

# FOCUS

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

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*“The benefits are far reaching. We have eliminated emissions of all pollutants from conventional electricity. . .”*

– Tom Denslow  
Energy Manager  
Dyess Air Force Base

## Dyess Air Force Base 100 Percent Powered by Pollution-Free Wind Power

On January 1, 2003, Dyess Air Force Base (AFB), Texas, became the largest consumer of renewable electricity at a single site in the nation. The supply contract issued by the Defense Energy Support Center (DESC) provides 100 percent wind-generated electricity making all of the base’s electrical power pollution free. The Dyess purchase will result in approximately 80 million kilowatthours of wind energy generated annually, enough electricity to power an estimated 8,000 homes for a year.

The agreement makes the base the largest single institution in the United States to become fully powered by the wind. Because of the base’s size—about 4 million square feet—and its yearly power consumption, the purchase represents more than 20 percent of the Federal government’s procurement of renewable power. This single wind power procurement allows the entire Air Force Air Combat Command, 19 bases in all, to fulfill Executive Order 13123, which requires Federal agencies to use the equivalent of 2.5 percent of electricity from new renewable energy sources by FY 2005 and to reduce greenhouse gas emissions by 30 percent by 2010.

The wind energy will be supplied by Texas-based TXU Energy through a 2-year, \$1.5 million conversion of the existing contract to 100 percent renewable energy.

*continued on page 6*



*Dyess AFB’s 7th Civil Engineer Squadron (left to right): Dave Peterson, Larry Gordon, Second Lieutenant Matt Zimmerman, Major Mark Zimmerhanel, Second Lieutenant Courtney Zimmerman, Staff Sargent Brad Yosten, First Lieutenant Matt Olijnek, Lieutenant Colonel Darren Daniels, Captain George Franklin, and Tom Denslow at the Trent Mesa Wind Farm.*

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*... and more!*

**FEMP Focus Interview – see page 16.**

**John Howard, Federal Environmental Executive,  
Promotes Sustainable Environmental Stewardship**



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

## The Director's Column

Renewable energy and sustainable building projects are featured in this issue of the *FEMP Focus*. These topics are always important, but we highlight them while we reflect on Earth Day, as they are important elements in protecting the environment.

We also bring you the first of what we hope is a series of interviews with key executive level managers and other energy champions. This interview series begins with John Howard, the Federal Environmental Executive. We at FEMP value his comprehensive view of issues related to energy and the environment for Federal facilities and others, and welcome his new focus on sustainable buildings.

I am very pleased to highlight the substantial progress that Federal agencies have made using renewable energy in the past year. This issue highlights renewable energy purchases, on-site renewable energy systems, and forward thinking by agencies like the Department of Defense and the Department of the Interior's Bureau of Land Management. We also feature a variety of renewable resources and technologies and types of projects. The new solar projects at the White House represent the Administration's approach of leading by example. The small but effective guard building at DOE's National Renewable Energy Laboratory demonstrates that renewable energy can solve security problems, improve power reliability, and cost less than a traditional solution. And several of these projects have been financed through energy savings performance contracts and utility energy services contracts. These examples show we are making substantial progress using renewable energy resources. As Secretary of the Interior Gale Norton says in the article regarding the development of renewable energy on Bureau of Land Management lands: "We must explore ways to better capture the sun's light, the sky's winds, the land's bounty, and the earth's heat to provide energy security for America's families."

Sustainable buildings, or high performance buildings, provide an important way to integrate energy efficiency and renewable energy with other environmental objectives in new construction. The articles in this issue show some of the successful projects and methods for achieving and documenting these relatively new ideas.

I am pleased that FEMP can showcase these success stories and thank all the champions in the Federal government, and our partners outside of government, for all their hard work in bringing these exciting projects to fruition. Please know that FEMP is ready to assist you with information, training, renewable energy purchases, design support, technical assistance, and financing options to help your agency or site move toward an environmentally clean and secure energy future. To get started, call your DOE Regional Office FEMP Representative (see page 31) or take a look at FEMP's renewable energy web site at [www.eere.energy.gov/femp/techassist/renewenergy.html](http://www.eere.energy.gov/femp/techassist/renewenergy.html).

— Beth Shearer, Director  
Federal Energy Management Program

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## Federal Agencies Nearing Halfway Mark to Federal Renewable Energy Goal

There is good news about renewable energy use in the Federal government. As of February 2003, Federal agencies are using almost 663 gigawatthours of new renewable energy, almost halfway to the 1,384 gigawatthours needed to reach 2.5 percent of Federal electricity consumption by 2005.

Total Federal renewable energy has almost doubled from the 362 gigawatthours reported in September 2002. Notable gains include the National Aeronautics and Space Administration's new landfill gas project in Maryland that accounts for the equivalent of 108.5 gigawatthours (370 billion Btu) of biomass thermal contribution shown in the table and pie chart below. This is a preliminary estimate of the output of the plant since it only has limited operating experience. Biomass transportation fuels—E85 (85 percent ethanol) and biodiesel—increased from the equivalent of 10 to 18 gigawatthours from the last report.

The other big success is renewable energy purchases and purchases of renewable energy credits, which increased from 127 gigawatthours to more than 310 gigawatthours (equivalent to 310 million kilowatthours). Most of this green power is generated from wind turbines. Government demand for wind power through renewable power purchases is booming. The Department of Defense alone has more than 19 agreements to purchase renewable energy or renewable energy credits, totaling more than 215 gigawatthours annually. The Air Force is also considering installation of additional wind turbines in the Azores, adding to total wind power generation.

Photovoltaic (PV) and solar thermal systems continue to increase, including the 750-kilowatt PV system at Naval Base Coronado in California that was partially financed by a Super Energy Savings Performance Contract. The U.S. Coast Guard and the Departments of the Navy and the Army are steadily developing a full complement of solar water heating systems in Hawaii. There are now approximately 3,400 Federal solar roof systems, including a new PV system and a solar water heating system installed by the National Park Service on the White House grounds in Washington D.C. The goal for 2010 is the installation of 20,000 solar roofs.

There is more good news on the way. Several hundred solar water heating systems planned for Hawaii are expected to be completed in 2003. New data on geothermal heat pump (GHP) installations will be analyzed and added to the Federal renewable energy total. GHP installations are taking off thanks to DOE's GHP technology-specific Super Energy Savings Performance Contract—a substantial increase in renewable energy levels is expected. Applications for the development of renewable energy projects on Federal lands are being facilitated by the Department of the Interior. The resulting projects may be installed in time to contribute toward the goal for 2005.

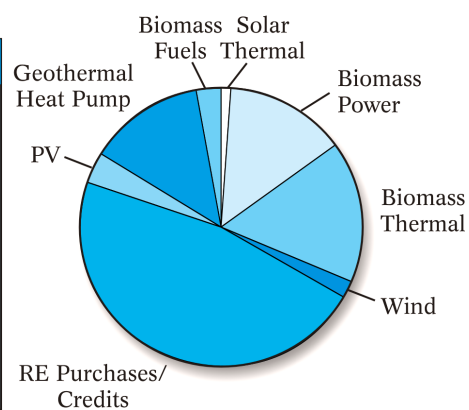
Federal agencies have reported even more renewable energy usage on their FY 2002 Federal Energy Management Scorecards. A detailed analysis of the scorecards and background data is currently underway to ensure that all projects meet the criteria for qualifying towards the goal. So the current Federal renewable energy count is conservative.

It is important to note that the renewable energy total of 663 gigawatthours only counts renewable energy from projects or power purchases that were signed after 1990, because the intent of Executive Order 13123 was to encourage the use of new renewable energy. Pioneering projects like the COSO Geothermal Plant at China Lake Naval Weapons Station in California and Keflavik Air Force Base in Iceland have been using large amounts of renewable energy since the 1980s. There are also many small biomass projects and thousands of solar systems that agencies installed before 1990. While they cannot be counted toward the 2.5 percent renewable energy goal, they certainly paved the way for today's renewable energy projects and have been making a steady contribution to our energy security and environment for nearly 20 years.

For more information, please contact Anne Crawley of FEMP at 202-586-1505 or [anne.crawley@ee.doe.gov](mailto:anne.crawley@ee.doe.gov).

**Current Federal Use of Renewable Energy Technologies**

| Technology                              | Gigawatthours |
|---|---------------|
| Renewable Energy (RE) Purchases/Credits | 310.9         |
| Biomass Thermal                         | 108.5         |
| Biomass Power/CHP                       | 92.5          |
| Geothermal Heat Pump                    | 88.8          |
| Photovoltaics (PV)                      | 23.5          |
| Biomass Fuels                           | 18.0          |
| Wind                                    | 14.1          |
| Solar Thermal                           | 6.5           |
| <b>Total Generation Estimate</b>        | <b>662.8</b>  |



## White House Installs Three Solar Energy Systems

Three new solar electric systems have recently been deployed on the grounds of the White House. The National Park Service (NPS), which manages the grounds and other elements of the White House complex, installed a 9-kilowatt, rooftop solar electric (photovoltaic) system, as well as a solar thermal system that provides domestic hot water for the complex's maintenance building. In addition, a solar thermal system was installed on the roof of the swimming pool cabana.

During August 2002, the White House had 167 photovoltaic panels (EC-51 watt modules) installed on the roof of the NPS grounds maintenance building on the southwest corner of the White House grounds. Three 2,500-watt Sunny Boy inverters convert the DC electricity into AC power which is fed into the White House grounds distribution system, supplementing the complex's power supply and providing electricity wherever it is needed. The American-made solar panels were manufactured by Evergreen Solar, Inc. of Marlborough, Massachusetts.

A residential-scale solar water heating system for domestic hot water was positioned on an adjoining roof section of the maintenance building. This system, comprised of a 4x8 foot-flat-plate collector, manufactured by SunEarth, Inc. of Ontario, California, was installed using a typical stand-off mount in a drain-back configuration. The third project is a five-panel, building-integrated solar hot water system on the White House cabana next to the swimming pool. This system is integrated into a lead-coated, standing seam copper roof. The inset design of the panels provides a relatively flush profile. The hot water produced by the solar-water system provides domestic hot water for the cabana, with all of the extra energy going into the outdoor pool. The absorber plates for these panels were made by SunEarth, but the rest of the system was site-manufactured to improve integration with the roof.

*“Installing solar panels at the White House is yet another example of President Bush’s personal stewardship commitment.”*

– John Howard  
Federal Environmental Executive

The NPS, which administers portions of the White House complex, worked with Solar Design Associates, a Boston-based firm, to install the systems. “We believe in these technologies, and they’ve been working for us very successfully,” said James Doherty, the architect and project manager at the NPS Office for White House Liaison. “The National Park Service as a whole has long been interested in both sustainable design and renewable energy sources. We also have a mission to lower our energy consumption at all our sites, and we saw an opportunity to do both at the White House grounds.” John Howard, the Federal Environmental Executive, said “Installing solar panels at the White House is yet another example of President Bush’s personal stewardship commitment.”

*For more information, please contact James Doherty of NPS at [jim\\_doherty@nps.gov](mailto:jim_doherty@nps.gov).*

*“The National Park Service as a whole has long been interested in both sustainable design and renewable energy sources. We also have a mission to lower our energy consumption at all our sites, and we saw an opportunity to do both at the White House grounds.”*

– James Doherty  
Architect and Project Manager  
NPS Office for White House Liaison

# DOD Evaluates the Renewable Resource Potential of Military Sites

Recently, the U.S. Congress directed the Department of Defense (DOD) to assess the potential for the development of renewable energy resources on DOD-controlled lands, as well as the cost-effective purchase of renewable power. DOD occupies more than 400 installations on more than 25 million acres in the United States. DOD's interest in obtaining secure power supplies through private industry has been renewed, and commercial power developers are interested in exploring renewable resources on DOD-controlled lands.

DOD's renewable energy assessment is a joint-services program with the U.S. Air Force leading the evaluation. The assessment will focus on installation-based power production from geothermal, wind, and solar resources. Studies are underway to review the Military's large pool of installations and facilities, and assess the commercial viability of each renewable resource. The Department of the Navy is evaluating the on-site potential for solar and geothermal development, and the Air Force will assess the potential for wind resource development. Independent renewable energy industry consultants are members of each technical study team, assisting with site and technology evaluations. DOD is providing a platform for resource development should private energy developers provide development financing.

The Services resource study teams are identifying DOD installations that are compatible with each renewable resource and evaluating the level of the installation's potential for on-site development by reviewing:

- the current and future mission of the installation,
- the base's mission critical operations,
- the base's electricity requirements,

*“Due to large military power requirements, and the growing recognition of the value of secure power, DOD's renewable energy assessment takes several steps beyond traditional agency mapping, evaluating how much power and which locations can securely provide renewable energy resources.”*

*– Dr. Get W. Moy, P.E.  
Director of Utilities and Energy Use,  
Office of the Deputy Under Secretary of Defense for Installations and Environment*

- any operational issues, and
- other Military and economic factors.

The restructuring of Military missions may result in the exclusion of some DOD sites, or increase a site's potential. Many National Guard and Reserve installations are co-located with civilian properties, such as commercial airports, introducing technical, land use compatibility, and other issues.

The objective of the resource evaluation is to generate a list of DOD installations with the highest potential for renewable resource development that are compatible with mission requirements. Sites with the best development potential will be selected for creating a “business case” for renewables development. Emissions and energy security benefits will be factored into the business case analyses as well.

The studies are expected to support a “good business practices” strategy for DOD development and procurement of renewable resources. “Due to large military power requirements, and the growing recognition of the value of secure power, DOD's renewable energy assessment takes several steps beyond traditional agency mapping, evaluating how much power and which locations can securely provide renewable energy resources,” said Dr. Get W. Moy, P.E., Director of Utilities and Energy Use, Office of the Deputy Under Secretary of Defense for Installations and Environment.

Additional analyses of legal, regulatory, and institutional barriers to develop renewable resources on DOD sites will also be identified. The assessment, due to Congress in summer 2004, will serve as a “roadmap” for DOD to cultivate on-site renewable power projects and/or purchase renewable power.

*For more information, please contact Gueta Mezzetti of DOD at 703-604-4306 or [gueta.mezzetti@pentagon.af.mil](mailto:gueta.mezzetti@pentagon.af.mil).*

# Defense Energy Support Center Facilitates Renewable Power Purchases

The Defense Energy Support Center's (DESC's) mission is to provide the Department of Defense (DOD) and other government agencies with comprehensive energy solutions in the most effective and economical manner possible. DESC is taking an active role in Federal renewable power purchases by routinely including requests for prices on renewable power in their competitive electricity market solicitations. Both the U.S. Air Force and DOE have requested that DESC seek renewable power pricing when soliciting for competitive electricity for their facilities. The result is that DESC asks for renewable power pricing in almost all their electricity solicitations.

Recently, DESC awarded a 2-year contract to BP that will provide between 5 to 10 percent renewable power to four Department of the Navy installations and three U.S. Air Force Bases in Texas, for a total of 29.5 million kilowatthours per year (see table for details). In addition, DESC assisted with the contract modification resulting in Dyess Air Force Base's purchase of 80 million kilowatthours of wind power (see article on the cover page). "Our customers' need only contact us, we are glad to assist them with their purchase of renewable power products," said John Nelson of DESC. The recent purchases by the DOD in Texas have clearly established the DOD

as a leading purchaser of renewable energy in Texas and the Nation, once again demonstrating Federal leadership by example.

The recent Texas purchases however were not the first renewable energy purchases by DESC. In 2002, DESC contracted for renewable energy on behalf of the Department of the Army in Washington, D.C. and the National Aeronautics and Space Administration (NASA) in Texas. Through a supply agreement with Washington Gas Energy Services, Inc., more than 8 percent of the electricity needs of the Army's Fort McNair, Walter Reed Army Medical Center, and Adelphi Laboratories are being generated by a combination of wind power and landfill gas through the end of 2004. (See "Army Shows Renewable Energy Leadership in the Nation's Capital," *FEMP Focus*, November 2002.) For NASA's Johnson Space Center, TXU Energy will provide 10 million kilowatthours of renewable power.

*For more information or assistance with a renewable power purchase, please contact John Nelson of DESC at 703-767-8153 or john.nelson@dla.mil.*

| Air Force and Navy Renewable Power Purchases in Texas |               |
|---|---------------|
| Facility  | Kilowatthours |
| Navy - Corpus Christi Naval Air Station               | 6.6 million   |
| Air Force - Shepherd AFB                              | 6.4 million   |
| Navy - Reserve Facility                               | 6.0 million   |
| Air Force - Laughlin AFB                              | 4.2 million   |
| Navy - Ingleside Naval Shipyard                       | 2.4 million   |
| Air Force - Goodfellow AFB                            | 2.2 million   |
| Navy - Kingsville Naval Air Station                   | 1.7 million   |

## DYESS AIR FORCE BASE 100 PERCENT POWERED BY POLLUTION-FREE WIND POWER (continued from page 1)

Dyess is offsetting the extra cost of the wind power with savings realized in the state's competitive retail electricity market. The wind power provided by TXU Energy will be in addition to any wind power purchased by TXU as a result of state renewable portfolio standards. DESC conducted the original electricity solicitation about a year ago, and assisted with the contract modification. The base will receive electricity from six wind farms throughout Texas, including the Trent Mesa Wind Project, 25 miles west of Dyess.

"The benefits are far reaching," Tom Denslow, Dyess AFB's energy manager. "We have eliminated emissions of all pollutants from conventional electricity—negating the production of more than 105 tons of nitrogen oxide, 152 tons of sulfur dioxide, and 58,000 tons of carbon dioxide per year. Further, it sets Dyess in front of all the rest of the Federal government and sets the bar for the rest to follow." Through the

purchase, Dyess demonstrates Federal leadership by example by supporting the President's National Energy Policy goals for increasing America's use of clean renewable energy, promoting energy security through the development of new domestic energy sources, and supporting the President's call for voluntary reductions in greenhouse gas emissions.

Dyess also became the first Air Force Base to join the Environmental Protection Agency's Green Power Partnership, a voluntary program that assists organizations procuring renewable power. The base is the largest site in the partnership to make a 100 percent commitment to renewable energy. Over the last several years, Dyess has been a recipient of the Federal Energy and Water Management Awards for its dedication to the use of energy-efficient lighting and heating systems and water-conservation technologies.

*For more information, please contact Tom Denslow of Dyess AFB at 915-696-5628 or george.denslow@dyess.af.mil, or John Nelson of DESC at 703-767-8153 or john.nelson@dla.mil.*

## PNNL Makes Significant Purchase of Wind Power

In response to a challenge from Energy Secretary Spencer Abraham to increase Federal agency procurement of green power, DOE's Pacific Northwest National Laboratory (PNNL) completed a purchase of 8.8 million kilowatthours of power generated from the Stateline Wind Energy Center. The purchase agreement was made on October 1, 2002 through the City of Richland, Washington, for a 1-year period and includes an option for delivery for 2 additional years.

The Stateline wind power facility, owned by FPL Energy, straddles the Washington-Oregon border and is located 23 miles west of Walla Walla, Washington. The site's wind turbines began supplying renewable power in July 2001. The 50-square-mile wind farm consists of 399 turbines arranged in numerous "strings," located entirely on private farmland, with 273 turbines in Washington and 126 in Oregon. The facility's 660-kilowatt V47 turbines were manufactured by Vestas American Wind Technology, Inc. Agricultural activities, such as dryland wheat and cattle grazing, take place directly adjacent to the access roads and foundation pads of the turbines.

An additional 90 turbines have been permitted and are being installed. In addition, FPL Energy has applied for a permit to add 177 turbines in the Oregon portion of the wind farm.

With this purchase, more than 13 percent of the energy PNNL needs to operate its research Laboratories and offices is now being met by renewable energy sources, making the Laboratory one of the leaders



*PNNL receives more than 13 percent of the energy it needs to operate its research Laboratories and offices from wind power.*

in the Federal sector for the use of "green energy." This purchase also will diversify the region's electricity portfolio and continue to stimulate a new energy economy in the Pacific Northwest region. The large purchase of wind power also paved the way for the City of Richland to launch a green energy program so current electric customers can purchase green energy for a small premium.

Dr. Raymond Orbach, Director of DOE's Office of Science, which oversees PNNL, announced the purchase while visiting PNNL for the annual review of program activities. Richard Moorner, DOE Deputy Assistant Secretary for Technology Development, Office of Energy Efficiency and Renewable Energy, joined Orbach in making the announcement in Richland.

"With this purchase, PNNL is showing it supports the President's energy strategy and that it is a national leader in boosting renewable energy and energy efficiency," Orbach noted. "At the same time, PNNL is promoting the growth and success of an up-and-coming Northwest industry and again is partnering with local and regional energy providers."

*For more information, please contact Mike Moran of PNNL at 509-372-2680 or [mike.j.moran.jr@pnl.gov](mailto:mike.j.moran.jr@pnl.gov).*

# NREL Uses Distributed Renewable Energy Systems to Meet Facility Security Functions and Save Money

Renewable energy is saving DOE's National Renewable Energy Laboratory (NREL) power and money in both the initial construction costs and the ongoing operation of its site entrance building at the National Wind Technology Center's (NWTC's) site entrance building in Golden, Colorado. Project engineers were able to integrate energy-efficient and renewable energy features into the project so that no additional utility infrastructure was needed. The result is a building that reduces utility costs by more than 50 percent, provides more secure uninterrupted power for security functions, and cost less to build because the infrastructure did not need to be upgraded.

To enhance security, NREL recently constructed NWTC's site entrance building to control access to the site, but the structure's existing power line could not provide enough power to operate a typical building and its monitoring equipment. The solution is a building that uses energy very efficiently, incorporates passive solar design, and uses renewable energy to supplement the shortfall of the existing utility line. This solution cost less to build than upgrading the utility line. Using NREL-developed technologies, the project's engineers used energy-efficiency and renewable energy features to manage the existing available power and provide supplemental power to the building. The 16x10-foot site entrance building uses passive solar design and solar electricity integrated into the roof to significantly reduce utility costs. In addition, distributed renewable generation improves security by providing uninterrupted power in the event of a conventional power outage.

The building's energy-saving features include:

- daylighting,
- overhangs for summer shade control,
- natural ventilation,
- energy-efficient windows,
- high-efficiency lighting with automatic dimming and motion sensor control,
- trombe wall for passive solar winter heating,
- energy-efficient computers and appliances,
- good thermal envelope,
- high thermal mass building,
- heat-pump for heating and cooling without resistance backup,
- simplified controls with outdoor temperature lockout,
- 768-watt grid-tied photovoltaic (PV) system with battery backup,
- 1,000-watt wind turbine, and
- capability for expansion with both PV and wind.

The building's PV/wind turbine system consists of 12 Uni-Solar, 64-watt PV panels, and a 1-kilowatt Bergey XL.1 wind turbine on a 30-foot tilt-up-tower. The PV/wind turbine system is connected to a Trace inverter, and to four deep-cycle, sealed gel cell 130Ah batteries.

These renewable technologies not only reduce the electricity used from the grid, but also send excess electricity back to the grid. A Southwest Windpower H40 900-watt wind turbine will soon be added to provide additional power to the building and will help the structure become a near "zero-energy building," a building that generates as much power as it uses. NREL is monitoring and analyzing the building to track its performance.

*For more information, please see [www.nrel.gov/buildings/highperformance/nwtc\\_seb.html](http://www.nrel.gov/buildings/highperformance/nwtc_seb.html). For additional information, please contact Otto VanGeet of NREL at 303-384-7369 or [otto\\_vangeet@nrel.gov](mailto:otto_vangeet@nrel.gov), or Paul Torcellini of NREL at 303-384-7528 or [paul\\_torcellini@nrel.gov](mailto:paul_torcellini@nrel.gov).*



*(above) The passive solar design of the National Wind Technology Center's site entrance guard post reduces lighting loads in the building.*



*The National Wind Technology Center's site entrance guard post uses passive solar design and roof-integrated solar electricity to significantly reduce utility costs for the building.*



## The Pentagon Aggressively Deploys Multiple Renewable Energy Systems

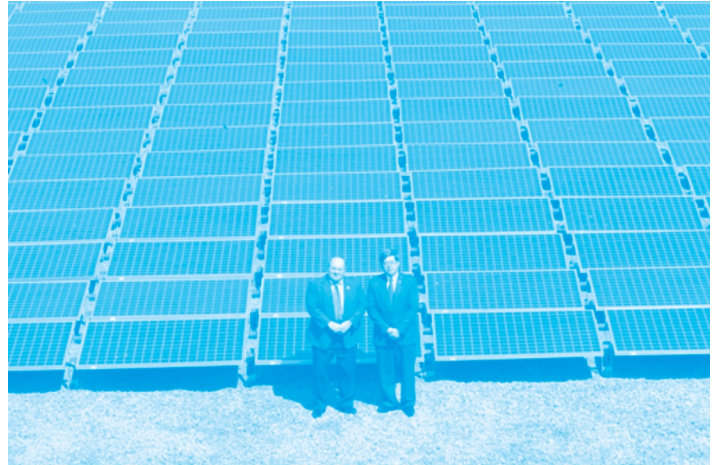
The Pentagon Reservation Solar and Hydro Energy Farm has expanded its renewable energy capacity. With the recent installation of a 70-kilowatt photovoltaic (PV) array, the 3rd phase of the Pentagon's PV deployment is in place. The Pentagon's newest PV installation, located at the Pentagon Heating and Refrigeration Plant (HRP) is producing more than 106,690 kilowatthours annually.

The 70-kilowatt PV system features ultra-high efficiency, 315-watt PV modules from RWE Solar/ASE Americas of Billerica, Massachusetts. The panels are 5 percent more efficient than the 300-watt PV modules deployed in earlier phases of the project. A total of 276 modules have been installed in 23 rows of 12 modules per row. Tilt-angle modules were chosen to minimize row-to-row separation, allowing greater power density to be achieved at the site. The DC capacity of the array is 87 kilowatts.

The system's multiple distributed small inverters will be used to provide protection against loss of power due to a single inverter fault. A total of 46 SMA1800 inverters with 6 modules have been installed. The inverters will be mounted on wall sections to be constructed at the north end of the array field. This wall of inverters allows convenient viewing of the status of each subsystem and simplifies system troubleshooting and maintenance in the future. Pentagon Energy Manager Bob Billak said, "The Department of Defense continues to step out decisively as a leader utilizing renewable resources at DOD facilities. Our goal for the Pentagon Reservation Solar and Hydro Energy Farm is to increase the PV capacity of the facility to more than 120 kilowatts."

The Pentagon has also completed a 76-kilowatt solar-thermal system consisting of 1,080 Thermomax Vacuum Tubes on the Pentagon's mechanical roofs. The unique design of the system integrates solar arrays directly into the facility's existing domestic hot water recirculating system. The Pentagon's new solar-thermal system provides domestic hot water using evacuated tube collector technology to supplement the Pentagon's existing domestic hot water recirculation loops during daytime hours.

Another recent Pentagon installation is a solar thermal tile system, manufactured by American Solar, which uses high-temperature metal absorbers to drive an air conditioning system activated by solar heat. The technology uses centuries old slate



*(left to right) Bob Billak, Energy Manager, Pentagon, and Dr. Get Moy, P.E., Director of Utilities and Energy Use, Office of the Deputy Under Secretary of Defense for Installations and Environment, in front of the Pentagon's newly installed 70-kilowatt photovoltaic array.*

and tile roofing techniques to install translucent tiles over corrugated metal solar absorbers. Solar energy passing through the tiles heats absorber plates. Air moved through the system and across the painted absorbers becomes heated to as much as 190 degrees Fahrenheit.

A fourth system in development, an intake/outfall energy recovery turbine system, utilizes discharge water from the Pentagon's HRP to generate electricity. The system, which is expected to be completed by December 2003, takes advantage of the HRP's outfall discharge rate of more than 30,000 gallons of water per minute. This structure will concentrate discharge water flow through two parallel turbines into a second set of parallel turbines. A 60-inch valve will regulate discharge flow for the turbines and the turbines will use a gearbox to drive generators that produce power at 4,160 volts.

The system's total available horsepower at a flow rate of 30,000 gallons per minute will be 288 horsepower. The net anticipated power generated, with an equipment efficiency of 70 percent, is 204 kilowatts resulting in an annual cost savings of \$98,290 and life-cycle savings to the DOD of more than \$4.1 million.

*For more information, please contact Bob Billak of the Pentagon at 703-695-7909 or [rbillak@ref.whs.mil](mailto:rbillak@ref.whs.mil).*

# FEMP's BAMF Program Expands Landfill Gas-to-Energy Industry into the Federal Sector

For decades, the private sector has been capturing methane released from landfills and making beneficial use of landfill gas (LFG) as an inexpensive fuel for heat and power applications. FEMP's new Biomass and Alternative Methane Fuels Super Energy Savings Performance Contracts (BAMF Super ESPCs) enable Federal agencies to participate in LFG-to-energy projects even when the landfill is not on Federal property.

## The Potential of the Resource

The U.S. Environmental Protection Agency's (EPA's) Landfill Methane Outreach Program estimates that there are more than 300 landfills in the United States where the methane is captured and put to beneficial use. More importantly, there are at least 600, and perhaps up to 1,700, additional landfills that may be good candidates for economical LFG-to-energy projects.

A resource assessment, using the higher estimate, developed for FEMP by DOE's National Energy Technology Laboratory, identified more than 1,200 large (over 100,000 square feet) Federal facilities that are within 15 miles of at least one "candidate" landfill (i.e., a landfill without an active landfill gas project). Nearly 500 of these Federal facilities are within 5 miles of a candidate landfill—well within the limits to keep costs for

pipng LFG low enough to make its use economical. Although most projects limit piping to less than 10 miles, that distance can be extended to 20 miles, depending on the output at the landfill and the energy load at the end use.

Landfills begin producing methane as soon as 6 months after they begin operations, and many of the landfills identified in the FEMP and EPA studies will be capable of producing LFG for more than 20 years after site closure. A rule of thumb for estimating gas volume is that 1 million tons of municipal solid waste typically yields about 300 standard-cubic-feet per minute of collectible landfill gas—enough to deliver approximately 800 kilowatts of electricity.

## Applications

More than 1,000 megawatts of electricity are produced from over 200 LFG-to-energy projects now in operation. Additionally, more than 100 projects are delivering useful thermal energy, either directly, or as a by-product of electricity generation. A wide range of systems including internal combustion engines, diesel generators, microturbines, and other technologies can use LFG to produce electricity, and most boilers are easily reconfigured to burn LFG to produce hot water or steam.

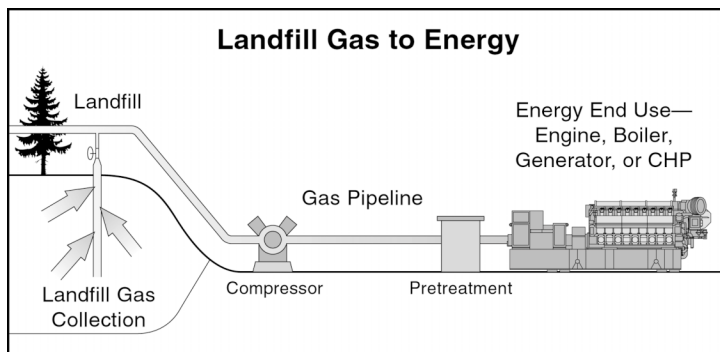
The caloric value of LFG is about 500 Btu per cubic foot, or roughly one-half of natural gas. At some locations the LFG is conditioned to increase its Btu content to bring it up to pipeline quality.

See the article in this issue describing NASA Goddard Space Flight Center's new LFG project for a description of the kind of LFG project that can be implemented using this technology. The NASA Goddard project was financed under a utility contract, the technology and the potential cost effectiveness of this LFG energy recovery project is profiled on page 12.

## Benefits of LFG and the BAMF Super ESPC

Under the BAMF Super ESPC, agencies can partner with prequalified, competitively selected energy service companies (ESCOs) and use an expedited contracting process to implement projects quickly, avoiding the uncertainty and delay of depending on appropriated funding. The ESCO arranges financing for project development, equipment, and installation, and the debt is paid back over time from the guaranteed cost savings generated by the project. FEMP's experienced project facilitators can guide the agency through the entire process, providing expert consultation and assistance with technical, contractual, and financial aspects of the project. For more information about ESPCs, see FEMP's web site at [www.eren.doe.gov/femp/financing/escp.html](http://www.eren.doe.gov/femp/financing/escp.html).

In a typical BAMF LFG project, the ESCO builds a pipeline from the landfill to the Federal facility and then installs or



*More than 1,000 megawatts of electricity is now produced from LFG in the United States, and FEMP has identified nearly 500 Federal facilities within 5 miles of landfills that are good candidates for economical LFG-to-energy projects.*

*continued on next page*

**FEMP'S BAMF PROGRAM  
EXPANDS LANDFILL  
GAS-TO-ENERGY INDUSTRY  
INTO THE FEDERAL SECTOR**  
*(continued from previous page)*

reconfigures the end-use-equipment to utilize the resource. LFG-to-energy projects can bring immediate and long-term benefits to Federal facilities:

- Energy cost savings.
- Energy security.
  - When LFG is piped directly to its end use, it provides security from interruptions in the gas and electric grids.
  - For facilities that require back-up or standby electricity generation, LFG systems provide the lowest cost while still accommodating a steady base load.
- Utility cost stabilization — Because the LFG resource is obligated under a long-term contract, LFG systems provide an excellent hedge against fluctuations in fuel and electricity prices.
- Environmental benefits — Significant reductions in greenhouse gas emissions. (The methane from landfills is 21 times more harmful to the atmosphere than carbon dioxide.)
- Progress toward Federal goals for the use of renewable energy.

*Is there a LFG-to-energy opportunity in your backyard? For more information about implementing an LFG-to-energy project using the BAMF Super ESPC, please contact your FEMP Regional Office Representative (see the list of DOE Regional Offices on the contacts page of the FEMP Focus). For additional information, please contact Christopher Abbuehl, National Program Representative for the BAMF Super ESPC, at 215-656-6995 or christopher.abbuehl@ee.doe.gov; Steve Cooke, BAMF Technical Lead, at 304-285-5437 or steve.cooke@netl.doe.gov; or Danette Delmastro, FEMP BAMF Team Lead, at 202-586-7632 or danette.delmastro@ee.doe.gov. Also see EPA's Landfill Methane Outreach Program web site at [www.epa.gov/lmop](http://www.epa.gov/lmop).*

# Your Alternative Financing Questions Answered

**Are there alternative financing vehicles that can help Federal agencies finance projects to take advantage of renewable resources to cut energy costs?**

Technology-specific Super Energy Savings Performance Contracts (ESPCs) give Federal agencies ready access to quality sources of expertise and financing for four technology families: biomass and alternate methane fuels (BAMF), geothermal heat pumps (GHPs), photovoltaics (PVs), and solar thermal concentrating systems.

FEMP's BAMF Super ESPC program is designed to reduce energy use, manage utility costs, and promote the use of renewable energy at Federal facilities. The five ESCOs awarded contracts under the BAMF Super ESPC competitive solicitation each have substantial experience in implementing energy-efficient, cost-effective BAMF projects, and can help you determine which BAMF resources are best suited to meet your facility's specific needs.

FEMP's GHP, PV, and solar thermal concentrating technology-specific Super ESPCs, also help agencies take advantage of renewables. Since 1998, when FEMP initiated its technology-specific GHP Program and awarded prime contracts, U.S. government facilities' investment in GHP technology has skyrocketed. GHP Super ESPCs, under which GHP ESCOs and Federal sites partner to develop, finance, and implement projects, are just one component of the overall GHP program. Several utilities are also partnering with their Federal customers using utility energy service contracts for GHP projects, and some facilities have appropriations for GHP projects.

To learn more about FEMP's technology-specific Super ESPC programs including PV and solar thermal concentrating system Super ESPCs; as well as technology-specific ESCOs, please see FEMP's web page at [www.eere.energy.gov/femp/financing/escp/technologies.html](http://www.eere.energy.gov/femp/financing/escp/technologies.html).

## **What type of applications can use biomass and alternative methane fuels?**

BAMF resources can be used in a wide variety of applications, including many that are already located at your facility. Potential BAMF projects and applications include boilers, hot water heaters, reciprocating engines, gas turbines, and combined cooling, heating, and power systems. BAMF can also be used to power advanced generation technologies such as microturbines and fuel cells. BAMF can be used to supplant or supplement your existing fuel sources; facilities, for example, can co-fire BAMF with coal or natural gas. Vehicle refueling stations for your facility's fleet using ethanol and other biofuels can also qualify as a BAMF project.

While the economics of a BAMF project may necessitate that your facility is located within a reasonable proximity to a BAMF resource, the BAMF resources themselves do not have to be located on the Federal facility. They can be piped or trucked into your facility.

*What questions do you need answered? FEMP wants to provide the most useful information possible, but we need your help to achieve this! Please submit your questions via e-mail to Tatiana Strajnic of FEMP at [tatiana.strajnic@ee.doe.gov](mailto:tatiana.strajnic@ee.doe.gov).*

## NASA's Goddard Space Flight Center Harnesses the Energy of Landfill Gas

Early this year, the National Aeronautics and Space Administration's (NASA's) Goddard Space Flight Center in Greenbelt, Maryland, became the first Federal facility to heat its facility by burning landfill gas (LFG), a biomass renewable energy, on-site. NASA Goddard is using LFG from nearby Prince George's County's Sandy Hill Landfill in Bowie, Maryland, to fire boilers that produce steam for the Center. The project, the result of several years of coordination and hard work will save NASA Goddard an estimated \$350,000 or more annually in energy costs and benefit the environment by minimizing the use of non-renewable energy sources.

The LFG is transported to the Center through a 5-mile pipeline where it is used in place of natural gas and fuel oil. The LFG provides 100 percent of the facility's heating needs 95 percent of the time, with natural gas serving as the back-up fuel to ensure consistency and flame stability.

The project, completed under a utility services contract with Toro Energy, Inc., modified two boilers in NASA Goddard's central heating plant, upgraded the controls system at the powerhouse, installed the pipeline to transport LFG to Goddard, and constructed a gas treatment facility at Sandy Hill Landfill. Under the contract, NASA Goddard is required to purchase 365 billion Btu of LFG annually over 10 years. This is equivalent to

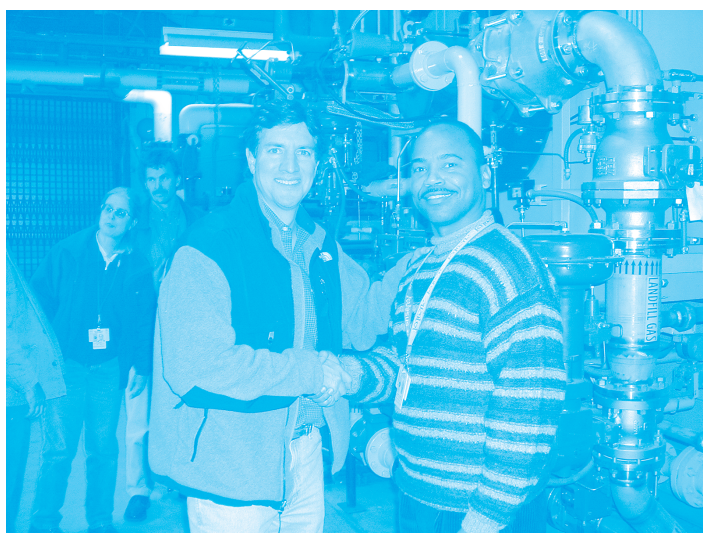
108 gigawatthours toward the Federal renewable energy goal of 2.5 percent of total Federal facility electricity use.

Decomposing trash in landfills naturally and continually produces LFG. Currently, holding approximately 6 million tons of waste, Sandy Hill Landfill has many years of additional landfill receipts. The landfill's gas collection operations have been ongoing at the site for about 14 years with the facility's landfill waste currently generating about 2,300 cubic feet per minute of LFG. Until now, Sandy Hill Landfill operators were capturing the LFG and flaring the gas into the atmosphere, as required under the Clean Air Act. "In addition to NASA Goddard benefitting from the use of the gas, there is the pollution-prevention equivalent of planting 68,000 acres of trees or removing more than 100,000 cars from Maryland's roads," said Barry Green, NASA Goddard Space Flight Center's Energy Manager. "An added benefit is that NASA Goddard has locked in lower gas rates for the next 10 years, reducing the Center's overhead."

Although this LFG project was financed through a utility services contract, it is a great example of the kind of project that can be implemented under FEMP's new Biomass and Alternative Methane Fuels technology-specific Super Energy Savings Performance Contract.

Along with air quality benefits, the use of LFG reduces greenhouse gas emissions and meets the goals of Executive Order 13123, as well as Executive Order 13134, "Developing and Promoting Biobased Products and Bioenergy," which seeks to stimulate the creation and early adoption of technologies needed to make bioenergy cost-competitive in large markets. "This LFG project offers NASA Goddard a cost-effective, clean-energy alternative that will supply nearly 5 percent of the agency's total facilities energy requirement from a renewable energy source," said Rich Wickman, NASA Energy Coordinator. "Using LFG complements NASA's commitment to sustainability by preventing pollution, reducing greenhouse gas emissions, enhancing energy efficiency, and using renewable energy sources."

For more information, please contact Barry Green of NASA at 301-286-7383 or [barry.n.green@nasa.gov](mailto:barry.n.green@nasa.gov), or Rich Wickman of NASA at 202-358-1113 or [richard.a.wickman@nasa.gov](mailto:richard.a.wickman@nasa.gov). For information about implementing a LFG-to-energy project using FEMP's BAMF technology-specific Super ESPC, see the article on page 10. Also see FEMP's web site at [www.eere.energy.gov/femp/financing/espc/biomass.html](http://www.eere.energy.gov/femp/financing/espc/biomass.html) for more information about implementing waste-to-energy projects.



(front left to right) Paul Kaden, Project Manager, Toro Energy, Inc. and Barry Green, Energy Manager, NASA Goddard Space Flight Center in Goddard's Central Heating Plant Boiler Room with landfill gas pipe to the far right.

# Energy is a Terrible Thing to Waste

By John Trotti, *MSW Management*

*Reprinted from the March/April 2003 issue of MSW Management magazine.*

Just returned from the U.S. Environmental Protection Agency's Landfill Methane Outreach Program conference in Washington, D.C., where I listened with genuine astonishment to presentation after presentation that came to the somewhat unexpected conclusion that the future for landfill gas (LFG) is more than good—it's hot.

Keep in mind that these were presentations to landfill owners, energy developers, equipment manufacturers, financial analysts, and regulators who have grown weary watching various governmental bodies hem and haw over how to deal with political, environmental regulatory, and economic issues that have given industry regulars an ongoing case of heartburn. So I think the largely optimistic tone took many by surprise.

Barely halfway into the first morning's agenda, it became clear monumental change was afoot. Pointing the way to things to come were back-to-back presentations by representatives of DOE who outlined alternative energy programs that not only included LFG but proceeded to label the resource the most favorable from several perspectives, including the environment, economic, and—and perhaps the most interesting since it occurred to me that it underlay DOE's appearance at the event—LFG's energy contribution to homeland security.

Chris Abbuehl, national program representative of the Biomass and Alternative Methane Fuels Program (BAMF)—a subset of DOE's Federal Energy Management Program (FEMP)—led off by explaining the programs involved and what DOE expects to accomplish. Points I

feel significant to LFG-to-energy projects are: (1) the complementary aspects of DOE and EPA programs, especially in the applicability of LFG to their critical objectives, (2) the Federal government with its \$10 billion per year energy bill is the nation's largest energy customer, and (3) DOE's Super Energy Performance Contracts (ESPCs) are designed to reduce cost and bring alternative sources to bear on the government's energy needs.

Steve Cooke of DOE's National Energy Technology Laboratory (NETL) in Morgantown, West Virginia, brought the focus home to LFG by presenting NETL's program for identifying potential Federal landfill opportunities throughout the United States using Geographic Information Systems (GIS) to pair up candidate landfills with government facilities. Establishing as selection criteria: (1) size and availability of landfills, (2) end-use capacity of the Federal facilities, and (3) the distance separating them, the GIS identified 1,227 candidate pairs that meet the screening criteria.

The basis for NETL's assessment is that the National Energy Policy goals, bolstered by Executive Order 13134, "Developing and Promoting Biobased Products and Bioenergy," seek to stimulate the creation and early adoption of technologies needed to make bioenergy cost-competitive in large markets. DOE is tasked with providing technical assistance as well as helping resource owners obtain private financing and performance contracts through FEMP's BAMF Super ESPC Program.

Even before the implications of the DOE presentation had fully sunk in, representatives of two manufacturing concerns—S.C. Johnson and General Motors—made them even more indelible

by telling of their companies' success in bringing in gas from nearby landfills to meet their needs. Allow me to paraphrase the mutual and essential messages they conveyed:

- Reducing greenhouse gas (GHG) emissions is good not only for the environment but it adds luster to the corporate image as well.
- Reducing GHG emissions has positive economic value in emissions credits, both in terms of cash and/or as a regulatory relief trading chip.
- LFG is presently price-competitive with traditional fuel sources in many parts of the country and destined to become ever more so in the future.
- LFG provides an enterprise the ability to determine and hold stable long-term fuel costs without regard to fluctuations in commercial fuel prices.
- LFG is a 24-hours-per-day, 7-days-a-week resource.
- LFG provides security from interruption of operations resulting from disruption to commercial fuel delivery activities.

Notice what's going on here. Of the points listed, only the first two are "iffy" or subject to outside acceptance. The last four advantages are "real" with tangible bottom-line value. What's most apparent to me from this is that on both the Federal and private enterprise fronts, LFG is finally being recognized first and foremost for its economic value rather than as an environmental trading chip. However, I think this is only a part of a larger point that there is real and increasing value in the organic fraction of waste that needs to be studied. What's to prevent us from dedicating portions of the wastestream to meet energy needs upstream of landfills? Why, for instance, doesn't it make sense to site transfer stations or materials recovery facilities in the vicinity of candidate businesses or Federal facilities and dedicate a portion of the biomass to serve their energy needs?

*MSW Management articles can be accessed at [www.mswmanagement.com](http://www.mswmanagement.com).*

## Navy Uses Super ESPC to Make Photovoltaic Energy Pay

Already a national leader in energy conservation, the Navy Region Southwest (NRSW) has recently become the proud owner of one of the largest Federal photovoltaic (PV) systems in the nation, demonstrating its commitment to using renewable energy technologies. The 750-kilowatt PV system installed at Naval Base Coronado makes the Navy one of the largest public-sector generators of clean renewable energy in California. The project is also a landmark for DOE's Super Energy Savings Performance Contract (ESPC) Program, as one of the largest renewable energy projects (other than geothermal heat pumps) financed to date under a Super ESPC.

With two contiguous solar arrays consisting of more than 3,000 solar panels and covering approximately 80,000 square feet, the "carport" PV system not only generates power for the base but also provides shade and protection for more than 400 vehicles stored in long-term parking for Navy personnel aboard deployed ships. "Using clean generation is very consistent with our base's mission of leveraging superior operational expertise and technologies," said Commander Pat Rios, Naval Base Coronado Public Works Officer.

The Naval Base Coronado PV energy project was developed by the NRSW Energy Team, which includes representatives of Navy Public Works Center, San Diego; Southwest Division of the Naval Facilities Engineering Command (NFESC); Naval Facilities Engineering Service Center; Engineering Field Division Southwest; and Tetra Tech EM Inc. The project was awarded to NORESKO, through FEMP's Western Regional Super ESPC. The PV system was designed and installed by PowerLight Corporation, a leading manufacturer of grid-connected solar electric systems.



The 750-kilowatt solar electric carport generates power for the Naval Base Coronado while providing more than 400 covered parking spaces for Navy personnel.

Utility- and state-incentive funds and the Department of Defense's commitment to green power together resulted in a simple payback of only 5.8 years for the bundle of energy conservation measures for the base (including rebates and pre-performance payments) and a financed contract term of 10 years for the project. Another important factor in the project's success was the teamwork of NRSW, NFESC, and NORESKO and their mutual determination to deliver technically sound projects with good economics. For example, two large compressor projects brought excellent savings to the bundle of energy conservation measures. The Navy's investment of \$15.5 million for the PV project and five other measures will yield life-cycle cost savings of \$11.7 million after reimbursing the contractor's investment. The project's energy savings will total about 17 billion Btu per year. The PV project on its own had a capital cost of \$7.7 million, with the Navy's capital contribution totaling \$2.2 million and third-party rebates totaling \$3.6 million. \$1.8 million of the cost was part of a larger special appropriation supporting the President's demand reduction program in the West. "Solar power proved to be the ideal energy solution for Naval Base Coronado," noted Lieutenant Commander Wade Wilhelm, Navy Region Southwest Utilities Program Manager.

The solar electric system will provide 3 percent of Naval Base Coronado's peak summer electricity load and will save more than \$228,000 in annual operating costs beginning the first year. The system will also cut expensive electricity purchases from the utility grid during peak energy demand periods and provide the base with reliable, high-quality power with minimal environmental impact. Reducing peak load also helps the utility system avoid system overload and rolling blackouts. Producing enough electricity during the day to power more than 935 homes, the system's peak DC capacity is 924 kilowatts with 750 kilowatts of expected average AC output. Total projected system electrical output is 1,244,000 kilowatthours per year.

By replacing fossil-fuel-generated electricity with solar power, Naval Base Coronado will spare the environment from thousands of tons of harmful emissions annually. Over the 25-year lifetime of the PV system, the solar-generated electricity will reduce emissions of nitrogen oxides by 11,660 pounds, sulfur dioxide by 10,480 pounds, and carbon dioxide by 7,430 tons—emissions reductions equivalent to removing 1,480 cars from California's roadways.

For more information, please contact Mike Holda, FEMP Project Facilitator, at 209-835-8150 or [maholda@lbl.gov](mailto:maholda@lbl.gov); Michael Beccaria of NORESKO at 203-335-0266 or [mbeccaria@noresko.com](mailto:mbeccaria@noresko.com); or Wade Wilhelm, Navy Project Manager, at 619-556-7013 or [wilhelmwmb@pwcsd.navy.mil](mailto:wilhelmwmb@pwcsd.navy.mil).

## Utility-Financed GHPs Breathe Fresh Air into Historic Marine Corps Facility

Geothermal or ground source heat pumps (GHPs), well known for their cost and energy advantages in retrofits of military family housing, are also becoming the system of choice for a wide range of other HVAC applications. This renewable energy technology uses the earth's energy to heat and cool buildings, and to heat domestic water. Energy management staff at Marine Corps Base Camp Lejeune found GHPs to be the most cost-effective option available to replace the old, ineffective HVAC system in Marston Pavilion, a historic building and community center for the base. The new GHP system costs 60 percent less to operate than the old system and provides excellent air quality and thermal comfort for the Pavilion—for the first time in memory for many of the building's users.

Marston Pavilion, set on the scenic waterfront of the New River in North Carolina and surrounded by parkland, is the site of large, high-profile events, such as the regional Marine Corps Balls, and many other Camp Lejeune social functions. As a recreational facility, Marston Pavilion was unlikely to be funded for an upgrade ahead of more critical Marine Corps priorities. However, the large energy and cost savings to be gained through retrofitting with GHPs made it a good candidate for alternative financing. The project was completed under Camp Lejeune's utility energy services contract with Carolina Power & Light (CP&L).

Constant repairs just to keep Marston Pavilion's old HVAC system running cost about \$63,000 per year. Plus the system had fundamental problems that could not be repaired. Without any ventilation system to bring fresh air in, the building was usually overheated, stuffy, and humid.

*A new GHP system has the flexibility and efficiency to provide excellent air quality and thermal comfort at Camp Lejeune's historic Marston Pavilion, while reducing HVAC operating costs by 60 percent.*



Designing the new system was an exercise in balancing capacity and efficiency, according to Robert Reierson, Operations Manager for Progress Energy Solutions, Inc., the energy services company that carried out the project for CP&L. Besides providing ventilation to accommodate 1,000 occupants (and complying with building codes), the new system needed heating and cooling operations to work quickly, as occupancy in the building can swing from 12 to 1,000 in a short time. The new system optimizes efficiency and flexibility using two sets of GHPs connected to 104 bores drilled to a depth of 200 feet.

Ventilation is provided by five water-to-water GHPs with an air-handling unit and an exhaust heat recovery system. Ventilation air flow is adjusted by carbon dioxide sensors to prevent over-ventilation during periods of low occupancy.

Three water-to-air GHPs provide heating and cooling of the building's interior. A variable-frequency drive for the water distribution system maximizes efficiency by maintaining water flow to the heat pumps at an amount just sufficient for needed cooling or heating. A fluid cooler

is connected to the system to provide extra cooling capacity for the building's high cooling requirements without installing excessive and expensive bore length.

The finished system delivers about 80 tons of capacity and will pay for itself in about 19 years, although the bundle of financed energy-conservation measures has a 10-year payback.

*For more information about the Marston Pavilion project, please contact Jim Sides, Camp Lejeune Energy Program Manager (910-451-5950, ext. 201 or SidesJC@lejeune.usmc.mil), or Kevin Johnson, Managing Director, Federal Energy Services, Carolina Power & Light (919-546-7247 or Kevin.Johnson@pgnmail.com). For information about FEMP's Financing or GHP Programs, contact Tatiana Strajnic, FEMP Project Financing Team Lead (202-586-9230 or Tatiana.strajnic@ee.doe.gov); John Shonder, FEMP GHP Team Lead (865-574-2015 or shonderja@ornl.gov); or Brad Gustafson, FEMP Utility Program Team Lead (202-586-5865 or brad.gustafson@ee.doe.gov). The Southeast Regional Office FEMP contact is Lisa Hollingsworth (404-562-0569 or lisa.hollingsworth@ee.doe.gov).*

# John Howard, Federal Environmental Executive, Promotes Sustainable Environmental Stewardship

During February 2003, the FEMP Focus conducted an extensive interview with John Howard, Federal Environmental Executive. Mr. Howard discusses the role of the Office of the Federal Environmental Executive (OFEE), President Bush's views on environmental and energy issues, environmental management systems, and many other interesting topics.

**FEMP Focus:** *Let's start at the beginning, what is the mission of the OFEE?*

**John Howard:** Our mission is to promote sustainable environmental stewardship throughout the Federal government. We focus our energies on six priority action areas:

1. Environmental Management Systems
2. Waste Prevention and Recycling
3. Green Purchasing
4. Electronics Stewardship
5. Sustainable Buildings
6. Industrial Ecology

During February 2002, we articulated a vision statement: "A Federal government that applies sustainable environmental practices." We also developed our methods to initiate momentum for adoption of sustainability practices and policies:

- encourage sustainable practices;
- identify and share success stories, best practices, and other tools to make sustainable practices easier to adopt and maintain;
- provide training, awareness, and outreach;
- assist in coordinating and advancing sustainability policies across agencies;
- publicly advocate and support sustainable practices and policies; and,

- measure and report on agencies' progress.

**FEMP Focus:** *Your first priority action area is environmental management systems (EMS). What are the benefits of an EMS?*

**John Howard:** Environmental management systems are a huge priority for OFEE as EMS's provide the strategic framework for complying with the law, reducing costs, avoiding potential liability, increasing sustainability, and implementing green purchasing.

Two key concepts are integration and systems. DOE has taken an innovative approach with DOE Order 450.1, "Environmental Protection Program," which requires DOE sites to implement an EMS integrated into DOE's Integrated Safety Management System (ISMS). The Order also aligns the Department's system for environmental protection with the requirements of Executive Order 13148, "Greening the Government Through Leadership in Environmental Management." The integration of the EMS into the ISMS is the appropriate approach, but will require some work to resolve differences in traditional operating procedures.

Systems are also important. When I came here, OFEE was doing a lot of training, especially for green procurement and then EMS training, but it was not systematic. It was ad hoc, and we were missing a lot of people, such as new government credit card holders. To be more systematic, we're trying to reach more people with the best tools, such as using our web site to connect more people with the right training.

Another important benefit of EMS's is the unexpected results from new groupings of people working together to achieve new goals. People from energy, budget, health, environmental, and legal areas will develop and implement new ideas that will be effective and successful. That is exciting.



*John Howard, Federal Environmental Executive, addresses the audience at the 2002 Presidential Awards for Leadership in Federal Energy Management.*

EMS's are typically for manufacturers, not for offices, but because they are so important, we are developing one for our office here at OFEE. And, of course, we're looking at energy usage.

An internal audit in our office revealed that computers were not turned off at night, and that the ENERGY STAR® function had not been enabled. DOE has developed software to ensure that the ENERGY STAR® functions are enabled, and the Department of the Interior recently applied this successfully here in Washington, D.C. (Please see [www.energystar.gov](http://www.energystar.gov).) Another aspect of our EMS concerns mitigating the environmental effects of business travel

*Continued on next page*



and meetings. Our EMS is not final, but we are working on it.

**FEMP Focus:** *How, and why, have you expanded the mission of OFEE to include sustainable buildings?*

**John Howard:** We've adopted sustainable building as one of our priorities for two reasons. First, buildings—in their design, construction, operation, maintenance, use, and removal—affect our indoor activities, land use, energy use, communities, and the environment. As stewards, we have the opportunity and responsibility to reduce these impacts. Using sustainable principles in buildings can reduce these impacts, as well as improve working conditions and worker productivity, increase energy efficiency, and reduce costs and risks. Second, sustainable buildings can be great showcases to educate people about environmental issues, possible solutions, partnerships and creativity, and opportunities for reducing environmental impacts in our everyday lives.

**FEMP Focus:** *We understand that you have a long standing interest in environmental issues. Please tell us about it.*

**John Howard:** As a child I won an Earth Day poster contest, and as a Boy Scout I was very active in recycling. I attended law school and worked on environmental issues for 8 years in private practice in Washington, D.C. and Austin, Texas. I worked for then-Governor George Bush's policy team studying a range of environmental and natural resource issues, including energy. When President Bush took office, I served as the Senior Associate Director for the White House Council on Environmental Quality, and worked on the National Energy Policy. I became the Federal Environmental Executive in April 2002.

**FEMP Focus:** *What is your understanding of President Bush's views regarding environmental and energy issues?*

**John Howard:** I am happy to answer that. I have worked for him for nearly 7 years, and I know that he is passionate about these issues. The President's ranch house in Texas is just a fantastic environmental and energy success story—using site orientation, a single-level building with integrated breezeways, and geothermal heating. On the ranch itself, the President is replacing high water consumption cedars with native plants, which is restoring streams and wildlife, and using propane to fuel the pick up trucks on the ranch.

When he was Governor, the Governor's Mansion was one of the first entities to enroll in the City of Austin's renewable energy program, and solar panels were recently installed on the White House grounds buildings. (See the article on page 4.) President Bush is conscious of energy use and was very involved with the National Energy Policy and the Executive Order on standby power devices. These measures are not just a response to the California energy crisis; during his campaign, the President named energy efficiency and security as one of the country's most important issues. He even tells staff to turn off the lights when they're done meeting in a room. Although the President doesn't use the term sustainability, he adheres to the principles of sustainability and considers stewardship our responsibility to the future.

**FEMP Focus:** *What can you tell us about the solar panels recently installed at the White House? Is it fair to say that this is an example of the President's personal commitment to stewardship?*

**John Howard:** Yes, absolutely. There is a huge drive to improve energy efficiency,

which you can look at from several perspectives, including the pure benefits of energy efficiency, the cost savings, and the environment—reducing greenhouse gas emissions, national security, and promoting domestic supplies and our own renewables. Part of what the President sees as his job is to lead by example. We were very comfortable sharing the story for them. It is very important to get the story out. The government can show people opportunities by being good examples ourselves.

**FEMP Focus:** *How does the OFEE relate to FEMP's mission to reduce Federal energy use?*

**John Howard:** Energy is not in our name, but it is certainly in our goals and we try to be supportive of your mission. Our report, *Leading By Example—A Report to the President on Federal Energy and Environmental Management (2000-2001)* (Please see the OFEE web site at [www.ofee.gov](http://www.ofee.gov)) includes a large section about DOE's activities, such as ENERGY STAR® and greenhouse gas emissions reductions. Since there are some gaps in the government's efforts, the report provides 18 recommendations.

Regarding integration, one of our goals is to bring people together to share information about the various green product programs across the Federal government—from ENERGY STAR® to biobased products. Regarding our office and FEMP, it is in the energy efficiency world's best interest to work together, share information, and think strategically. We work very closely with the DOE Federal Energy and Water Management Awards, and the OMB Presidential Award for Leadership in Federal Energy Management. We also are very interested in the Interagency Sustainability Working Group and helping it as much as we can.

*Continued on page 18*

**JOHN HOWARD, FEDERAL ENVIRONMENTAL EXECUTIVE, PROMOTES SUSTAINABLE ENVIRONMENTAL STEWARDSHIP**

*(continued from page 17)*

**FEMP Focus:** *What are your near-term goals for OFEE?*

**John Howard:** As an Office, we change a lot since we only exist with people from other agencies who are here for short periods of time. Our focus this year is on implementing the 18 recommendations in the President's report. The two most important are, as I have said, the integration idea, and the systems idea. Some things we can implement directly, and for others we serve as a cajoler, which can be difficult, but I use my relationships with others as much as I can.

We are about sharing successes. One of the things that I have had the most fun doing in this job is visiting facilities, attending conferences, and giving speeches, and hearing what people are doing. Invariably, I learn a great new story. Even though it's our job to know those stories, I hear new stories all the time—my favorite is the hybrid Humvee.

DOD did a fuel cost study and determined that the actual fuel costs were much higher than they realized. The Department of the Army built six hybrid Humvees. They use batteries with conventional combustion engines. Battery mode provides low noise and heat signatures for battlefield operations, in addition to increased fuel economy. The battery also replaces a towed generator for other uses. It is our job to collect and share this type of exciting story.

The President has said "lead by example." It is the name of a FEMP report and our report, so we are trying to do that.

**FEMP Focus:** *What do you hope to accomplish at OFEE by 2005?*

**John Howard:** Ensure that Federal facilities are developing and implementing robust EMSs, for all the reasons we discussed before—they provide a strategic framework to help

with compliance, cost cutting, sustainability, public relations, and other issues, such as risk management. It is important to have the EMS tool, and not another program, because the EMS tool will help you solve your issues. There is the beginning of a trend to combine environmental and national security issues into a comprehensive risk management system.

**FEMP Focus:** *Thank you for speaking with us. Are there any final comments that you would like to make to our readers?*

**John Howard:** The great thing that they can do is to share their success stories (and problems, for that matter) through a listserv, for example. I'm really impressed with all of the work we see going on—and we need to do more.

*For more information, please see the OFEE web site at [www.ofee.gov](http://www.ofee.gov).*



Waste Prevention and Recycling   Green Purchasing   Electronics Stewardship  
Environmental Management Systems   Sustainable Buildings   Green Jobs

**Office of the Federal Environmental Executive**  
*Promoting sustainable environmental stewardship throughout the federal government*

# Opening Up the West to Renewables

Public lands in the West have great potential for power production from renewable energy, study shows

People in the western United States should soon be able to see more than just beautiful natural vistas. They might also be able to watch clean, renewable energy resources—such as wind, solar, biomass, and geothermal—being developed on western public lands, thanks to an important new study conducted by FEMP in partnership with the Department of the Interior’s Bureau of Land Management (BLM).

The study—*Assessing the Potential for Renewable Energy on Public Lands*—shows there is high potential for the development of one or more renewable energy resources in 11 western states, and high potential for development of three or more renewable resources in seven states (see the table).

FEMP staff at DOE’s National Renewable Energy Laboratory (NREL) partnered with BLM on the study, which was conducted in support of BLM’s National Energy Policy Implementation Plan.

Commenting on the study, Rebecca Watson, Assistant Secretary of the Interior for Land and Minerals Management, said, “Our public land managers will be able to use this information as a tool for planning purposes as we work to increase our domestic sources of renewable energy. By working in partnership with DOE to locate and identify sources of renewable energy on public lands, we maximize our efforts in implementing the President’s National Energy Policy.”

In his National Energy Policy, of May 2001, the President directed the Departments of Energy and the Interior to identify and evaluate renewable energy resources on public lands, as well as any limitations to access to those resources by private energy developers. BLM will use the results of the study to prioritize land-use planning activities and increase opportunities for the development and use of renewable resources.

As an indication of the level of interest, the draft version of the assessment report and related industry meetings in 2002 resulted in nearly 40 applications from developers to BLM field offices for wind technology development and testing on western public lands; in contrast, in the 10 years before 2002, no more than five applications had been received for wind development.

The potential for wind power production has been conservatively estimated at more than 2,000 megawatts, if most new BLM grants result in wind projects. This is enough energy for 250,000 average U.S. households.

Glenn Hamer, Executive Director of the Solar Energy Industries Association, said, “We’re very excited about what BLM and the Department of the Interior are doing in terms of increasing renewable production on Federal land.”

For this study, BLM requested technical assistance and support from DOE through NREL to accomplish four tasks requested by BLM Director Kathleen Clarke:

- (1) gather available information on the potential for renewable energy,
- (2) develop appropriate screening criteria,
- (3) process data identifying broad

geographical areas for renewable energy development, and (4) provide a final report on high-potential areas for inclusion in a Renewable Energy Action Plan.

The BLM/NREL team used Geographic Information System (GIS) data to analyze and assess the potential for concentrating solar power (CSP), photovoltaics (PV), wind,

**Western U.S. BLM Planning Units with High Potential for the Development of Three or More Renewable Energy Sources**

| Planning Unit              | Field Office    | State | CSP | PV | Wind | Biomass | Geothermal |
|----------------------------|-----------------|-------|-----|----|------|---------|------------|
| Las Cruces                 | Las Cruces      | NM    | •   | •  | •    | •       | •          |
| Safford                    | Safford         | AZ    | •   | •  | •    | •       |            |
| Carson City                | Carson City     | NV    | •   | •  | •    |         | •          |
| Elko                       | Elko            | NV    | •   | •  | •    |         | •          |
| Fillmore                   | Fillmore        | UT    | •   | •  | •    |         | •          |
| Arizona Strip              | Arizona Strip   | AZ    | •   | •  |      | •       |            |
| Phoenix                    | Phoenix         | AZ    | •   | •  |      | •       |            |
| Barstow                    | Barstow         | CA    | •   | •  | •    |         |            |
| El Centro                  | El Centro       | CA    | •   | •  |      |         | •          |
| Palm Springs - South Coast | Palm Springs    | CA    | •   | •  | •    |         |            |
| Ridgecrest                 | Ridgecrest      | CA    |     | •  | •    |         | •          |
| Battle Mountain            | Battle Mountain | NV    | •   | •  |      |         | •          |
| Las Vegas                  | Las Vegas       | NV    | •   | •  | •    |         |            |
| Winnemucca                 | Winnemucca      | NV    | •   | •  |      |         | •          |
| Albuquerque                | Albuquerque     | NM    |     | •  | •    | •       |            |
| Socorro                    | Socorro         | NM    | •   | •  |      | •       |            |
| Lakeview                   | Lakeview        | OR    |     |    | •    | •       | •          |
| Cedar City                 | Cedar City      | UT    | •   | •  |      |         | •          |
| Salt Lake                  | Salt Lake       | UT    | •   | •  | •    |         |            |
| Wenatchee                  | Wenatchee       | WA    |     |    | •    | •       | •          |

*Continued on page 20*

### OPENING UP THE WEST TO RENEWABLES

(continued from page 19)

and biomass resources and technologies on public lands. BLM, NREL, and several industry representatives jointly developed screening criteria for each renewable resource to produce GIS-based maps and analyses. The team was able to identify the top 25 BLM planning units whose areas have the highest potential for CSP, PV, wind, and biomass development.

The team also identified high-potential geothermal energy sites. This part of the assessment took advantage of BLM's knowledge of, and experience with, geothermal resources in seven western states. BLM experts were able to identify 35 "top-pick" sites and 18 planning



*Wind energy will be part of the development of renewable resources on public lands; 40 percent of the electricity produced by these 600-kilowatt turbines—part of a 40-megawatt project near Arlington, Wyoming—is being purchased by the DOE's Bonneville Power Administration. (photo courtesy of Tom Hall, DOE)*

units in six states as having high potential for near-term development of geothermal resources. (See table on page 19.)

NREL provided information and guidance on renewable energy technology development, renewable energy resource potential assessment, GIS mapping of the analysis and results, and renewable energy system analysis. The collaborative study also resulted in the development of a Memorandum of Understanding among BLM's National Science and Technology

Center, the DOE's Golden Field Office, and NREL for continued cooperation in assessing and analyzing renewable energy resources.

While developing the report, staff from DOE Headquarters, NREL, and DOE's Oak Ridge National Laboratory met with representatives of BLM and the renewable energy industry. Discussions were held on the availability of resource information, technology considerations, and siting criteria relevant to various renewable energy resources.

Because data were not readily available, neither hydropower nor the State of Alaska were included in the BLM/NREL study. Future studies including hydro and Alaska could, therefore, indicate even greater potential for the development of renewable resources.

Secretary of Energy Spencer Abraham said, "The Department of Energy is pleased to provide the technical renewable energy expertise of our national Laboratories to the Bureau of Land Management. Federal agencies can lead by example to improve America's energy security by helping renewable industries bring energy resources to market."

The current BLM/NREL assessment resulted in the following findings:

- Sixty-three BLM planning units in 11 western states have high potential for power production from one or more renewable energy sources.
- Twenty BLM planning units in seven western states have high potential for power production from three or more renewable energy sources.

The table lists BLM planning units identified in the study with high potential for the development of three or more renewable energy resources for power production. BLM can use this information to prioritize land-use planning activities and determine the best order in which to prepare or amend land-use plans.



*Rebecca Watson, Assistant Secretary, Department of the Interior, announces the results of the study—Assessing the Potential for Renewable Energy on Public Lands—at DOE's National Renewable Energy Laboratory (NREL). Admiral Richard Truly, Director, NREL, is seated to the right.*

Most uses of renewable energy on public lands can be accommodated by current BLM land-use plans, and industry may apply for authorization to develop renewable resources under the appropriate authority at any time. These land-use plans identify wilderness areas, Areas of Critical Environmental Concern, and other designated management areas where restrictions may apply to certain uses. However, new land-use plans specifically addressing renewable energy development could accelerate the processing of future applications for such development projects.

Reiterating the Interior Department's commitment to increased renewable energy development earlier this year, Interior Secretary Gale Norton said, "We must explore ways to better capture the sun's light, the sky's winds, the land's bounty, and the earth's heat to provide energy security for America's families."

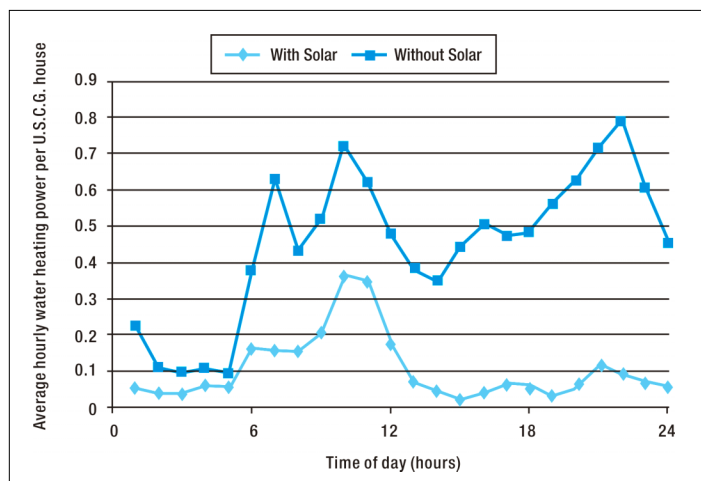
*The study can be downloaded at [www.eere.energy.gov/femp/techassist/publiclands.html](http://www.eere.energy.gov/femp/techassist/publiclands.html) or [www.blm.gov/nhp/spotlight/energy\\_report/](http://www.blm.gov/nhp/spotlight/energy_report/). For more information, please contact Mike Kirby, Associate Director, BLM National Science and Technology Center, at 303-236-6491 or [mike\\_kirby@blm.gov](mailto:mike_kirby@blm.gov), or Doug Dahle, Senior Program Manager, NREL FEMP, Energy and Environmental Applications Office, at 303-384-7513 or [douglas\\_dahle@nrel.gov](mailto:douglas_dahle@nrel.gov).*

# Time-Of-Use Monitoring Assessment of U.S. Coast Guard Residential Solar Water Heating Pilot Project

A combination of high energy costs, uniform solar resource, and an active solar industry combine to make Hawaii a good location for cost-effective application of solar water heating. In 1998, the U.S. Coast Guard received a FEMP grant to install solar water heating systems as a pilot project on 60 existing three-bedroom houses at Kai Kai Hale U.S. Coast Guard Housing Area in Honolulu, Hawaii. The non-freezing climate allows for simple solar water heating system designs. In the mild climate of Hawaii, solar water heating can displace a large fraction of a home's electricity use since heating and cooling loads are small. This particular solar water heating project presented a cost-effective opportunity to contribute toward the goals of Executive Order 13123.

The installed solar water heating systems are of the active (pumped), direct type, where potable water is circulated to the collectors by a single pump controlled by a differential temperature thermostat controller. A single tank serves as both electric water heater and solar storage tank. The consequential heat loss of sending electric-heated water to the collectors is mitigated by:

- installation of a timer to keep the electric heating elements off during the day,
- setting a low temperature for control of the electric heating elements, and



Hourly load profile for Kai Kai Hale U.S. Coast Guard solar water heating pilot project, averaged for 21 houses with solar water heating and 17 houses without. The profile is for the monitored period from June 11 to July 24, 2002.

- reduced heat loss (naturally) from the collector attributed to high ambient temperatures in Hawaii.

The systems were installed by Pacific Mechanical Company at an average cost of \$3,200 (\$4,000 minus \$800 utility rebate) per system.

DOE's National Renewable Energy Laboratory (NREL) conducted a time-of-use monitoring assessment of the solar water heating pilot units, which will give the Coast Guard the information it needs to negotiate for financing and implementing solar water heating on the remaining 256 units in the housing area. On 25 houses with solar water heating and 25 identical houses without solar, instruments were installed to measure on/off cycles of the electric water heaters and the tank outlet temperature. The results were monitored for a 6-week period from June 11 to July 25, 2002, with a statistical extrapolation to estimate annual savings.

The graph (below left) illustrates the average water heating power for houses with and without solar water heating, showing very substantial savings, especially in the evening when utility peak load occurs. Savings in peak demand (as opposed to average power) were measured at 1.62 kilowatts per house. Annual energy savings were estimated at 3,008 kilowatt-hours per house per year, and annual cost savings per house were estimated at \$380 per year due to solar. For a system cost of \$3,200 and a 25-year present worth factor of 17.1, the savings to investment ratio (SIR) is 2.03. Even without the rebate, the Coast Guard solar water heating application is cost effective according to Life Cycle Cost Methodology and Procedures (10 CFR 436), (which requires SIR>1.0). The annual solar fraction of total energy used is estimated at 74 percent and annual solar water heating system efficiency is estimated at 24 percent. The International Performance Measurement and Verification Protocol as applied to renewable energy systems was used in this analysis. NREL's analysis, in support of the Coast Guard pilot project, provides detailed load and time-of-use information useful to designers, utilities, and Federal and State agencies implementing solar water heating programs in Hawaii.

For more information, please contact Andy Walker of NREL at 303-384-7531 or [andy\\_walker@nrel.gov](mailto:andy_walker@nrel.gov).

## Earth Day 2003 “One Person Can Make a World of Difference”

FEMP led Federal agencies in celebrating Earth Day 2003 with a message that each individual has the power to make change. This year’s Earth Day theme was “One person can make a world of difference. Create a future where energy is clean, abundant, reliable, and affordable.” DOE highlighted this theme in its Earth Day exhibits at both the Forrestal Headquarters and Germantown buildings.

*To order FEMP’s Earth Day 2003 poster, please contact DOE’s Energy Efficiency and Renewable Energy Clearinghouse at 800-363-3732 or order online at [www.eere.doe.gov/femp/ordermaterials.html#awareness](http://www.eere.doe.gov/femp/ordermaterials.html#awareness). For more information, please contact Annie Haskins of FEMP at 202-586-4536 or [annie.haskins@ee.doe.gov](mailto:annie.haskins@ee.doe.gov).*



Earth Day 2003 Poster



## Federal Agencies Receive Nearly \$3 Million in Rebates from the Hawaiian Electric Company

Federal agencies are receiving benefits from the Hawaiian Electric Company’s Energy Solutions Program. The U.S. Departments of the Air Force, Army, and Navy, the U.S. Coast Guard, the U.S. Marine Corps, and the National Weather Service have installed 2,629 solar water heating systems in Hawaii. The Hawaiian Electric Company has provided nearly \$3 million in rebates to these agencies. Look for more information regarding

this valuable rebate program in the summer 2003 issue of FEMP’s *Save with Renewable Energy* technical bulletin.

*For more information, please contact Nancy Carlisle of DOE’s National Renewable Energy Laboratory at 303-384-7509 or [Nancy\\_Carlisle@nrel.gov](mailto:Nancy_Carlisle@nrel.gov).*

# Centers for Disease Control and Prevention Plans Sustainable Facilities

The Centers for Disease Control and Prevention (CDC), an agency of the Department of Health and Human Services, is the world's premier disease detection agency and is charged with guarding the health of the American public. CDC is constantly faced with new challenges and responsibilities, including bio-terrorism research and increased environmental monitoring.

CDC's vision for the 21st Century is Healthy People in a Healthy World—Through Prevention. With renewed commitment to this vision, CDC has embarked on a major building and facilities Master Plan in support of its responsibility to protect the health of the public, while improving the working environment for its employees.

Currently, the CDC has eight new buildings under construction in Atlanta. Additionally, three buildings in Atlanta and one in Fort Collins, Colorado, are being designed and scheduled to begin construction soon. The CDC Master Plan envisions many more laboratory and non-laboratory buildings in the future depending on Congressional authorization and appropriations. In addition to these efforts, there are many renovation and improvement projects underway or in the planning stages.

To further highlight its commitment to environmental and energy Executive Orders, the CDC Facilities Planning and Management Office (FPMO) joined the U.S. Green Building Council (USGBC) in 2002. The principles of the Leadership in Energy and Environmental Design (LEED™) program are being incorporated as guidelines for the design, construction, and maintenance of CDC's facilities in balance with security needs. Currently, two building projects have been

registered with the USGBC and are on track to obtain LEED™ certification. One of these is CDC's Building 21, which is a 12-story office building with a basement that encompasses approximately 336,000 square feet.

CDC's Building 21 is designed to improve the productivity and health of employees by providing an open environment that optimizes the use of natural daylight. Exterior sunshade fins control glare, and interior light shelves reflect light into the building to provide a balance between shading the building from heat gain and enabling more daylight to penetrate the interior. Energy initiatives aim to achieve energy reduction levels greater than 20 percent above standard codes by:

- designing HVAC and refrigeration systems to meet or exceed ASHRAE-90.1,
- optimizing building orientation and daylighting controls,
- using high performance glazing and exterior shading elements, and
- adopting ENERGY STAR® roof criteria.

Other features of the building include:

- continuous carbon dioxide, humidity, and temperature monitoring,
- pollutant monitoring in building systems to improve indoor air quality,
- zero use of chlorofluorocarbons (CFC) in HVAC and refrigeration equipment,
- reduction of light pollution to the neighboring community,
- 30 percent water reduction through low-flow fixtures and sensors,
- use of building products that contain recycled content, and
- reduction of construction waste by 50 percent compared to conventional means.

As a further commitment to the environment, the CDC has begun a major recycling program for white and mixed paper, aluminum cans and tabs, type 1 and 2 plastics, cardboard, and non-alkaline batteries. In support of this effort, CDC employees have been provided information on the proper method to dispose of, or recycle, items used in their work. Additionally, FPMO has recycled worn carpet that would have normally gone to a landfill, and installed recycled-content carpet in its facilities.



*The CDC's Building 21 in Atlanta, Georgia, is registered with the USGBC and is expected to obtain LEED™ certification.*

The FPMO considers it a major responsibility to protect the environment to safeguard the health of the public. FPMO's aim is to do this by fostering the principles of sustainability in construction and maintenance as well as security in the development of the built environment. The result is promoting environments that are healthier, safer, and more productive places to live and work.

*For more information, please contact Julia Chlarsen at the Centers for Disease Control and Prevention, FPMO, at 404-498-2645 or [jchlarsen@cdc.gov](mailto:jchlarsen@cdc.gov).*

## DOE Philadelphia Regional Office's New Facility Exemplifies Sustainability

DOE's Philadelphia Regional Office (PRO) recently moved into new office space which incorporates many sustainable design features. The new office is a model workspace and demonstrates that a Federal government field office with relatively small office space needs can include sustainability features into their design requirements. PRO Deputy Regional Director James M. Ferguson said, "The Philadelphia Regional Office wanted to show leadership to the stakeholders in the Mid-Atlantic Region, and to feature many of the available possibilities in sustainable design and products, along with energy efficiency and renewable energy technologies."

Before PRO's lease for downtown office space expired on January 1, 2003, the General Services Administration (GSA) informed the PRO that they would need to consider relocating to historic buildings in downtown Philadelphia as a result of Executive Order 13006. The Executive Order encourages the location of Federal facilities on historic properties in our nation's central cities. Reusing existing buildings is also a good sustainable practice.

The PRO worked closely with Douglas Dooling, Contract Officer, and Elizabeth Eagen, Realty Specialist, from GSA Region 3 Public Buildings Service, to find the appropriate site at the Wanamaker Building. The Wanamaker Building is an historic building next to the Philadelphia City Hall. The PRO and GSA found approximately 10,000 square feet in the Wanamaker Building that was a shell, which would be built out to PRO specifications keeping the original columns, beams, and cornices.

PRO Deputy Regional Director Ferguson wanted the new office space to be a showcase for energy efficiency and environmentally-friendly technologies, equipment, and materials. The building team consisted of: Hillier Group (architect); Bala Consulting Engineers, Inc. (engineering firm); the Sullivan Company (construction firm); GSA Region 3 Public Building Service; and, the Amerimar Wanamaker Management Company.

The 24 PRO employees moved into the new office space on December 16, 2002. The new space includes the following energy efficient and environmentally-friendly features:

- Power provided by 100 percent renewable energy from within the electric grid region of the PJM Interconnection, supplied by Community Energy, Inc. (47,452 kilowatthours per year of wind energy; 46,503 kilowatthours per year of biomass; and 949 kilowatthours per year of solar electric);
- Compact fluorescent lighting throughout the office, complemented by daylighting and motion sensors;
- Window shading to reduce glare but allowing natural lighting in private offices and open conference areas;
- ENERGY STAR® computers, printers, copiers, and other equipment;
- Carpeting with 100 percent recyclable material manufactured from 40 percent recycled-carpet tiles;
- Linoleum produced from 100 percent natural materials for use in file rooms, storage areas, and other high-traffic areas;
- Ceiling tiles produced from 60 percent recycled material and with a high acoustic rating.
- Fabrics made from 100 percent recycled polyester for chairs and workstations;
- Furniture from Knoll Inc., an environmental award-winning furniture manufacturer in Pennsylvania;
- Paints containing low amounts of volatile organic compounds; and
- A sound-masking system throughout the office to improve employee productivity.

The new office will be cost-effective for the life cycle of the 10-year lease, because the rent is lower in the Wanamaker Building than if the PRO had stayed in their previous office space. The premium paid for all of the energy efficiency, renewable energy, and environmentally-friendly features was less than \$27,000 above the cost of standard products and materials. This project proves that sustainable design can be applied beyond major construction projects to the build out and furnishing of a government office. Even as a small commercial office space lease holder, you can be a champion for sustainable design.

*For the sustainability procurement specifications, please see the PRO web site at [www.eere.energy.gov/pro](http://www.eere.energy.gov/pro). For more information, please contact James Ferguson of DOE's Philadelphia Regional Office at 215-656-6977 or [James.M.Ferguson@ee.doe.gov](mailto:James.M.Ferguson@ee.doe.gov), or Beverly Dyer of FEMP at 202-586-7241 or [beverly.dyer@ee.doe.gov](mailto:beverly.dyer@ee.doe.gov).*



# IAIA Sustainable Futures Greening Charrette Designs

## Framework for Sustainable Development

The Institute of American Indian Arts (IAIA) Sustainable Futures Greening Charrette, conducted March 12–14, 2003, was designed to guide the development of the IAIA campus and museum renovation based on the principles of environmental sustainability. A 4-year fine arts college located in Santa Fe, New Mexico, IAIA is one of 33 tribal colleges nationwide, and the only tribal college of national scope. It is one of three Federally-chartered colleges and is considered to be a Federal facility. The IAIA Charrette was the fourteenth supported by FEMP at a Federal facility, and the first for an educational institution or for a Native American institution.

The charrette was conducted under the IAIA Initiative for a Sustainable Future, which will guide all IAIA facility development, including renovation of existing buildings, design and construction of new buildings, facility operations and maintenance, campus land use, and outdoor recreation. The principles of sustainability will also be incorporated into IAIA education and outreach programs wherever appropriate. “What better way to carry out the IAIA vision than by developing our facilities in a way that respects the natural resources

we have been given and are about to use, and in the end to enable us to walk gently on our earth,” said Margaret Tiff Janis, Program Manager for the IAIA Initiative for a Sustainable Future.

Through a series of presentations and active brainstorming sessions regarding specific issues including energy efficiency, indoor environmental quality, and sustainable water use and landscaping, the charrette participants worked together to develop a framework for carrying these goals for sustainable development into the future. Participants included:

- IAIA faculty, students, and staff;
- community stakeholders;
- Federal and State agency representatives;
- project contractors;
- consultants; and
- facilitators.

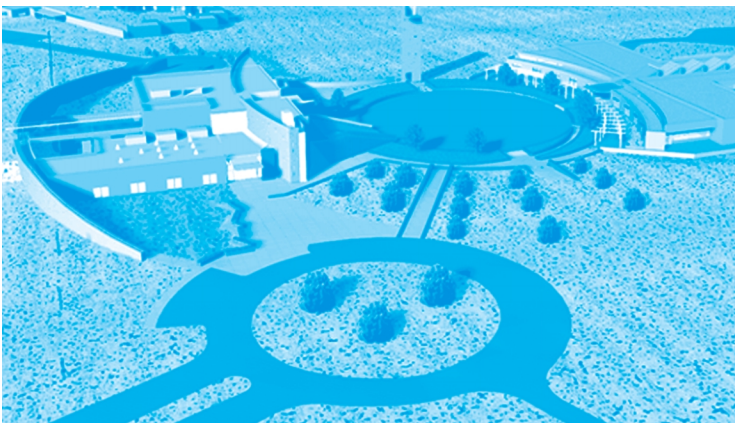
“The newest concepts in sustainability seem to align well with the oldest Native American philosophies. It’s as if we’ve come full circle back to the importance of earth, wind, sun, and water,” said Dr. Andy Walker of DOE’s National Renewable Energy Laboratory.

The IAIA charrette developed objectives for indoor environmental quality, energy use, and site master planning, including:

- develop master plan element and guidelines for interior or constructed spaces;
- reduce energy use by 30 percent for existing buildings, and 60 percent for new buildings compared to similar buildings in this climate;
- optimize use of renewable energy sources;
- conserve water resources; and
- increase biodiversity through restoration of plant and animal communities, and limit use of non-native plants.

The IAIA charrette identified a number of short, medium, and long-term action items to achieve these objectives, including:

1. Conduct a multi-disciplinary planning meeting as soon as the Life Long Learning Center team has been identified to establish (prototype) guidelines for design and construction.
2. Establish a database of green construction and art supply products.
3. Provide additional third party review of Library and Technology Center design to identify low cost efficiency improvements.
4. Make an assessment of water sources and uses, followed by implementation of a water reduction program for the main campus and the museum.
5. Develop the garden/landscape component of the Life Long Learning Center program, ensuring that this landscape is developed as an expression of native culture, and in such a way that it supports curriculum development and campus community life.



*Artist's rendering of the IAIA campus and museum.*

# FEMP Seeks Partners for an Energy and Sustainability Charrette

In the early 1990s, FEMP assisted with the “Greening of the White House” charrette and has conducted similar workshops for 13 other prominent sites including the Pentagon and Yellowstone and Grand Canyon National Parks. Sustainability planning exercises or environmental design charrettes result in near-term, mid-term, and long-term recommended actions which move a Federal site toward meeting the goals of Executive Order 13123, including those relating to sustainable building design (section 403 (d)).

Charrettes focus attention on the narrow windows of opportunity, when decisions affecting the use of resources are made, with an emphasis on actions that can be taken immediately. Charrettes bring together decision-makers from the facility and agency, regional stakeholders, utility and industry partners, and technology experts to form a multidisciplinary team. By joining solutions to problems and resources to needs, this combination of perspectives resolves obstacles and finds common ground upon which to build a sound initiative. The goal of the charrette is to:

- examine the conditions and requirements of a specific facility;
- brainstorm innovative, yet practical, solutions; and
- plan a course toward continuous improvement in:
  - resource efficiency,
  - energy efficiency,
  - renewable energy,
  - water and wastewater minimization,
  - solid waste management and recycling, and
  - transportation issues.

The charrette also trains, inspires, and motivates participants to propose sustainability targets and then take action to attain them during a multi-year process for a specific site. The resulting sustainability plan is then used as a foundation for action.

Topics to be included in the agenda will cover a full range of disciplines and sustainability activities. FEMP invites Federal agencies interested in co-sponsoring a charrette to reply by e-mail with the following information:

- Contact name,
- Address and phone number,
- Facility name,
- Facility location,
- Facility mission,
- Land area,
- Number of buildings and total square feet,
- Departments that would be involved in conducting a charrette,
- A brief description of any plans for major construction or rehabilitation, and
- Expectations from a charrette.

FEMP will select at least one site to partner with for a charrette in 2003. Please respond by e-mail to Andy Walker at DOE's National Renewable Energy Laboratory at [andy\\_walker@nrel.gov](mailto:andy_walker@nrel.gov) by June 9, 2003.

*For more information, please contact Andy Walker of NREL at 303-384-7531 or [andy\\_walker@nrel.gov](mailto:andy_walker@nrel.gov), or Anne Crawley of FEMP at [anne.crawley@ee.doe.gov](mailto:anne.crawley@ee.doe.gov) or 202-586-1505.*

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## IAIA SUSTAINABLE FUTURES GREENING CHARRETTE DESIGNS FRAMEWORK FOR SUSTAINABLE DEVELOPMENT

*(continued from page 25)*

The benefits are expected to include reduced operating costs, resource consumption, and site disturbance and increased health and productivity of students; not to mention the educational value of traditional Native American principles of sustainability and the positive contribution to the surrounding natural environment and community. “IAIA has a huge potential to provide leadership in sustainable design to Native America, indigenous peoples worldwide, the Santa Fe community, and the Nation,” said Margaret Tift Janis.

*For more information, contact Andy Walker of NREL at 303-384-7531 or [andy\\_walker@nrel.gov](mailto:andy_walker@nrel.gov), or Anne Crawley of FEMP at [anne.crawley@ee.doe.gov](mailto:anne.crawley@ee.doe.gov) or 202-586-1505.*

## DOE's High Performance Buildings Database Provides Valuable Sustainable Buildings Data

Interested in real world successes and lessons learned from sustainable building design? DOE's High Performance Buildings (HPB) Database provides public access to case study data on more than 40 high performance buildings worldwide. The database, launched in May 2002, is a centralized clearinghouse showcasing projects—from office buildings to campuses and whole neighborhoods—that have incorporated sustainable design principles. Information on facilities appears in a standard format, with details ranging from a basic overview to detailed cost and performance data. As the HPB Database

nears its first anniversary, it continues to grow in size and scope, developing into a resource which DOE hopes will ultimately improve building performance nationally and globally. Search the database at [www.highperformancebuildings.gov/case\\_studies](http://www.highperformancebuildings.gov/case_studies).

*For more information, please contact Drury Crawley of DOE's Building Technologies Program at 202-586-2344 or [drury.crawley@ee.doe.gov](mailto:drury.crawley@ee.doe.gov).*

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## National Building Museum Presents “Big and Green: Toward Sustainable Architecture”

The National Building Museum in Washington, D.C. is currently exhibiting “Big and Green: Toward Sustainable Architecture in the 21st Century.” The exhibit profiles large-scale projects such as skyscrapers, factories, shopping centers, and other megastructures that have been built to minimize environmental impacts of construction and to promote the efficient use of natural resources. The exhibit, co-sponsored by DOE's Office of Energy Efficiency and Renewable Energy, explores five categories of issues that design and building professionals are addressing to reduce the impacts of skyscrapers and other megastructures:

- energy;
- light and air;
- greenery, water, and waste;
- construction; and
- urbanism.

The exhibit will be on view until June 22, 2003, with an accompanying lecture series.

*For more information, please see [www.nbm.org](http://www.nbm.org) or call 202-272-2448.*



## Nomination Process Underway for 2003 Awards for Saving Energy at Federal Facilities

The criteria and guidelines are now available for the 2003 Federal Energy and Water Management Awards and the Presidential Awards for Leadership in Federal Energy Management.

The criteria and guidelines are available on FEMP's web site at [www.eere.energy.gov/femp/prodtech/awards.html#call](http://www.eere.energy.gov/femp/prodtech/awards.html#call).

All nominations should be sent to the office of the Federal Energy Management Program to arrive no later than May 16, 2003. The criteria and guidelines should be read and followed closely to prevent disqualifications.

Send all nominations to:

Federal Energy Management Program, EE-2L  
Federal Energy and Water Management Awards  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Mail Code: EE-2L  
Washington, DC 20585-0121

*For more information on the awards, contact Nellie Tibbs-Greer of FEMP at 202-586-7875 or [nellie.tibbs-greer@ee.doe.gov](mailto:nellie.tibbs-greer@ee.doe.gov).*

## Energy 2003 Workshop and Exposition Schedule

Sunday, August 17 -  
Wednesday, August 20  
Lake Buena Vista, Florida



### Opening Reception

Sunday, 5 p.m. - 8 p.m.

### Opening Plenary

Monday, 8:30 a.m. - 10 a.m.

### Networking Breakfasts

Monday, Tuesday, and Wednesday, 7:30 a.m. - 8:30 a.m.

### Networking Lunches

Monday, 12:30 p.m. - 2:30 p.m.

Tuesday, 12 p.m. - 1:30 p.m.

### Networking Reception

Tuesday, 6 p.m. - 9 p.m.

### Closing Plenary Luncheon

Wednesday, 11:30 a.m. - 2 p.m.

### Exhibit Hall Hours

Sunday, 5 p.m. - 8 p.m.

Monday, 10 a.m. - 6 p.m.

Tuesday, 7:30 a.m. - 4 p.m.

*For information on workshop tracks and sessions, please see [www.energy2003.ee.doe.gov](http://www.energy2003.ee.doe.gov).*

## FEMP's Utility Project Workshop Coming to Philadelphia and Chicago

Are you interested in seeing how your facility can benefit from energy and water efficiency improvement services that may be offered by utilities that serve your facility? If so, then make plans to attend FEMP's Utility Energy Services Contracting (UESC) Project Workshops and learn a step-by-step approach to implementing efficiency and renewable projects through Federal agency and utility partnerships.

These workshops provide attendees with an overview of the contracting options and services available from local utility companies that offer engineering, financing, and installation of cost effective energy and water savings projects. Participants walk through the typical project process, from the audit phase to commissioning equipment. Upon completing this workshop, participants will have the contracting and technical knowledge to begin a project at their facility. This innovative alternative financing opportunity provides a mechanism to help solve facility problems and meet program objectives and goals.

Who should attend? Federal project implementation teams including facility and energy managers, engineering and legal staff, and procurement and contracting officials are strongly encouraged to attend. Priority will be given to Federal personnel. However, state and local government customers are welcome! Upcoming workshops are scheduled for:

- Philadelphia, Pennsylvania — May 28-29, 2003; and
- Chicago, Illinois — September 16-17, 2003.

Take advantage of this opportunity to ask the experts! Attendees are encouraged to bring information about their specific energy and water efficiency and renewable energy projects for workshop exercises and to get input from the workshop instructors.

*The registration fee is waived for these workshops. For more information about FEMP's 2003 workshops or to register by phone, please call the FEMP Workshop Hotline at 703-243-8343.*

## AEE Offers Measurement and Verification Program at Energy 2003

The Association of Energy Engineers (AEE) is offering a 3-day Certified Measurement and Verification Professional training program in conjunction with Energy 2003, August 13-15. AEE, in cooperation with the International Performance Measurement and Verification Protocol (IPMVP), has established the Certified Measurement and Verification Professional program with the dual purpose of recognizing the most qualified professionals in this growing area of the energy industry, and raising the overall professional standards within the measurement and verification (M&V) field.

The objectives of the Certified Measurement and Verification Program are:

- To raise the professional standards of those engaged in distributed generation.
- To improve the practice of distributed generation by encouraging professionals in a continuing education program of professional development.
- To identify persons with acceptable knowledge of the principles and practices of distributed generation through completing an examination and fulfilling prescribed standards of performance and conduct.
- To award special recognition to those professionals who have demonstrated a high level of competence and ethical fitness for distributed generation.

The course outline includes:

- Reasons for M&V;
- Current M&V Protocols;
- IPMVP 2000 and its Evolution;
- Developing an M&V Plan;
- Current Issues in M&V;
- Baseline Adjustments;
- Federal Energy Projects Requirements;
- Verification of: the Plan, the Baseline, the Savings, the Adjustments; and
- Key Elements of Success: Theory and Examples of IPMVP 2000 Options.

*For more information or to register, please see [www.aeecenter.org/seminars](http://www.aeecenter.org/seminars) or call 770-447-5083, ext. 210.*

## FEMP Training Reminders

### High Performance, Low Energy Laboratory Design Workshop

May 6  
St. Louis, MO  
[www.epa.gov/labs21century/training/stlouis.htm](http://www.epa.gov/labs21century/training/stlouis.htm)  
781-674-7374

### Distributed Generation and Combined Heat and Power for Federal Facilities

May 13-15  
Newport Beach, CA  
[www.eere.energy.gov/femp/resources/training/fy2003\\_der.html](http://www.eere.energy.gov/femp/resources/training/fy2003_der.html)  
410-953-6215

### Operations and Maintenance Management

May 19-20  
Anchorage, AK  
[www.eere.energy.gov/femp/resources/training/fy2003\\_om.html](http://www.eere.energy.gov/femp/resources/training/fy2003_om.html)  
509-372-4368

### Super Energy Savings Performance Workshop

May 20-21  
Indianapolis, IN  
[www.eere.energy.gov/femp/resources/training/fy2003\\_super\\_espc.html](http://www.eere.energy.gov/femp/resources/training/fy2003_super_espc.html)  
703-243-8343

### Implementing Renewable Energy Projects

May 20-21  
Boston, MA  
[www.eere.energy.gov/femp/resources/training/fy2003\\_implement.html](http://www.eere.energy.gov/femp/resources/training/fy2003_implement.html)  
303-526-5528

### Introduction to Facility Energy Decision System (FEDS)

May 21  
Anchorage, AK  
[www.eere.energy.gov/femp/resources/training/fy2003\\_feds.html](http://www.eere.energy.gov/femp/resources/training/fy2003_feds.html)  
509-372-4368

### Measurement and Verification for Super ESPC Projects

May 21  
Indianapolis, IN  
703-243-8343

### Advanced Facility Energy Decision System (FEDS)

May 22-23  
Anchorage, AK  
[www.eere.energy.gov/femp/resources/training/fy2003\\_feds2.html](http://www.eere.energy.gov/femp/resources/training/fy2003_feds2.html)  
509-372-4368

### Utility Energy Service Contracting Projects

May 28-29  
Philadelphia, PA  
[www.eere.energy.gov/femp/resources/training/fy2003\\_uesc\\_projects.html](http://www.eere.energy.gov/femp/resources/training/fy2003_uesc_projects.html)  
703-243-8343

### High Performance, Low Energy Laboratory Design Workshop

May 29  
Seattle, WA  
[www.epa.gov/labs21century/training/seattle.htm](http://www.epa.gov/labs21century/training/seattle.htm)  
781-674-7374

### Operations and Maintenance Management

June 10-11  
San Diego, CA  
[www.eere.energy.gov/femp/resources/training/fy2003\\_om.html](http://www.eere.energy.gov/femp/resources/training/fy2003_om.html)  
509-372-4368

### Design Strategies for Low-Energy, Sustainable, Secure Buildings

June 18-19  
Chicago, IL  
[www.eere.energy.gov/femp/resources/training/fy2003\\_low\\_energy.html](http://www.eere.energy.gov/femp/resources/training/fy2003_low_energy.html)  
202-628-7400 ext. 201

## Conferences

### EnvironDesign 7

April 30 - May 2  
Washington, DC  
[www.isdesignet.com/ED/](http://www.isdesignet.com/ED/)  
561-627-3393

### CHP on the Move: Meeting State, Federal, and International Challenges

April 30 - May 2  
Washington, DC  
[www.nem.org/uschpa/PolicyDay2003.htm](http://www.nem.org/uschpa/PolicyDay2003.htm)  
216-464-2137

### Third Annual DOE/U.N. Hybrid Conference and Workshop

May 13-15  
Newport Beach, CA  
[www.netl.doe.gov/](http://www.netl.doe.gov/)  
412-386-6044

### Energy 2003

August 17-20  
Lake Buena Vista, FL  
[www.energy2003.ee.doe.gov](http://www.energy2003.ee.doe.gov)  
800-395-8574

### Life-Cycle Costing (Combined: Basic & Project-Oriented)

June 18-19  
Philadelphia, PA  
[www.eere.energy.gov/femp/resources/training/fy2003\\_lifecycle2.html](http://www.eere.energy.gov/femp/resources/training/fy2003_lifecycle2.html)  
509-372-4520

### Strategies for Healthier and More Productive Buildings

June 19-20  
Atlanta, GA  
[www.southface.org/home/events/O&M\\_conference/O&M\\_conference.htm](http://www.southface.org/home/events/O&M_conference/O&M_conference.htm)  
404-872-3549 ext. 114

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## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. By investing in technology breakthroughs today, our nation can look forward to a more resilient economy and secure future.

Far-reaching technology changes will be essential to America's energy future. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a portfolio of energy technologies that will:

- Conserve energy in the residential, commercial, industrial, government, and transportation sectors.
- Increase and diversify energy supply, with a focus on renewable domestic sources.
- Upgrade our national energy infrastructure.
- Facilitate the emergence of hydrogen technologies as a vital new "energy carrier."



**U.S. Department of Energy**  
**Energy Efficiency and Renewable Energy**

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