May 2000 • NREL/CP-710-28017

Conference Paper

Renewable Energy for Federal Facilities Serving Native Americans

Preprint

Patrina Eiffert
National Renewable Energy Laboratory

Anne Sprunt Crawley
U.S. Department of Energy

Kathleen Bartow
San Francisco State University

Presented at the ASES Solar 2000 Conference
Madison, Wisconsin
June 16-21, 2000

National Renewable Energy Laboratory

1617 Cole Boulevard
Golden, Colorado 80401-3393

NREL is a U.S. Department of Energy Laboratory
Operated by Midwest Research Institute • Battelle • Bechtel

Contract No. DE-AC36-99-GO10337

RENEWABLE ENERGY FOR FEDERAL FACILITIES SERVING NATIVE AMERICANS

Patrina Eiffert, Ph.D.
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401

Anne Sprunt Crawley
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

Kathleen Bartow
San Francisco State University
San Francisco, California

ABSTRACT

The Federal Energy Management Program (FEMP) in the U.S. Department of Energy (DOE) is targeting Federal facilities serving Native American populations for cost-effective renewable energy projects. These projects not only save energy and money, they also provide economic opportunities for the Native Americans who assist in producing, installing, operating, or maintaining the renewable energy systems obtained for the facilities. The systems include solar heating, solar electric (photovoltaic or PV), wind, biomass, and geothermal energy systems. In fiscal years 1998 and 1999, FEMP co-funded seven such projects, working with the Indian Health Service in the U.S. Department of Health and Human Services, the Bureau of Indian Affairs in the U.S. Department of the Interior, and their project partners. The new renewable energy systems are helping to save money that would otherwise be spent on conventional energy and reduce the greenhouse gases associated with burning fossil fuels.

1. BACKGROUND

As the largest consumer of energy in the world, the U.S. government has an enormous number of opportunities to use energy more efficiently and install more clean, cost-effective renewable energy systems in its facilities. Therefore, Congress and the President, through laws and Executive Orders, have directed the U.S. Department of Energy and the Federal Energy Managment Program (FEMP) to assist Federal agencies in identifying and implementing projects that reduce energy costs, increase energy efficiency, make use of renewable energy systems, and conserve water resources.

In fiscal years 1998 and 1999, FEMP and its partners funded more than 50 cost-effective renewable energy projects in the Federal sector. Some of these projects will directly benefit Federal facilities serving Native Americans. Candidate renewable energy systems for these facilities included, but were not limited to, those that produce energy from solar, wind, and geothermal resources and from agricultural and urban wastes, which are known as biomass resources.

2. CRITERIA FOR FUNDING

To qualify for FEMP funding and support, applicants needed to ensure that their proposed projects met certain criteria and followed certain guidelines. For example, the projects had to pertain to Federal facilities serving a Native American population and be life-cycle cost-effective. In addition, participants were encouraged to collaborate with a Native American tribe and to leverage their resources with project partners whenever possible.

In addition, proposals were reviewed more favorably if they involved installations of multiple, standardized, renewable energy systems or involved a facility that could serve as a "showcase" or model for other, similar government projects. These criteria and guidelines are described in more detail below.

2.1 Use Renewable Energy

Proposals needed to specify the use of renewable energy to supply heating, cooling, or electric power to a Federal facility serving Native Americans. Serving such a population is part of the mission of most Federal government agencies. In addition, the applicant had to be

a Federal employee applying for funding for a project at a Federal facility.

2.2 Demonstrate that the Project Is Cost-Effective

The proposed project had to be life-cycle cost-effective. This means that any new equipment installed had to have less than a 25-year payback period, after all applicable state and utility incentives (e.g., rebates and tax credits) and any non-Federal cost-sharing amounts were subtracted. Many renewable energy systems actually pay for themselves in energy cost savings in about 10 to 15 years or less.

2.3 Collaborate with Native American Groups

These projects were intended to foster the use of renewable energy technologies to support sustainable economic development in Native American communities. Applicants were thus encouraged, but not required, to form collaborative arrangements or partnerships with Native American tribes or groups. A letter of support from an authorized representative of a Native American group was included in many of the applications.

Proposers were asked to identify likely benefits to the specific population, such as the creation of new jobs for Native Americans who would either provide, design, install, validate, maintain, or operate the renewable energy system. Proposers were also asked to include plans for implementing education and training programs for tribal members associated with the project.

2.4 Leverage Resources

An agency could propose to leverage funding in several ways. For example, agencies could commit to an in-kind contribution, such as donated services, property, equipment, buildings, or supplies. They could choose to contribute their unrecovered indirect costs or provide any other measurable project costs.

An agency could also propose a cost-sharing arrangement between itself and any other interested Federal or non-Federal partners, including FEMP. It was the agency's responsibility to ensure that a cost-sharing arrangement would not violate government rules or requirements concerning the augmentation of funds.

Proposers could also couple the FEMP award to an agency's commitment to finance a larger number of renewable energy systems. Under that option, an agency would request a FEMP award for a defined number of systems, for example, 25% of the systems for a large project involving solar water heating at an Indian Health Service clinic. The agency could then offer to finance the balance of the project through an energy-savings performance contract or a utility energy services contract.

2.5 Install Standardized Renewable Energy Systems

FEMP has encouraged Federal agencies to purchase standardized (virtually "off-the-shelf") renewable energy systems (Fig. 1). This is done in part to foster the procurement of renewable energy equipment on Federal supply schedules, where the equipment is now more accessible to government staff members. Standardizing these systems also helps to reduce the cost of renewable energy by making it possible for industry to manufacture and supply energy systems in volume.

For example, an agency might plan to install renewable energy systems on several similar buildings at one site, such as a cluster of residences, schools, or hospital buildings. Large orders can help energy system manufacturers reduce their prices as a result of the reduced paperwork and generally lower transportation, design, and engineering costs. So agencies were asked to consider multiple system installations whenever possible.

In addition, agencies were encouraged to use renewable energy systems in concert with proven energy conservation measures**.** This helps to reduce utility costs while it increases the cost-effectiveness of a project.

Fig. 1: Photovoltaic-powered lights, like the ones installed at an Indian Health Service facility in New Mexico, are listed on the GSA Solar Supply Schedule.

2.6 Plan for Replication or for an Energy Showcase

Proposers were asked to include any plans they had made to install standardized renewable energy systems in projects that could easily be replicated by the proposing agency or by another agency. Pilot demonstrations for

larger projects were also considered. So were proposals to create an energy showcase facility to help educate the government and the public about the benefits of using renewable energy.

Projects like these foster not only greater energy efficiency but also a healthier environment, as agencies help to reduce greenhouse gas emissions associated with burning fossil fuels to generate heat and electric power.

3. FUNDED PROJECTS

A number of proposals were reviewed and evaluated on the basis of the criteria and guidelines. Then, seven projects were awarded funds by FEMP in FY 1998 and FY 1999 to provide heating, cooling, or electric power from renewable energy to selected facilities serving Native Americans. The first three projects described below were funded for Indian Health Service facilities in the U.S. Department of Health and Human Services. The last four identified are projects involving facilities within the U.S. Department of the Interior's Bureau of Indian Affairs. Brief project descriptions follow.

3.1 ACL Hospital, New Mexico

The Indian Health Service received $13,000 in funding from FEMP to provide photovoltaic (PV)-powered street lights for the New Sunrise Regional Treatment Center, an Acoma-Canoncito-Laguna (ACL) hospital facility that provides a residential treatment program for adolescents in Albuquerque, New Mexico.

The treatment center and associated hospital facilities serve three tribal groups in the area: the Acoma Pueblo, the Canoncito Navajos, and the Laguna Pueblo. The estimated simple payback period needed to recoup the initial cost of the PV-powered lights is 4.8 years.

3.2 Alaska Native Medical Center

FEMP awarded $45,000 to the Indian Health Service and the Alaska Native Medical Center in Anchorage for a groundwater cooling system (Fig. 2). This project will use groundwater pumped through a heat exchanger to remove heat from a closed-loop, chilled-water system in the medical center; the water discharged back to the ground will be slightly cooler, which should improve salmon spawning conditions.

The new chilled-water system will replace three ozone-depleting machines and reduce the facility's electrical consumption by an estimated 1 million kWh per year, saving both energy and money. System design, management, operation, and maintenance will be provided by Alaskan Natives. The simple payback period is estimated to be 5.1 years.

Fig. 2: The Alaska Native Medical Center in Anchorage has a new groundwater cooling system.

3.3 Santa Fe IHS Hospital, New Mexico

FEMP provided $60,000 to refurbish a large solar water-heating system for an Indian Health Service Hospital in Santa Fe, New Mexico (Fig. 3). The Santa Fe facility features medical, surgical, pediatrics, obstetrics, intensive care, and cardiac care units. The estimated simple payback for the two-phase refurbishment project is just over 6 years.

Fig. 3: A large, solar water-heating system is being refurbished in this two-phase project in New Mexico.

3.4 Fort Apache Indian Reservation, Arizona

The Bureau of Indian Affairs and the Fort Apache Agency received $23,500 in funding to install five new

wind turbines. The turbines will generate electricity for the Fort Apache Indian Reservation in Arizona (Fig. 4).

The reservation includes about 1.7 million acres of remote forest land in Arizona's White Mountains. Five fire-lookout towers are scattered across the forest for surveillance and radio communications purposes, and PV systems have been the only source of power. During heavy usage periods or very poor atmospheric conditions, power supplies can be uncertain. Adding new wind turbines to create hybrid PV-wind energy systems will ensure a more reliable supply of power.

Native Americans will conduct maintenance and operation activities associated with these turbines. The simple payback period is estimated to be 13.83 years.

Fig. 4: Small wind turbines have been added to the fire lookout towers at Fort Apache Reservation, Arizona, to create hybrid PV-wind energy systems.

3.5 Sherman Indian School, California

FEMP awarded $50,000 to the Bureau of Indian Affairs and the Sherman Indian School in Riverside, California, for a portion of the hardware for a 13.8-kW PV system. The system will be connected to the existing power distribution grid on the school's campus, thus providing electricity to the grid as well as to nearby facilities. Native Americans employed at the facility will be trained to operate and maintain the system and to assist in transferring these skills to others.

The project will also serve as an educational resource for high school science classes. Currently, 13.8 kW of PV power used in the school utility system provides an annual conventional energy savings of 27,000 kWh. The estimated simple payback period is 13 years.

3.6 Seba Dalkai School, Arizona

The Bureau of Indian Affairs and Seba Dalkai School were awarded $50,000 by FEMP for a new PV system for the school. The new building will serve as both a solar outdoor classroom and a hands-on laboratory for training students in the use of building-integrated PV systems. As part of the curriculum, students will be monitoring the performance of the PV system.

The 13-kW (peak) PV system will help to prevent the blackouts and brownouts that have caused so many problems in the school's computer-based curriculum. DINE, Inc., will work with other groups in the Navajo Nation to provide training in the use of PV systems. The project was co-funded by Native American Photovoltaics. The simple payback period is estimated to be 14.26 years.

3.7 Havasupai Indian Reservation, Arizona

FEMP awarded $61,300 to the Bureau of Indian Affairs and the Truxton Canon Agency to install three PV energy systems at Federal facilities on the Havasupai Indian Reservation (Fig. 5). This project will provide electricity to the Havasupai school, a jail, and a government fourplex, which includes housing for school teachers and police officers. The PV system will help to prevent the communication, refrigeration, and water losses that have occurred as a result of regular electric power outages in the area.

These power outages may be the result of the nearness of the water table to the power lines, which short out when they get wet. But whatever the cause, maintenance costs associated with the power lines have been increasing. And during some of the blackouts, diesel fuel for the backup generators must be flown in by helicopter, at a

cost of $650 per hour for the helicopter alone. Using PV systems rather than diesel generators as backups could save more than $2,700 annually for each avoided trip.

Fig. 5: This 2-kilowatt PV system was obtained recently for a school in remote Supai Village in the Grand Canyon.

Native Americans associated with this project also received training in the maintenance and operation of the new energy systems. The savings resulting from reduced utilities and maintenance costs can also be redirected to community and economic development activities. The estimated simple payback period is 16.4 years.

4. CONCLUSIONS

The FEMP initiative to support renewable energy projects for Federal facilities that serve Native American populations has been successful on a number of levels. First, these projects help to save both energy and tax dollars. Second, they are improving the environment by replacing fossil fuels such as diesel oil with nonpolluting renewable energy, as well as integrating new energy efficiency measures into the activities of government agencies. Last, but equally important, these projects serve as educational resources and create opportunities for Native Americans to enter the ever-growing renewable energy industry.

REPORT DOCUMENTATION PAGE

Form Approved
OMB NO. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	May 2000	Conference paper

4. TITLE AND SUBTITLE
Renewable Energy for Federal Facilities Serving Native Americans

5. FUNDING NUMBERS
FE00.6020

6. AUTHOR(S)
P. Eiffert, A.S. Crawley, K. Bartow

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
NREL, U.S. Department of Energy, San Francisco State University

8. PERFORMING ORGANIZATION REPORT NUMBER
NREL/CP-710-28017

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The Federal Energy Management Program (FEMP) in the U.S. Department of Energy (DOE) is targeting Federal facilities serving Native American populations for cost-effective renewable energy projects. These projects not only save energy and money, they also provide economic opportunities for the Native Americans who assist in producing, installing, operating, or maintaining the renewable energy systems obtained for the facilities. The systems include solar heating, solar electric (photovoltaic or PV), wind, biomass, and geothermal energy systems. In fiscal years 1998 and 1999, FEMP co-funded seven such projects, working with the Indian Health Service in the U.S. Department of Health and Human Services, the Bureau of Indian Affairs in the U.S. Department of the Interior, and their project partners. The new renewable energy systems are helping to save money that would otherwise be spent on conventional energy and reduce the greenhouse gases associated with burning fossil fuels.

14. SUBJECT TERMS
Renewable energy, Federal buildings

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL