

FOCUS

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

Summer 2008

DOE Forrestal Building Earns ENERGY STAR® Label

The Department of Energy (DOE) Forrestal Headquarters building in Washington D.C. has achieved the ENERGY STAR rating, outperforming almost 90 percent of office buildings nationwide. ENERGY STAR is a voluntary program sponsored by the Environmental Protection Agency and DOE that promotes energy-efficient choices in products and facilities.

Buildings earning the ENERGY STAR label must demonstrate low utility usage (e.g. electricity, gas, steam), good indoor air quality, and good indoor comfort. To qualify for an ENERGY STAR building label, a facility is rated on a scale of 0 to 100. Commercial, industrial, and Federal buildings with a score of 75 or greater qualify for the award. DOE's Forrestal building received a score of 88.

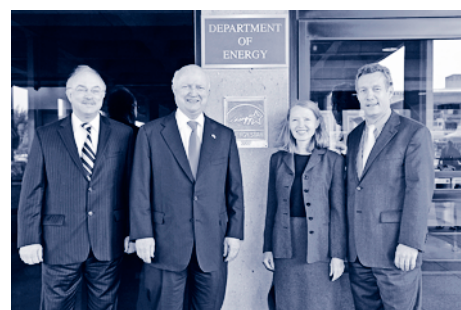
The Forrestal Building uses 40 percent less energy than the average office building. That translates to preventing more than 28 million pounds of carbon dioxide emissions each year - all while saving taxpayers thousands of dollars in energy bills.

Over the years, the Forrestal facilities management staff worked hard to upgrade the building and make it a top energy performer through such initiatives as:

- Installing energy efficient motors in the building's air handling equipment;
- Replacing chilled-water and hot-water pumps with high-efficiency units;
- Consolidating local area network rooms into central computer areas, thereby reducing computer equipment air-conditioning requirements;
- Constructing photovoltaic solar arrays on the Child Development Center roof, the South Building wall, and Earth Day Park;
- Installing and optimizing automated HVAC control systems for better indoor temperature control; and
- Using an array of energy efficient lighting options (low watt fluorescent lamps, compact fluorescents, and LED lights) to update lighting in many areas across the

building including: all office space, the cafeteria, the main lobby, elevator cars, janitorial closets, emergency exit signs, and outdoor lighting.

Forrestal joins DOE's other Headquarters facility in Germantown, Maryland, which earned the ENERGY STAR label in 2002. It is now one of only two Federally-owned and operated office buildings located in Washington D.C. to have earned this distinction.



DOE officials left to right: John Mizroch, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy; Samuel Bodman, Secretary of Energy; Ingrid Kohb, Director, Office of Management; and Brian Costlow, Director, Office of Administration.

For more information, please contact Eric Haukdal, DOE Logistics and Facilities Operations, at eric.haukdal@hq.doe.gov or 202-586-3777.

IN THIS ISSUE, You Will Find. . .

- A New Energy Efficiency Campaign for Military Base Housing
- Technologies from DOE's Industrial and Building Technologies Programs
- A State and Local Initiative to Accelerate ESPC Utilization
- New Energy Efficient Resources and Tools from DOE
- Bonneville Power Administration Success Stories



U.S. Department of Energy
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Cover Magnifying Glass Photo:

*The U.S. Department of Energy's
Forrestal Headquarters building at
1000 Independence Ave,
Washington DC earned the
Environmental Protection Agency's
Energy Star rating in April 2008.*



*Leading by example, saving energy and
taxpayer dollars in federal facilities*

Federal Government Sets Goals to Save Energy in U.S. Data Centers

Within the Federal Government energy intensive facilities such as data centers account for \$930 million in energy costs—approximately 6.4 percent of Federal energy spending. These same facilities also emit more carbon dioxide than the country of Argentina—approximately 141.7 metric tons in 2004. The United States has more than 7,000 data center facilities, 10 percent of which are Federal. This number continues to rise in an effort to support the growing demand for data processing power throughout the nation, which in turn puts a significant burden on the U.S. electric grid.

The U.S. Department of Energy's (DOE) Save Energy Now program has partnered with the Federal Energy Management Program to find and implement opportunities for energy efficiency in data centers across the U.S. Through this partnership DOE plans to meet energy efficiency goals for data centers, including a 25 percent improvement in energy efficiency in 1,500 mid-tier and enterprise-class data centers and a 50 percent improvement in energy efficiency in an additional 200 enterprise-class data centers by 2011.

As part of the Save Energy Now Data Center Program, DOE has developed the Data Center Energy Profiler (DC Pro) online software tool to help track and reduce energy use in data centers. DC Pro is a scoping tool that provides a general idea of where energy is being used in a data center. Users can input information specific to their data center including geographical and spatial data, energy use systems, average output, and average quantity and cost of electricity, fuel, steam, and chilled water purchased or generated onsite. In a few hours DC Pro will calculate a report that will include:

- Average annual amount and cost of energy purchased or generated onsite;
- Average annual amount of energy consumed, broken down by each major energy use system;

- Potential amount of energy that could be saved annually broken down by each major energy use system with potential cost savings;
- A comparison of the data center's energy consumption to others; and
- Suggested next steps to save energy and money broken down by major energy use system.

DC Pro will be used to train data center operators in energy management practices and to help them conduct energy assessments to find near-term opportunities for energy efficiency in information technology, cooling and air management, electrical distribution systems, and on-site generation. In addition, DOE plans to train 200 Qualified Specialists on DC Pro and other data center best practices to assist data centers with energy efficiency. These Qualified Specialists will be highly trained in DOE's Industrial Technologies Program assessment and analysis software tools to identify system efficiency opportunities.

Through the data center program, Federal and private-sector data centers will be able to limit the growth of their electricity demand and carbon emissions, protect critical data and computing functions, increase regional electricity reliability, and postpone building new electricity generation facilities.

For more information on the data center program please visit the Save Energy Now Data Center Web site at http://www.eere.energy.gov/industry/saveenergynow/partnering_data_centers.html.

DOE is currently seeking feedback on DC Pro. To download and provide feedback, please visit <http://dcpro.ppc.com/>.

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State and Local Initiative Accelerates ESPC Use Through Statewide Program Innovation

Energy savings performance contracting (ESPC) can have a tremendous impact on advancing energy efficiency at the Federal, state and local government levels. This financing tool delivers sustained, measurable reductions in energy use and greenhouse gas emissions while improving the state and local economy. Moreover, the benefits of energy savings and emissions reductions by states offers the Federal government tremendous leverage in meeting larger national policy goals. In 2006, the market for ESPC hit a record \$3.6 billion, \$2 billion of which was in the state and municipal government, university, school, and hospital markets. While a seemingly large number, this represents a fraction of the energy improvements needed in all state and local buildings.

For these reasons, the U.S. Department of Energy's Office of Weatherization and Intergovernmental Activities Program and the Energy Services Coalition (ESC) – a non-profit organization dedicated to creating public-private partnership to overcome barriers to wider ESPC utilization – created the Accelerated ESPC Initiative. The initiative was launched in late 2007 in partnership with the National Association of Energy Services Companies, National Association of State Energy Officials, National Conference of State Legislators, and Oak Ridge National Laboratory.

The primary purpose of the ESC-led program is to assist states in adopting and adapting best practices in statewide ESPC program design and delivery that result in dramatically increasing the amount of project activity and speeding its implementation. ESC and its partners are working to accomplish the goals of the initiative through five primary activities:

- Encourage, engage, and guide the creation or expansion of state public-private partnerships and chapters committed to advancing ESPC in their respective states or territories;
- Provide ESC's proven set of tools (e.g., model contracts, procurement methods, analyses) to all interested states and State Energy Offices;

- Deliver one-on-one expert assistance to states via ESPC state technical support liaisons, as well as State Energy Office peer-to-peer technical assistance;
- Deliver a model for an accelerated ESPC program and self-sustaining state based program funding mechanism; and
- Create a Web based, self-reporting metric system that will provide state-by-state and national emissions reductions, energy savings, and economic development data.

The response to the Accelerating ESPC Initiative from state governments has been very favorable. Since November 2007, the Energy Services Coalition's state technical liaison specialists – former state energy office officials Eddie Riddle (KY) and Linda Smith (CO) – have responded to approximately 40 requests for technical assistance across a variety of states. Requests range from basic ESPC information and presentations at state or local meetings to statewide program design and implementation assistance and partnership development.

The Energy Services Coalition and its partners have identified the components of an ESPC statewide program implementation toolkit (model state regulations and legislation, model request for proposals and contracts), and are working to complete the toolkit over the next several months. The final ESPC implementation toolkit will contain a step-by-step programmatic approach with samples, model documents, best practices, and other technical guidance materials that have been gathered from successful state ESPC programs for replication. Draft metrics for the initiative have been identified, and data is being collected from states assisted by the Coalition and with active ESPC programs.

Please visit <http://www.energyservicescoalition.com>. For more information, please contact Johanna Zetterberg, State and Local Programs, at 202-586-8778 or johanna.zetterberg@ee.doe.gov.

FEMP Releases New UESC Toolkit

FEMP's newly developed UESC toolkit can help you develop a utility energy services contract (UESC) project that is financially smart, technically, contractually, and legally sound, and addresses your organization's priorities and needs. Toolkit materials include information on:

- FEMP's Utility Program;
- UESC overview, contract types, benefits, and strategies to lower finance costs;

- Utility incentives and rebates;
- The Federal Utility Partnership Working Group (FUPWG);
- And more!

For more information on UESCs and to access the new toolkit materials online, please visit <http://www.eere.energy.gov/femp/financing/uescs.html>. For additional assistance, contact FEMP's UESC experts listed on the FEMP Web site at http://www.eere.energy.gov/femp/financing/uescs_contacts.html.

Bonneville Power Administration Completes \$100 Million in Federal Energy Efficiency Projects

Bonneville Power Administration (BPA), an agency of the U.S. Department of Energy, is the Federal power marketing administration for the Federal Columbia River Power System. BPA serves approximately 150 Pacific Northwest (PNW) utilities, industries and Federal agencies, marketing about 70 million megawatt-hours (MWh) of energy annually. BPA is required by law to give energy efficiency (using existing power resources more efficiently) the highest priority when making investments in its power supply. Since 1980, BPA and the PNW retail utilities have produced 29 million MWh of energy efficiency improvements, enough to meet over half of the region's electric energy load growth from 1980-2007. That's enough to serve the entire annual requirements of the state of Idaho and all of western Montana.

Federal agencies have contributed significantly to achieving these energy savings. Recognizing that Federal agencies offer a special opportunity for energy efficiency, BPA has implemented since 1996 a targeted Federal agency energy efficiency program within its portfolio of energy efficiency initiatives.

In February 2008, BPA reached a milestone in its Federal agency program, passing the \$100 million mark in its completion of Federal energy efficiency projects. This total expenditure includes more than \$15 million in BPA rebates and incentives for PNW Federal agency electric energy savings projects, and \$85 million in agency funds provided to BPA to meet cost-sharing requirements or for projects that BPA implemented on a fully reimbursable basis for regional and other Western federal agencies. BPA also facilitated an additional \$50 million of third-party financing for other agency- implemented projects.

BPA has completed more than 750 diverse projects for Federal agencies since 1996. These range from \$500 compact fluorescent light (CFL) installations in small buildings to \$10 million spent in one General Services Administration (GSA) building over several years. More than two dozen agencies have worked with BPA in completing these projects, including the Army, Air Force, Navy, GSA, Department of Energy, Bureau of Reclamation (BOR), Forest Service, National Park Service, Coast Guard, Federal Aviation Administration, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, the Bureau of Land Management, Geological Survey, and the Department of Agriculture.

As a result of working in collaboration with these agencies, BPA's annual firm power loads have been reduced by 200,000 megawatt-hours (MWh). This has helped keep BPA rates lower than they would have been otherwise. Additional natural gas, steam, water savings and non-BPA electric energy savings have

also been produced. These projects have reduced agency utility bills, improved agency facilities and properties, and benefited the region's environment and economy.

One productive agency to agency relationship BPA has is with the U.S. Army Corps of Engineers (USACE). BPA recently completed a project at Bonneville Dam, from which BPA received its name, that included basic T-12 to T-8 fluorescent lighting retrofits as well as induction and cold cathode lighting. In the lobby of the Dam's Visitor Complex, where lamps above escalators are extremely difficult to change, old mercury vapor



Mercury vapor lighting was replaced with induction lighting in Bonneville Dam's Visitor Center Complex lobby.

lighting was replaced with induction lighting to provide longer life and better lighting quality. For the complex's catwalks, cold cathode lighting replaced 75-watt mercury vapor lamps. Thanks to the project, about 117,000 kilowatt-hours per year (kWh/year) of additional Federal power is available for BPA to market.

In the past seven years, BPA has completed 60 energy efficiency projects at 26 dams in the Federal Columbia River Power System (FCRPS), owned by the BOR and USACE. One of the largest projects included comprehensive CFL replacements and commissioning of a newly installed cooling system at the Celilo converter station, saving about 1.2 million kWh/year. At Chief Joseph Dam, BPA replaced more than 2,400 T-12 fluorescent fixtures with a state-of-the-art high performance fluorescent lighting system and installed 1,400 CFLs and occupancy sensors,

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ENERGY STAR® Program Encourages Military Bases to Replace Inefficient Light Bulbs at Base Housing

The U. S. Department of Defense (DoD) and the U.S. Department of Energy (DOE) kicked off the first ENERGY STAR® *OPERATION CHANGE OUT – THE MILITARY CHALLENGE*, at Camp Lejeune, North Carolina on Earth Day, April 22, 2008.

Inspired by the success of the national ENERGY STAR Change a Light, Change the World Campaign, *OPERATION CHANGE OUT* was created expressly for our Nation's servicemen and women and their families to encourage them to replace inefficient, incandescent light bulbs in their base housing with ENERGY STAR qualified models.

The project aims to support Federal energy efficiency goals and offers significant savings potential for military families and taxpayers, as well as a substantial reduction in energy use at military facilities. Though the effort began at Camp Lejeune, the goal is to have all the military facilities across the country take part in the Challenge.

Base Commanders and other military personnel are encouraged to take part in *OPERATION CHANGE OUT* by creating a team, setting a goal, working with partners, and implementing light bulb-changing activities in residential base housing. Bases that have already changed out residential lighting are encouraged to consider changing out inefficient light bulbs in other base locations. Bases are also encouraged to work with their local utilities and other partners to consider additional energy-savings opportunities that may be available for housing or other base facilities, as appropriate.

Participating bases can register at <http://www.energystar.gov/OCO> and utilize the Web site's toolkit with tips on how to create a successful program, as well as share their success with the rest of the country by posting pictures and stories. The endeavor has the potential to save more than 95 million pounds of carbon dioxide emissions and cut nearly \$7 million in energy costs over the lifetime of the bulbs if each of the more than 200 military bases in the United States participates by changing out just one inefficient light bulb in every on-base housing unit.

At Camp Lejeune alone, the change-out of more than 17,500 incandescent bulbs to ENERGY STAR qualified light bulbs is



Secretary of Energy Samuel Bodman (far right) changes a light bulb with Colonel Flatau, Commanding Officer Camp Lejeune; Jeffrey Simon, President, Actus Lend Lease; and home residents Ginny and Gracie Learlin.



Secretary Bodman and Colonel Flatau (left to right) discarding the inefficient light bulb.

expected to prevent more than 7.5 million pounds of carbon dioxide emissions and save nearly five million kilowatt hours of electricity and at least \$500,000 on energy bills over the lifetime of the bulbs.

The savings results from *OPERATION CHANGE OUT* will be announced on ENERGY STAR Change a Light Day, October 1, 2008.

Please visit <http://www.energystar.gov/OCO>. For more information, please contact Lani MacRae, Department of Energy, at lani.macrae@ee.doe.gov or 202-586-9193.

Industrial Technologies Program Tools & Resources Help Federal Facilities Assess Savings Opportunities

Today, proven energy management resources and innovative technologies are helping the U.S. industrial manufacturing sector reduce carbon emissions and save energy and money. These same resources and technologies can also provide cost and energy-saving solutions for the nation's Federal complex. This is the idea behind the Federal Energy Management Program (FEMP) Industrial Facilities Initiative (IFI)—a joint effort of the Department of Energy's Industrial Technologies Program (ITP) and FEMP.

Executive Order 13423, signed by President Bush in January 2007, sets goals that require laboratory, standard, and industrial facilities to reduce their energy usage 30 percent by 2015 (3 percent annually). The alliance between ITP and FEMP is part of a strategy to help Federal facilities meet these aggressive goals by tapping into tools, resources, training opportunities, and technical expertise all aimed at improving energy management.

ITP offers a variety of BestPractices resources to help Federal facilities identify near-term or promising energy-savings opportunities. These resources are designed to help plants identify and implement savings opportunities today by focusing on energy-intensive systems, including motors, fans, and pumps, process heating, and steam. Federal facilities can benefit from any of these ITP resources that are currently available and use them as part of an overall energy management strategy.

Self-Assessment Software Tools and Technical Publications

ITP's suite of analysis software and publications provide guidance on energy savings and in-depth system-specific technical expertise. All are available online and free of charge.

- **Software Tools:** Start with the ITP's Quick Plant Energy Profiler, or Quick PEP, tool to help you diagnose overall energy use and target specific opportunities for saving at your plant. This online tool can help you quickly complete a profile and get an overall energy picture with a plan for investigating further. Then use ITP's system-specific software tools to self-assess your compressed air, fan, motor, pumping, process heating, and steam systems.
- **Technical Information:** ITP has developed a portfolio of technical information to help plant managers, engineers, and operators increase their knowledge on managing specific energy systems. These resources include sourcebooks, which are essential references for analyzing and implementing energy efficiency and productivity improvements; technical tip sheets

and fact sheets that offer targeted, low-cost improvement recommendations; and market assessment reports that provide the big picture energy efficiency opportunities in areas such as compressed air, motors, and steam.

- **Case Studies:** These highlight examples of successful energy savings projects that can be implemented in other facilities—including Federal facilities. While the findings vary for each example, case studies provide examples of plant-wide or system improvements that plants have implemented. Many times, they have achieved savings with a small investment and quick payback.
- **Periodicals:** ITP's online quarterly e-magazine, *Energy Matters*, features technical articles by industry experts, tips, and technology highlights. The ITP online monthly newsletter, *E-Bulletin*, provides updates on ITP activities, new products, and technology developments. Subscribe online—both publications are free.

For more on ITP's software tools, publications, and other technical information, please visit <http://www.eere.energy.gov/industry/bestpractices>.

Training

Federal facilities can take part in ITP's system- and component-specific training sessions that focus on improving energy management and the use of ITP software tools. One- and two-day training sessions taught by instructors with expertise in a specific system and/or software tool are offered throughout the year and around the country. Webcasts are also offered to provide an introduction to energy management and other special topics including ITP's fan, steam, process heating, and compressed air self-assessment software tools. Additionally, ITP is offering Federal Data Center workshops to provide information on state-of-the-art strategies to improve data center energy performance.

Federal personnel, such as plant managers and engineers, can utilize the expertise of ITP's Qualified Specialists to identify system efficiency in their plant. Qualified Specialist training requires two to three days of instruction and a rigorous exam. By passing the exam and attending the training, Qualified Specialists demonstrate their ability to use a tool to perform global investigations, and identify and quantify potential system improvement opportunities. Federal plant personnel who are interested can also become Qualified Specialists to use their expertise in their own facility to identify energy savings opportunities.

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DOE Provides Technical Assistance for Federal Fleets

Alternative fuel use requirements outlined in the Energy Independence and Security Act of 2007 (EISA) and Executive Order (E.O.) 13423 present Federal fleets with new compliance challenges. In these times of change, obtaining pertinent, factual, unbiased information on alternative fuels and advanced vehicles is critical in making decisions on how to meet petroleum reduction goals.

The Web-based Alternative Fuels and Advanced Vehicles Data Center (AFDC) can help. Sponsored by the U.S. Department of Energy's Clean Cities initiative (within the Vehicle Technologies Program) and administered by the National Renewable Energy Laboratory, the AFDC (<http://www.eere.energy.gov/afdc/about.html>) is a comprehensive clearinghouse of data, publications, tools, and information related to advanced transportation technologies. The site hosts more than 3,000 documents and interactive tools that help fleets and consumers make transportation decisions while educating the public about alternative fuels and advanced vehicles. For example:

- Do you need to find out if E85 or another alternative fuel is available in your area? Visit the Alternative Fueling Station Locator (<http://www.eere.energy.gov/afdc/fuels/stations.html>) and enter your vehicle's garaging address. The Station Locator will pull up a list of stations within a chosen radius.

- Are you thinking about installing onsite alternative refueling infrastructure? Visit the AFDC's Alternative Fueling Stations section (<http://www.eere.energy.gov/afdc/fuels/stations.html>). At the bottom of the page are links to information on the development of infrastructure for ethanol, biodiesel, natural gas, and propane. In addition, the AFDC's E85 Fleet Toolkit (<http://www.eere.energy.gov/afdc/e85toolkit>) walks fleets through the process of installing E85 refueling stations.
- Are you looking for general information on alternative and advanced fuels? The AFDC's Fuels section (<http://www.eere.energy.gov/afdc/fuels/index.html>) features detailed descriptions of all EPA-approved alternative fuels including E85, biodiesel, natural gas, and propane. It also covers advanced fuels such as biogas, P-Series, and Fischer-Tropsch diesel.

The AFDC is a valuable resource and should be the first stop in researching information on compliance options. However, additional assistance is also available through local Clean Cities coordinators, who routinely work with fleets to help them meet petroleum-consumption goals.

To find the coordinator in your area, please visit the Contacts section of the Clean Cities Web site at <http://www.eere.energy.gov/cleancities/progs/coordinators.php>. For assistance with general alternative fuels and advanced vehicle questions, please contact the U.S. Department of Energy's EERE Information Center at 877-337-3463.

Labs21 Heads to the Heart of the Silicon Valley

This September 16-18 in San Jose, California—the heart of Silicon Valley—Laboratories for the 21st Century (Labs21®) will host leading laboratory professionals from around the globe at the Labs21 2008 Annual Conference. In addition to the engaging and informative technical sessions that attendees have come to expect from the world's leading conference for energy and sustainability in laboratories, this year's event features several new offerings for participants.

A new track called DataCenters21™ features sessions and panel discussions dedicated to data center sustainability. Additional data center-focused offerings will include a full-day pre-conference training workshop, followed by an evening tour and reception. Also new this year is the *Go Beyond Awards Ceremony* featuring Dr. Chris Field, Director of Stanford University's Department of Global Ecology. To learn more about the *Go Beyond Awards* and the call for nominations, please visit <http://www.i2sl.org/labs21/conference/awards.html>.

Participants will also have the opportunity to visit some of Silicon Valley's unique and sustainable high-tech facilities. Anticipated tours include Stanford University's Jerry Yang and Akiko Yamazaki Environment and Energy Building and the Carnegie Institute for Global Ecology, the Santa Clara County Crime Laboratory, and premier data centers at NetApp and Sun Microsystems. The Technology and Services Fair will once again provide an opportunity for manufacturers and service providers within the sustainable laboratory community to showcase their products and services.

Registration for this year's exciting conference is \$850 after July 18, 2008 and \$900 on site. Labs21 is also offering full-time students a discounted fee of \$100.

For more information about the Labs21 2008 Annual Conference, including how to register, please visit the Labs21 Web site at <http://www.labs21century.gov/conf>.

Industrial R&D Technologies Provide Solutions for Federal Facilities

In 2005, the Department of Energy's (DOE) Industrial Technologies Program (ITP) was instrumental in achieving energy cost savings of 402 trillion Btu—approximately \$4.44 billion. Working in partnership with industry, ITP helps minimize the risks for individual companies of investing in new energy-saving technologies and leverages limited research and development (R&D) resources. By supporting collaborative R&D and providing technical and financial assistance to encourage new technology demonstrations, ITP has developed a portfolio that includes more than 120 commercially available technologies, with additional technologies under development. While these technologies were developed to reduce specific energy requirements at industrial plants, many have the potential for application in industrial facilities within the Federal complex.

ITP and FEMP are looking at ways to make many of these technologies, including Super Boiler, wireless sensors, and combined heat and power, available to Federal facilities.

Super Boiler

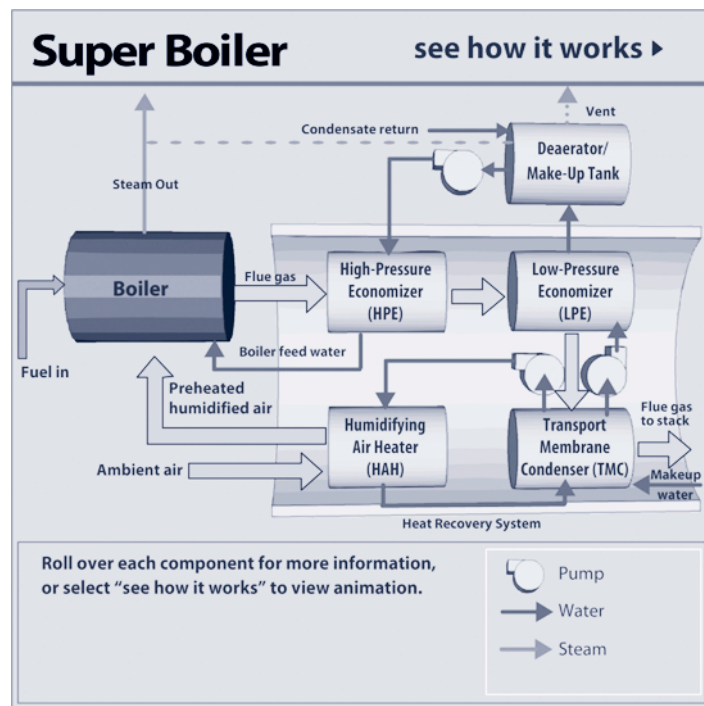
Today, 80 percent of U.S. industrial boilers are more than 25 years old, and steam accounts for 31 percent of U.S. manufacturing energy consumption. The potential for new energy-efficient technologies in facilities that use steam is considerable, and as such researchers are working to develop new steam generation technologies that could potentially save U.S. facilities billions of dollars annually in operating costs with a much lower environmental impact.

The first generation Super Boiler—a package boiler that increases efficiency, reduces emissions, and requires less floor space than conventional boilers—is one of these new technologies and is undergoing three demonstrations in industrial plants around the country. In the initial field demonstration, the Super Boiler maintained a fuel-to-steam efficiency of more than 94 percent, much higher than today's best of 85 percent. By 2020, Super Boilers could result in annual U.S. manufacturing energy cost savings of \$1 billion, and dramatically cut NOx and greenhouse gas emissions. These technologies have the potential to increase the energy efficiency of Federal industrial facilities.

To find out more about the initial Super Boiler field demonstration, read the *Combustion Success Story: First Super Boiler Field Demonstration* fact sheet at http://www.eere.energy.gov/industry/combustion/pdfs/super_boiler_success_story.pdf.

Wireless Technologies

Federal facilities can use energy efficiency to meet national energy targets in a practical and cost effective manner. Advanced wireless technologies could help by ensuring that



The Super Boiler is a new state-of-the-art ultra-high efficiency technology developed in part by ITP. To learn more about the Super Boiler and to view this animation, read the Winter 2008 issue of Energy Matters at www.eere.energy.gov/industry/bestpractices/energymatters/full_issue.cfm/volume=40.

equipment operates at peak performance levels and functions efficiently.

Relying on core wireless systems created under ITP sponsorship, facilities operators can now identify in real time that systems are functioning properly and efficiently. For example, facility personnel can monitor compressor motors and solar panels to verify that they are performing and producing electricity according to specifications. With supplemental software, facility operators can project which component will fail and when.

Knowing the condition of equipment can drastically reduce the need for and cost of preventative maintenance, and enables facilities operators to meet increasingly tight budgets while satisfying essential operability requirements. By implementing wireless systems, Federal facilities can achieve reduced costs, increased productivity, and improved data management capabilities.

New wireless sensors can eliminate the cost of wiring and cabling (\$50/foot for many installations and up to \$2000/foot in nuclear power plants), and help a facility save money by monitoring system performance. Several new wireless products on the market

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INDUSTRIAL R&D TECHNOLOGIES PROVIDE SOLUTIONS FOR FEDERAL FACILITIES (continued from page 8)

today that can optimize system energy efficiency are based on technologies developed through the financial assistance of ITP's Sensors and Automation (S&A) program.

S&A has partnered with leading industrial firms to complete several R&D projects that are making headway in industry. These technologies are improving sensing capabilities and system performance in manufacturing plants by continuously monitoring and recording the slightest system changes in motors, air compressors, high-temperature heaters, and other facility and process equipment. Major U.S. vendors have already begun offering wireless technologies to end-users because of these advantages:

- Reduced installation and maintenance costs
- Improved safety, reliability, and control
- Easily replaced and upgraded
- Reduced connector failure
- Greater physical mobility and freedom
- Data security and invulnerability to interference
- Power that lasts as long as the sensor itself.

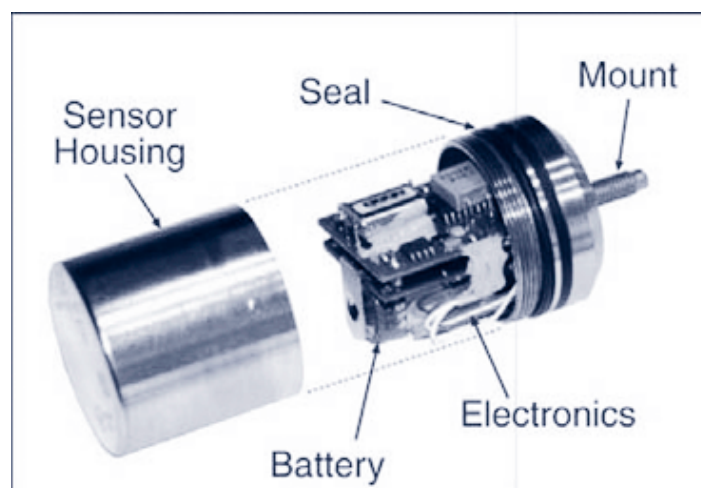
A variety of R&D wireless installations are also in the active stages of implementation at industrial facilities around the country. The application of wireless technologies can make the collection of important information needed for the reliable functioning of government installations economically practical.

ITP is currently developing a Webinar to address proven wireless technology applications throughout industry. Check the S&A Web site regularly at http://www.eere.energy.gov/industry/sensors_automation for Webinar dates and new case studies.

Combined Heat and Power

Combined heat and power (CHP) and other distributed energy systems can meet increased energy needs, reduce transmission costs, cut emissions, and increase power, quality, reliability, and overall energy security in Federal facilities by utilizing energy normally lost in the production of electricity. CHP can provide cooling, heating, humidity control, energy storage, and other process functions.

Distributed energy systems, as compared to traditional electricity generation, are smaller and more fuel-flexible as they are installed closer to the usage point. This means Federal facilities such as hospitals, prisons, R&D sites, military bases, and industrial locations have the opportunity to implement CHP systems for greater energy efficiency and less reliance on utilities for power.



Exploded view of a wireless sensor shows the compact electronics used to monitor performance indicators such as vibration and temperature.

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INDUSTRIAL TECHNOLOGIES PROGRAM TOOLS & RESOURCES HELP FEDERAL FACILITIES ASSESS SAVINGS OPPORTUNITIES (continued from page 6)

Visit ITP's training calendar at http://www.eere.energy.gov/industry/bestpractices/events_calendar.asp to learn more about these opportunities.

Energy Assessments

A key element of ITP's energy management strategy is energy assessments. ITP encourages industrial plants of all sizes and in all industrial sectors to take stock of energy use—and more importantly—identify key opportunities for energy savings through these assessments by examining an entire industrial process, or focusing on a particular system (process heating, steam, compressed air, fans, or pumps).

Federal facilities can take steps to assess energy use and opportunities for savings by using any of the ITP software tools, technical information, and training. Through the ITP/FEMP Industrial Facilities Initiative partnership, plants can also apply for an energy assessment by Oak Ridge National Laboratory (ORNL). Contact Melissa Madgett at madgettmg@ornl.gov or 865-576-3373 for more information.

In addition to offering resources for near-term opportunities, ITP and FEMP are exploring ways to facilitate the application of near-commercial and proven technologies in Federal facilities that can reduce energy consumption, save money, and help Federal facilities achieve efficiency goals. Read more about these technologies on pages 8 and 9.

For more information, please contact Elliott Levine, Industrial Technologies Program, at elliott.levine@ee.doe.gov or 202-586-1476, or visit <http://www.eere.energy.gov/industry>.

Cool Roofs Are Putting a Lid on Energy Use

Cool roofing is the fastest growing sector of the roofing industry as building owners and facilities managers realize the immediate and long-term benefits of solar-reflectant, high-emittance roofs. Using a cool roof product in warmer climates is one of the most effective ways to reduce a building's cooling load. They work by reflecting the sun's heat back to the sky and emitting a percentage of the absorbed solar radiation. Traditional dark-colored roofing materials absorb the sun's heat into the building and increase the interior temperature.

A "cool" roof can reduce typical roof surface temperatures by 50°F or more, thereby reducing the building's interior temperature and the running time of the air conditioning system. This in turn reduces energy usage and energy costs. Department of Energy (DOE) studies show that cool roof products can not only save energy and money, they can also increase comfort in the building's interior and extend the life of the roof. For example, in a study conducted by DOE, when a black EPDM (ethylene propylene diene terpolymer) roof on a 100,000 square foot retail store in Austin, Texas was replaced with a white thermoplastic roof membrane, the savings on energy expenditures alone was \$7,200 annually.

Cool Options

Cool roof options exist for most traditional roofing materials, including dark colors. The roof is made cooler by incorporating pigments that reflect more solar energy than traditional pigments. For low-sloped roofs, cool options include coatings, membranes, and metal roofing. For steep-sloped roofs, cool options include tiles, metal, and asphalt shingles. Each product offers a different level of reflectance and emittance. The Cool Roof Rating Council, an independent and non-biased organization, established a rating system for displaying accurate radiative property data on the outermost layer of roof surfaces and lists the solar reflectance and thermal emittance of different roof products in its Rated Products Directory. Visit <http://www.coolroofs.org/products/search.php>.

Metal Roofs: Several metal roof products have earned the ENERGY STAR® label, thanks to the development of pigments that make metal roofs highly reflective. Cool metal roof products are extremely durable and recyclable, with paint finishes that can last well beyond 30 years.

Membranes (single-ply): These flexible or semi-flexible pre-fabricated sheets consist of EPDM, PVC (polyvinyl chloride), or TPO (thermoplastic polyolefin). They can be applied as new roofs or as retrofits over existing low-sloped roofs when the existing roof is in reasonable mechanical condition and is

adequate as a substrate for the new roof. They are available in a wide variety of colors; however, the lighter colored membranes have higher solar reflectance.

Tiles: Like metal roofs, clay and concrete tiles can incorporate special pigments that reflect solar energy while mimicking traditional colors, including green, brown, and terra cotta. These tiles are extremely durable and especially suitable for new homes or for construction projects where a white roof might be aesthetically unacceptable.

Architectural shingles: These products resemble traditional roofing shingles and are available in a variety of colors. They have the reflective properties characteristic of other cool roof materials because their aggregate or stone surfacing comes in cool pigmented colors and the overall color is reduced to lighter shades.

Coatings: These elastomeric, polyurethane, or acrylic liquids have the consistency of thick paint. They can be applied over existing low-slope roofs with a roller or power sprayer, and last from 5 to 10 years.

Recent research and development efforts have not only introduced new cool roof products and improved the performance of those already on the market, they have also driven down costs such that cool products better compare to traditional roof products. Some cool roof products cost only fractionally more than a traditional option, and even the initial investment of costlier products can be quickly recovered through energy cost savings.

For example, in 2002 and 2003, two virtually identical elementary schools were built in Georgia, one with a metal roof painted with infrared reflective (IR) pigments and the other with a metal roof without the IR coating. Both roofs have the same hunter green appearance, and the schools are equal size with the same HVAC units and the same orientation to the sun. The school with the cool roof technology saved close to \$15,000 in 2007.

Energy saved by installing cool roof technology will vary depending on the geographic location and climate, existing insulation levels, the type of roof installed, the type it replaces, and how well it is maintained. In colder climates, there may be a heat penalty which offsets the summertime energy savings of a cool roof.

To see how cool roof savings will add up for your project, use the DOE Cool Roof Calculator at <http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm>. You can also find a list of cool roof manufacturers and suppliers at the Cool Roof Rating Council Web site at <http://www.coolroofs.org>.

For more information, please contact Allison Pruitt at alison.pruitt@ee.doe.gov or 703-448-0209.

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BONNEVILLE POWER ADMINISTRATION COMPLETES \$100 MILLION IN FEDERAL ENERGY EFFICIENCY PROJECTS (continued from page 4)

saving another two million kWh/year. Together, the 26 FCRPS projects saved about 35 million kWh/year. An additional 10 million kWh/year of savings is expected from FCRPS projects currently underway or planned for completion in 2008.

The energy efficiency quest continues. More than 150 BPA-Federal agency electric energy savings projects are funded or under construction today, investing \$50 million of BPA and agency

funds. When completed, BPA annual loads will be reduced by an additional 150,000 MWh. Additional natural gas, steam, and water savings will also result.

Ultimately, the success of these initiatives depends on Federal partnerships. BPA recognizes and values the importance of working with other Federal agencies in achieving shared energy savings goals.

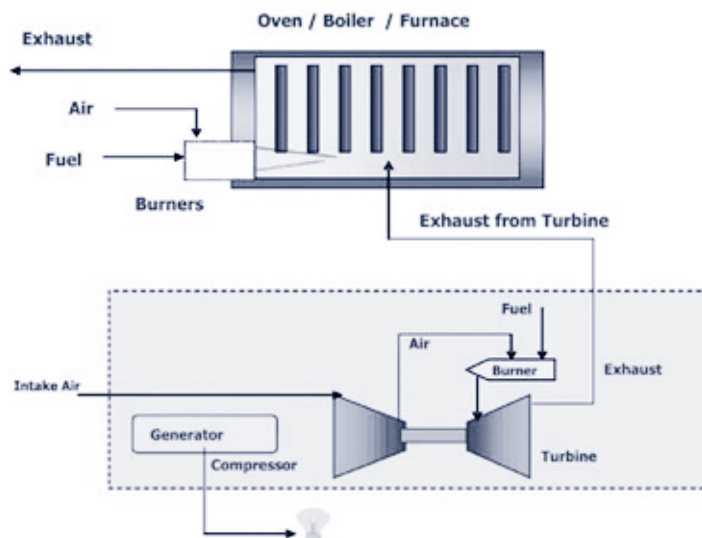
For more information, please contact Frank Brown at febrown@bpa.gov, 206-220-6774 or Kathryn Patton at kbpatton@bpa.gov, 206-220-6785.

**INDUSTRIAL R&D TECHNOLOGIES PROVIDE SOLUTIONS
FOR FEDERAL FACILITIES**
(continued from page 9)

ITP is helping to accelerate the deployment, testing, and validation of novel distributed energy applications through Regional Application Centers (RACs) that have been established in selected parts of the United States. These RACs educate, provide project-specific support, offer feedback on R&D needs, and work with the states on relevant policies.

As part of its suite of energy systems analysis software, ITP has also developed the Combined Heat and Power Tool to help users evaluate the feasibility of using CHP in heating systems, such as fuel-fired furnaces, boilers, ovens, heaters, and heat exchangers. The CHP software tool is available online at <http://www.eere.energy.gov/industry/bestpractices/software.html>.

To learn more about other available technologies as well as those expected to break into the market over the next three years, read ITP's *Energy Technology Solutions: Public-Private Partnerships Transforming Industry* at www.eere.energy.gov/industry/bestpractices/pdfs/itp_successes.pdf. For more information on ITP's R&D, you may also contact the Energy Efficiency and Renewable Energy information center at <http://www.eere.energy.gov/informationcenter>, or call 877-337-3463.



Example application of CHP - exhaust gases from a gas turbine can be used to heat liquid or gas fluids in a heat exchanger.



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Energy Efficiency and Renewable Energy

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