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

FEMP Renewable Energy Overview

Meeting Federal goals for renewable energy use will help to conserve our natural resources and increase the nation's energy security

Abundant energy from the sun, the wind, plants, and the Earth itself—renewable energy—can provide some or all of your Federal facility's needs for heating, cooling, and electricity. The U.S. Department of Energy's Federal Energy Management Program (FEMP) has developed ways to help you tap into these clean, secure energy resources.

FEMP provides agencies with information, guidance, and assistance in using renewable energy. Using renewable energy reduces the nation's need for imported fuels, which enhances our energy security. Renewable energy also helps to conserve the nation's natural resources, and it has almost no adverse effect on the environment. It also provides fuel diversification, which serves as a hedge against volatile utility prices.

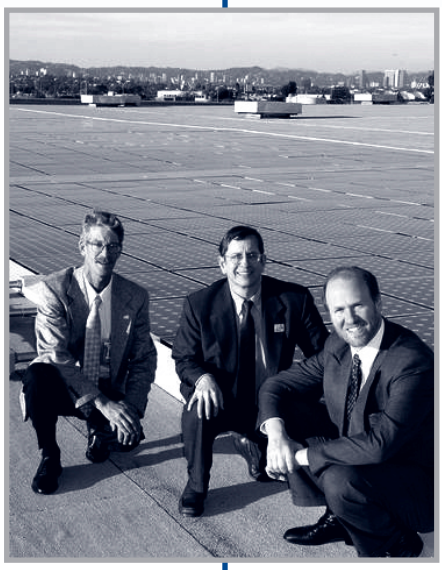
Where renewable resources are available, they can contribute significantly to the energy security of an individual Federal facility. They provide a naturally occurring, continual flow of energy, at or near the place where the energy is used. They are thus distributed rather than centralized resources. This can be important to energy managers who have to make sure their facility will keep operating even if utility power is disrupted by reductions in supplies or national emergencies.

Your agency may have already started or completed projects that help to meet Federal requirements and goals for using renewable energy (see box on this page). If not, FEMP can help you get started. If you need assistance with a project in progress, FEMP can help you find good solutions along the way. FEMP works with agencies like yours to—

- Increase the number of successful renewable energy projects on Federal sites,
- Increase purchases of power or fuels generated from renewable energy resources, and
- Encourage the facilitation of renewable energy projects that are on Federal lands, use Federal resources, or serve certain Federal agency customers.

These are the three major approaches to helping the Federal Government increase its use of renewable energy.

George Marsh/PIX11017



This rooftop PV array at the USPS Marina del Rey Center in Los Angeles generates 127 kilowatts (kW) of electricity; project partners included Joe VandenBerg and Ray Levinson, USPS, Dan Shugar, PowerLight Corp. (shown left to right in the photo) and staff at Lawrence Berkeley National Laboratory.

Federal Goals for Renewable Energy

Executive Order 13123 requires Federal agencies to increase their use of renewable energy, and it called for the Secretary of Energy to set a goal for Federal use. Therefore, the Secretary directed that Federal agencies obtain the equivalent of 2.5% of their electricity from renewable energy by 2005. Solar, wind, biomass, and geothermal systems installed after 1990 are the applicable renewable energy resources listed in the Executive Order. Several different technologies make use of those renewable resources; at least one is appropriate for almost any Federal facility in the world (see page 3 for a list of resources and technologies).

When the Federal goal was established in June 2000, it represented about 1,355 gigawatt-hours (GWh) of electricity. At that time, agencies were obtaining more than 170 GWh, or about 13% of the goal, from renewable resources. March 2003 data indicate that the Federal Government is now using approximately 663 GWh of renewable energy, or about 48% of the revised goal of 1,384 GWh. The new goal takes into account recent increases in overall Federal electricity use.

In addition, the Executive Order calls for 20,000 Federal Solar Roofs by 2010, as one of the nation's Million Solar Roofs goals. See FEMP's Web site for updates on our progress in meeting these goals (www.eere.energy.gov/femp/).

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

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Federal Energy Management Program
Renewable Energy Overview

Benefits of Renewable Energy

Using renewable energy systems brings agencies benefits like these:

- Reliable, distributed power supplies and fuel diversification, which enhance energy security for both individual facilities and the nation
- More power for peak-use periods
- Fewer (or no) emissions or greenhouse gases associated with energy use
- Lower risk of fuel spills in environmentally sensitive, remote locations
- Less need for imported fuels
- Lower utility bills
- Reduced operation and maintenance (O&M) costs
- Greater price stability in an uncertain energy economy.

How Federal Facilities Can Use Renewable Energy

On-Site Projects. In on-site projects, a solar water heating, photovoltaic (PV), wind, geothermal heat pump, or other distributed renewable energy system is installed where the energy will be used. These projects can feature one or more systems. On-site systems are effective both as retrofits in existing buildings and as planned options in new facilities.

In new construction projects, using renewable energy along with low-energy design principles can greatly reduce a facility's energy bills and O&M costs. And when budgets for capital improvements are tight, authorized private-sector financing for projects can be arranged through FEMP via Utility Energy Services Contracts and Energy Savings Performance Contracts.

In the past, most renewable energy projects were small. Today, many agencies are installing larger systems or a greater number of smaller systems. For example, the U.S. Postal Service recently installed a large, 127-kW rooftop solar system at its Marina Processing and Distribution Center in California. Smaller, individual solar water heaters are now on hundreds of housing units at several military bases in Hawaii, saving energy and measurably reducing utility bills. And at Fort Polk, Louisiana, the Army is saving more than $3 million in annual energy costs with 4000 new ground-source heat pumps.

Some agencies have been working on large, on-site projects that produce nearly a megawatt or more of electricity. For example, the Navy is using several large wind turbines on San Clemente Island, off California's coast, to generate 675 kW. The Air Force plans to add more 225-kW wind turbines to those already producing 900 kW at a base on Ascension Island in the South Atlantic. At Fort Stewart, Georgia, the Army operates a sizable wood-waste combined heat and power plant with a capacity of more than 5 megawatts (MW).

Large projects featuring multiple applications of a single technology usually have a high total energy output and greater economies of scale. FEMP encourages agencies to consider large biomass and geothermal projects as well as those featuring solar and wind resources. Projects in general provide Federal energy professionals with valuable experience in using renewable energy.

Geothermal, biomass, and wind systems are usually installed in specific areas with good resources. But solar technologies—which include passive solar building designs, solar water heating, photovoltaics, and daylighting—can be suitable for almost any type of Federal facility anywhere. For example, simply installing skylights and lighting controls in an airplane hangar in Arizona reduced electricity costs by more than $9,600 per year; the project will pay for itself in about four years. In addition, at Chandalar Lake in Alaska, near the Arctic circle, the Federal Aviation Administration is using a PV array and two small wind turbines to generate emission-free electricity for remote communications equipment. The renewable energy systems significantly reduce the need to deliver liquid fuels to this remote site.

Warren Gretz/PIX08699

With assistance from staff at DOE's National Renewable Energy Laboratory, the Navy installed three 225-kW wind turbines on San Clemente Island near California, to provide electricity and reduce diesel fuel use on the island.

Renewable Energy Purchases. Agencies can also meet the Federal renewable energy goal by buying renewable power or renewable fuels. There are three different methods for purchasing renewable power—also called "green power":

- Through a competitive electricity procurement, if the facility is in a state with a competitive power market,
- Through a utility green power pricing program, or
- Through the purchase of tradeable renewable certificates (TRCs), also known as "green energy certificates," "renewable energy credits," or "green tags." TRCs represent the environmental attributes of renewable generation, which can be sold separately from the electricity.

Purchasing renewable power can be helpful at agency sites that either do not have adequate on-site renewable resources or cannot obtain financing for on-site projects. These purchases allow a facility to obtain a percentage of its energy from renewable sources without incurring capital or O&M costs, and each kWh of renewable power purchased

What Is Renewable Energy?

Renewable energy resources include—

- *Biomass*—energy from plants, trees, forestry by-products, agricultural residues, organic waste, and landfill gas.
  Biomass technologies include—
  - Large-scale biomass conversion systems, which can produce electricity (biopower); a wood stove or small wood-fired furnace uses biomass, too
  - Biomass gasifiers
  - Biofuels, which include ethanol, methanol, bio-oil, and biodiesel
- *Geothermal*—energy from the heat and hot water in the Earth.
  Geothermal technologies include—
  - Ground-source heat pumps
  - Direct geothermal steam or power production
- *Solar*—energy from the sun.
  Solar technologies include—
  - Passive solar building design
  - Photovoltaics (solar electric systems)
  - Concentrating solar power
  - Solar water heating systems
  - Solar ventilation-air preheating ("solar walls")
- *Wind*—energy from the wind.
  Wind technologies include—
  - Small wind turbines, which generate from a few watts to about 40–50 kilowatts of electricity, for small and remote applications
  - Large wind turbines, which can generate more than a megawatt for large sites and utility applications

Hydropower is also a renewable resource, but it is not currently included in Executive Order 13123's definition of renewable energy sources for Federal facilities.

counts toward meeting the agency's energy efficiency goals.

For renewable power purchases, FEMP encourages the use of Green-e certified products. The Green-e Program sets consumer protection and environmental standards for electricity products and verifies that Green-e certified products meet those standards. FEMP also encourages Federal agencies purchasing renewable power to enroll in the Environmental Protection Agency's Green Power Partnership, which assists and promotes organizations that commit to using green power. FEMP can help you determine the best renewable power purchase option in your area and provide you with Green Power Partnership requirements and application procedures (see page 4 for ways to contact FEMP). You may also check the Green Power Network Web site (see page 4) or contact your utility representative to find out whether your serving utility has a green pricing program.

In addition, Federal agencies are increasingly purchasing renewable fuels for their automotive fleets. Renewable fuels include ethanol, methanol, bio-oil, and biodiesel. They are available from the Defense Energy Supply Center and can be used in alternative fuel, dual-fuel, and other vehicles.

Facilitated Projects. FEMP can also assist agencies in facilitating projects that are on Federal lands or that serve Federal agency customers. Examples of agency customers include, but are not limited to, Native Americans served by the Bureau of Indian Affairs and residents of housing funded by the Department of Housing and Urban Development. FEMP has also been working with the Bureau of Land Management (BLM) to assess opportunities for renewable power on BLM lands.

Currently, about 2 GWh of facilitated renewable energy projects are in place in the Federal Government, although more are

Hawaiian Electric Co./PIX07310

At the Navy's Moanalua Terrace housing complex in Hawaii, 366 rooftop solar water-heating systems offset about 622 tons of carbon dioxide emissions each year.

pending. Facilitated projects are not constrained by Federal demand and are usually much larger than other projects; thus, their contribution to Federal goals could be significant. For example, in FY 2002, FEMP helped the BLM conduct a renewable resource assessment that has resulted in 40 proposals for new wind projects, in comparison to the three proposals received in the last 10 years. Because much of the demand for facilitated projects is driven by the private sector's interest in developing renewable resources on Federal lands, FEMP's role in assisting these projects is flexible and depends on the agency's needs.

Getting Started

How do you decide if your agency or facility can use renewable energy? One of the first things you can do is answer as many of the following questions as possible. If you're not sure how to answer some of them, FEMP can help.

1. *What are the objectives of my renewable energy project?*
2. *What renewable resources are available in my area?*
3. *What applications are best for my facility?*
4. *How big (or small) should my project be?*
5. *How much funding do I need?*
6. *What kinds of assistance can FEMP provide?*

Obtaining Assistance from FEMP

Depending on your needs, FEMP can provide information and training, renewable energy site screenings, and technical and financing assistance for your project. FEMP has also developed renewable energy resource maps for Federal sites that take economic considerations into account (see the renewable energy section of FEMP's Web site).

You can obtain and download software such as FRESA, the Federal Renewable Energy Screening Assistant, directly from the FEMP Web site. Software programs like this can help you decide on the best renewable energy systems for your facility. To make purchasing a solar system easier, the General Services Administration has added a list of solar suppliers to the Federal Supply Schedule; see FEMP's Web site for this helpful list.

FEMP has worked with dozens of agencies at hundreds of Federal sites on renewable energy projects. In addition, Energy Saver Showcase facilities continue to help educate facility managers, energy planners, and others about the benefits of renewable energy. FEMP's Web site contains more detailed information about many of these topics.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, cleaner environment, and greater energy independence for America. 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 diverse portfolio of energy technologies.

U.S. Air Force/PIX07648

To obtain assistance for your agency, contact your Regional Office FEMP Representative or one of the renewable energy experts listed on FEMP's Web site under Renewable Energy. You can also call our clearinghouse for more information.

FEMP's Web Site: www.eere.energy.gov/femp/

FEMP Information Clearinghouse:
800-DOE-EREC (800-363-3732)

Green Power Network:
www.eere.energy.gov/greenpower/home.shtml

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See www.eere.energy.gov/femp/

Geothermal heat pumps installed at 1,535 residential housing units on Little Rock Air Force Base should save about $1 million in annual electricity costs and about $285,000 in maintenance costs.

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

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