Save with Solar

Winter 1998 — Vol. 1, No. 3

A quarterly technical bulletin for Federal solar energy champions

Contents

U.S. Department of Energy
Federal Energy Management Program

$1.9 Million Awarded for Federal Renewable Energy Projects in FY 1998

In fiscal year 1998, Congress provided the U.S. Department of Energy's (DOE's) Federal Energy Management Program (FEMP) with $2.3 million in funding to identify and pursue opportunities to deploy solar and other renewable energy technologies in the Federal sector. These technologies can provide heat and electric power to government facilities without emitting carbon dioxide, nitrogen oxides, and other greenhouse gases. Developing renewable energy technologies also helps to create new jobs and reduce the nation's need for imported fuel.

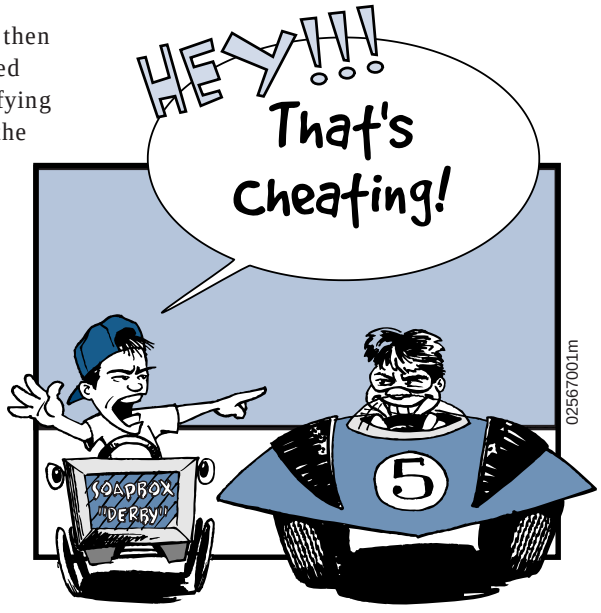
FEMP issued a solicitation last year to award approximately $1.9 million of the funding to government agencies to help them purchase solar systems and other renewable energy equipment and hardware. Eligible renewable energy technologies included solar water heating, photovoltaics (PV), ventilation air preheating (transpired solar collectors or "solar walls"), passive solar and daylighting systems, and wind systems.

A panel of five FEMP reviewers then independently evaluated and ranked approximately 70 proposals, identifying 26 for the 1998 awards (please see the list accompanying this article). Successful proposers had to meet several important criteria. For example, their project had to be cost effective, with a payback period of 10 years or less, as mandated by Congress and Executive Order 12902. In addition, project funds had to be spent before September 30, 1998, primarily on solar and other renewable energy system hardware. Proposers were also awarded points for meeting any of these additional criteria:

- Multiple, standardized solar or renewable energy systems would be installed at more than one location.
- Energy conservation measures, as well as renewable energy systems, would be included.
- System design, hardware, and vendors were specified, and applicable Federal agency approvals were obtained.
- The spending plan leveraged agency resources with those of any Federal or non-Federal partners in the project.
- The project could be replicated easily.
- The facility could be a showcase that would help to educate and inform other agencies about renewable energy.

The first criterion, which called for multiple, standardized solar systems, was particularly of interest because of FEMP's recent work with the General Services Administration (GSA). This work involved placing solar and other renewable energy

(Continued on p. 7)



Solar power: The competitive edge!

Goal: 2000 Roofs by Year 2000

619

Federal Energy Managers Partner in President Clinton's Million Solar Roofs Initiative

Collecting Our Thoughts

By Patrina Eiffert, Ph.D., Editor

Patrina Eiffert

It has been over a year since President Clinton committed the Federal sector to the long-term goal of 20,000 new solar energy systems on government roofs by 2010. As a near-term goal, the Department of Energy's Federal Energy Management Program (FEMP) is focusing on assisting agencies in their efforts to install 2,000 systems by 2000. The good news is that, in a preliminary count, Federal energy managers have already installed 619 solar systems that meet the requirements of the Million Solar Roofs Initiative (MSRI). This preliminary count will be confirmed when the national registry is in place early next year.

The new solar systems include 7 for the National Oceanic and Atmospheric Administration in the Department of Commerce; 532 for the U.S. Navy and 3 for the U.S. Air Force in the Department of Defense; 2 for the Western Area Power Administration in the Department of Energy; 11 for the Bureau of Land Management, Bureau of Reclamation, and National Park Service in the Department of Interior; 63 for the U.S. Coast Guard in the Department of Transportation; and 1 for the Environmental Protection Agency. By technology, there are 608 solar hot water systems, 10 photovoltaic power systems, and 1 transpired solar collector (solar ventilation air preheating). If you have installed a system that you think may not be included in the national count, please contact Patrina_Eiffert@ nrel.gov as soon as possible.

Additional resources are coming on line for renewable energy projects, including the MSRI. All solar Technology-Specific Energy Savings Performance Contracts (ESPCs) are expected to be in place by the end of Spring 1999. In addition, FEMP is encouraging agencies to use regional ESPCs for Million Solar Roofs and other renewable energy projects by bundling systems with energy conservation measures. Recent developments include these:

- The Photovoltaic Technology-Specific ESPC has been awarded to two energy service companies: HEC, Inc., of Natick, Massachusetts, and CES/Way International, Inc., of Houston, Texas. For more information, please see the related article on page 6 of this issue and contact Tatiana Strainic Muessel, DOE FEMP, at 202-586-9230.
- The Solar Transpired Collectors Super ESPC solicitation is in development, and the first delivery order has been identified.
- The Solar Thermal Super ESPC solicitation is in progress, and NREL is currently working to identify the first delivery order. If you have a potential site for a delivery order under this contract, please contact Patrina_Eiffert@nrel.gov

The next steps in our strategic plan include a focus by FEMP on MSRI partners and communities to encourage Federal participation in the partnerships and accelerate the implementation of cost-effective roofs in the communities. FEMP will be seeking opportunities for cost-effective energy systems with the following nine MSRI partners: the states of Colorado, Hawaii, and Washington; the Sacramento Municipal Utility District and Los Angeles Department of Water and Power in California; the Salt River Project and Tucson Electric Power in Arizona; New England Electric Services; and the Maryland Energy Administration. New partnerships will be added in the next few months. If you have facilities in these areas and would like assistance in partnering with the MSRI, please let us know.

In other news, FEMP's first annual trade show (Energy '98 — Breaking the Barriers) emphasized practical results, user-oriented information, and reports on how Federal facilities take projects from conception to completion. Topics included Super ESPCs, Operation and Maintenance, Energy Awareness, Procurement, and Technologies. A special session was held on Federal participation in the MSRI. This session covered available technical and financial tools and resources as well as Federal and private-sector partnerships, and several solar suppliers exhibited at the trade show. Energy '99 is scheduled to be held in August 1999 in Orlando, Florida, where a special session on federal participation in the MSRI will be convened. ■

Coming Up in January: Mark Your Calendar!

energyNow: The First Annual Mid-Atlantic Regional Energy Workshop, co-sponsored by DOE, the Philadelphia Regional Support Office, FEMP, the GSA, and Washington Gas, will focus on bringing local customers and suppliers together to make projects happen. Workshop tracks include new technologies, deregulation, and both Federal and non-Federal projects. Special events include a networking breakfast with utilities and ESCOs, a tour of the energy-efficient MCI sports complex, and closing speech by Robert F. Kennedy, Jr.

Location: Ritz-Carlton Hotel, Pentagon City, Arlington, VA
Dates: January 6-8, 1999
Contact: Matt Burdetsky, LTM, Inc., 703-207-1703
e-mail: matt@cmpinc.net

Exhibition Illuminates Design Aspects of Solar Technologies

By Lucy Fellowes, Cooper-Hewitt, National Design Museum, Smithsonian Institution

Members of the renewable energy community and thousands of other visitors were able to view a special exhibition this year titled "Under the Sun: An Outdoor Exhibition of Light." The exhibition ran from June to November in New York City at Cooper-Hewitt, National Design Museum, Smithsonian Institution.

Held in an 18,000-square-foot terrace and garden area at the museum, "Under the Sun" had a particularly appropriate name and setting, since the garden is bathed in sunlight almost all day long. The exhibition explored solar energy as a catalyst for both practical and visionary design, and illuminated some of the ways in which design and technology intersect. As the preservation of our environment becomes increasingly more important, solar energy technologies continue to suggest innovative solutions to serious local and global energy problems. These are some of the exhibition's highlights:

- A solar clock and sundial formed by a dozen chairs incorporating special lights powered by photovoltaics
- Solar glass and solar tensile pavilions
- A *Himawari* (sunflower), a system for bringing sunlight into a building, and a solar fountain
- Solar products of the future, including a solar lantern, a solar lawnmower, and a solar-powered laptop computer.

The National Design Museum's galleries are devoted to changing exhibitions that examine issues of design as they relate to daily life. These exhibitions present the results of research and stimulate dialogue, offering different perspectives on the creation and consequences of design. This particular exhibition was made possible by BP Solar and by the U.S. Department of Energy, with contributions from more than 20 additional organizations, companies, designers, engineers, and advisors. If you missed "Under the Sun" this year, the exhibition should be presented again next year. A four- or five-city tour is planned by the Smithsonian Institution Traveling Exhibition Service (SITES). For more information, contact Sandra Narva, SITES, 202-357-3168, ext. 126 (on the Internet, see **http://www.si.edu/ndm/exhib/sun)**.

Solar-Powered Fountain

Where there is no electric grid, or network of power lines, the sun is often the best and cheapest source of power. But even at a distance of only several hundred feet from a grid connection, solar energy can be economical. Solar pumps, for example, are effective, low-cost solutions to problems of water delivery. A fountain in this exhibition demonstrates on a small scale the potential of solar-powered waterworks. This fountain's design integrates solar electric or photovoltaic (PV) cells on a curved surface to catch the changing angles of the Sun. The custom design features specially sized, configured, and wired polycrystalline PV cells encapsulated in clear urethane. Eight solar arrays power the 12-volt pump and the lights and charge the battery. The intensity of the sunlight determines the fountain's water flow. A visual display at the base of the fountain shows the energy input from the PV system, the load, or demand for power, and the charge level of the battery.

Solar-Powered Fountain

Design: Amelia Amon, Alt.Technica, 1998, New York, NY

Engineering: Kevin Conlin, Solarcraft Inc., Stafford, TX

Materials: Photovoltaics, metal substrate, and water

Photovoltaic cells: Kyocera America, San Diego, CA

Solar Modules: Photocomm, Inc., Scottsdale, AZ

Module Encapsulation: Development Assoc., North Kingston, RI

Metal Works: Studio Dell'Arte, Brooklyn, NY

Basin: Arcaseum, New York, NY

Shield: Atta Inc., New York, NY

Battery: East Penn Manufacturing, Lyon Station, PA

Photo: Lucy Fellowes

Lucy Fellowes/PIX06861

Solar Glass Pavilion

The least expensive but not the most efficient PV material, thin-film photovoltaics is still well suited for both new and existing residential and commercial buildings. Thin-film PV is produced by depositing extremely thin layers of PV materials onto a glass or metal surface. Fine laser-cut lines in glass-based PV create patterns of light. Opaque, metal-based thin-film PV can be used for roofing or siding. This versatile technology can be used on glass and other solid

(Continued on p. 6)

Solar Glass Pavilion

Design: Gregory Kiss, Kiss & Cathcart Architects, and Nicholas Goldsmith, FAIA, FTL Happold Architects & Engineers, New York, NY

Materials: Thin film Apollo® photovoltaic solar modules, glass

PV Manufacturer: BP Solar, Fairfield, CA

Apollo® is a BP Solar registered trademark

Glass Pavilion made possible by BP Solar

Photo: Bill Jacobson

Bill Jacobson/PIX06862

■ *Spotlight on Technology:*

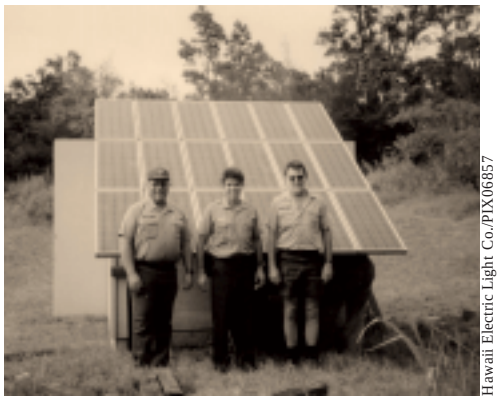
Standard PV System Design Works for National Park

A prefabricated photovoltaic (PV) hybrid power system is now operating in Volcanoes National Park, Hawaii, and saving money, thanks to the combined efforts of staff in the National Park Service (NPS), Hawaii Electric Light Company, Inc. (HELCo), and DOE's Federal Energy Management Program (FEMP).

The PV-propane hybrid power system, which has a payback period of less than six years, was installed by HELCo staff at Ainahu Ranch, a historic NPS site. Founded in 1941, the ranch originally belonged to the Shipman family, who ran it until the 1960s. It eventually became a sanctuary for the "nene," or Hawaiian goose, which the Shipman family is credited for saving from extinction. The landscaped grounds contain many exotic trees and an extensive potable water catchment and distribution system. Purchased by Volcanoes National Park in 1972, the Ainahou Ranch facility is now being restored. The facility will be used for group retreats and for different environmental education programs.

Hawaii Electric Light Co./PIX06854

Ainahou Ranch House



Hawaii Electric Light Co./PIX06857

Volcanoes National Park Staff (Wayne Rawls, Dick Rasp, and Nick Heinrick) with solar energy shed

Nick Heinrick, Maintenance Division of Hawaii Volcanoes National Park, said, "The power provided by the photovoltaic system is invaluable for the restoration and future operation of the ranch. It is far superior to a diesel generator with all the inherent problems of noise, smell, safety, and transportation of fuel. The park service is very grateful to NREL and HELCo for acquiring the system for us."

The prefabricated, self-contained, portable energy shed procured for and installed in Volcanoes National Park has a steel frame permanently anchored in a concrete foundation. It is enclosed in a plywood structure that supports and protects the PV power system. The PV panels or modules are mounted onto the roof of the structure, and the roof is pitched approximately 30 degrees to correspond with the angle of the winter

Hybrid PV-Propane System Specifications

The components of the standardized hybrid photovoltaic-propane system in Volcanoes National Park are as follows:

(1) One 900-peak-watt photovoltaic array consisting of 18 ASE Americas, Inc., 50-AL modules with DC peak current of 2.86 amps. Modules are paired in series to provide 24 volts DC.

(2) One Ananda Power Technologies, Inc. (APT) 'Powercenter 4B' charge controller that handles an array output up to 60 amps.

(3) One Trace Engineering Company, Inc., 4024 sine wave inverter supplying up to 4,000 watts continuously and handling surges up to 16,000 watts.

(4) Eight Trojan L-16 batteries wired in series to provide 24 volts and in parallel to provide a total of 700 amp-hours of storage.

(5) One Onan 4.5-kilowatt backup generator, model # 4-5 BGDFB1L, integrated with the Trace inverter to provide a maximum charge rate of 120 amps for the system's batteries when operating. A fire extinguisher is mounted in the generator compartment as a safety measure.

Materials used to connect the solar electric system to the facility's electrical service include a ground rod, 250 feet of direct burial cable containing three #2 wires and three # 12 wires, and 500 feet of direct burial telephone wire. The 8-foot ground rod is connected to the grounding conductor. The #2 wires connect the system to the main electrical service. The #12 wires are used in a relay switch unit so that the generator may be started from inside the facility. The direct burial telephone wire will power the 'Smart Light,' a small LED instrument that can be mounted in a visible spot inside the structure that instructs residents and guests about the status of the storage batteries and when to operate the back-up generator.

Recommendations for Operation and Maintenance

Maintenance and electrical staff at Volcanoes National Park participated in the installation of the solar electric system and were given hands-on instructions on the care and maintenance of the system. Two manuals specifically written to address operation and maintenance of the prefabricated integrated photovoltaic system were provided to park personnel, along with manufacturers' manuals and information on the separate components of the system. Construction details and electrical schematics for the system are contained in the operations and maintenance manual. Specific instructions for park personnel regarding operation and maintenance of the solar electric system were as follows:

(1) Provide regular maintenance for the backup generator and operate on a regular basis to prevent internal corrosion.

(2) Equalize the batteries approximately once a month when the solar electric system is being used on a regular basis.

(3) Add distilled water to the batteries every month or two using the semiautomatic single-point watering system (Hydrocap Catalyst Battery Caps) installed in the battery only when the batteries are in a fully charged state.

(4) Keep the photovoltaic modules clean of dirt and debris.

(5) Lock the battery, generator and inverter compartments of the energy shed to prevent theft and tampering with the equipment.

The following signs were laminated and provided to Volcanoes National Park staff for use at Ainahou Ranch:

(1) A simple diagram showing the integration of the specific components of a stand-alone PV system.

(2) A one-page explanation about how a PV system works and how to live with a solar system by practicing energy conservation, using energy-efficient appliances, and switching fuels to meet the demand for energy.

(3) A color-coded instruction sheet, to be used with the 'Smart Light' indicator, that explains to users the appropriate response to the information provided by the LED instrument. The sheet recommends that the smart light and remote start switch for the generator be mounted in the same spot.

(4) A half-page sheet listing inappropriate loads and appliances that should be used only on a limited basis.

Simple Payback Calculations

Ainahou Ranch is located approximately one mile from the Chain of Craters Road in Volcanoes National Park. The cost of a utility line extension to the area would be more than $100,000, making this a cost-prohibitive option. Usage of the facility will vary, but the calculations provided below are based on the assumption that a full-time caretaker will reside at the facility and groups of 15–20 people will use the facility for a minimum of five days a month.

The simple payback calculations assume that the alternative to PV for providing electricity to the facility would be a diesel generator. To provide power equivalent to that provided by the proposed PV system, a diesel generator would need to run an average of 40 hours a week.

For these payback calculations, the formula provided in *Photovoltaic Systems for Government Agencies*, a publication of Sandia National Laboratories (SAND88-3149), was used. The formula is as follows:

$$\frac{\text{Capital Cost of Solar System} - \text{Capital Cost of Other System Option}}{\text{First-Year Fuel O\&M Cost of Other System} - \text{First-Year Fuel O\&M Cost of Photovoltaic System}} = \text{Simple Payback}$$

PV System Simple Payback Calculation:

$$\frac{\$26{,}500 - \$6{,}500}{(2080 \text{ hrs} \times \$1.80/\text{gal.}) - (150 \text{ hrs} \times \$2.40/\text{gal.} \times 3/4 \text{ gal.})} = \frac{\$20{,}000}{\$3{,}474} = 5.75 \text{ years}$$

Assumptions:

(1) Installed cost of a prefabricated PV system in a self-contained energy shed is $22,500.

(The energy shed will be equipped with a 900-watt PV array, APT charge controller, 4024 Trace SW inverter, and eight Trojan L-16 batteries providing 700 amp-hours of storage. The energy shed contains a compartment to house the existing back-up generator).

(2) The existing generator integrated into the portable solar energy shed is valued at $4,000.

(3) Estimated fuel consumption of a 5-kilowatt propane generator is 3/4 gallon per hour of run time.

(4) Estimated run time for the 5-kilowatt propane backup generator is approximately 150 hours per year.

(5) Estimated cost of propane is $2.40 per gallon.

(6) Estimated cost of 6-kilowatt diesel generator is $6,000.

(7) Estimated cost of constructing a generator shed to house the diesel generator is $500.

(8) Estimated run time for a diesel generator is approximately 2080 hours per year.

(9) Estimated fuel consumption of a 6-kilowatt diesel generator is 1 gallon per hour of run time.

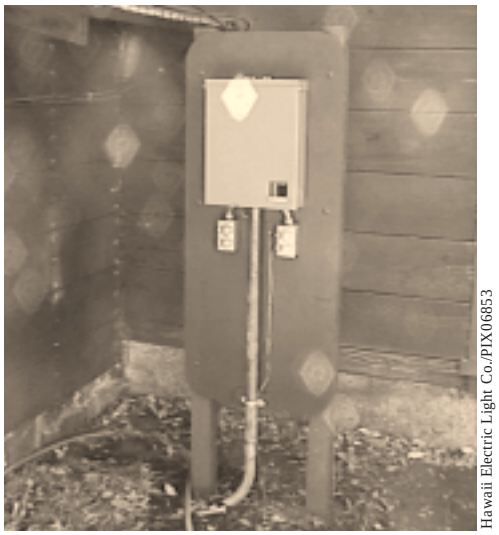
(10) Estimated cost of diesel is $1.80 per gallon.

(11) Estimated maintenance of the PV system in the first year, excluding generator operating costs, is $0.

sun in Hawaii. The shed is oriented nearly due south, and it is placed where neither plant growth nor buildings will interfere with the sun's path throughout the year.

The integrated structure is built to withstand wind loads up to 120 miles per hour.

(Information for this article was provided by Hawaii Electric Light Company, Inc.) ■



Hawaii Electric Light Co./PIX06853

Connection to main electrical service for Ainahou Ranch House

Hawaii Electric Light Co./PIX06851

Propane generator compartment with installed exhaust housing

Hawaii Electric Light Co./PIX06852

Inverter and charge controller

Hawaii Electric Light Co./PIX06858

Solar energy shed being delivered along Ainahou Ranch Road

Hawaii Electric Light Co./PIX06856

Energy shed being unloaded by the Manitex crane

Hawaii Electric Light Co./PIX06855

Steve Burns, HELCo, and the inverter compartment of the solar electric shed

DOE Awards "PV Super ESPCs"

The Department of Energy recently announced the award of Photovoltaic Power System Technology-Specific Super Energy Savings Performance Contracts ("PV Super ESPCs"). They are managed out of DOE's Golden Field Office and are worth up to $50 million. After a competitive solicitation, DOE awarded these contracts to two energy service companies (ESCOs). The contracts were developed by DOE's Federal Energy Management Program (FEMP) and are based on DOE's Indefinite Quantity, Indefinite Delivery (IDIQ) contracting.

Technology-Specific Super ESPC contracts make it easier for government agencies to reduce their energy costs and help protect the environment by obtaining and using solar and other renewable energy systems. These contracts stipulate that the ESCO is responsible for the labor, materials, equipment, and capital costs of the installed system. In return for its investment, the ESCO receives, for the term of the contract (which can be up to 25 years), a negotiated share of the agency's cost savings, which result from lower energy bills at the installation site.

The PV Super ESPC contracts were awarded to HEC, Inc., of Natick, Massachusetts, and CES/Way International, Inc., of Houston, Texas. These ESCOs and their subcontractors were selected because of their capabilities and experience in providing energy savings by installing PV and associated energy systems. In delivery orders written under the contracts, the cost of the PV system must be at least 33% of the total cost of the hardware and services supplied. The PV system must have some or all of these components:

- PV modules that generate electricity for a direct load; modules with battery storage; or modules with battery storage and generator backup (the generator charges the batteries)
- Controllers
- Engine generators or controls for interfacing the system with an engine generator
- Inverters and associated energy conservation technologies that reduce the energy load.

Unlike Regional Super ESPCs, which cover several different energy efficiency measures and renewable energy systems in a particular region, Technology-Specific Super ESPCs focus on one particular technology and are available to any Federal agency in the nation and U.S. territories. The government can thus use its substantial buying power to stimulate the growth of emerging sustainable energy technologies such as photovoltaics.

For more information about the PV Super ESPCs, please see the October 1998 issue of *FEMP Focus*, or the DOE FEMP Web site (http://www.eren.doe.gov/femp). You may also contact Tatiana Strainic Muessel, DOE FEMP, 202-586-9230, or your DOE Regional Support Office:

Seattle RSO, Curtis Framel, 206-553-7841

Denver RSO, Randy Jones, 303-275-4814

Chicago RSO, Sharon Gill, 312-886-8573

Atlanta RSO, Dave Waldrop, 404-347-3483

Philadelphia RSO, Bill Klebous, 212-264-0691

Boston RSO, Paul King, 617-565-9712 ■

Lawrence Berkeley Lab/PIX01057

This PV skylight system is integrated into the main entry of the Thoreau Center at Presidio National Park, in California. It is the first integrated overhead glazing system at a Federal facility.

*You really **can** change the world if you care enough.*

Marion Wright Edelman

Exhibition Illuminates Design Aspects of Solar Technologies

(Continued from p. 3)

surfaces, and it is one of only a few renewable energy forms that can be integrated into an urban environment. A glass-based PV module can replace glass almost anywhere in a building. Modules can be part of curtain walls, act as sunshades, or provide overcladding. Semitransparent PV can also be used in skylights to generate power while transmitting light. Today, architectural glass is coated with thin layers of metal or pigments that filter or deflect light. The same effect can be achieved, at comparable cost, with photovoltaic glass. Recent developments in thin-film PV, such as more efficient use of materials and large-scale production, have enhanced its cost-effectiveness.

The glass pavilion in the exhibition typifies the state of the art in thin-film PV glass for buildings. Here, PV modules are the structure, enclosure, and power source. The arrangement of clear and PV glass creates a visual effect of light and dark. The Apollo® thin-film PV modules and clear glass panes are laminated in four-feet-square glass sheets that form the pavilion's walls and roofs. Metal plates connect the modules, and the floors and reinforcing ribs are made of clear laminated glass. The glass pavilion generates enough electricity to power its own ventilation system and night lighting. It demonstrates the potential for buildings that are not only shelters but also mini-power stations, at times generating enough power to export back to the grid. ■

$1.9 Million Awarded in FY 1998

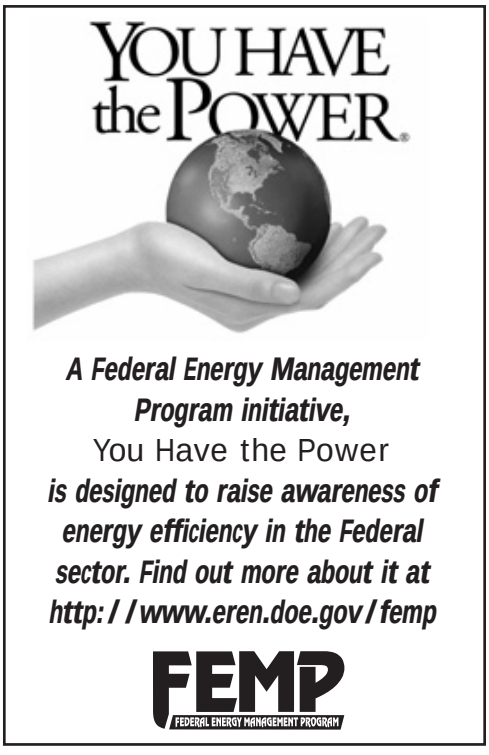
(Continued from p. 1)

systems on the Federal Supply Schedule, which allows Federal agencies to obtain systems virtually "off the shelf" through the GSA. It also helps to speed up the procurement and installation of renewables throughout the government.

Here is a breakdown of the FY 1998 project awards by technology:

- $653,000 for projects to install solar water heating systems
- $558,500 for photovoltaic energy systems
- $550,000 for wind energy systems (wind turbines)
- $150,600 for passive solar (daylighting) systems
- $15,000 for solar ventilation preheating systems (transpired solar collectors or "solar walls").

FEMP has been reporting on these FY 1998 projects as they are completed (see an article on Hawaii Volcanoes National Park on page 4 of this newsletter). Watch for news about another round of awards in FY 1999 in upcoming issues of *FEMP Focus*. For more information, contact Nancy Carlisle, NREL, 303-384-7509 (Nancy_Carlisle@nrel.gov) or Patrina Eiffert, 303-275-3066 (Patrina_Eiffert@nrel.gov).■



A Federal Energy Management Program initiative,
You Have the Power
is designed to raise awareness of energy efficiency in the Federal sector. Find out more about it at http://www.eren.doe.gov/femp

FEMP
FEDERAL ENERGY MANAGEMENT PROGRAM

Federal Solar and Renewable Energy Projects Funded by DOE FEMP in FY 1998

U.S. Navy, Dept. of Defense; Moanalua Terrace, Pearl Harbor, HI: Solar systems for about 40 base housing units. Project award: $130,000; estimated payback: 6.3 years.

U.S. Navy, Dept. of Defense; Pearl Harbor Naval Shipyard, HI: Solar water heaters for two commercial buildings, a laundry and an electronics shop. Project award: $130,000; estimated payback: 2.8 years.

U.S. Navy, Dept. of Defense; San Clemente Island, CA: Partial funding of a 550-kW wind turbine. Project award: $550,000; estimated payback: 9.4 years.

U.S. Coast Guard, Dept. of Transportation; Kia'i Kai Hale, HI: Solar water heating for 62 housing units. Project award: $200,000; estimated payback: 8.8 years.

National Park Service, Dept. of Interior; Gulf Islands National Seashore: PV system for remote island park. Project award: $58,000; estimated payback: 6 years.

Federal Emergency Management Agency (FEMA); DOE Atlanta Regional Support Office: Portable PV equipment for use in disaster-relief situations. Project award: $150,000; estimated payback: 7.7 years.

U.S. Army Garrison-Hawaii, Dept. of Defense; Schofield Barracks, HI: Passive daylighting systems for five warehouses. Project award: $150,600; estimated payback: 8 years.

National Park Service, Dept. of Interior; Lake Roosevelt National Recreation Area, WA: Two PV systems for boat ramp lighting. Project award: $5,000; estimated payback: 6 months.

National Weather Service, National Oceanic and Atmospheric Administration; Pacific Tsunami Warning Center, Oahu, HI: Passive solar water heaters for six staff residences. Project award: $23,000; estimated payback: 2.8 years.

Bureau of Land Management, Dept. of Interior; BLM campgrounds, UT: Eight small, portable PV power systems for campground hosts and staff at small administration sites. Project award: $64,000; estimated payback: 1 year.

U.S. Bureau of Reclamation, Dept. of Interior; Leadville, CO: Transpired solar collector ("solar wall") for Leadville Treatment Plant building. Project award: $15,000; estimated payback: 6.9 years.

National Park Service, Dept. of Interior; Zion National Park, UT: Two PV systems for ranger cabin lights, battery charging, water pumping. Project award: $13,000; estimated payback: 2.1 years.

National Park Service, Dept. of Interior; USS Arizona: PV-powered parking lot lights for visitors to historic ship. Project award: $57,000; estimated payback: 4.6 years.

U.S. Navy, Dept. of Defense; Navy Public Works Center, Norfolk, VA: Solar heating system for Navy swimming pool. Project award: $82,000; estimated payback: 3.6 years.

National Park Service, Dept. of Interior; Hawaii Volcanoes National Park: One solar electric system for historic buildings. Project award: $22,500; estimated payback: 5.8 years.

National Park Service, Dept. of Interior; Grand Canyon National Park, AZ: PV power systems for NPS remote radio sites. Project award: $32,000; estimated payback: 1 year.

U.S. Navy, Dept. of Defense; Naval Surface Warfare Center, Dahlgren, VA: Solar water heating systems for four buildings. Project award: $53,000; estimated payback: 6.1 years.

National Park Service, Dept. of Interior; Rainbow Point, Bryce Canyon National Park, UT: PV-powered water pumping station. Project award: $11,000; estimated payback: 1.2 years.

Forest Service, U.S. Dept. of Agriculture; Portable PV generators for Forest Service use in fighting fires. Project award: $43,000; estimated payback: 8.8 years.

Indian Health Service, Dept. of Health and Human Services; Santa Fe, NM: Refurbish a large solar water heater for IHS hospital (phase 1). $15,000.

National Renewable Energy Laboratory, Dept. of Energy; NREL, Golden, CO: Solid-state ceramic PV path lighting. Project award: $11,000; estimated payback: 9.7 years.

National Park Service, Dept. of Interior; Manti-LaSal National Forest, UT: PV power systems for two remote guard station lights and electrical needs. Project award: $34,000; estimated payback: 10 years.

Indian Health Service, Dept. of Health and Human Services; A-C-L Hospital, NE Sunrise Regional Treatment Center, Albuquerque, NM: Solar-powered street lighting for treatment center. Project award: $13,000; estimated payback: 4.8 years.

U.S. Environmental Protection Agency; EPA Region 10 Manchester Lab Complex: One PV-powered UPS system for laboratory. Project award: $12,000; estimated payback: 2 years.

U.S. Army, Dept. of Defense; Camp Pendleton, CA: Refurbish and retrofit solar pool heating systems at training tanks. Project award: $20,000; estimated payback: 9.9 years.

U.S. Marine Corps, Dept. of Defense; Marine Corps Recruit Depot, Parris Island, SC: Solar-powered lights for playground, parking lots, etc. Project award: $33,000; estimated payback: 1.1 years.

Save with Solar

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FEDERAL ENERGY MANAGEMENT PROGRAM

A 9.1-kilowatt photovoltaic hybrid energy system provides clean, quiet electricity for a U.S. Fish and Wildlife Service installation on Farallon Island, which is 30 miles west of San Francisco, California, and home to 6000 sea lions. The energy system, which was procured through the GSA Supply Schedule, was designed by Applied Power Corporation to withstand the harsh, corrrosive enviromental conditions of the seashore. The system provides three days' worth of backup power for staff biologists and volunteers.