Cooling, Heating and Power for Buildings), CCHP (Combined Cooling Heating and Power), BCHP (Buildings Cooling, Heating and Power), and IES (Integrated Energy Systems).

CHP systems provide many benefits, including:

- reduced energy costs,
- improved power reliability,
- increased energy efficiency, and
- improved environmental quality.

The objective of this site is to provide you with information on CHP systems to facilitate your decisions relating to these systems. Information on the site has been organized to address anticipated needs of various user groups. Click on a link of your choice to learn about some of the basics, benefits, success stories and much more. The site incorporates an interactive database of CHP installations, along with animations, multimedia videos and a virtual tour of a CHP System facility.

As you move through the site, your current location will be identified by "bread crumbs" within the gray bar along the top of all pages. Available sub-topics will appear in the list of links, on the left of the page, below the link for the major category currently open. The footer for each page also contains links to all the major sections of this site and the major organizations providing support for it.

News & Events

Integrated Energy Systems Peer Review Meeting
April 30 - May 2, 2002
Nashville, Tennessee

Some of the highlights of the meeting, chaired by Ronald J. Fiskum (DOE), include the following:

DOE announced the creation of the Office of Distributed Energy and Electric Reliability (O-DEER)

Ronald Fiskum

A diverse group of five panelists discussed "The Role of IES in the Design, Construction, and Operation of Buildings and the use of DER." The five panelists in the discussion, moderated by Rich Sweetser (Exergy Partners Corp.), were: Ray Splinter (Albertsons Food Stores), John Wimberley IV (I.C. Thomasson), Suzanne Watson (Northeast-Midwest Institute), Robert Thronton (International District Energy Association), and Ronald Fiskum (DOE).

more details

- Events
- News Archive

ORNL

Division Director

Dr. R. B. Shelton (Bob)

Energy Division

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Welcome. If this is your first visit to our website, you may wish to click here to take a brief guided tour of the division.

Energy Division is one of 15 research divisions at Oak Ridge National Laboratory. Our mission is to provide innovative solutions to energy and related issues of national and global importance through interdisciplinary research, development, and deployment.

- We focus on technology and human systems, with special emphasis on energy and environmental issues.
- Our disciplinary diversity reflects our issue orientation and is the source of our greatest strength—the ability to combine perspectives from among natural, social, and engineering sciences.

Our Organization. Our research focus areas are reflected in our organizational structure. Each focal area is programmatically administered by a center of excellence. Click on the links below to visit the homepages of our centers.

- Buildings Technology Center
- Center for Energy and Environmental Analysis
- Center for Transportation Analysis

B L A C K S E A

Workshop on a Regional

Oil Spill Emergency Response System for the Black Sea

Hotel Londonskaya
Odessa, Ukraine
September 14–16, 1999

WORKSHOP ON A

Regional Oil Spill Emergency Response System for the Gulf of Guinea

November 1-2, 2000

Le Méridien Hotel

Douala, Cameroon

Co-Sponsored by:

Cameroon Ministry of Environment

U.S. Department of Energy

International Petroleum Industry Environmental Conservation Association (IPIECA)

WORKSHOP ON

Legal and Legislative Issues Associated with Implementing National and Regional Oil Spill Response Systems

Co-Sponsored by
Kazakhstan Parliament
U.S. Department of Energy,
Office of International Affairs
U.S. Agency for International Development

OKAN-Intercontinental Hotel
Astana, Kazakhstan
April 18-19, 2001


Oak Ridge National Laboratory
BUILDINGS
CHP
Building
AMERICA
U.S. Department of Energy
BUILDINGS VIII

ustrial Technologies

Power Technologies

ansportati

Performance of Exterior Envelopes of Whole Buildings VIII
Integration of Building Envelopes

BUILDINGS VIII

Sheraton Sand Key Resort • Clearwater Beach, Florida
December 2-7, 2001

Hosted by Oak Ridge National Laboratory

Thermal Performance of the Exterior Envelopes of Buildings VII

Thermal VII

Sheraton Sand Key Resort, Clearwater Beach, Florida
December 6-10, 1998

Hosted by Oak Ridge National Laboratory

Thermal Performance of the Exterior Envelopes of Buildings VI

December 4-8, 1995 • Sheraton Sand Key Hotel
Clearwater Beach, Florida

Thermal VI