

FOCUS

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...and more!

Renewable Power Purchase Activity Continues to Grow

The number of federal agencies purchasing renewable power continues to grow rapidly, helping the federal government move closer to the federal renewable goal of 1,384 gigawatt-hours (million kilowatt-hours) by 2005. This is the equivalent of 2.5 percent of federal electricity use. As of March 2004 federal sites have made annual renewable power purchases totaling 527 gigawatt hours per year, more than half of the total federal renewable use counting toward the goal. The breakdown of purchases by federal agency is shown on page 3, and the breakdown of total renewables use is on page 16.

Fairchild Air Force Base recently signed a renewable contract with the Bonneville Power Administration for 100 percent of the base load, or approximately 65 gigawatt-hours. This is currently the second largest renewable purchase by a federal agency (after Dyess AFB).

With recent purchases of 11.2 gigawatt-hours per year for their Georgia sites and more than 35 gigawatt-hours per year worth of renewable energy for EPA's largest laboratory complex—Research Triangle Park in North Carolina—the EPA now uses renewable power for 44 percent of its total electricity needs. This is the highest percentage of any federal agency. The EPA partnered with the Defense Energy Support Center (DESC) for both of these Renewable Energy Certificate (REC) purchases, helping DESC develop REC procurement expertise. The EPA also committed to purchase 5.7 gigawatt-hours of green power in FY 2004 through the new North Carolina Green Power Program. The North Carolina Green Power is the nation's first public utility commission regulated and approved statewide green energy program. EPA is a founding partner and will be one of the first customers to receive Green Power through the program.



Credit: Long Island Power Authority

Wind turbines, such as this 50 kW AOC turbine owned by the Long Island Power Authority in Calverton, NY, provide much of the energy used in renewable energy purchases.

continued on page 3

Program Manager's Column

I am pleased to report that federal agencies are making substantial progress toward meeting the federal renewable energy goal, and are using new procurement methods for renewable power as they become available and easier to use. Federal agencies also continue to incorporate sustainable design features in new buildings. This issue highlights both these topics.

Purchasing renewable power has been a successful, and relatively simple, strategy for many agencies, and it is becoming even more widely available. Purchases covering 217 gigawatt-hours (million kilowatt-hours) have been made since we issued last spring's *FEMP Focus*. These purchases have given federal agencies, and their contracting and legal experts, the experience and confidence to use these strategies more broadly. The Defense Energy Support Center has expanded into purchasing Renewable Energy Credits (REC) or Green Tags as well as renewable power. GSA continues to make large competitive purchases, and there are many more renewable power and REC products available across the country.

Federal leadership in renewable energy is strong. The Dyess Air Force Base team that purchased 80 gigawatt-hours of wind energy last year (100 percent of its electricity use) was honored as a Partner of the Year at EPA's Green Power Partnership meeting in the fall. The combined federal agency purchases under the Partnership of 220 gigawatt-hours annually make the federal government overall the largest purchaser in the Partnership. I also congratulate the Fairchild Air Force Base team for another 100 percent renewable energy purchase in March 2004.

As of March 31, the federal agencies are using the equivalent of at least 1,067 gigawatt-hours of new renewable energy which is 1.9 percent of federal electricity use. Large on-site renewable projects also continue to be installed. Two projects that have been covered in recent *FEMP Focus* issues are the 1.2 megawatts of photovoltaics installed at 29 Palms Marine Base in conjunction with 7.2 megawatts of combined heat and power, and the 8.5 gigawatt-hours equivalent of landfill gas contracted for at Hill Air Force Base, UT.

Federal agencies are also demonstrating leadership in the area of sustainable design. The recently published *Business Case for Sustainable Design in Federal Facilities* provides significant evidence that sustainable design is a smart business choice. Nine federal agencies are currently using the U.S. Green Buildings Council's Leadership in Energy and Environmental Design (LEED™) rating system to foster sustainability in new construction. This issue includes articles about the National Park Service efforts at Eielson Visitors Center, Denali, AK and those of the Department of Health and Human Services Centers for Disease Control Facilities in Atlanta, GA, to incorporate sustainable design features at their sites.

I encourage agencies to review their progress toward the renewable goal, and I encourage those that are not on-track to look at strategies and take action to have projects and purchases in place by 2005. As always, the FEMP team is ready and willing to help with information, training, and technical assistance. This issue covers many of these topics in greater detail, so read on!

— Schuyler Schell,
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Cover:
The magnifying glass photo on the front cover is of a 3-Kilowatt array at the Carrizo Plain National Monument, Washburn Ranch. See article on page 4.



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

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RENEWABLE POWER PURCHASE ACTIVITY CONTINUES TO GROW (continued from page 1)

Other recent EPA renewable power purchases include 6.1 gigawatt-hours for their New York Regional Office, 4.4 gigawatt-hours for their New Jersey laboratory and 3.4 gigawatt-hours for their Houston laboratory. These four purchases were completed through the GSA. The EPA New York purchase is part of a larger GSA renewable power contract for almost 70 gigawatt-hours, the largest federal civilian renewable power contract to-date. Other federal agencies and organizations in New York City such as the United Nations, American Red Cross, Smithsonian, and Social Security Administration are also purchasing renewable power through GSA's contract.

The Department of Energy (DOE) headquarters sites, Forrestal and Germantown, with the assistance of the General Services Administration (GSA), recently increased their annual renewable purchase from 6.1 gigawatt-hours (17 percent of site total electricity use) to 14.0 gigawatt-hours (38 percent site electricity use). Michael Watkins, Forrestal Building's Assistant Facilities manager noted, "By increasing the percentage of renewable energy used at Headquarters, we hope to set the example for other DOE field offices and encourage them to follow our lead in support of DOE's directive to use 3 percent of electricity from non-hydro renewable energy by 2005, 7.5 percent by 2010."

Several other federal agencies have made renewable power purchase commitments—the National Park Service, Federal Aviation Administration and World Bank; as well as the Departments of the Interior, Labor, and Transportation who are purchasing a total of 10 gigawatt-hours in the Washington DC area through a GSA contract. Department of Defense facilities are currently purchasing 243 gigawatt-hours. Some of these purchases are described in March/April 2003 *FEMP Focus* articles. A complete list of federal renewable purchases is available on the FEMP web site at www.eere.energy.gov/femp/technologies/renewable_powerresources.cfm.

The premiums applied to competitively procured renewable prices have decreased significantly during the last few years—from about 1 cent per kilowatt-hours to 0.5 cent or less.

There are several contributing factors to this price decrease:

- 1) The Renewable Energy Certificates (REC) option. RECs are the environmental attributes of renewable power, and can be sold separately from the physical power. RECs provide another option for facilities that are not in states with deregulated electricity markets and may not have attractively-priced green power available from their local utility. RECs also help to bring the renewable product price down since REC suppliers do not have to pay for

transmission to get the renewable power to the site or for electricity scheduling.

- 2) Increased experience by the federal procurement agencies, GSA and DESC, and federal agency sites.
- 3) Increased renewable purchase volume—by both the federal and private sector. This should provide confidence to renewable developers and financiers that the renewable market is thriving and will continue to grow.
- 4) Increased fossil fuel prices making renewable products more attractive. Natural gas prices have been above \$5 per million Btu for all of 2004—compared to \$2.50 per MMBTU or below throughout the late 1990s. (Natural gas price information can be found at DOE's Energy Information Administration at <http://eia.doe.gov> and selecting Weekly Natural Gas Update).

The premiums for utility green pricing programs are higher than those from competitively procured renewable electricity or REC products. They are typically in the 1 to 3 cents per kilowatt-hours range, but can be as high as slightly more than 10 cents per kilowatt-hours for pure solar products (see <http://www.eere.energy.gov/greenpower/markets/pricing.shtml?page=1>).

The increased activity and savvy of federal buyers of renewable power are making it cheaper and easier for federal agencies to purchase renewable power and meet the goal.

For more information regarding renewable power purchase options, visit FEMP's renewable power purchase web site at www.eere.energy.gov/femp/technologies/renewable_purchasepower.cfm or contact David McAndrew at 202-586-7722, david.mcandrew@ee.doe.gov.

New Solar Power Installation at the Carrizo Plain National Monument

The Carrizo Plain is the largest remaining remnant of the original San Joaquin habitat, and is one of the largest undeveloped grassland areas in Central California. Photovoltaics have been a fixture of the Carrizo Plain area for more than 20 years. For example, Atlantic Richfield Oil Company (ARCO) installed a 5.2-megawatt grid-connected system in the Carrizo Plain in 1983. But the plant operated until 1994 at a loss of 6 to 8 cents per kilowatt hour and was dismantled in the late 1990s. Many of the plant's modules were resold throughout the world.

Today, photovoltaics are in the news once again on the Carrizo Plain, but on a much more economical scale. The Carrizo Plain National Monument (CPNM) recently installed a new photovoltaic system at the Washburn Ranch Administrative Site. The CPNM is managed through a partnership with the Bureau of Land Management (BLM), the California Department of Fish and Game and The Nature Conservancy (TNC). The CPNM consists of 250,000 acres of land set aside to protect threatened and endangered species, significant Native American rock painting and other archaeological sites, important geologic viewing sites such as the San Andreas Fault, as well as maintaining opportunities for recreation, scientific research, and other visitor use.

The Washburn Ranch Administrative Site includes a large modern ranch house, a double-wide modular home, several barns, a maintenance shop, hookups for travel trailers, and a generator building. The Washburn Ranch Administrative Site now supports Monument management by providing a maintenance yard for staff to perform equipment maintenance, storage of supplies, and fabrication of



Washburn Ranch House located on the Carrizo Plain National Monument.



This array was installed in November 2003 by the Bureau of Land Management maintenance personnel.



Inverter and battery system located in the generator building at Washburn Ranch, Carrizo Plain National Monument.

materials needed for the daily operations. It also serves as a place for meetings and other administrative functions. Temporary housing is provided at the site for visiting researchers, seasonal employees, and volunteers.

Electrical power for the Washburn Ranch has historically been supplied by diesel or propane generators. The nearest tie to the electrical grid is more than nine miles away. In recent years, up to \$50,000 a year was spent on propane fuel costs for two onsite generators.

In March of 2003, monument staff met with Trent Duncan and Glen Yamashita, engineers with BLM, and with Hal Post and Larry Moore of Sandia National Laboratories to assess this facility and determine if a photovoltaic power system would be more economical.

Summer cooling represented a significant portion of the summer load. The recommendations from the assessment included shifting cooling from air conditioning units to evaporative cooling, and replacing refrigerators with high efficiency models and incandescent lights with compact fluorescent lamps. With the significant increase in efficiency, the Washburn Ranch loads were estimated to be 28 kilowatt-hours per day in the summer and 10 kilowatt-hours per day the rest of the year. It was determined the facility could operate with a 3-kilowatt photovoltaic array, 120-kilowatt-hour flooded battery, two

5,500-watt inverters, and a 200-amp auxiliary battery charger. An existing 55-kilowatt propane fueled generator was left in place and integrated into the system. It is anticipated that the generator will be required every 5 days in the summer months to meet the larger cooling loads.

Sunwize Technologies, a GSA vendor, supplied the equipment, wiring diagrams, and operation manuals. BLM maintenance personnel installed the system. Including cooling and lighting upgrades, the installed system cost \$53,000 (not including labor). The new system was commissioned on December 19, 2003, and has been operating flawlessly.

“This new photovoltaic system is a reliable and economic addition to the Monument,” says Monument Manager Marlene Braun. “Our resource conservation efforts now extend beyond habitat management to our electrical system at our largest infrastructure site on the Monument. We hesitated to use our generators much at the Washburn Site because it was so expensive. What a pleasure it is now to be able to turn on a light switch without having to turn the generators on! And the fuel savings from this project can be diverted for other important land management needs.”

For more information, contact Trent Duncan, Bureau of Land Management, at 801-539-4090 or Trent_Duncan@blm.gov.

U.S. Coast Guard Training Center Petaluma Installs Solar Power

Imagine you are responsible for overseeing a small town's electrical consumption. You've got 800 acres of land and 219 buildings, including 129 family units, a large school, a fully-staffed clinic, a chapel, a small police and fire department and more than 200,000 square feet of training facilities.

Now, suppose you want to reduce your electricity bill. How do you do it? This was the task assigned to Tony vanWinden, Chief of Engineering Services at the U.S. Coast Guard Training Center Petaluma in Northern California. Formerly an Army communications station, the base is essentially a small town containing the buildings and facilities described above.

Given the importance of the Training Center's mission and its energy requirements (classroom lighting, air conditioning, power equipment, etc.) it was not realistic to reduce energy consumption alone. Rather, the solution lay in offsetting the Center's energy bill by producing power on site using a 125-kilowatt photovoltaic (PV) system designed and installed by RWE SCHOTT Solar, Inc.

Making it a single project was the logical approach for the 125-kilowatt installation. However, the system consists of three separate arrays, generating power on the Horsley Hall Barracks sloped roof and on the Dennis R. Bauer Building's flat roof. The latter uses the SunRoof™ FS mounting system

which requires no roof penetrations or ballasting. The photovoltaic modules are secured in a fixed position with a 5-degree tilt angle. Linking all the modules together creates a large, stable interlocking structure for maximum strength and stability regardless of high winds or seismic events.

"The Coast Guard strives to be a good steward of the environment and with its long history with small PV systems on its navigation buoys, it is well-educated in the benefits of solar power. Our recently completed 125-kilowatt solar energy project is a great way for us to showcase the Coast Guard's commitment to sustainable energy while saving critical dollars on a larger scale," said vanWinden. "These highly-visible PV systems demonstrate to thousands of students and hundreds of permanent staff and visitors that the Coast Guard is an innovative leader in renewable energy. However, what they can't see is also very important. The FS mounting system and PV panels have a Class A UL fire safety rating, a unique attribute among PV systems. This translates into low maintenance on the rooftop and an elevated safety factor which is important, especially on the roof of a barracks."

The installation process, from shipment on November 13, 2003 to completion of the system, took only six weeks. The arrays now generate DC power; Xantrex PV-45208 inverters convert it to AC power with dedicated isolation transformers



Attractive roof-mounted PV systems can be seen on the sloped roof of the Horsley Hall Barracks, Petaluma, CA.



Horsley Hall Barracks' east plane PV system.



The SunRoof™ mounting system on the Dennis R. Bauer Building requires no roof penetrations or ballasting.



Xantrex PV-45208 inverters convert DC power to AC power.

between the inverters and the building's electrical distribution. Despite inclement weather throughout the month of February, the system still produced 9,752 kilowatt-hours of electricity and should produce slightly more than double that amount in the summer months. Assuming normal weather patterns, the system should pay for itself in about 12 years.

System Configurations

The PV installation on the Horsley building consists of one power system, with two sub-arrays. Electrically-connected, the sub-arrays are physically separate, feeding a common DC disconnect, inverter, and transformer. The PV project on the Bauer building consists of two separate power systems, one on the east roof and one on the west roof. A common enclosure joins the output of the two systems and feeds it into the main electrical panel. However, each system operates independently and can be shut down or started separately from the other.

ASE300-DGF/50-315 modules, with a rated output of 315 watts each, make up all of the arrays. The PV modules convert sunlight directly into DC electricity. There are no moving parts, and each sealed module has an expected life in excess of 25 years. Material and labor costs were \$982,000. Although the system connects to the grid, it will never produce more than the Training Center can use, qualifying it for "non-export" status with the local utility. The base will consume the power it produces (thereby lowering the amount of power it draws from the grid) and a net meter is not required. In addition, the system qualified for a 50 percent rebate from the local utility, cutting the final cost to \$491,000.

Readers can find more information on the Training Center or RWE SCHOTT Solar on their respective web sites: www.uscg.mil/hq/tcpet/index.shtml and www.rweschottsolar.us. Tony vanWinden can be reached at tvanwinden@d11.uscg.mil or 707-765-7655.

Federal Agencies Partner with Native Americans to Develop Renewable Energy

Five federal agencies have partnered with the Intertribal Council on Utility Policy (ICOUP), in a multi-year program to jump-start the development of renewable energy on tribal lands. The first step in a long-term development plan was the installation in 2003 of a 750-kilowatt wind turbine to be owned and operated by the Rosebud Sioux Tribe in South Dakota. And there are much larger projects on the drawing board.

The effort was led by the Federal Interagency Working Group on Environmental Justice. Working Group members include the Department of Energy, Department of the Interior, the Department of Defense, the Department of Agriculture, and the Environmental Protection Agency. Two key players working towards the success of the project are Ellsworth Air Force Base and Native Energy. Ellsworth purchased renewable energy certificates (RECs) for the first 5 years of the turbine's output. Native Energy, a renewable energy development company (see <http://www.nativeenergy.com/>) provided \$200,000 to purchase RECs for resale from the 5th through the 20th year of the turbine's life.

EPA's Daniel Gogal said "Federal interagency coordination and collaboration is crucial for the success of this project, as it is for many tribal projects. It is my hope and expectation that this project will serve as a catalyst to encourage even greater Federal interagency cooperation on projects which seek to revitalize tribal communities and economies, including additional clean energy generation projects in the Northern Great Plains."

The Working Group has developed a plan that provides guidance and sets obtainable goals through the stage-by-stage realization of a 5-year comprehensive plan for the transition to tribally-controlled sustainable homeland economic development. This development will be based upon the integration of renewable wind energy into the existing federal electrical grid. The activity intends to provide for future tribal economic, cultural and community revitalization.

The first phase of the plan involves the installation of the 750-kilowatt utility scale wind turbine at the Rosebud Reservation. In the second phase, the tribe will:

- 1) develop a commercial wind farm (approximately 50 megawatts in size) with power to be sold to at least one of the three utilities in the region,
- 2) collect data at the 50-meter tower level across all participating reservations, and

- 3) promote intertribal wind development among all the reservations of the Northern Great Plains. In addition, the project intends to prepare a programmatic Environmental Impact Statement to address tribal cultural resource and environmental protection concerns.

The third phase is the distribution phase, wherein up to eight additional ICOUP reservations in North and South Dakota will develop new wind farms of approximately 10 megawatts each. Development at this scale will provide the reservations with a self-sufficient source of clean energy. In phase four, each participating reservation will have the opportunity to explore the expansion of the 10-megawatt clusters to 50 megawatt installations. In the final stage, which is beyond the scope of this project, the plan is to replicate this project in other areas.

The Rosebud Tribe won a cooperative cost-sharing grant from the Department of Energy to build the utility scale turbine. Part of the Tribe's success in obtaining the grant can be attributed to the 18 months of wind data they had collected.

The Rosebud Sioux Tribe reservation sits in the plains west of the Missouri River in South Dakota, on the northern border of Nebraska. Larger Dakota and Montana tribal lands offer the vision of economic development for distressed Native American economies. Like large federal hydro resources, these renewable resources are geographically isolated from the major load centers. In the short term, the solution will require encouragement of the capacity to deliver the power to the load centers by high voltage transmission. In the longer term, the renewable resources may produce hydrogen that would be piped to distant load centers.

The Interagency Working Group is actively seeking federal agencies that will support the environmental justice initiative by agreeing to purchase either the output from the turbines or the renewable energy credits from the turbines under long-term contracts. The purchase will help the agencies meet their energy efficiency and renewable energy goals as contained in Executive Order 13123.

A core group of local governments and renewable energy Tribes have initiated the Energy Independence Day Campaign. The campaign includes a Declaration of Energy Independence, and activities for Energy Independence Day on July 4th in Washington, DC.

For more information, please contact Daniel Gogal, Office of Environmental Justice, Environmental Protection Agency at 202-564-2576.

U.S. Postal Service Sacramento Facilities Undergoing Comprehensive Energy Retrofits

In January 2004, the U.S. Postal Service (USPS) issued a delivery order under their Northern California Shared Energy Savings (SES) contract to Chevron Energy Solutions for comprehensive energy retrofits at eight sites in the USPS Sacramento District, including the West Sacramento Processing and Distribution Center (P&DC). Shared Energy Savings, the USPS version of the federal ESPC contract, was created, in part, because the USPS is not governed by the Federal Acquisition Regulations. The SES contract, originally developed out of USPS Headquarters in Washington, DC, was substantially modified by the Pacific Area Environmental Programs and the San Francisco Purchasing Center with technical assistance from the Lawrence Berkeley National Laboratory to reflect both lessons learned from earlier experiences with the SES contract and the new realities of the California energy markets. Two regional SES contracts, one for northern and one for southern California, were issued out of San Francisco in October 2002. The delivery order for the work in Sacramento was issued by the USPS Windsor, CT, Utilities Category Management Center.

The West Sacramento P&DC is a 573,000-square-foot facility, originally built in 1992 with approximately 1,500 employees and a pre-retrofit peak demand of 2.6 megawatts. The facility processes 8 to 10 million pieces of mail daily and operates 24-hours-a-day, 7-days-a-week.

The centerpiece among the measures being installed at the P&DC is a 403-kilowatt peak photovoltaic (PV) system and parking shade structure using the PowerLight Corporation's PowerShade product. The PV installation was modeled after the Navy's PV parking shade at Coronado Island. In addition to the on-site generation benefits of the measure, facility staff are very excited at the prospect of enjoying shaded parking. Additional measures to be implemented include: compressed air, variable volume air handlers, variable speed chilled and heated water pumps, energy management system re-commissioning, air curtains, high efficiency chillers, light-emitting diode exit signs, compact fluorescent lighting, T-8 lighting, electronic ballasts, and occupancy sensors. A solar load controller, which links the output from the PV system to controls on other building equipment for purposes of demand reduction, while an option for the future, was not included in the initial project because the

value of the energy savings were sufficient without demand response benefits. The overall project is expected to save 5.5 gigawatt-hours (million kilowatt-hours) per year.

According to Director Bruce Dickinson, Business Development for Chevron Energy Solutions, "The project now in construction at the USPS mail processing facility in West Sacramento, CA, is a good example of how solar photovoltaic technology has quickly matured and become a viable solution for federal, commercial, and industrial sites requiring energy-intensive processes. The combined impacts provided by the 403-kilowatt solar PV system; energy-efficient lighting systems; heating, cooling, and ventilation systems; air compressors; and energy management controls will reduce the processing plant energy purchases by more than 33 percent and provide long term, reliable energy savings, and peak demand reduction."

The P&DC retrofit, which received \$1.6 million from Pacific Gas & Electric Company's Self-Generation Incentive Program for the photovoltaic system and an additional \$250,000 from their Standard Performance Contracting and Express Efficiency programs, will cost approximately \$6.2 million and will pay for itself in 10 years out of utility bill savings. The chiller replacement component of the project is being funded out of a USPS Headquarters CFC chiller replacement program, managed by Al Watkins.

Ray Levinson, Pacific Area Manager of Environmental Compliance for the USPS and the driving force behind SES in California, noted "The successful awarding of the delivery order for this project demonstrates the value of our partnership between the Postal Service, Lawrence Berkeley National Laboratory on behalf of FEMP, our ESCO partner ChevronTexaco, and the servicing utility, Pacific Gas & Electric Company. Our unique SES contracting mechanism, modified specifically to meet the needs of the California energy marketplace, is allowing us to retrofit our facilities to the highest standards of cost-effective renewable energy and energy efficiency."

For more information, please contact Bill Golove, Lawrence Berkeley National Laboratory, 510-486-5229 or WHGolove@lbl.gov.

State and Utility Partnership Gets Geothermal Off the Ground at Offutt Air Force Base

Offutt Air Force Base in Bellevue, NE, like many Department of Defense installations, is in the process of substantially upgrading facilities. When faced with the need to upgrade heating and cooling systems in dormitories, it formed a partnership with its electric utility, Omaha Public Power District (OPPD), and the Nebraska State Energy Office for assistance in making the best system choices.

After extensive testing and analysis, ground source heat pumps (GSHPs) were found to be the most cost effective alternative for three buildings providing 440,000 square feet of living space for service personnel. GSHPs are expected to reduce energy use by 36 percent from the original boiler and chiller fan coil systems, and use 21 percent less energy than a new boiler and chiller package alternative.

The partnership was launched through a FEMP grant, competitively selected as a special project through the DOE State Energy Program and awarded to the Nebraska Energy Office. Through this grant OPPD and Offutt staff worked with the design team to perform thermal conductivity tests needed to assess GSHP viability, conduct full building computer energy simulations to determine the most life cycle cost effective energy efficiency and renewable energy recommendations, and produce 35 percent—complete construction documents, based on the recommendations.

The geothermal systems move heat to and from the earth, dramatically reducing fossil fuel consumption for heating or cooling. Geothermal systems are not only cost-effective, but also good for the environment. In addition, these systems are expected to have lower maintenance costs.



Project Partners inspect one of the trenches of the ground source loop.

At the time of publication the dormitory project had proceeded to the construction bid phase. Additional GSHP systems have been installed at the Offutt Chapel and the Bellevue Public Schools/Offutt AFB Welcome Center and Lied Activity Center.

The U.S. Air Force took full advantage of the effort by sharing the GSHP knowledge gained with government and military officials from all 18 other Air Force bases that make up the Air Combat Command. Offutt, OPPD, and their partners hosted a special field day which included dissemination of technical information, construction documents, and installation training. Results have been very valuable and saved the Air Force actual design dollars on multiple projects.

For more information, contact Peter Rubin, Offutt AFB, 402-294-7614, peter.rubin@offutt.af.mil; or Randy Jones, 303-275-4814, randy.jones@ee.doe.gov.

Energy Efficiency Incentive Programs Available

FEMP's Utility Management Web site (<http://pnnl-utilityrestructuring.pnl.gov/energymanagement/energymanagement.htm>) has the latest state-by-state information on energy efficiency and load management programs offered by local utilities and other state agencies. Information easily accessed by clicking on the state of interest.

Energy Efficiency Programs: can be either 1) *public purpose programs* which are administered either by utilities, state agencies or other third parties, and are paid for by utility ratepayers, typically through a non-bypassable System Benefits Charge which is instituted as part of restructuring legislation or rules or 2) *utility programs* administered by the

local utility and paid by utility ratepayers through their bundled rates.

Demand Response Programs: Programs which provide incentives to curtail demand and reduce load during peak periods in response to system reliability or market conditions.

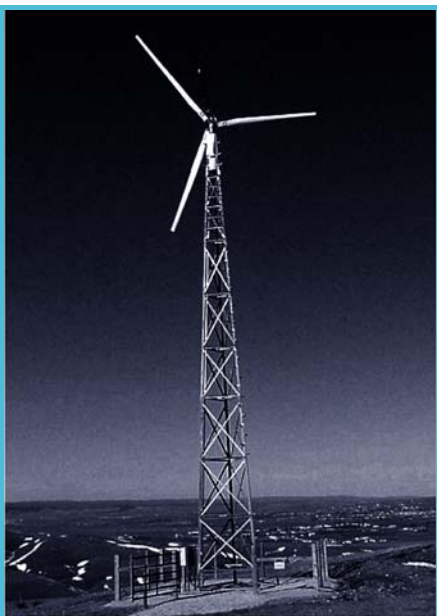
Federal Agencies Find Cost-Effective Opportunities for Small Renewable Energy Applications

Large, new federal renewable energy systems are widely publicized for the contribution they make to the nation's energy supply. At the same time, federal agencies are taking advantage of opportunities to install small, cost-effective renewable energy systems in all parts of the country. Together these smaller systems also make important contributions.

Here are just a few examples of small renewable energy projects that have been supported by FEMP through the DOE Midwest, Northeastern, and Southeastern Regional Offices:

Putting wind to work in South Dakota

To provide power for air-to-ground communications, the Federal Aviation Administration recently installed a 20-kilowatt wind turbine at its Rapid City, SD, Remote Center Air/Ground Communications Facility. Before the installation, this remote site relied on electricity from a rural electric cooperative that was supplemented by a backup diesel generator to ensure reliable power for pilot communications.



This 20-Kilowatt wind turbine in Rapid City, SD, supplies power to the Federal Aviation Administration's Remote Center Air/Ground Communications Facility.

The new wind system includes batteries for storage. When the turbine generates more energy than is needed and the batteries are fully charged, the excess energy is sold back to the electric co-op. Having a clean, reliable source of power was the main purpose of this project, but it has also reduced conventional energy use at the site by 40 percent.

Solar-supported research off the coast of Maine

At the Petit Manan National Wildlife Refuge, which encompasses several islands off the coast of Maine, the U.S. Fish and Wildlife Service has installed two small photovoltaic (PV) systems. The refuge has also obtained two mobile systems and will soon be finished installing two additional small systems, each rated from 360 to 480 watts.

Petit Manan National Wildlife Refuge has been actively involved in restoring populations of colonial nesting seabirds to Maine's coastal islands. Energy is needed to power research equipment there from April to September each year for computers, sound systems, cell phones,

lights, and camp equipment. Transporting gasoline and propane to fuel generators is both difficult and dangerous, so PV is the most viable and cost-effective energy source for the refuge.

PV power for a sanctuary in the Florida Keys

Sixty-eight miles west of Key West, FL is a 64,000-acre marine sanctuary consisting of seven small islands (only two are developed) and coral reefs. The National Park Service installed energy conservation equipment and a 14.4-kilowatt PV system at Loggerhead Key, Dry Tortugas National Park. That island contains a historic lighthouse, two residences, a water house, water and fuel tanks, and a boat house. Volunteer caretakers live on the island in the smaller residence, and visitors stay in the larger one.

Before PV was installed, diesel generators supplied all the island's electric power. Through an energy conservation program, NPS was able to reduce by two-thirds the energy load of 165 kilowatt-hours per day. PV-supplied electricity is used for staff and visitors needs as well as to power a reverse osmosis water treatment system. The PV system has a simple payback of less than 5 years, making it very cost-effective. In fact, solar and wind systems are usually cost-effective in comparison to large diesel generators that have to run small loads for long periods of time.

If you have questions about the applicability of renewable energy systems for your site, please call your FEMP regional representative; for information, see the FEMP Web site at www.eere.energy.gov/femp/about/regionalfemp.cfm. For vendors, the GSA supply schedule lists several for renewable energy; see GSA's site at www.gsaelibrary.gsa.gov, search for the word "solar" then click on "SIN 206 3" for more information.

On-Site Energy Installations Increase Nationwide

As power reliability becomes more and more important, the United States is turning to on-site energy systems more than ever before. Sales were up by 20 percent overall in 2003, and most purchases were fairly evenly distributed among the government, communications, and emergency response/health-care sectors.

On-site systems generate power or heat for nearby use, and they can be connected to a building as well as to the electric grid. Energy generation thus appears to be following a “distributed” pathway similar to the one charted in the telecommunications industry by cellular technology.

Today, both established and new energy technologies are used for on-site electricity generation. Some of the major technologies include:

- advanced batteries and fuels cells;
- combined heat and power (CHP) systems;
- heat engines and smaller natural gas, propane, and diesel generators;
- micro-hydropower and small (less than 50-kilowatt) wind systems;
- modular biomass; and
- solar technologies (photovoltaics and solar thermal systems).

On-site systems can also provide thermal energy for space heating and cooling, water heating, and industrial process heat and preheating. In addition to CHP systems, these technologies include the following:

- concentrated solar systems,
- ground-source heat pumps,
- solar thermal water heaters, and
- transpired solar “walls” to preheat air for buildings.

There are several reasons for this increase in the use of on-site energy systems; one is cost. On-site systems save money in some applications, especially when the alternative involves installing new utility wires and transformers. In addition, both demand charges and peak power rates can often be offset by producing energy on site for use during times of peak demand.

Another reason for the increase in the use of on-site energy systems is regulatory. On-site renewable energy technologies help users meet green power requirements and renewable portfolio standards. They also provide ways to comply with procurement and environmental regulations established by federal, state, and local governments.

Some users want to ensure backup power with something other than diesel generator sets, not only because it might be hard to obtain diesel fuel, but also for environmental reasons. If the fuel must be transported a great distance, this can also be costly as well as risky. On-site solar, wind, or fuel cell generators are some of the technologies that can alleviate this problem.

Another reason for on-site generation is to increase power quality. In some applications, surges and transients on the electric grid can impede the performance of electrical equipment or even harm sensitive controls, computers, or communication systems. Dedicating sensitive systems to on-site generation, or adding distributed energy to the grid as backup, can be a good solution.

Finally, one increasingly important reason is to ensure reliability. Distributed, on-site energy systems are maturing to the point that it’s easier than ever to use them to ensure reliable power, particularly for strategically-important functions such as national emergencies and homeland security.

In addition to installations described in earlier issues of *FEMP Focus*, there are numerous examples of effective, reliable on-site energy systems meeting the need for reliable power in critical applications. One is the 1-kilowatt ReliOn fuel cell unit installed at McCord Air Force Base in Tacoma, Washington. The unit runs on unpressurized, industrial-grade hydrogen to back up communications for a Federal Aviation Administration radar system. It has been running flawlessly, according to Mr. Howard Kernodle of the Federal Aviation Administration.

The FAA supported the San Francisco International Airport’s installation of building-integrated photovoltaic (BIPV) roofing panels to produce 20-kilowatts of electricity. This system supplies a portion of the power needed at one of the airport’s support buildings.

In New York City, Montefiore Medical Center was the only hospital that continued to operate with full power during the first night of the 2003 regional blackout, in large part because a Solar Turbines Taurus 60 generator set drives its CHP system. Montefiore operates its own 14-megawatt cogeneration plant, and all its critical loads are backed up by emergency power generators.

The United States Postal Service implemented an innovative combination of on-site renewable generation and demand control measures to reduce electrical demand and energy use at the Marina Mail Processing Center in Los Angeles. Their partnership with PowerLight and Viron Energy Services led to the installation of a 127 kWp solar electric system atop the

Marina del Rey facility, and a state-wide energy information system for 27 USPS sites. This energy system allows USPS to automatically shed more than 4 megawatts of electrical load. The solar system covers more than 15,000 square feet of the facility's roof and can generate enough electricity during the day to power more than 120 homes. The combination of solar electric generation and demand control measures gives USPS maximum flexibility to respond to high electric demand charges and utility grid emergencies.

Utilities are also using on-site alternatives. Solargenix LLC recently installed a 30-ton solar absorption cooling system to cool the Austin Energy Sand Hill Power Plant control center in Texas. This power plant provides energy to many federal and state government facilities in and around the state capitol, so it's important to keep it up and running.

On-site systems are becoming more attractive options as cleaner, quieter, and even more reliable systems enter the market. They also come with warranties and are becoming more standardized.

To help cover costs, several innovative leasing and financing packages are available for federal, state, and local government groups. In the coming years, look for even better choices, system configurations, and financing methods that will help facility managers obtain the on-site energy systems that are best for their sites.

For more information, please contact Scott Sklar: solarsklar@aol.com; www.thestellagroupltd.com.

Western Area Power Administration's Federal Renewable Program

Western Area Power Administration's (Western) federal renewable program is poised to take off (see the Fall 2003 *FEMP Focus* article at www.eere.energy.gov/femp/newsevents/fempfocus.cfm). There are currently three federal renewable procurements in various stages of development described below. Note that Western had a history of successful renewable purchases for federal customers even before their formal federal renewable program was developed.

Environmental Protection Agency

The EPA has requested that Western purchase Renewable Energy Certificates (RECs) on their behalf for three sites: the Kansas City Science and Technology Center (3.85 gigawatt-hours per year), the Denver Regional Office (4.7 gigawatt-hours per year) and the San Francisco Regional Office (2.275 gigawatt-hours per year). The request for proposals will likely be issued in Summer 2004.

The EPA plans to follow up with a renewable procurement for their Kansas City Regional Office in the next year.

New Mexico

Western issued a renewable power Request for Information in June 2003 on behalf of several New Mexico sites—Kirtland Air Force Base, Los Alamos National Laboratory, and Sandia National Laboratory. Responses were received in September 2003. The sites are in the process of evaluating the responses and determining next steps.

Department of Defense

The DOD Renewable Assessment Project team has proposed a renewable power purchasing approach in conjunction with their on-going project (see article on page 14). They have identified Western as a potential partner for renewable purchases at some of their sites in the western United States and are exploring various opportunities such as joining the New Mexico procurement. This partnership builds on the existing relationship between DOD and Western since DOD is one of Western's major power allocation customers (17 Air Force bases have Western power allocations). In addition to being a firm power customer of Western, DOD entered into an agreement with Western in 1987 that further defines the full range of power marketing services Western provides DOD.

Additional information is available on the web at www.wapa.gov/powerm/pmtags.htm. Agency sites that are interested in learning more about Western's federal renewable program should contact Mike Cowan of Western at 720-962-7245 or cowan@wapa.gov or David McAndrew at 202-586-7722, david.mcandrew@ee.doe.gov.

Status Report on DOD Renewables Assessment

In FY 2002, Congress appropriated funds to assess wind, solar and geothermal energy resources at domestic military installations and to formulate a strategic renewable energy plan. Under the leadership of the Air Force, the Department of Defense (DOD) Renewables Assessment project is being conducted by the Renewable Energy Working Group (RWG), with representatives from each of the Military Services and the participation of four U.S. Department of Energy national laboratories.

The assessment is divided into four phases, with the phase 2 assessment report becoming available shortly. The phase 2 report investigates the potential for developing renewable power generation on installations, and the potential for solar thermal projects. The assessment examined 900 domestic DOD sites with sufficient land area to support a commercial-scale renewable power project. Additionally, renewable energy's role in increasing energy security and reliability is evaluated. This information provides a foundation for DOD to develop a renewables strategy and develop specific projects.

Wind Assessment Results

Twenty-one installations with strong wind resources were selected for in-depth financial analyses. Nineteen meteorological towers were erected on 17 installations to collect detailed wind data, with one more awaiting base approval. Three additional installations have previous wind data available. Based on the results of these analyses, in November 2004 the RWG will recommend to the Services whether procurements should be pursued for up to 14 commercial-scale wind facilities and 7 military-use projects.

Solar Assessment Results

Considering the large number of installations with solar potential, the complexity of site-specific evaluations, and the time available for the assessment, an estimate of full solar project potential for DOD program planning purposes could not be completed. However, the RWG developed software for Service planning offices and installation personnel to use in estimating the long-range potential for projects and to identify and propose individual projects. The solar software is designed for use on almost any domestic federal facility but requires site specific energy cost data. Existing energy cost data for some military installations was provided to the assessment team. From this data, 351 sites were identified where potentially cost-effective solar applications could be considered. As more installations provide their energy cost data more solar project evaluations can be made, and more projects proposed.

Geothermal Assessment Results

Two types of geothermal evaluations were conducted: 1) the potential for utility-scale electric power production and 2) direct use of geothermal resources, which augment building heating and cooling systems.

Four installations with high potential for utility-scale power production and 6 installations with possible potential were identified for further evaluation. Evaluations of direct-use geothermal potential resulted in 21 installations with strong indications, of which 4 are most promising. Installations can request funding for direct use geothermal projects through the Energy Conservation Investment Program process.

Conclusions

The on-installation assessments to date indicate that some U.S. installations have development potential in some locations. However, developing this potential faces numerous mission, financing and environmental challenges. DOD will need to rely on purchasing renewables from the electric grid to significantly increase use of renewable energy across a wide geographic range of installations in the nearer term. Developing an approach to purchasing renewable power will be the focus of the DOD renewables assessment over the coming months.

For more information, please contact Gueta Mezzetti of DOD at 703-604-4306 or gueta.mezzetti@pentagon.af.mil; or Mike Warwick of Pacific Northwest National Laboratory at 503-417-7555 or mike.warwick@pnl.gov.

Errata— Super ESPC, Super Successful

In our Spring 2004 issue, the article titled "Super ESPC, Super Successful," page 1, contained erroneous data. In the second paragraph of that article, it was incorrectly reported that annual energy savings from all Super ESPC investments are 17.4 trillion Btu, equivalent to the energy use of more than 172,000 average households. The corrected information is as follows: Annual energy savings from all Super ESPC program investments are 5.2 trillion Btu, equivalent to the energy use of more than 51,000 average households.

Green Power Partnership Program to Recognize Agency Success

Renewable power purchasing is creating the same environmental product buzz that “recycled content” products have realized in the past. As with recycled content paper, federal agencies are now leading the charge. The Green Power Partnership (GPP), a federal voluntary program that encourages organizations to use renewable power as a part of best-practice environmental management, is highlighting the nation’s government facilities and businesses that are switching to renewable power. In return for technical assistance and public recognition, partners in the program pledge to replace a portion of their electricity consumption with renewable power within a year of joining.

Currently 21 federal organizations have joined the GPP—including sites from the Air Force, Army, Department of Agriculture, Department of Energy, General Service Administration, NASA, National Park Service, and the Navy. The Environmental Protection Agency (EPA) is an agency-wide partner. Federal agencies have committed to purchasing more than 220 million kilowatt-hours annually, making the federal government the largest single purchaser in the Partnership. Dyess Air Force Base (AFB) became the first AFB to join the GPP, and it is the largest site in the Partnership to make a 100 percent commitment to renewable energy (see March/April 2003 *FEMP Focus* article at www.eere.energy.gov/femp/newsevents/fempfocus_article.cfm?newsID=221). In recognition for its

unparalleled commitment to renewable energy, Dyess won the Partner of the Year Award at the 2003 Green Power Leadership Awards in Chicago.

Each year, the EPA, the DOE, and the Center for Resource Solutions (CRS) recognize the actions of individuals and organizations in purchasing and providing renewable electricity through the annual Green Power Leadership Awards. In addition to the competitive awards, any Partner which has purchased approximately four times the requirement for joining the Partnership is eligible for the Green Power Leadership Club. See www.epa.gov/greenpower/gpleadership.htm for more information regarding these awards.

CRS is a non-profit organization that administers the Green-e program, the nation’s leading voluntary certification program for renewable electricity and renewable energy certificate products. Green-e sets consumer protection and environmental standards and verifies that Green-e certified products meet these standards. The Green-e logo denotes products that meet the Green-e Standard for environmental excellence, and is a quick and easy way for consumers to identify environmentally superior energy products. Green-e standards for defining renewable power are the standards used by the Green Power Partnership.

Check out www.green-e.org and www.epa.gov/greenpower for additional information about Green-e and the GPP.

FEMP Seeks Technical Assistance Projects for FY 2005

FEMP provides technical assistance, financing assistance, education, and outreach to federal agencies meeting energy efficiency and renewable energy goals set by Executive Order 13123, the Presidential directive on “Energy Conservation at Federal Facilities,” and the National Energy Policy.

FEMP would like to hear from federal agencies that require technical assistance in the following areas:

- Sustainable New Building Design;
- Energy and Water Efficiency Retrofits;
- Distributed Generation (DG)/Combined Heat and Power (CHP) projects contributing to energy security and reliability;
- Renewable Energy; and
- Operations and Maintenance.

Technical assistance includes screening for project opportunities, performing feasibility studies, reviewing procurement

specifications (including those for A&E services), design review, evaluation of completed projects, and conducting sustainable facility workshops. This Call for Projects is for technical assistance only and cannot be used for funding of hardware or buy down of financed projects. Funding for successful applicants will not be transferred to agencies, rather the assistance will be provided directly by DOE national laboratories and contractors selected from the best energy and sustainability consultants in the country.

If you are interested in requesting technical assistance from FEMP, please complete and submit the application on-line at <http://fempcentral.com/tacalls/logon.ta> by close of business **July 16, 2004**. Applications received after July 16 will not be accepted. Agencies that participated in the FY 2003 Call for Projects are encouraged to reapply.

For more information, please contact your regional office representative on page 29.

Renewable Energy Workshops Assist Agencies in “Meeting the Goal”

How much of your facilities’ energy currently comes from renewable sources? The federal renewable energy goal of Executive Order 13123, as developed by the Secretary of Energy, requires federal facilities to obtain the equivalent of 2.5 percent of their electricity consumption from renewable energy by 2005. That goal is approximately 1,400 gigawatt-hours from renewable energy by 2005. In June of 2000, federal renewable production was 173 gigawatt-hours. Since that time, there has been 834 gigawatt-hours of new renewable energy use added to the federal sector. Agencies still have approximately 400 gigawatt-hours to go to reach the goal. FEMP’s “Meeting the Federal Renewable Energy Goal” workshops were designed to show participants how to achieve the renewable energy goals by 2005.

DOE’s Seattle and Philadelphia Regional Offices teamed with the FEMP Renewable Energy program and the National Renewable Energy Laboratory to help agencies make the final push to reach the Executive Order 13123 renewable energy goal. The Seattle workshop took place April 29 and the Philadelphia workshop was held June 15. These one-day workshops helped to facilitate renewable power and renewable energy certificate (REC) purchases by agencies. Given the remaining time available to reach the goal, the workshops stressed these renewable energy options because they have the shortest lead times to procure and are often the easiest, most cost-effective way for facilities to obtain a significant amount of renewable energy. An added benefit is that these purchases promote growth of utility-scale

renewable energy nationwide while helping to bring costs down. The workshops informed participants about the options available, service providers in their region, and the contracting process.

The workshops showcased a provider panel that represented the various options available to federal facilities in the region, including: power marketing administrations, utilities, REC providers, and federal procurement agencies. Representatives from regional companies and agencies outlined the specifics of their own programs and answered questions.

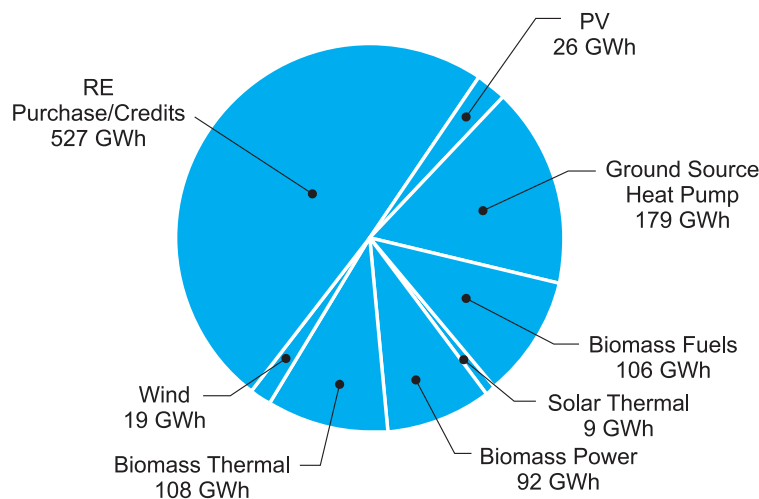
Also included was an update on current renewable energy incentive programs available in each state in those regions and a presentation on how the Green-e Renewable Certification Program provides independent third party certification of their widely used Green-e Renewable energy products.

Participants were led step-by-step through the process of how to purchase renewable power from utility green pricing programs or in a competitive market.

The workshops included a discussion for on-site renewable energy projects in conjunction with local renewable resources available—photovoltaics, solar thermal, wind, and geothermal in the west and photovoltaics, solar thermal, wind, and biomass in the east. This is another way that agencies can meet the goal.

For more information, contact Anne Crawley at 202-586-1505, anne.crawley@ee.doe.gov.

Federal Renewable Energy Purchases by Technology (gigawatt-hours)



Labs21 Taps Industry Expertise to Develop Best Practice Guides

Building on current tools and resources meant to help laboratory stakeholders incorporate energy efficiency and sustainable features into retrofits and new construction, the Laboratories for the 21st Century (Labs21) program released its first three Best Practice Guides in October 2003. The three guides, *Daylighting in Laboratories*, *Energy Recovery in Laboratories*, and *On-site Power Systems for Laboratories*, each provide information about technologies and practices that can be used to design, construct, and operate safe, sustainable, high-performance laboratories.

The typical laboratory is about five times as energy intensive as a standard office building and costs at least three to ten times as much per unit area to construct—which means that every element of its design and construction can impact the building's overall efficiency and performance. With this in mind, Labs21 worked closely with industry volunteers to ensure the Best Practice Guides would provide innovative, useful information that addressed specific challenges facing today's laboratory professionals.

Each guide highlights topic-specific technical descriptions, design considerations, codes and standards, and case study examples. With the help of its industry volunteers, Labs21 will continue to develop additional Best Practice Guides on a variety of technologies and strategies for the next few years. Labs21 has identified and prioritized these additional topics for which it is developing, or plans to develop, Best Practice Guides (see Figure 1).

To ensure the quality and relevance of these guides, Labs21 is actively seeking additional volunteer participation from members of the laboratory design community as lead developers, contributors, or reviewers of new guides. To find out how to participate in the development of new guides, or to download existing guides, visit www.labs21century.gov/toolkit/bp_guide.htm.

For more information on the Labs21 program, see www.labs21century.gov or contact Will Lintner, FEMP Labs21 Program Manager, at 202-586-3120 or william.lintner@ee.doe.gov.

Design Area	Best Practice Guide
Loads	<ul style="list-style-type: none"> Optimizing laboratory ventilation requirements Minimize simultaneous heating and cooling Right-size laboratory equipment loads
HVAC Design	<ul style="list-style-type: none"> Efficient fume hood systems Low-pressure drop distribution system Manifolded exhaust systems Specifying efficient fans, motors, controls Efficient chiller systems for Labs
Lighting	<ul style="list-style-type: none"> Efficient electrical lighting in labs
Commissioning	<ul style="list-style-type: none"> New construction commissioning Retro-commissioning
Water Efficiency	<ul style="list-style-type: none"> Water conservation in laboratories
Indoor and Outdoor Environmental Quality	<ul style="list-style-type: none"> Modeling of airborne releases Fume hood and laboratory commissioning CFD modeling to optimize indoor air flow Room pressure control
Lab Design	<ul style="list-style-type: none"> Design for flexibility and reconfigurability

Figure 1: Labs 21 Best Practice Guides planned or under development

Labs21 Toolkit includes new and revised tools . . .

The Labs21 Best Practice Guides are one of several new and revised tools in the Labs21 toolkit, including:

- Labs21 Process Manual:** This document provides step-by-step guidance of the design process for a high-performance laboratory, and includes a checklist of sustainable design strategies. It is especially useful for design charrettes.
- Case Studies:** New case studies highlight the Nidus Center for Scientific Enterprise in St. Louis, MO, and the Donald Bren Hall in Santa Barbara, CA.
- Design Guide:** A compendium of hierarchically organized references on energy-efficient strategies, this guide has been updated with more than 120 new sources.
- Design Intent Tool:** Includes a new template with the Labs21 Environmental Performance Criteria. This tool, with its automated report generation feature, allows a design team to consistently document and track design targets.
- Benchmarking Database:** Now has energy use data on more than 40 facilities.

All the tools can be accessed at www.labs21century.gov/toolkit.

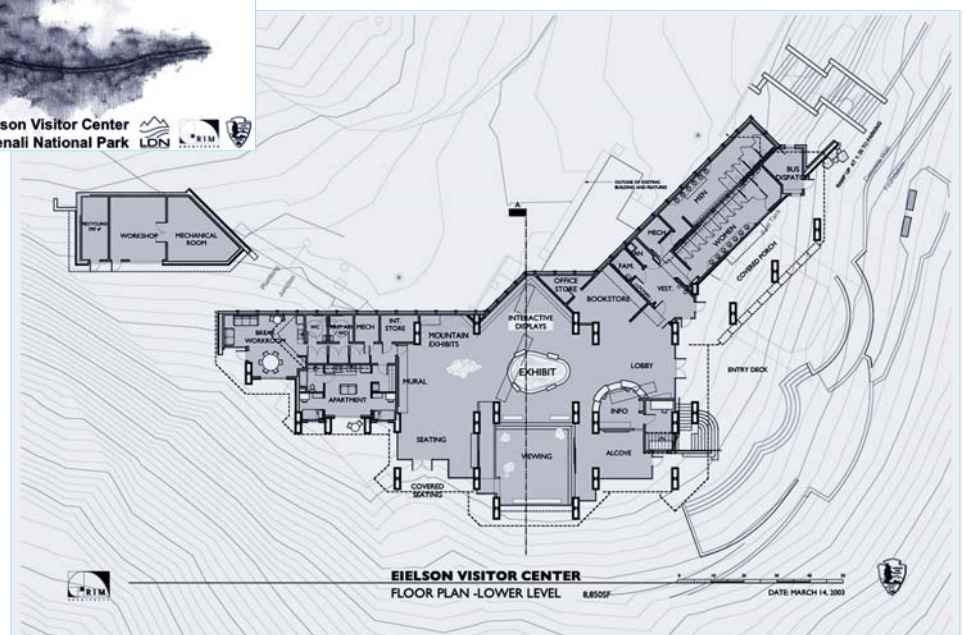
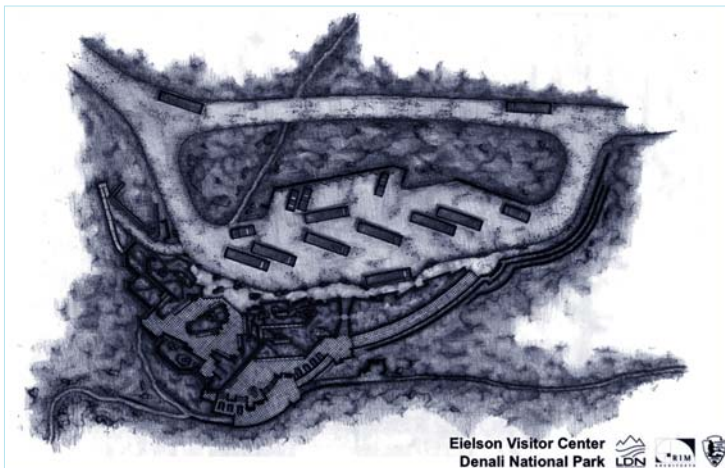
Eielson Visitor Center as a Model of Sustainability

In the heart of Denali National Park and Preserve, 6 million acres of protected wilderness surround the Eielson Visitor Center, the most visited site deep within the park boundaries. The project site commands a view of the Alaska Range featuring Mt. McKinley (Denali), North America's highest peak. Located 60 miles from the park entrance, the visitor center is operated seasonally, June through September, and is off the power grid. All visitors traveling to Eielson Visitor Center ride on one of Denali's Alternative Transportation shuttle buses for 4 hours. Visitors experience first hand how vast Denali's wilderness is as they view the sub-arctic environment and protected wildlife of Alaska en route to the visitor center.

The current visitor facility is too small (3,500 square foot) and has serious maintenance needs. For the past 2 years, a team of architects, engineers, and park staff have been working together to design a new 8,900 square foot facility that will better meet the needs of the users. As one of the leaders in sustainable design, the National Park Service (NPS) has made it a priority to make the new visitor center a model of sustainability. Utilizing the LEED™ (Leadership in Energy and Environmental Design)

evaluation process throughout the design, the team has applied and evaluated various design options with green energy at the heart of these decisions. NPS hopes to achieve a gold certification, although at this juncture a platinum level may be achievable.

One of the main goals for the project has been to design a low-profile building that blends into the landscape and minimizes the visual intrusion of a manmade structure in that environment. The steep slope enables the designers to partially bury the building, which will visually screen the structure from the road. The design of the new visitor center calls for a green roof. To achieve this tundra mats salvaged from the construction site will be relocated to planters dispersed on the roof terrace to camouflage the roof deck, helping the building blend into the landscape. The green roof will also assist in storm water run-off reduction and thermal energy conservation. Other high priority strategies used in the design of the visitor center include maximizing natural day-lighting by optimally locating a series of clerestory windows, selecting energy-efficient heating and venting systems, use of renewable energies, and thoughtful



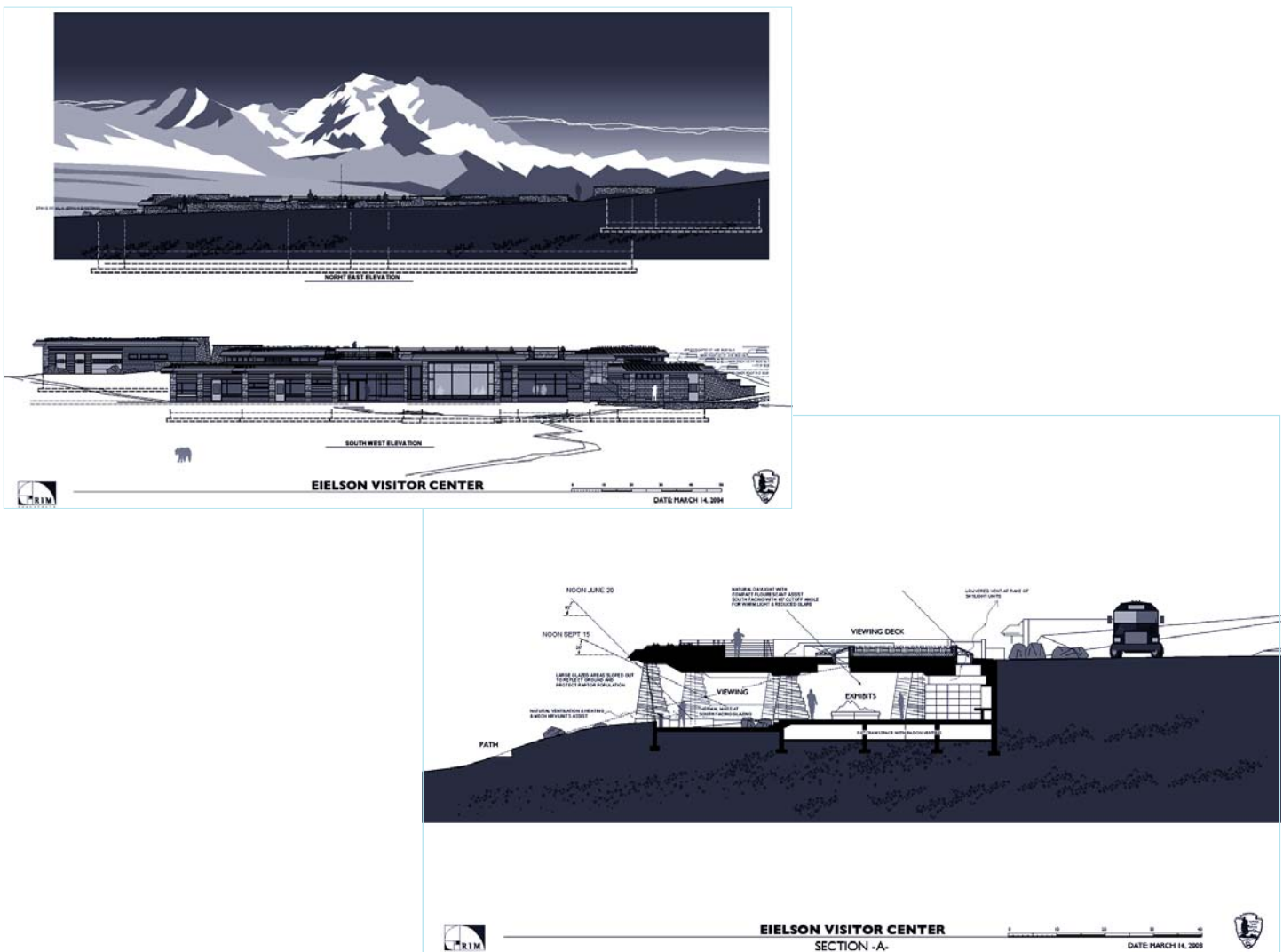
selection of materials including recycled and locally produced material. Remote site concerns and construction costs have led the team to analyze ways to re-use portions of the existing visitor center by grinding up the concrete block and using it as fill in the parking area as well as an attempt to design the site such that the cut and fill are mostly balanced.

In the past, the remote location has spurred the park to implement award-winning renewable energy strategies at the site, including the implementation of a hybrid generator system with photovoltaic panels and a battery bank. The Department of Energy's HOMER Analysis program was applied to the project to evaluate the best mix of renewable energy options and helped determine the optimal mix of renewable energies. With the information gained from the HOMER program the building design will include the following alternative renewable energy

systems: expanding the solar photovoltaic panels and battery bank currently in use at the visitor center, installing a solar hot water heating system for the public restrooms, and constructing a small hydroelectric system in a nearby stream.

Denali National Park and Preserve is a National Park System Center for Environmental Innovation. The park has committed to showcase new technologies, motivate and educate the public and NPS employees about environmentally-friendly practices, install systems and alter behaviors to reduce energy needs and adverse environmental impacts. The design effort for the replacement Eielson Visitor Center embraces that challenge and will exemplify these goals.

For more information, please contact Mary Tidlow, Mary_Tidlow@nps.gov; or Arun Jhaveri, Arun.Jhaveri@ee.doe.gov.



Federal Agencies Designing New Buildings “to LEED”

At least nine federal agencies, as well as several states and many local governments, are using the LEED (Leadership in Energy and Environmental Design) rating system to foster sustainability in new building construction.

LEED, developed by the U.S. Green Buildings Council, is a consensus-based system for rating a new building at one of four different levels: certified, silver, gold, or platinum. The rating is based on the total number of “green” points or credits earned. These credits are given for specific sustainable strategies incorporated into the design. The credits fall into six main categories: (1) sustainable sites, (2) water efficiency, (3) energy and atmosphere, (4) materials and resources, (5) indoor environmental quality, and (6) innovation and design process.

LEED has been remarkably successful in the public sector. Of 948 LEED projects registered as of August 2003, federal projects make up 10 percent; state projects, 13 percent; and local government projects, 25 percent.

According to a white paper of the journal *Building Design & Construction* (November 2003), federal agencies using LEED include the following:

- The General Services Administration (GSA): All GSA buildings must be LEED certified; a silver rating is encouraged.
- National Aeronautics and Space Administration (NASA): Goals were established for facility projects to achieve a LEED silver rating; they can strive for gold if it is cost-effective.
- Department of the Interior, National Park Service (NPS): All construction projects valued at more than \$500,000 must submit a LEED checklist to the NPS Board, but LEED certification is not required.
- Department of Health and Human Services: The Centers for Disease Control, Food and Drug Administration, and National Institutes of Health require analysis of renewable energy systems and the sustainable design principles included in LEED and the *Whole Building Design Guide* (see article on page 21).
- Department of State: The State Department Architectural Branch encourages all new office buildings to achieve LEED certification.
- Environmental Protection Agency (EPA): EPA requires a silver rating for significant building projects and strives for gold or platinum.
- Department of the Navy: The Navy has adopted LEED as a required tool and metric, but LEED certification is not required.
- U.S. Air Force: The Air Force issued a 2001 policy mandate to use sustainable development concepts consistent with budget and mission requirements throughout a building’s life cycle. LEED is the preferred self-assessment metric; at least 20 percent of each major command’s projects will be LEED pilot projects in 2004.
- U.S. Army: The Army has developed its own tool based on LEED, the Sustainable Project Rating Tool (SPiRiT). SPiRiT also includes operations and maintenance. All construction projects must strive for a bronze SPiRiT rating; the 2003 goal is to have 10 gold- or platinum-rated SPiRiT projects.

If your agency is considering using LEED in sustainable design projects, here are some things to keep in mind:

- Consider supplementing LEED with additional guidance. For example, several states require not only LEED but also a level of energy performance.
- LEED is a good tool to use in the design process, but sustainability needs to permeate all phases of construction and operation of a new building. Building commissioning and monitoring, verification, and reporting of periodic energy use are all good supplements to LEED.
- Several federal agencies have created policy and guidance documents on sustainability in the federal sector. FEMP is developing a Sustainable Federal Buildings database to collect and organize the data.
- Due to its rapid growth in popularity, LEED may be seen as a *de facto* standard for green buildings now widely used in commercial practice. Even though some questions have been raised about the limited use of a consensus process in developing LEED, the rating system continues to evolve with extensive input from designers, suppliers of green products, and their customers in both the private and public sectors.
- The Whole Building Design Guide (www.wbdg.org) is an online resource for Federal agency designers. The site includes detailed information on sustainable design under its sustainable design objective section. It also includes many other topics that are interlinked with the sustainable information.

If you would like more information, please contact Beverly Dyer at beverly.dyer@ee.doe.gov.

Healthier People in Healthier Buildings at the CDC

The Centers for Disease Control and Prevention (CDC) has a clear vision for the 21st Century: Healthy People in a Healthy World—Through Prevention. The CDC, within the Department of Health and Human Services, is demonstrating its commitment to this vision in many ways, including redesigning its buildings and campuses to help improve its own employees' health.

The CDC is moving toward healthier buildings at its Atlanta headquarters and in regional offices throughout the United States. The agency has incorporated principles from the Leadership in Energy and Environmental Design (LEED™) rating system and the government's *Whole Building Design Guide* (www.wbdg.org) into guidelines and standards for the design, construction, and maintenance of CDC facilities. Three new building projects, among several planned, are now registered with the U.S. Green Building Council and on track to obtain LEED certification.

The first is a new, five-story laboratory with interstitial space on each floor; this refers dedicated floors for mechanical and electrical equipment located between occupied floors. The lab is being constructed for the CDC's National Center for Environmental Health (NCEH). Measuring approximately 225,974 square feet and scheduled for completion in 2005, the building is on target to receive a Silver LEED rating for features like these:

- a design that consumes approximately 43 percent less energy than required by model energy codes,
- energy-use zoning (lab areas served by a separate mechanical system),
- adjustable sash fume hoods with occupancy sensors,
- heat recovery using a runaround loop,
- variable speed pumping,
- humidification systems and controls,
- interstitial floors,
- daylight views for 90 percent of the occupants, including energy efficient lighting with daylighting controls and occupancy sensors,
- emphasis on low-emission materials,
- a rain garden to retain and absorb storm water after the water has been channeled through cisterns and rills to reduce velocity, and
- native plant landscaping, minimizing the need for irrigation and fertilizer.

The second building, also scheduled for completion in 2005, is a new laboratory tower for the National Centers for Infectious

Disease. This building will include Biohazard Safety Level (BSL) 3 and 4 laboratories. Because researchers in BSL 3 and 4 labs handle the most hazardous biological agents, the buildings require many special design considerations to maintain safety. The building is on target for a LEED—certified rating.

The third is a 12-story office building with a basement (see the March/April 2003 issue of *FEMP Focus* at www.eere.energy.gov/femp/newsevents/fempfocus.cfm). This building contains about 364,000 gross square feet and is scheduled for completion in 2006. It is on target for a LEED-certified rating. In fact, the CDC would like all its future office buildings to receive LEED certification.

In response to President Bush's HealthierUS Initiative, the CDC has also formed a Healthier Worksite Advisory Committee to head up its Healthier Worksite initiatives. The agency is taking the lead in making its own workplaces into ones that encourage the health of employees. Many of these initiatives are intertwined with principles of sustainable design.

For example, in the past year, the CDC created a walking trail through nearby woods, completed upgrades to stairwells to encourage indoor walking, and made architectural improvements to a cafeteria (while adding nutritious food selections). The agency also began "walkability" studies on all campuses to help implement the recommendation that people walk 10,000 steps per day. The CDC's new buildings will have inviting, safe, day-lit stairways near entrances and signs that encourage people to use the stairs.

The CDC is also telling us more about how buildings affect all of us. Dr. Richard Jackson, former Senior Advisor to the Director of the CDC, initiated the agency's involvement in the issue of the impact of the built environment on the health of Americans.

In a December 2003 *AIA Journal of Architecture* article, "Physical Spaces, Physical Health," Dr. Jackson notes, "The implications for architects of just these two diseases (obesity and Type 2 diabetes) related to inactivity become clear. Attractive, naturalized settings encourage engagement, mental refreshment, and exercise. Buildings can be designed to provide light, clean air, and opportunities for physical activity. Communities can be designed with pleasing, safe public places to enhance social contact." (For more, please see www.cdc.gov/healthyplaces.)

Using principles of sustainable design and health prevention, the CDC looks to improve its own communities, as well as ours, by showing us how to build healthy places for healthy people.

For more information, please contact Julia Chlarson at the Centers for Disease Control and Prevention, FPMO, at 404-498-2645, or e-mail jchlarson@cdc.gov.

Making the Business Case for Sustainable Design

Are the additional up-front costs—“first costs”—of an investment in sustainable buildings a sound investment of public dollars? In FEMP’s recently published *Business Case for Sustainable Design in Federal Facilities*, Beverly Dyer and Anne Sprunt Crawley of DOE set out to answer that question.

The report provides significant financial evidence, from research findings and case studies, that sustainable design is a smart business choice. Both the 20-page brochure and the longer resource document show that sustainable design does not have to significantly increase first costs.

In addition, sustainable design yields economic, social, and environmental benefits to both building owners and society. Benefits include annual energy, water, and O&M cost savings; higher productivity of building occupants; lower churn (reconfiguration) costs; higher resale value; lower liability; reduced environmental impact; and increases in the safety, security, health, and well-being of occupants.

For the study, FEMP developed two detailed energy models for a prototype 20,000-square-foot building and compared a code-compliant (ASHRAE 90.1-1999) reference building with one having an integrated package of sustainable features. The analysis showed that the sustainable building used 37 percent less energy, and additional first costs were only between 0 and 2 percent. The simple payback for the sustainability measures was 8.7 years; life-cycle cost savings over 25 years were \$23,000. (See this report on the Web at www.eere.energy.gov/femp/technologies/sustainable_federalfacilities.cfm.)

Another report released in 2003, *The Cost and Financial Benefits of Green Buildings*, by Greg Kats, used a different method to draw similar conclusions. Kats studied the costs and benefits of 40 California buildings. He found that the added premium for sustainable design ranged from 0 to 2 percent, as in *The Business Case*, and average energy savings were about 30 percent.

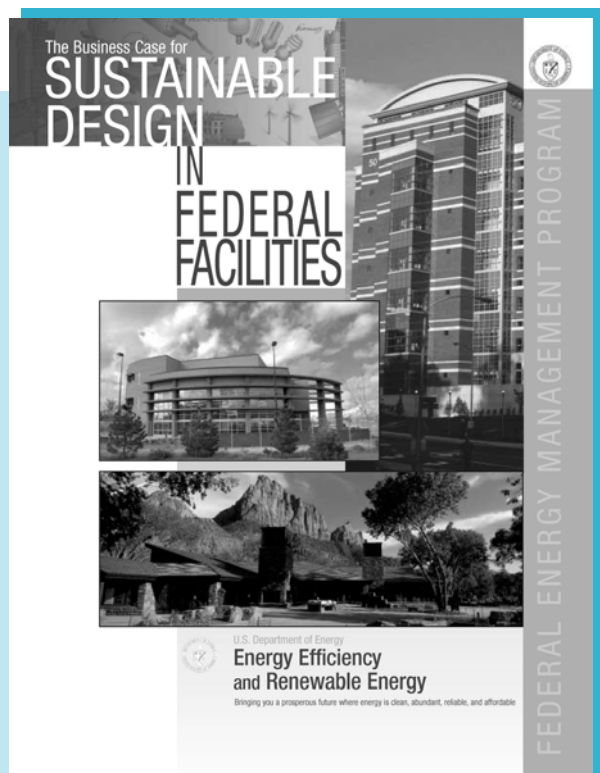
This report points out that additional up-front investment of less than 2 percent in construction costs yields life-cycle cost savings of more than 10 times the initial investment. This report, as well as the FEMP report, includes a broad survey of the literature about quantifying the value of energy and water savings, reduced emissions, waste reductions, higher productivity, and greater health. (On the Web, see www.ciwmb.ca.gov/GreenBuilding/Design/CostBenefit/Report.pdf.)

Although the many benefits of sustainable buildings can be shown in data, as these reports show, they acknowledge that some issues are still difficult to quantify, such as the correlation between better interior environments and improvements in the performance of both workers and businesses. But stay tuned; FEMP and others in the public and private sectors will continue to pursue answers to these questions.

For more information, contact Anne Crawley, 202-586-1505, anne.crawley@ee.doe.gov; or Beverly Dyer, 202-586-7241, beverly.dyer@ee.doe.gov.

“We at the Department of Energy believe that there can be a sound business case for the use of sustainable design options, and we encourage all federal agencies to incorporate these options whenever possible.”

David Garman,
Assistant Secretary,
DOE Office of Energy Efficiency
and Renewable Energy



FEMP's Interagency Sustainability Working Group: Promoting Sustainable Design in Federal Facilities

The Interagency Sustainability Working Group (ISWG) was established in September 2001 in response to Executive Order 13123, and operates under the auspices of the Interagency Energy Management Task Force. The purpose of the ISWG is to:

- 1) Serve as a forum for the exchange of information within the federal government on individual agency sustainable design activities.
- 2) Foster and encourage each executive branch department and agency to consider the adoption of sustainable design practices and technologies in new federally-owned, operated, and leased buildings, as well as major renovations of existing federal facilities.
- 3) Identify and propose solutions to barriers for the adoption of sustainable design in the federal sector.

Chaired by Beverly Dyer of FEMP, the Working Group is composed of more than 180 representatives with approximately 40 to 50 attending bi-monthly meetings in Washington, D.C. (teleconferencing is available to those outside of the DC area).

Members represent a cross section of federal agencies, including the Departments of Defense, Energy, State, Interior, Agriculture, Commerce, and Health and Human Services. Other members include the National Aeronautics and Space Administration, Environmental Protection Agency, Office of Management and Budget, Tennessee Valley Authority, Bonneville Power Administration, and U.S. Postal Service.

The ISWG enjoys a close working relationship with the Office of the Federal Environmental Executive (OFEE) headed by John Howard. Members are currently collaborating with OFEE on the collection of on-going federal sustainability activities in the area of research and development, performance indicators, life cycling costing, and communications-priorities of the Federal Green Building Council, a group established by Mr. Howard of upper level agency managers interested in pursuing sustainability in the federal sector. This effort follows previous work by ISWG and OFEE volunteers who developed five white papers on

the sustainability subjects of implementing policy, measuring performance, research and development, life cycle costs, and education and training.

Collectively, the working group has contributed to, reviewed or evaluated a number of reports and program activities, including the *Business Case for Sustainable Design for Federal Facilities*, Checklist of Opportunities to Upgrade Energy Efficiency with Building Security, a U.S. Green Building Council report on high-performance green buildings, OMB Circular A-11, the Office of the Federal Environmental Executive's report on the status of federal green buildings, and a collection of federal high-performance case studies.

In addition to learning from guest speakers, the group has also gained first-hand insight on current and innovative sustainable design practices by touring the Chesapeake Bay Foundation's green building in Annapolis, MD, the campus of the U.S. Naval Academy, and the National Building Museum's "Big and Green" exhibit on sustainable architecture for the 21st century.

Sustainability basics, federal requirements, project implementation, case studies and resources may be found on FEMP's sustainability Web pages at www.eere.energy.gov/femp/technologies/sustainable.cfm. The site also includes a listing of ongoing federal sustainable design programs, pending federal sustainable design projects (culled from the Commerce Business Daily) and a listing of future conferences, workshops, and training programs dealing with sustainable design and related topics. An Intranet Web site was established, allowing federal agencies to post sensitive agency-sponsored sustainable design information for member review and comment. This password protected site also posts bi-monthly meeting reports, including summaries of recent working group meeting discussions and presentations on federal and private sustainable design issues and activities.

If you would like to join the working group, please contact Beverly Dyer at FEMP at beverly.dyer@ee.doe.gov.

ENERGY STAR® Promotes the Design of Energy Efficient Buildings

To reduce the air pollution caused by commercial building energy use, the Environmental Protection Agency (EPA) is expanding the ENERGY STAR® program to include new commercial buildings by encouraging the design of energy efficient buildings. Architecture firms will now be able to distinguish buildings that have been designed to be among the most efficient buildings in the country as “Designed to Earn the ENERGY STAR.”

Recognizing the influence that the nation’s architects can have in reducing the environmental impact of buildings, EPA is providing this new designation. Commercial buildings alone emit about 20 percent of the nation’s greenhouse gas emissions. Expanding the ENERGY STAR to cover new construction fulfills recommendations outlined in the President’s National Energy Policy.

A building design will be eligible for the new designation if the building is expected to qualify for the ENERGY STAR label once in operation. The ENERGY STAR is EPA’s designation for superior energy performance. Buildings that have been in operation for at least 1 year qualify for the ENERGY STAR by scoring 75 or higher on EPA’s 100-point national energy rating scale.

Existing buildings that have earned the ENERGY STAR label use about 40 percent less energy than average buildings, without compromising comfort or services. They also conserve natural gas.

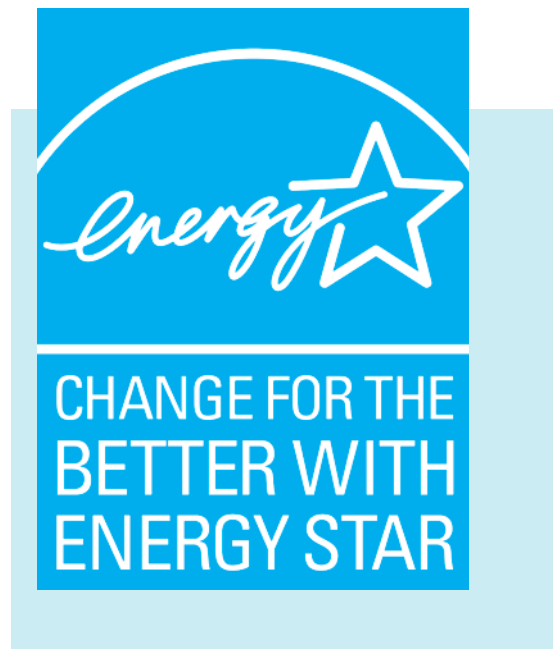
EPA finds that newly constructed buildings are not significantly more efficient than buildings constructed years ago. With this new designation, EPA hopes to call attention to building design practices that are expected to deliver high quality and energy efficient commercial building space.

In 1999, EPA announced its national energy performance rating system for commercial buildings. The rating system now includes 10 types of buildings representing more than 50 percent of commercial building square footage across the country. Currently, more than 19,000 buildings have been rated nationwide, and more than 1,400 have earned the ENERGY STAR. By earning and displaying the ENERGY STAR, organizations demonstrate their commitment to energy efficiency and environmental stewardship—while saving money on power bills.

Introduced by EPA in 1992 for energy-efficient computers, the ENERGY STAR label is now featured on products in more than 40 categories, including lighting, appliances, home office equipment, home electronics, and heating and cooling equipment. Since the mid-1990s, EPA has collaborated with the U.S. Department of Energy, which has responsibility for certain product categories. Efficient new homes became eligible for the ENERGY STAR label in 1995. Last year alone, ENERGY STAR helped Americans save enough energy to power about 20 million homes, reducing greenhouse gas emissions equivalent to those of 18 million vehicles. These reductions also saved Americans collectively \$9 billion on their energy bills.

To learn more about ENERGY STAR, visit: <http://www.energystar.gov>.

For more information about the article, contact John Millett at 202-564-7842; millett.john@epa.gov.



Proper O&M Procedures Pay Off with Long-Lasting Savings for Performance Contracting Projects

Energy efficiency gains resulting from improvements financed through performance contracting can be greatly enhanced by following proper operations and maintenance (O&M) procedures. And conversely, poor O&M can quickly compromise the gains accomplished through performance contract projects.

Performance contracting is an important tool for agencies trying to reduce energy use in their buildings. It provides facilities a means of financing infrastructure improvements when funding is limited. These contracts allow facility management to make comprehensive improvements with the assistance of highly-qualified energy efficiency experts from qualified energy service companies (ESCOs) or utilities. In addition to expert assistance in designing and installing energy-efficient technologies, performance contracts provide guarantees of performance throughout the life of the contracts. A key contractual element that affects these guarantees is the proper O&M of the equipment, as well as repair and/or replacement of equipment that fails during the term of the contract. While these are important aspects of the contracts, many facilities are unable to hand off actual performance of O&M to ESCOs. Many facilities have unionized or contracted maintenance situations that make delegation of O&M duties to the ESCOs too costly to be included in the contracts. At the same time, many prefer to assume the risk of premature failure of the equipment to maximize the amount of improvements installed under the performance contract.

It is perfectly legitimate for facilities to take on the responsibility of the O&M and/or take on the responsibility for repair and replacement of installed equipment. In these cases, a strong O&M program is more important than ever to ensure continued performance of the equipment as guaranteed by the ESCO. The facility representatives must carefully consider the responsibility and risk they are accepting and plan how they will deal with it. Performance contracts have routinely produced savings of 10 to 30 percent. Implementation of solid O&M programs are also estimated to save 10 to 30 percent of energy and energy-related O&M costs. However, improper O&M can compromise persistent energy and energy-related cost savings from energy conservation measures.

FEMP is developing tools to assist facilities in managing performance contracts through the performance period. FEMP's

assistance is important for several reasons. For example, performance contracts routinely have contract lengths of 10 to 20 years, and facilities are not used to dealing with long-term contracts. There are going to be many personnel changes at the facility and with the ESCOs during the term of the project. While the ESCO is guaranteeing performance of the project, facility management is responsible for overseeing the project to ensure the ESCO continues to perform. Shrinking budgets and staffs for O&M at facilities have in many cases led to failure of O&M programs. Various audits of facilities throughout the country have found that poor or improper O&M has negated many of the energy efficiency improvements made over the years.

These audits have found makeup air vent controls disconnected, or vents jammed in the full-open position. Lighting controls have been disabled, control points disconnected, or the controls themselves disabled. In some cases the controls are physically disabled, and in others the set points have been overridden at the central computer control station. These actions are usually prompted by complaint calls from building occupants. And improper measures taken may be due to poor understanding of computer controls, or poorly written/proprietary control systems that do not allow changes by the maintenance staff.

One important tool that is part of the Super ESPC contract is the "Risk/Responsibility Matrix" (Found at www.eere.energy.gov/femp/docs/r-r-matrix.doc). This matrix is used during development of the ESPC delivery order to clearly delineate risks related to various aspects of the project and how they are divided between the contractor and the agency. It is important to clearly show the responsibility and expectations of both partners in ESPC projects before the award of the delivery order.

Given the current understanding of the O&M challenges facing facilities with awarded performance contracts, FEMP is working with some agencies that use the Super ESPC contracts to improve existing tools and develop new ones. The Measurement and Verification (M&V) working group continues to refine M&V tools. They have rolled out formats for the post-installation M&V report, as well as an annual M&V report format. Other working groups are developing O&M checklists and a quick reference tool that captures the essence of the project. The reference tool points to sources of detailed information needed by facility staffs during the performance period of the project.

These tools are intended to help facility personnel ensure continued savings through the life of the performance contract.

The M&V post installation checklist and annual report formats can be found (under products) at: <http://www.dc.lbl.gov/mv/>. These tools provide regular information to facilities regarding the performance of the project. Changes in performance can be important indicators of changes that have been made to the system that are affecting the savings generated by the project. Standardizing the information provided by the ESCOs in these reports helps to ensure the facility gets the information they need in a format that they can understand. While this is important information, it is generally provided once a year, which can mean that a lot of savings may have been lost since the last report.

The O&M checklists help facilities monitor the equipment regularly to ensure that it is operating as designed. The maintenance part of the plan helps to ensure that the equipment will continue to operate as intended. Streamlined checklists that lay out key elements of O&M, with references to applicable parts of various O&M manuals, are being designed to give facility maintenance supervisors and technicians an easy-to-use tool to ensure routine maintenance is performed as required. This is particularly important for facilities that are understaffed and have significant staff turnover. If less time is needed to determine what is required, more time can be used in the actual maintenance of the equipment. Convenient operations checklists are also envisioned to make it more likely that operations personnel will correctly operate the equipment, rather than disabling system components to solve immediate problems.

The third tool that FEMP is developing is a quick reference guide for key performance period activities for use by facility management personnel. It is also a reference to help new personnel quickly learn about an existing performance contract, what their responsibilities are, and where to find pertinent information. The reference will contain a short synopsis of the project, including current project savings and performance status. The tool references key parts of the contract, the M&V plan and annual reports, and O&M check sheets, so that facility personnel can quickly locate needed information.

For more information, contact Tatiana Strajnic at 202-586-9230 or tatiana.strajnic@ee.doe.gov.

You've asked...

Biomass Super ESPC Q&A

- Q. ***Our facility is interested in renewable energy but heard it is expensive and unproven. Is that correct?***
- A. Definitely not. Many renewable energy resources and technologies have been around for years and might prove to be the least cost option. For example, a combined-heat-and-power (CHP) project that could run on a waste resource such as wastewood or landfill gas would most likely be less expensive than a system operated on natural gas, oil, or even coal.
- Q. ***Apart from the environmental benefits, are there any other advantages to installing a renewable energy system?***
- A. Two likely benefits are price stability and energy security. By employing, for example, a biomass-to-energy system, a facility could insure itself against price volatility associated with fossil fuels and interruptions in the gas and electric utility grids.
- Q. ***Under DOE's Biomass Super ESPC contract, does the resource need to be located on federal property in order to qualify?***
- A. No, it makes no difference whether a resource such as landfill gas, digester gas or some type of biomass like waste wood is generated on federal property or brought over by pipeline, rail, or truck.
- Q. ***We have a situation where the energy generation potential from our collected wood waste exceeds our facilities needs. What can we do, size the system to our load or size it to the resource?***
- A. In that setting, under the Biomass Super ESPC contract, the ESCO could install a system sized to the resource and sell the excess energy to another customer such as the grid.

Federal Energy Projects - Emissions Markets Opportunities

Federal agency energy efficiency and renewable energy (EERE) projects may be able to take financial advantage of existing and emerging emissions markets. In some cases the emissions values may significantly improve EERE project cost effectiveness. This article provides basic emissions market information and describes two federal examples.

The 1990 Clean Air Act Amendments encouraged the development of emissions trading markets as a method to meet air quality goals. There are two main types of emissions trading programs:

- 1) Cap and trade, and
- 2) Emission reduction credits (ERCs)

Emissions markets for nitrogen oxides (NOx) and sulfur dioxide (SO₂) are the most common and well established. There are also small markets for other types of emissions such as volatile organic compounds (VOCs), carbon monoxide (CO) and particulates (such as PM10).

Cap and Trade Emissions Markets

Cap and trade programs set an emission cap, and then allocate a corresponding number of emissions “allowances” to emission sources. Sources that reduce their emissions below their allocation can sell allowances to those sources in the trading region that emit more than their allotted amount.

The SO₂ cap and trade program covers the entire United States. Cap and trade programs for NOx have been established to address summer ozone pollution in the Eastern U.S. Both of these programs are primarily focused on utilities and other large electricity generators. However, seven states (Indiana, Massachusetts, Maryland, New Hampshire, New Jersey, New York and Ohio) have included EERE set-aside provisions that will make certain EERE projects in their state eligible for NOx allowances. Massachusetts and New York are in the process of finalizing their rules that define what type of EERE projects qualify for EERE allowances. The other states do not have detailed rules. Emissions allowance market prices were as high as \$5,000/ton during winter 2003, but have slipped to \$2,500/ton or less since summer 2003. See www.epa.gov/airmarkets/progsregs/noxview.html#overview for more information and www.evomarkets.com/resources/index.php?xp1=1 for a monthly NOx price report.

Typically one ton of emissions reductions during the ozone season (May through September) will be required for emissions allowance applications. Therefore it takes a total of 1,333 MWh of

renewable energy production and/or energy efficiency savings to be eligible for one allowance (using 1.5 lbs NOx reduction per megawatt-hour—the EPA recommended emissions factor). Emissions savings from several projects (federal or private sector) can be aggregated to meet the one-ton minimum.

FEMP and the EPA are exploring an emissions trading pilot project in Massachusetts that will include the EPA’s Chelmsford laboratory, along with other interested federal (or private) sites with qualified EERE projects. A variety of methods are being considered to ensure that the federal sites retain the financial benefit of the emissions trade.

Emission Reduction Credit Markets

ERC programs are for major new or expanding emissions sources (typically NOx) in certain air quality non-attainment areas. These sources are required to “offset” their projected new emissions by procuring ERCs from sources that have eliminated or reduced emissions. ERC transactions are usually administered at the state or local levels, with each jurisdictional authority setting its own rules and procedures. Federal sites that reduce emissions from on-site generation sources, by replacing a diesel generator with solar or wind for example, may be able to sell the resulting emission reductions in these ERC markets. The NOx ERC price in some of these markets is significant - as much as \$100,000/ton (or even more) in southern California. However, it is important to note that these markets are relatively inactive, with volatile prices. The most active and high value markets include several regions in California, Texas, New York, Pennsylvania and New Jersey. To see the U.S. EPA Ozone Nonattainment Area Map, (August 2003) visit www.epa.gov/oar/oaqps/greenbk/mapozone.html

The Naval Facilities Engineering Command-Southwest Division (SWDIV) Energy Team has developed a method to include ERC market value in their \$16 million Utility Energy Service Contract (UESC) Cogeneration Upgrade project at the Naval Medical Center San Diego. This project will result in 10 to 20 tons NOx reduction per year, with total emissions value estimated in the \$1 to 1.5 million range. This value will be directly credited back to the financed amount of the contract, as part of the salvage value of the equipment removed.

Navy project details and additional information regarding emissions markets will be described in future FEMP Focus articles. Please contact Chandra Shah at 303-384-7557 or chandra_shah@nrel.gov if you are interested in learning more about emissions market opportunities. For information on SWDIV Energy Team, contact David. B. Deiranieh at david.deiranieh@navy.mil.

HUD's Energy Efficient Rehab Advisor Helps Improve Home Energy Efficiency

Recognizing the enormous potential for energy savings and comfort improvements, the U.S. Department of Housing and Urban Development in early March launched the Energy Efficient Rehab Advisor (www.rehabadvisor.com), a Web-based tool designed to help homeowners, contractors, architects, facility managers, and others to improve energy efficiency in existing homes during renovation and remodeling.

In six clicks, the Advisor provides recommendations for cost-effectively increasing the energy efficiency of a typical renovation project in single-family or multifamily housing. These recommendations are based on the building type, age, location and project—and they are free. The Advisor suggests specific actions to get the most value from a typical remodeling project.

Increasing a home's energy-efficiency is relatively simple, especially when coupled with a planned renovation. Making a few easy improvements, like sealing air leaks when finishing a basement or upgrading to ENERGY STAR® qualified appliances with a kitchen remodel, can produce big savings on energy bills, increase comfort and create a quieter, healthier indoor environment.

"Improving housing affordability is a key component of HUD's mission. The Energy Efficient Rehab Advisor represents one way

HUD can help identify energy efficiency improvements and pinpoint cost savings for any remodeling project," said Mike Blanford, a research engineer with the Office of Policy Development and Research who managed the development of the Advisor.

HUD developed the Advisor in cooperation with the U.S. Department of Energy and the U.S. Environmental Protection Agency. The energy efficiency recommendations are based on ENERGY STAR specifications, where applicable. HUD recommends following these Advisor's guidelines when undertaking any type of renovation project in single-family and multifamily housing, whether it is privately-owned or public housing.

Bob Paquin, director of HUD's Boston Office of Community Planning and Development noted, "The Advisor sets a new standard for 'user-friendly.' It offers easy access to a complex subject. This tool is comprehensive, efficient and informative."

The Energy Efficient Rehab Advisor was developed for HUD by D&R International, Ltd., and the New Jersey Institute of Technology.

For more information, visit www.rehabadvisor.com, or contact Amita Chen at achen@drintl.com.

Benefits of the Energy Efficient Rehab Advisor

Savings—increasing energy efficiency decreases monthly utility bills, which pays for the measures through energy savings.

Better Indoor Air Quality, Improved Comfort and Noise Reduction—eliminate hot spots, chilly drafts and air that's too dry or moist with added insulation, efficient windows, and efficient heating and cooling systems. Better windows and more insulation also reduces noise from outdoors, creating a more peaceful household.

Decreased Maintenance—new HVAC systems, advanced controls and efficient lighting reduce maintenance demands.

Tighter, better insulated buildings lighten the load on your HVAC system and reduce the likelihood of water damage and mold growth.

Environmental Benefits—increasing energy efficiency promotes cleaner air and water by reducing pollution from power plants.

Cross-functional:

- **Good for Homeowners:** Gives ideas and helps you budget your remodeling project.
- **Builders and Subcontractors:** Shows clients the benefits of energy efficiency.
- **Designers:** Shows energy efficient measures in which to concentrate.

- **Developers:** Stretches your budget by incorporating energy efficiency in your projects.
- **Lenders:** Shows that a larger loan can result in smaller overall payments.
- **Property Managers:** Increases comfort and efficiency without raising rents.

Lots of additional information:

- Background and descriptions of energy efficiency measures,
- Case Studies,
- Links to sites listing energy efficiency rebates and tax credits, and
- Installation and Operation & Maintenance instructions.

FEMP Training Reminders

Introduction to ESPC

July 20 – July 21
Washington, DC
202-586-7632

Measurement & Verification for Super ESPC Projects

July 21
Washington, DC
202-586-7632

Building Energy and Water Conservation Workshops

July 26 – July 27
Cleveland, OH
312-886-5582

Strategies for Low-Energy, Sustainable, Secure Buildings

August 3 – August 4
Poulsbo, WA
202-628-7400 x201

Distributed Generation and Combined Heat and Power Workshop

August 8
Rochester, NY
865-574-0266

Energy 2004

August 8 – August 11
Rochester, NY
1-800-395-8574
www.energy2004.ee.doe.gov

Hands-On Distributed Energy Resources Training

September 15 – September 16
Albuquerque, NM
505-844-4383

World Energy Engineering Congress 2004

September 22 – September 23
Austin, TX
757-275-1046

Energizing the Northwest, Today and Tomorrow

September 28 – September 29
Portland, OR
509-527-6232

Labs21 High Performance, Low Energy Design Course

October 4
St. Louis, MO
www.labs21century.gov/

Laboratories for the 21st Century

October 5 – October 7
St. Louis, MO
781-674-7374

DOE Department Energy Management Awards

October 27
Washington, DC
202-586-7632

Federal Energy and Water Management Awards

October 28
Washington, DC
202-586-7875

Energizing the Northwest, Today and Tomorrow

These days, the hot topic isn't just about using energy more wisely, but also delivering that energy in a reliable, efficient and environmentally sound way.

The Pacific Northwest leads the nation with innovative transmission approaches, including non-wires solutions. This region has a strong history of "mining" energy efficiency, which is the second largest resource behind hydro electricity.

Utility executives, policy makers, environmentalists, implementers and experts from around the region and the nation will explore innovative ways energy efficiency and transmission adequacy can help maintain the reliability of the electric system and the quality of the environment at the September 28-29, 2004, symposium, "Energizing the Northwest, Today and Tomorrow," hosted by the Bonneville Power Administration.

The event will be held on the banks of the region's premier renewable resource, the Columbia River, at the DoubleTree Hotel, Jantzen Beach in Portland, OR. The symposium will focus on system reliability and environmental stewardship through energy efficiency, two key values shared by many in the Northwest.

Transmission topics will include:

- System adequacy
- Progress in non-wires solutions planning and implementation
- Idea-sharing for regional collaboration
- Technology and innovation

Energy efficiency topics will include:

- Current and future regional acquisition and infrastructure programs
- EnergyWeb and GridWise™
- Technologies
- Education
- Implementation
- Policies and more.

Presentations will consist of special speakers, panels and concurrent sessions to engage regional stakeholders on these important issues. A tradeshow will showcase non-wires solutions, transmission and energy efficient technologies, products and service providers. Attendees will find the products and services they need to get the job done. The schedule includes exclusive time to visit the exhibits.

For more information, please contact Jennifer Eskil at 509-527-6232 or jleskil@bpa.gov or visit www.bpa.gov/corporate/education/Conferences_and_Events/Energizing_The_Northwest/index.cfm.

Army Completes Advanced Combined Heat and Power Plant

A ribbon cutting ceremony is planned for July, 2004, to celebrate the successful collaboration among the U.S. Army at Fort Bragg, DOE's Office of Distributed Energy (DE), private industry and FEMP, to complete a new combined heat and power (CHP) plant. The project illustrates the value of a "packaged integrated energy system" and will reduce operating costs while improving energy efficiency and security. The CHP system includes a 5.5 megawatt gas combustion turbine with dual fuel

capability; it can switch, on the fly, from base operations using natural gas to #2 fuel oil in the event of an emergency. Turbine exhaust fires an absorption chiller that produces up to 1,000 tons of chilled water or to fire a heat recovery steam generator that can produce up to 80,000 pounds of steam per hour. System efficiency is expected to approach 80 percent. The large turbine that drives the CHP plant plays a key role in improving Fort Bragg's abilities to manage electric demand and operate in an island mode

(e.g. in the event of a prolonged outage on the main utility grid). Costs were shared between DOE-DE (through Oak Ridge National Laboratory) and Fort Bragg which obtained financing through an Energy Savings Performance Contract with Honeywell.

For more information, contact Jerry Kaylor, Fort Bragg Energy Manager at 910-396-6369 or Kaylorj@bragg.army.mil; or Kirby Wilcher, ORNL, at 805-574-0429 or wilcherk@ornl.gov.

Let Us Send You *FEMP Focus* Via E-mail

FEMP Focus is now available to you by e-mail! More than 800 people receive the *FEMP Focus* electronically, and you can too. When you sign up for the e-mail newsletter, your copy of the *Focus* goes to your e-mail address and you will no longer receive the printed version. Some of the benefits of switching to an e-mail subscription include more timely delivery and sharper graphics and photos. Since less paper and ink are used for the *Focus*, you'll help save energy, money, and valuable natural resources.

If you are interested in *FEMP Focus* via e-mail, visit www.eere.energy.gov/femp/newsevents/fempfocus.cfm. As always, the *Focus* is complimentary to subscribers.



FEMP Contacts

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