

Renewable Energy Deployment in the Federal Sector: A Status Report

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RENEWABLE ENERGY DEPLOYMENT IN THE FEDERAL SECTOR: A STATUS REPORT

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ABSTRACT

Executive Order 13123, *Greening the Government Through Efficient Energy Management*, signed on June 3, 1999, by President Clinton, has re-energized the challenge to Federal agencies to expand their use of renewable energy in Federal facilities by implementing renewable energy projects and by purchasing electricity from renewable energy sources. The order directs the Secretary of Energy, in collaboration with other agency heads, to develop goals for the amount of energy generated at Federal facilities from renewable energy technologies. The goals developed in response to E.O. 13123 will be formed on a foundation built of the experience with renewable energy that Federal agencies gained in implementing Executive Order 12902, *Energy Efficiency and Water Conservation at Federal Facilities*. This paper describes that foundation of experience. Specifically, it covers two topics that serve as a status report on Federal efforts to deploy renewable energy throughout the Federal sector. The topics are (1) a description of the objectives and goals within the Executive Order that relate to renewable energy and the process that the Federal Energy Management Program (FEMP) is using to implement the order; and (2) Federal progress to date in deploying renewable energy technologies. The paper concludes by summarizing the next steps in the process.

KEY PROVISIONS OF E.O. 13123 REGARDING RENEWABLE ENERGY TECHNOLOGIES

Executive Order 13123, issued on June 3, 1999, by President Clinton, establishes target numbers and dates for solar installations under the Million Solar Roofs Initiative. The order states: "Each agency shall strive to expand the use of renewable energy within its facilities and in its activities by implementing renewable energy projects and by purchasing electricity from

renewable energy sources. In support of the Million Solar Roofs initiative, the Federal government shall strive to install 2,000 solar energy systems at Federal facilities by the end of 2,000 and 20,000 solar energy systems at Federal facilities by 2010." (Sec. 204)

The Executive Order tasks the Secretary of Energy, in collaboration with other agency heads, with setting the goals for energy generated at Federal facilities by renewable energy technologies. It also reemphasizes the Administration's position on the long-term benefits of renewable energy. Since the Executive Order did not specifically include a goal for Federal renewable energy use, the challenge to FEMP is to ensure that the use of renewable energy technologies by Federal agencies is strongly recommended as a tool to assist agencies in carrying out the primary quantitative directives of the Executive Order. These directives include the following:

- "Each agency shall reduce its greenhouse gas emissions attributed to facility energy use by 30% by 2010 compared to a 1990 baseline." (Sec. 201)
- "Each agency shall reduce energy consumption per gross square foot of its facilities, excluding facilities covered in section 203 of this order, by 30% by 2005 and 35% by 2010 relative to 1985." (Sec. 202)

The Executive Order defines renewable energy technologies as those that "use renewable energy to provide light, heat, cooling, or mechanical or electrical energy for use in facilities or other activities. The term also means the use of integrated whole-building designs that rely upon renewable energy resources, including passive solar design." Renewable energy can be used on-site or purchased from an energy provider.

The order also identifies the use of renewable energy technologies as a priority and key strategy for achieving the government's primary goals. It directs agencies to incorporate renewable energy technologies into their projects in the following ways:

- Where appropriate, agencies shall consider the life cycle costs of combinations of projects, particularly to encourage bundling of energy efficiency projects with renewable energy projects. (Sec. 401)
- Agencies shall apply sustainable design principles to the siting, design, and construction of new facilities. (Sec. 403 (d))
- Agencies shall use off-grid generation systems, including solar hot water, solar electric, solar outdoor lighting, small wind turbines, fuel cells and other off-grid alternatives, where such systems are life cycle cost effective. (Sec. 403(h))
- Each agency shall evaluate its current use of electricity from renewable energy sources and adopt policies and pursue projects to increase the use of such electricity. Agencies may use savings from energy efficiency projects to pay additional incremental costs of electricity from renewable energy sources. (Sec. 404 (c) (1))
- Each agency shall evaluate its current use of electricity from renewable energy sources and report this level in its annual report to the President. Based on this review, each agency should adopt policies and pursue projects that increase the use of such electricity. Agencies should include provisions for the purchase of electricity from renewable energy sources as a component of their requests for bids whenever procuring electricity. Agencies may use savings from energy efficiency projects to pay additional incremental costs of electricity from renewable energy sources. (Sec. 404 (c) (1))

Section 604 revokes E.O. 12902, which was issued March 9, 1994. The 10-year payback requirement was removed from the definition of life-cycle cost-effectiveness for renewable

projects. Section 304 requires each agency to designate a Senior Agency Official at the Assistant level or above who is responsible for meeting the goals and requirements of this order.

The agency energy scorecard required by the order is a key tool for measuring and reporting an agency's progress to the President. The agency scorecard is also the central mechanism that will make the order one of an agency's priorities. The scorecard will measure not only how an agency is progressing but also how it is taking advantage of certain key tools for saving energy and reducing greenhouse gases. The order specifically identifies renewable energy technologies and electricity from renewable sources as key tools.

The Secretary of Energy is responsible for issuing guidance by June 2000 on the following topics:

- Developing goals for the amount of energy generated at Federal facilities from renewable energy technologies;
- Guidance on counting renewable and highly efficient energy projects and purchases of electricity from renewable and highly efficient energy sources toward agencies' progress in reaching greenhouse gas and energy-reduction goals.

The Federal Energy Management Program (FEMP) has set up a number of working groups to develop the guidance called for in the Executive Order. The Renewable Working Group (RWG), which was established in 1994 under the Interagency Energy Task Force, was charged with developing these guidance products. The RWG began this task in June 1999. The RWG has been meeting every 2-3 months to review progress on these documents. The RWG is currently analyzing three possible goal scenarios for energy "generated" at Federal facilities from renewable energy technologies over the next 5 years. The RWG has interpreted "generated" to encompass energy from renewable energy used on-site as well as purchases of fuels or electricity generated from renewable energy sources. As described in the

section below, Federal use of renewable energy now amounts to only 0.31% (or 19 MW of installed capacity producing 169,790 annual kWh) of energy use (mostly in buildings). This excludes renewable energy technologies that are in the U.S. national energy generation mix. The three possible scenarios for Federal goals for the contribution of renewables by the year 2005 are 0.6% , 2.5%, and 5% (excluding renewable energy technologies in the national energy generation mix).

Previously, FEMP had analyzed the impact of a 5.5% Federal renewable purchase requirement in terms of cost and impact on government agencies. The analysis found that, if the 5.5% renewable energy purchase requirement applies only to electricity purchases, it would equal 2,942,253 MWh of renewable power per year. (This figure is based on Federal agencies' reported 53,495,175 MWh of electricity used in 1997.)

The Departments of Defense and Energy, along with the General Services Administration, the U.S. Postal Service, and the Veterans Administration, account for 77% of Federal electricity use, and they would therefore be the agencies most affected by a renewable energy purchase requirement. In 1997, U.S. renewables-based electricity production, excluding hydropower, was 76,614,000 MWh. A 5.5% Federal electricity purchasing requirement equals 3.84% of total U.S. renewable power generation. Estimates for the added cost of meeting a 5.5% requirement range from a high of \$82 million (representing a 2.6% increase in Federal electricity costs) to a low of \$15 million (representing a 0.5% increase in Federal electricity costs, according to McNeil Technologies (Estimate of the Cost of a 5.5% Renewable Energy Purchase Requirement for Federal Agencies; January 28, 1998).

**FEDERAL PROGRESS TO DATE
ON E.O. 13123**

FEMP has compiled data on renewable energy use in the Federal sector. The data, summarized by agency in Table 1, include on-site renewable energy use as well as electricity procured from

renewable energy sources. This is approximately 19 MW of installed capacity. Renewable technologies include photovoltaics, solar water heating, biomass, ground-source heat pumps, and purchased electricity from renewable energy sources.

The DOE has directed FEMP to assist agencies in the deployment of renewable energy technologies to meet the requirements of E.O. 12902 and now, E.O. 13123. The RWG is now a FEMP-sponsored task force that offers agencies a forum to exchange information on renewable energy and a means to have input into shaping Federal renewable energy policy. The elements of the FEMP renewable program as described below are the Renewable Working Group, education and training, technical project assistance, Federal renewable hardware support, support to other Federal initiatives, including the Million Solar Roofs and the Wind Powering America programs, alternative financing, and others.

Table 1. Renewable Energy Consumption and Production

Federal Agency	Generation/Use (Mwh/year)
Dept. of Defense	127,374
NASA	32,237
Dept. of Transportation	2,535
EPA	2,216
Dept. of the Interior	1,721
Dept. of Justice	1,335
Dept. of Agriculture	1,231
Dept. of the Treasury	631
National Records and Archives Administration	292
Dept. of Energy	207
US Postal Service	11
Total	169,790

Source: McNeil Technologies, *Renewable Energy in the Federal Sector*, report to NREL, 10/28/99.

The FEMP Renewable Energy Working Group

As directed by E.O. 12902, the Task Force established the RWG in 1994 to introduce cost-effective, mainstream renewable energy technologies and designs in to Federal facilities by creating awareness about and confidence in

cost-effective renewable energy projects, as well as improving direct communications between Federal energy managers and renewable energy experts within government and industry. The RWG has a mailing list of over 300 people from Federal agencies, DOE programs, and the renewables industry who are interested in increasing the use of renewable energy technologies in the Federal sector. Through the RWG, FEMP has worked with various agencies to develop agency-specific plans to promote the use of the technologies. The RWG has held numerous informational meetings for agencies on various topics over the years. In FY98 and FY99, the focus became more strategic, and the RWG began to focus on analyzing the Federal barriers that should be overcome to deploy renewable energy technologies more fully in the Federal. It also undertook analysis to determine the impact of a Federal goal for renewable energy purchase. RWG information products have included an analysis of barriers to greater federal use of renewable technologies and the FEMP Strategy for Deploying Renewable Energy Technologies. The RWG is currently developing the renewable guidance documents required by E.O. 13123.

Education and Training

FEMP has developed training courses and workshops that help agencies attain objectives they need to meet in order to carry out the directives of EPACT and Executive Order 13123. These objectives include: meeting energy reduction goals, managing the use of water, encouraging the use of alternative strategies for financing energy and water improvements, and increasing the use of solar and other renewable energy technologies at their sites. FEMP offers two courses on renewable energy topics on a yearly basis: *Implementing Renewable Energy Projects* and *Designing Sustainable Low Energy Buildings*. The first course is offered as a classroom training and the latter course is offered as both a classroom course and as a distance learning course. The classroom courses are two days in length.

Direct Technical Assistance

FEMP offers, through the National Renewable Energy Laboratory (NREL) and Sandia National Laboratories (SNL), direct technical assistance to provide Federal agencies design assistance for their renewable energy projects. The assistance can be for the design of a new building that includes sustainable, low energy features, the design and procurement of renewable hardware for on-site generation of power, or assistance with a procurement to buy power from renewable sources. The types of assistance provided includes screening for renewable on-site opportunities using the software package, the Federal Renewable Energy Screening Assistant (FRESA). FRESA assesses the opportunity and potential for renewable energy use at an agency's facility. FEMP also assists agencies with feasibility studies, life-cycle costing, developing technical specifications or RFPs, architectural and engineering design teams to establish goals for energy use in new construction, and identifying renewable opportunities. It also assists industry interested in getting renewable products on the GSA and Defense Logistics Agency supply schedules, and assists agencies in bundling renewable and efficiency projects under utility and Energy Savings Performance Contracts.

Some representative examples (out of the tens of projects assisted) of design assistance last year included a water-heating system for the Phoenix Federal Correctional Institute, a photovoltaic project at Joshua Tree National Park, and assistance to the EPA in the procurement of 100% green power for their Richmond, CA laboratory.

- FEMP helped the Phoenix Federal Correctional Institute to design and install an 18,000-square foot-solar parabolic water heating system to preheat 50,000 gallons of water needed for the laundry, showers and kitchen system at the facility. The system was financed using an Energy Savings Performance Contract (ESPC). The system will reduce annual electrical energy usage by 1.3 million KWh, saving taxpayers \$72,000 annually.

- FEMP helped the National Park Service to buy and install photovoltaic system for many of their facilities. One recent example is the replacement of two 32-kilowatt (kW) diesel generators with photovoltaics to provide power to the Cottonwood Spring Area at Joshua Tree National Park. The PV system cuts the \$50,000 annual operating cost by 90% and the new system has a simple payback under 6 years.
- FEMP worked with the GSA to assist the Environmental Protection Agency in purchasing 100% renewable power for its Richmond, California, laboratory. The lab's load is 1,800 MWh/year. Their average annual cost of power is approximately \$154,000. The premium for the power from renewable energy systems is 10% more per year.

FEMP's Renewable Energy Hardware Awards

In FY 1998 and FY 1999, FEMP received funding to offer renewable hardware awards to Federal agencies. In FY 1998, FEMP issued a solicitation and selected and funded 26 solar projects from over 70 applications for a total of \$1.9 million. These 26 proposals resulted in the purchase of 85 PV systems, 65 PV-powered lights, 116 solar water heating systems, approximately 74 daylighting skylights, 1 solar ventilation air preheating system, and 1 large wind turbine. All projects had simple paybacks under 10 years.

In FY 1999, FEMP received 90 proposals and selected 26 projects for funding for a total of \$1.6 million. These projects resulted in 111 Federal solar systems include 56 solar water heating systems, 3 cost-shared PV systems, 13 grid-tied PV systems, 19 off-grid PV systems, 14 PV powered lights, 3 solar walls, and 2 wind turbines. These FY99 projects are estimated to save the Government more than \$645,000 in annual energy costs and avoid 1,700 tons of carbon emissions each year .

In addition, in FY 1999, FEMP awarded \$230,000 in funding to Federal agencies to assist them in purchasing renewable energy systems for schools, medical centers, and other facilities that serve Native Americans. DOE selected five applicants out of a total of fourteen for this funding. The sites for these systems are in Alaska, Arizona and California.

Support to Other Federal Initiatives

FEMP is supporting both the Million Solar Roofs Initiative (MSRI) and the Wind Powering America Initiative. The goal of the MSRI is 20,000 solar systems installed on Federal facilities by 2010. The near-term goal is 2,000 Federal systems by the year 2000. This goal is specified in E.O. 13123 (see Sec. 204). The Federal government has successfully met its year 2000 goal and will recognize those that contributed to meeting the goal in April 2000. The key strategies that have been used by FEMP to support this goal in the Federal sector include focusing on cost-effective applications with less than a 25-year payback period, leveraging resources including state and utility incentives, streamlining procurement through the GSA Federal Supply schedule, and specifying multiple, standardized systems to minimize costs.

On June 21, 1999, U.S. Secretary of Energy Bill Richardson announced the Clinton Administration's latest renewable energy initiative, Wind Powering America, which seeks to dramatically increase the use of wind power in the United States. He announced the goal of increasing the Federal government's use of wind generated electricity to 5% by 2010. This translates into a goal of 1000 MW of wind power in the Federal sector by 2010. For FEMP, the near-term strategy is to identify niche markets for wind energy in the Federal sector and pilot Federal procurement mechanisms. Three markets are currently being pursued, targeting small scale generators (under 50 kW); large distributed wind generators that are financed and owned by the government; and green power procurement.

Alternative Financing Mechanisms

FEMP offers assistance to agencies in finding alternative means of financing renewable energy projects. There are several means through which agencies may fund their projects. These include the following:

- *Regional Super Energy Savings Performance Contracts:* FEMP has pre-selected several ESCOs in each region of the country to provide energy retrofits, including renewable energy systems in Federal facilities.
- *Technology-Specific Super ESPC:* These contracts target opportunities at facilities where renewable energy is the primary technology to be implemented at a facility (bundled with efficiency to optimize system performance). Technology-specific ESPCs are in place for photovoltaics and parabolic trough solar thermal collectors.
- *Utility Off-Grid Tariffs:* An off-grid tariff is off-grid power provided to customers for a monthly fee.
- *Utility Energy Services Contract:* These contracts use the utility to finance a package of energy efficiency and renewable measures for a Federal agency.

FEMP has been educating agencies, energy service companies, and utilities regarding the importance of bundling renewable energy technologies with energy efficiency in financed packages. We are currently pursuing several opportunities to finance renewable energy strategies.

Other Efforts

E.O. 13123 requires that agencies "designate exemplary new and existing facilities with significant public access and exposure as showcase facilities to highlight energy or water efficiency and renewable energy improvements." (Sec. 406 (e)) This requirement is fulfilled by each agency's Energy Saver Showcase Facility, which educates the public and promotes the use of energy efficient and renewable energy technologies to the Federal, state, and private sectors.

FEMP has also been working with the GSA to get more solar products on the Federal General Supply Schedule. The Solar Schedule is available on the Internet at www.gsa.gov/regions/7fss/7fx/schedules (click on Schedule 62, Part II). Sales of solar technologies and equipment off the schedule have increased from \$572,000 in 1994 to 1,500,000 in 1998. And in FY 1999 in the first three months, sales were \$876,000. Services such as design assistance and installation supervision can also be ordered using the GSA Solar Schedule.

NEXT STEPS

Section 503 (b) of E.O. 13123 requires the Secretary of Energy to develop the goals for the amount of energy generated at Federal facilities from renewable energy technologies to be developed by June 2000. The RWG will deliver a guidance document on this topic to FEMP for their review and concurrence.

The FEMP renewables program will continue to work with Federal energy managers at headquarters and in the field to address the barriers to greater Federal use of renewable energy. The program will also continue to provide recognition, technical assistance and support to those individuals who we define as Federal champions – individuals who are currently installing renewable energy systems at their facilities today, or are interested in purchasing green power, or both. The program has also recognized the importance of involving members of the renewable energy industry in the RWG and as speakers at various training sessions and seminars. This will continue to be a key focus of the program.

For more information, please contact Nancy Carlisle, Senior Project Leader, Deployment Programs, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401; 303-384-7509; e-mail: Nancy_Carlisle@nrel.gov

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