U.S. DEPARTMENT OF ENERGY

PNNL-19804

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

American Recovery and Reinvestment Act

Federal Energy Management Program Technical Assistance Project 244

US Coast Guard – Eastern Region

WF Sandusky

September 2010

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Pacific Northwest National Laboratory
Richland, Washington 99352

Executive Summary

The report documents the activities of a resource efficiency manager (REM) that served the US Eastern Region during the period of performance (POP) that ran from November 23, 2009 and August 3, 2010. The REM was provided by the Redhorse Corporation under subcontract to the Pacific Northwest National Laboratory (PNNL). Funding for the subcontract was made available to PNNL based on American Recovery and Reinvestment Act (ARRA) funding that was allocated to the U.S. Department of Energy's Federal Energy Management Program (FEMP).

With the funding that was made available for this activity, the REM identified 19 potential projects that could be implemented either by use of available agency funding or using a utility energy savings contract (USEC) with the appropriate electric service provider. For these projects, the REM was instrumental in refining the project economics to determine if they were cost-effective to implement. If the projects are implemented, the US Coast Guard (USCG) would realize an annual energy savings of 131,298 million British thermal units (MMBtu) of electrical energy, resulting in an annual cost savings of $408,736. The estimated cost to implement all the initiatives is $3,132,358, with a simple payback of 7.7 years. The largest portion of the savings and cost are related to UESC projects for two sites in the Miami area.

At the end of the POP, numerous other projects were in various stages of development. FEMP has authorized PNNL to utilize non-ARRA funding to extend the POP of the REM until the end of November 2010. U.S. Coast Guard has agreed fund the REM after the POP has ended. A revised listing of project activities will be available after the POP has been completed.

If the USCG needs assistance with securing additional alternative financing for identified projects, they are strongly encouraged to contact the FEMP Federal Financing Specialist (FSS) for their region. For southeast region, the designated FSS is Doug Culbreth. His contact information is carson.culbreth@ee.doe.gov or (919) 870-0051. For installations located in the mid-Atlantic region, the designated FSS is Tom Hattery. His contact information is Thomas.hattery@ee.doe.gov, or (202) 256-5986.

Contents

Figures

Tables

1.0 Description of ARRA Program

The Federal Energy Management Program (FEMP) facilitates the Federal Government's implementation of sound, cost-effective energy management and investment practices to enhance the nation's energy security and environmental stewardship. To advance that goal and help accelerate agencies' progress, FEMP works to foster collaboration between its Federal agency customers and the U.S. Department of Energy (DOE) national laboratories.

In 2009 and 2010, FEMP has utilized funding from the American Recovery and Reinvestment Act of 2009 (ARRA) to facilitate Federal agency access to the broad range of capabilities at the national laboratories. Funds were directed to the laboratories to assist agencies in making their internal management decisions for investments in energy efficiency and deployment of renewable energy sources, with particular emphasis on assisting with the mandates of the Energy Independence and Security Act of 2007 related to Federal facilities and fleets.

FEMP provided major DOE laboratories with funding that will allow them to respond quickly to provide technical advice and assistance. FEMP applied a simple vetting and approval system to quickly allocate work to each of the laboratories in accordance with FEMP allocated funding. All assistance provided by the laboratories was in accordance with the requirements of Federal Acquisition Regulation (FAR) Subpart 35.017 and the laboratories' designation as "Federal Funded Research and Development Center" (FFRDC) facilities.

The USCG submitted a response to this call requesting that funding be provided to secure the services of a REM to identify energy efficiency and renewable project opportunities at installations located in the eastern region of the United States. This region includes installations located along the Gulf of Mexico and the Atlantic Ocean. The purpose of securing a REM, besides the identification of potential projects, is the rapid identification of support to implement all projects in a timely manner to secure energy and/or cost savings so the USCG can meet legislative goals regarding the reduction of both energy and water intensity and acquisition of generation from renewable sources. This request was selected by FEMP to received technical assistance and designated as Project 244.

2.0 Project Activities

Based on the nature of the requested services, Pacific Northwest National Laboratory (PNNL) contracted with the Redhorse Corporation of San Diego, California to provide a REM. The REM would be located at the Miami Base Support Unit (BSU) to provide support to installations in the eastern region of the U.S. The requirements for the position included knowledge of the typical operating environment at USCG installations, knowledge of the basic REM concept, and experience in the full-range of energy management activities at Federal facilities. Once potential projects were identified, the REM was expected to identify and evaluate various funding mechanisms to get the projects implemented.

During the period of performance, the REM focused on identification of projects at the following installations listed below.

- BSU – Miami, FL
- Mobile Safety & Security Team (MSST) – Miami
- Civil Engineering Unit (CEU) - Miami
- Air Station – Miami, FL
- Air Station – Ft. Lauderdale, FL
- Air Station – Savannah, GA
- Station – Key West, FL
- Station – Marathon, FL
- Station – Islamorada, FL
- Station – Ft. Lauderdale, FL
- Station – Lake Worth Inlet, FL
- Station – Port Canaveral, FL
- Station – Ft. Pierce, FL.

The REM has completed other activities during the period of performance that are noted below but only partially included in Table 1. This includes conducting an initial energy audit of the Air Station Clearwater (USCG 2010), which identified five potential projects. Most of these projects have already been completed, except for project 14 in Table 1 (see page xx).

3.0 Background

3.1 Climate, locations, and Floorspace

The general climatic condition at the USCG sites located on the Gulf of Mexico, coast line of Florida, and coast portion of Georgia, is warm and humid. For the installations in the southern portion of Florida, the area is considered extremely warm and humid.

The various USCG installations are primarily located adjacent to navigable water ways. Figure 1 shows the geographic locations. Installations located in Washington, Oregon, and extreme northern California are not included in this figure. This figure also provides a relative indication of amount of floorspace for each installation. The USCG installation with the largest amount of flloorspace is the region covered by the REM is USCG Base-Miami (126,417 ft^2). Most of the installations in the region covered by this report have floorspace in the range of 80,000 to 20,000 ft^2.

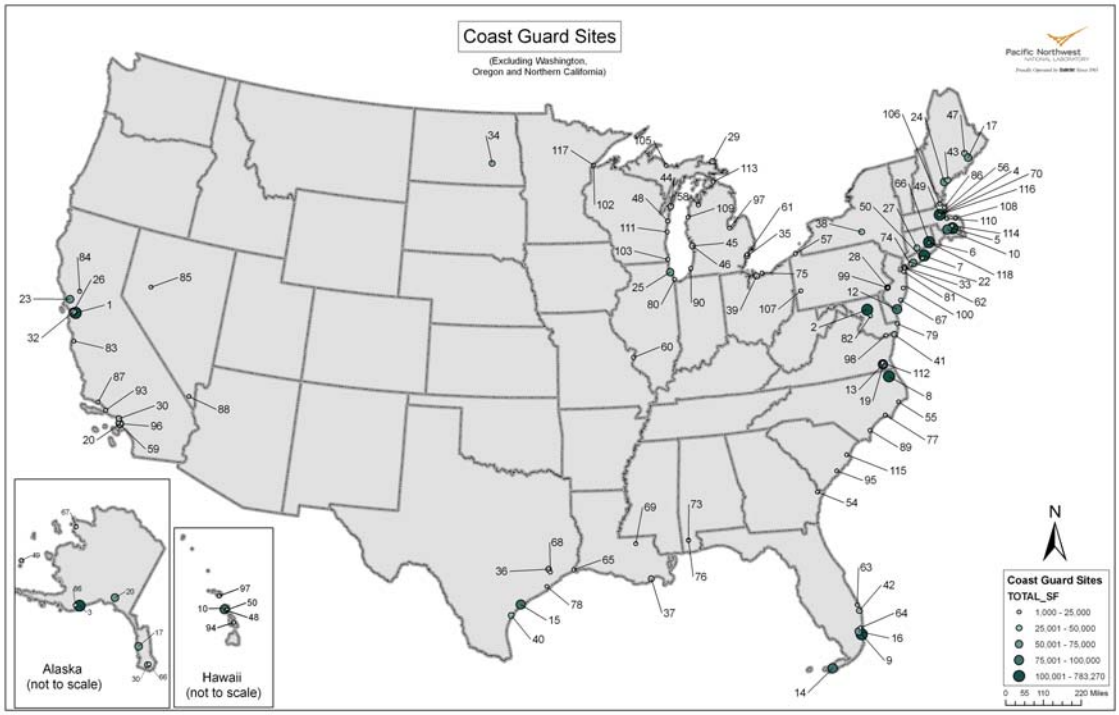

Figure 1. Geographic Location of USCG Installations

4.0 Projects Identified

A listing of the projects identified by the REM during the period of performance is provided in Table 1 below.

Table 1. USCG Eastern Region Proposed Projects

Project Number	Location	Payback (Yrs)	Estimated Cost ($)	Annual Cost Savings ($/Yr)	Energy Savings (kWh/Yr)	Water Savings (kGal/Yr)
1	Air Station Savannah	4.3	15,000	3,500	43,750	
2	Station Key West	4.5	85,000	18,900	126,000	
3	Station Key West	30.0	45,000	1,500	10,000	
4	Station Key West	0.9	14,500	17,000	0	600
5	Air Station Miami	3.8	7,500	2,000	20,000	
6	BSU Miami	5.4	35,000	6,500	76,500	
7	Air Station Savannah	1.3	16,580	2,500	22,875	
8	Base Key West	6.2	235,280	37,514	263,595	
9	Station Marathon	4.1	25,680	5,150	42,922	
10	Station Islamorada	7.5	18,100	3,769	30,127	
11	MSST	4.9	11,000	2,242	25,986	
12	CEU Miami	5.1	16,830	2,102	22,022	
13	Station Ft. Lauderdale	4.9	16,160	3,085	30,550	
14	Air Station Clearwater	11.4	152,000	13,373	215,192	
15	BSU Miami	8.5	1,404,000	165,000	1,701,030	
16	Air Station Miami	8.9	1,001,050	112,500	1,113,861	
17	Station Lake Worth Inlet	2.2	5,739	2,487	23,024	
18	Station Port Canaveral	1.9	16,000	5,842	52,279	
19	Station Ft. Pierce	2.5	11,939	3,772	27,746	
Total		**7.7**	**3,132,358**	**408,736**	**3,847,459**	**600**

4.1 Details of Proposed Projects

- Project 1 (Air Station Savannah): Convert the existing roofs on the hangar and administrative building to a cool roof. Project will be submitted for facility energy efficiency fund (FEEF) funding for FY11.

- Project 2 (Station Key West): Comprehensive lighting retrofit project for security lighting, high bay lighting, and area lighting. Project will be accomplished by the USCG. Bids have been requested from vendors and work order placed to complete the project once materials are received.

- Project 3 (Station Key West): For Project 2, upgrade the area lighting retrofit activity to a photovoltaic power source. Project development activities are underway, including implementation alternatives.

- Project 4 (Station Key West): Replace existing urinals with pint flush models and existing shower heads with low-flow models. Both result in savings in water use and sewage cost. Project being implemented.

- Project 5 (Air Station Miami): Install variable frequency drives on two 30-horsepower water pumps. Will be rolled into the UESC project that is being developed with Florida Power & Light (FP&L).

- Project 6 (BSU Miami): Replace existing perimeter security lightings with either LED or induction lighting. Will be rolled into the UESC project that is being developed with Florida Power & Light (FP&L).

- Project 7 (Air Station Savannah): Replace existing 1.5- and 4-ton heat pumps with high efficiency units and install programmable thermostats. Project will be accomplished by the USCG. Bids have been requested from vendors and work order placed to complete the project once materials are received.

- Project 8 (Base Key West): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the Base. Project will be submitted for FEEF funding.

- Project 9 (Station Marathon): Replace all T12 and T8-32 watt lights with T8- 28 watt lights. Replace all incandescent lights with compact

fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 10 (Station Islamorada): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 11 (MSST): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 12 (CEU Miami): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 13 (Station Ft. Lauderdale): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 14 (Air Station Clearwater): Replace all the split systems for the C130 and H60 hangars with a chilled water loop. Based on life-cycle cost analysis, air-cooled chiller is recommended.

- Project 15 (BSU Miami): Proposed UESC project with FP&L. Their audit has identified the following potential measures: lighting upgrades; heating, ventilation and air conditioning (HVAC) upgrades; solar domestic hot water; water efficiency measures; and building envelope modifications. The USCG contracting group in Cleveland, OH is developing contract documents.

- Project 16 (Air Station Miami): Proposed UESC project with FP&L. Their audit has identified the following potential measures: lighting upgrades, HVAC upgrades, solar domestic hot water, water efficiency measures, and building envelope modifications. The USCG contracting group in Cleveland, OH is developing contract documents.

- Project 17 (Station Lake Worth Inlet): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 18 (Station Port Canaveral): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

- Project 19 (Station Ft. Pierce): Replace all T12 and T8-32 watt lights with T8-28 watt lights. Replace all incandescent lights with compact fluorescents. Replace metal halides and mercury vapor lighting with T5 lights. Install occupancy sensors throughout the station. Project will be submitted for FEEF funding.

5.0 Potential Greenhouse Gas Reduction

The proposed initiatives will reduce greenhouse gas (GHG) emissions. All reported calculations in Table 2 are based on the U.S. Environmental Protection Agency (EPA) GHG emissions calculator and are reported as carbon dioxide equivalent (CO_2e). The EPA calculator estimates avoided CO_2 emissions in metric ton equivalent based on estimated kilowatt hour (kWh) savings. Once the projects are implemented, the actual kWh savings can be used to estimate GHG emissions reductions using the EPA eGRID model (Pechan 2008), using actual data from the electricity provider, which takes into consideration complex factors such as the mix of utility generation sources.

Table 2. Estimated Greenhouse Gas Reductions for Each Proposed Initiative

Reference: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Project	Estimated Energy Savings (kWh/yr)	GHG Avoided (Metric tons of CO_2e)
1	43,750	31
2	126,000	90
3	10,000	7
4	0	0
5	20,000	14
6	76,500	55
7	22,875	16
8	263,595	189
9	42,922	31
10	30,127	22
11	25,986	19
12	22,022	16
13	30,550	22
14	215,192	155
15	1,701,030	1,221
16	1,113,861	800
17	23,024	17
18	52,279	38
19	27,746	20
Total	**3,847,459**	**2,762**

To calculate jobs created and retained, one job for every $92,000 in funds expended was assumed. The cost to implement the activities associated with the various proposed projects ($3,132,358) will result in 34 jobs created and 2,762 metric tons of CO_2e emissions avoided.

6.0 Assessment Team Members

The Redhorse team for this activity consisted of Samuel Musora, who was the REM located at BSU-Miami, Florida, and Ben Hough. William Sandusky, PNNL Program Manager, provided technical direction for the activity and development of this report.

Funding in support of the REM was provided by FEMP through two sources. The majority of the funding was provided directly to PNNL, with a small portion provided to the Oak Ridge National Laboratory (ORNL). ORNL transferred their portion of the funding to PNNL to eliminate the need for redundant subcontracting activities. Catherine Brundage of ORNL was the responsible staff for this project at ORNL.

7.0 References

H. Pechan & Associates (Pechan). September 2008. The Emissions & Generation Resource Integrated Database for 2007 (eGRID 2007). Report Number 08.09.006/9011.239. Springfield, Virginia.

U.S. Coast Guard (USCG). 2010. *Air Station Clearwater – Initial Energy Audit Report*. Miami, Florida.