

DEPARTMENT OF THE INTERIOR

Energy Management Report Summary

Table of Contents

SECTION 1 - MANAGEMENT AND ADMINISTRATION SUMMARY

- A. Energy Management Infrastructure
- B. Management Tools

SECTION 2 - ENERGY EFFICIENCY PERFORMANCE SUMMARY

- A. Energy Intensity Reduction Performance
- B. Renewable Energy
- C. Water Conservation
- D. Metering of Electricity Use
- E. Federal Building Energy Efficiency Standards

SECTION 3 - IMPLEMENTATION HIGHLIGHTS OF FY 2012

- a. Life-Cycle Cost Analysis
- b. Retrofits and Capital Improvement Projects
- c. Use of Performance Contracts
 - i) Energy-Savings Performance Contracts (ESPCs)
 - ii) Utility Energy Services Contracts (UESCs).
 - iii) Other Types of Contracts
- d. Use of ENERGY STAR® and Other Energy-Efficient Products
- e. Sustainable Building Design and High-Performance Buildings
- f. Energy Efficiency/Sustainable Design in Lease Provisions
- g. Distributed Generation, including use on on-site renewable energy resources and combined cooling, heating, and power systems

SECTION 1 – Management and Administration Summary

Agency Information

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A. Energy Management Infrastructure

1. Senior Agency Official Rhea Suh

The Assistant Secretary - Policy, Management and Budget is the Department of the Interior's (Interior) Senior Sustainability Official responsible for meeting the goals of the Energy Policy Act of 2005 (EPAct), Energy Independence and Security Act of 2007 (EISA), Executive Orders (EO) 13423 and 13514.

2. Agency Energy Team

Implementation of the Energy Management and Conservation Program within Interior is the responsibility of the Assistant Secretary - Policy, Management and Budget and is delegated to the Office of Acquisition and Property Management through the Deputy Assistant Secretary – Budget, Finance, Performance, and Acquisition. Interior's Energy Management Team consists of Senior Bureau Asset Management Officers who are responsible for managing Interior's real property assets. In addition, the Departmental Energy Conservation Committee (DECC), comprised of bureau representatives ranging from property management specialists to engineers, is a forum to communicate information regarding energy management and water conservation issues; discuss best management practices; and provide advice and recommendations to senior leadership on energy management initiatives and policies as well as guidance on bureau energy management operations.

Departmental organizations and bureaus with responsibility for energy and water management at Interior facilities include the following:

- Office of the Secretary, National Business Center (NBC);
- Bureau of Indian Affairs (BIA);
- Bureau of Land Management (BLM);
- Bureau of Reclamation (BOR);
- National Park Service (NPS);
- U. S. Fish and Wildlife Service (FWS); and
- U. S. Geological Survey (USGS).

B. Management Tools

1. Awards

Interior bureaus take advantage of incentive programs to reward their exceptional employees. Interior actively participates in the Department of Energy's Federal Energy Management Program (DOE FEMP) awards programs and related awareness campaigns. Interior also holds its own Environmental Achievement Awards, many of which focus on energy and water conservation.

Three Interior nominations were recipients of DOE's FY 2012 Federal Energy and Water Management Awards:

- **National Park Service – Santa Monica Mountains National Recreation Area**, Thousand Oaks, California, received a project award. The Net-Zero Energy Student Intern Center is the first grid-tied net-zero energy facility completed by the NPS, achieving the Federal standard for 2020 ten years ahead of time. A 35 kilowatt (kW) photovoltaic (PV) system provides more than 100 percent of the facility's energy needs, with the surplus significantly contributing to the electricity requirements of a nearby NPS building. The new facility is heated and cooled by a unique, highly efficient ground source heat pump system that is "watered" by the tertiary-treated septic system effluent to increase thermal transmission from the soil to the pipe loops. This system produces about 15 million British thermal units (Btu) of renewable thermal energy per year. Together, the renewable energy systems avoid greenhouse gas emissions of about 22 metric tons (MT) of carbon dioxide equivalent (CO₂e) annually. Designed for Leadership in Energy and Environmental Design (LEED) Gold equivalence, the building includes numerous other sustainable features, including a compact design, the use of low-flow water fixtures, and no landscape irrigation. The Center provides housing for up to 16 student interns and researchers working in the park who otherwise would not be able to find affordable housing in the area.
- **U.S Fish and Wildlife Service – Neosho National Fish Hatchery**, Neosho, Missouri, won a project award. In FY 2011 the Neosho National Fish Hatchery (NFH), the oldest operating Federal fish hatchery, completed construction on its LEED Gold-rated visitor center, which yields energy performance at least 34 percent better than a standard building. The 9,800 square-foot building employs several energy efficiency strategies including a cool roof, energy-efficient lighting and daylighting, low-emissivity glazed windows, and a 31 ton geothermal heat pump. The 3.36 kW net-metered solar PV array produces 16 million Btu per year of renewable electric power that helps reduce greenhouse gases by the equivalent of 42 MT of CO₂e annually. Additionally, low-volatile organic compound carpets, paints, and adhesives provide a healthy indoor work environment. Many building elements that reduce the environmental footprint are composed of recycled materials, including insulation, acoustical ceiling tiles, ceramic tile, restroom partitions, and the exterior deck. Further, low-flow plumbing conserves more than 28,200 gallons of water annually, while water-efficient landscaping such as native plants and forbs eliminates the need for irrigation. Storm-water containment and drainage swales also help to maximize water conservation.

- **U.S. Fish and Wildlife Service – Audubon National Wildlife Refuge**, Coleharbor, North Dakota, won a project award. With an ENERGY STAR® rating of 87, the Audubon National Wildlife Refuge's new 17,123 square-foot Visitor Center and Headquarters building uses at least 40 percent less energy than a standard building. Energy-saving strategies include a cool roof, daylighting, low-emissivity glazed windows, energy efficient lighting, passive solar architecture, and ENERGY STAR®-rated appliances. The super-insulated LEED Gold-rated facility is heated and cooled by a 37-ton geothermal heat pump system. A net-metered, grid-tied 11.04 kW solar PV array and nine PV outdoor lights produce approximately 79 million Btu of renewable power annually. The exterior fixtures direct light downward to ensure the visual access to the night sky and prevent disruption of nocturnal animal habitat. Many building elements are composed of recycled materials, including fiber cement siding, acoustical ceiling tiles, carpet, ceramic tile, restroom partitions, and recycled glass countertops. Low-flow plumbing conserves 17,430 gallons of water annually, with native plantings and storm-water management helping to further maximize water conservation.

In addition, the **Bureau of Reclamation, Brackish Groundwater National Desalination Research Facility**, Alamogordo, New Mexico, received the inaugural Better Buildings Federal Award from DOE. The competition tracked single year energy savings among a field of competing facilities across the Federal Government. The Brackish Groundwater facility achieved a 53.6 percent reduction in energy use in FY 2012 compared with FY 2011. The results were tracked through EPA's Portfolio Manager tool.

A number of the winners of Interior's Environmental Achievement Awards focused on energy management, including the following:

- **National Park Service – Mr. Brian L. Cook**, Southeast Regional Sustainability Manager, NPS, Georgia, was named a Sustainability Hero for a multitude of sustainability accomplishments. Commander (CDR) Cook was instrumental in promoting, developing and managing energy audits for Southeast Region (SER) park units, which were used to select energy-savings projects funded by the American Recovery and Reinvestment Act of 2009 (ARRA). CDR Cook assisted in all phases of the installation of a 50 kW solar PV system at Kennesaw Mountain National Battlefields Visitor Center. The system meets the electrical needs of the center even on most cloudy days, and it generates credits for the park unit's utility account through an agreement with their electrical cooperative. CDR Cook also developed a Green Purchasing Tool to assist the region's employees in making sustainable choices in their acquisitions. In addition, CDR Cook has hired and worked with students to educate them on the importance of sustainability and the impact climate change has on NPS.
- **National Park Service –The Using Our Wits to Save Watts** program, Point Reyes National Seashore, California, is an active leader in promoting and practicing sustainable operations and climate change mitigation. Point Reyes has set goals and objectives using its environmental management system (EMS) to reflect the requirements of EO 13423 and 13514, the EPA Act 2005, EISA, and NPS Directors Orders. It has implemented a variety of sustainable practices and programs in the area of energy management and energy conservation. Point Reyes identified and

implemented energy conservation programs and the installation of six PV systems throughout the park. Energy efficient lighting and occupancy sensors were installed under a Utility Energy Savings Contract (UESC). Point Reyes uses EPA's Portfolio Manager to document energy consumption, see consumption trends and troubleshoot large energy spikes. Point Reyes also designed and constructed the first LEED-certified hostel in the country.

- **U.S. Fish and Wildlife Service – San Francisco Bay National Wildlife Refuge Complex**, California, Headquarters Office Renovation received an award. The renovated Headquarters Office at the San Francisco Bay NWR Complex was transformed into a model of sustainability, consuming 52 percent less energy than the previous headquarters office building and saving 104 MWh of energy annually, offsetting 72 MT of CO₂e. Passive solar energy technologies include light-bronze double-glazed low-emissivity windows, doors with thermal-break frames, expansive spray foam wall and ceiling insulation, and daylighting. Energy-efficient lighting, occupancy sensors, and ENERGY STAR® appliances save electricity, and a solar-thermal collector with an interior heat reservoir provides the domestic hot water. Low-flow plumbing saves 5,000 gallons per year. Salvaged cedar boards, heavy-timber beams, and useable portions of the original electrical system were incorporated into the building renovation. About 75 percent of construction waste was recycled. Over 60,000 visitors enjoy the benefits of this green building each year.
- **U.S. Fish and Wildlife Service – Benton Lake National Wildlife Refuge**, Montana, Hybrid Solar PV and Wind Energy System received an award. The 25.4 kW hybrid solar PV and wind energy system at Benton Lake NWR, located on the western edge of the northern Great Plains in Montana, is the first of its kind in the Mountain-Prairie Region. In November 2009, the FWS installed 15.4 kW of grid-tied pole-mounted single-axis adjustable solar PV panels and a 10 kW grid-tied horizontal axis Bergy wind turbine to reduce electric consumption at the already super-insulated, energy-efficient headquarters building. The impact on energy consumption was remarkable. In FY 2010, these integrated renewable energy systems accomplished a 93 percent decrease in purchased electricity consumption for the headquarters building and a 33 percent reduction in energy intensity from the field station's FY 2003 baseline, with a cost savings of approximately \$4,000 per year, an energy savings of 121 million BTUs, and 25 MT of greenhouse gases avoided in CO₂e.
- **U.S. Fish and Wildlife Service – Kooskia National Fish Hatchery**, Idaho, New Egg Incubation Water Reuse - Chiller System received an award. Kooskia NFH constructed a new egg incubation system that saves energy and reduces well water use. Historically, Salmon eggs at Kooskia NFH were incubated for 5 months using a single-pass system with chilled well water. The existing chiller was oversized in order to also accommodate summer operations such that half of the chilled water was wasted prior to reaching the egg incubators. To address this issue, the existing egg incubation recirculation system was rebuilt, increasing efficiency by reusing chilled water, which reduced the required chilling capacity by over 80 percent, from 150 to 25 gallons per minute. A new water reservoir with increased capacity was constructed to provide the system thermal stability and provide extra alarm response time during a loss-of-flow event. A more efficient chiller was added that was 90 percent smaller than the original chiller, and a

passive heat exchanger using ambient creek temperature to pre-chill well water was installed. The 25 horsepower (hp) production wells were also rehabilitated with new, more efficient 2 hp pumps. These measures have reduced electricity use by 65 percent, thereby saving \$32,875 annually and reducing annual greenhouse gas emissions by 297 MT of CO₂e.

- **U.S. Fish and Wildlife Service – Rocky Mountain Arsenal National Wildlife Refuge Visitor Center**, Colorado received an award. The land that is now the Rocky Mountain Arsenal NWR was once occupied by the U.S. Army, where chemical weapons were manufactured to support World War II. Waste handling procedures used at the time polluted the land. It was placed on the EPA's National Priorities List. After a two billion dollar cleanup, the land has been turned over to FWS and over 330 species of wildlife inhabit the Arsenal. The exhibit hall tells the remarkable story of how the lands at the Arsenal go full circle: going from native short grass prairie lands with an abundance of wildlife, to a toxic NPL site, through environmental remediation and cleanup, and back to the native short grass prairie land. This exhibit hall emphasizes the importance of sustainable design and being good stewards of the land. This visitor center includes features such as detention ponds and sand filtration beds for stormwater management, a high solar reflective index roof, energy efficient exterior lighting, a 56 kW PV system, water-efficient landscaping, low-flow plumbing fixtures, and a geothermal heating and cooling system.
- **U.S. Fish and Wildlife Service – Turnbull National Wildlife Refuge Maintenance Shop Energy Retrofit**, Washington, received an award. An integrated design team guided the collaborative planning and design process for the 6,000 square-foot, high-performance, heavy equipment maintenance building renovation at Turnbull NWR. Renovation methods specified are simple and transferable, and ongoing operations and maintenance are easy and low-cost. The project implemented energy conservation measures and renewable energy sources while conserving water, managing materials sustainably, and maintaining indoor air quality. The design team ensured incorporation of these goals throughout the design and lifecycle of the building, including deconstruction. Care was taken to ensure that the building complies with the Guiding Principles for Sustainable New Construction. Building features include a geothermal, ground source, heat pump; solar-thermal heating, ventilation, and air-conditioning (HVAC) system, solar PV system, and WaterSense plumbing fixtures.

2. Performance Evaluations

Interior recognizes the Energy Management Program responsibilities of facility managers, energy managers, designers, and senior leadership through the identification and incorporation of their responsibilities in performance evaluations and position descriptions.

3. Training and Education

In FY 2012, energy management training was provided for 1,583 personnel. Events such as GreenGov contributed greatly to educating Interior's energy managers, field personnel, and contracting officers. In addition, Interior energy managers provided information to personnel on available energy management training, and encouraged them to attend as

much training as operational requirements and funding permitted. Energy managers involved in building energy efficiency and water conservation have attended training and workshops offered by DOE's Federal Energy Management Program (FEMP) and the First Thursdays mini-seminars. Several personnel have also attended training offered by other organizations such as the Office of the Federal Environmental Executive, the Environmental Protection Agency (EPA), the Association of Energy Engineers, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), U.S. Green Buildings Council (USGBC), and public utilities; on topics such as green power purchase, the LEED rating system, building insulation advances, and water conservation. Interior energy personnel attended on-site training and satellite broadcasts of FEMP courses on meeting ASHRAE sustainable performance and design requirements, metering technologies, power purchase agreements, energy saving performance contracts, and utility energy savings contracts.

Energy managers disseminated relevant information concerning emerging technologies, alternative means of financing, and energy efficient practices; and developed employee outreach programs to educate building occupants about energy and water management programs.

Interior's Energy Awareness campaigns promoted the use of ENERGY STAR® and FEMP-designated efficient, low standby power products, as well as energy conservation of existing equipment. Energy Managers participated in Energy STAR® Portfolio Manager training.

USGS began an email energy and water efficiency newsletter that is being sent to the facility energy managers throughout the Bureau. The newsletter is short and focuses on current topics in Federal energy efficiency, training, one case study from a USGS or another Federal site, and one general efficiency article. USGS also organized a large Earth Day Expo at the National Center in Reston, VA, to showcase energy and water efficient and sustainable products and trends for employees. Solar power systems, Green commuting, energy efficiency office, recycling, organic food, local sustainable organizations, alternative fuel vehicles, and environmentally critical USGS science programs were showcased as well.

In FY 2012, Interior offered two classes—one on green procurement fundamentals and one on biobased training. The first class had approximately 100 attendees, while the second class had approximately 50. Interior will re-offer the biobased training each quarter of FY 2013.

4. Use of Energy and Water Efficiency measures in Facilities Covered under EISA Section 432

Section 432 of EISA requires that agencies complete comprehensive energy and water evaluations on its covered facilities that make up 75 percent of its facility energy use. Agencies should evaluate approximately 25 percent of their covered facilities annually so that all facilities are evaluated once every four years. Agency progress towards meeting Section 432 requirements are measured in DOE FEMP's Compliance Tracking System (CTS).

Through FY 2012, Interior evaluated 97.1 percent of its total EISA covered facilities gross

square feet. Through the completion of annual energy and water evaluations, Interior bureaus have identified \$211,788,868 in Estimated Implementation Cost of Potential ECMs. This cost represents both energy conservation measures (ECMs) that have been implemented as well as ECMs that have not been implemented.

Interior bureaus continue to enter implemented project data into CTS. To date, the Total Project Implementation Costs is \$ 36,262,947. These projects were implemented through the use of appropriated funding – construction, building rehabilitation, and operations and maintenance funding, as well as ARRA funding, Energy Savings Performance Contracts (ESPCs), and UESCs. Entering implemented project data into CTS will be an ongoing process throughout FY 2013.

SECTION 2 – Energy Efficiency Performance Summary

A. Energy Intensity Reduction Performance Summary

1. Goal Subject Buildings

EISA established the FY 2012 energy intensity reduction goal of 21 percent relative to the FY 2003 baseline for goal subject buildings.

In FY 2012, Interior's goal subject building energy consumption was **56,667 Btu per gross square foot**. This represents a total reduction in energy consumption per gross square foot of 28.6% percent relative to the revised FY 2003 baseline.

Interior's FY 2003 energy intensity baseline was revised to properly reflect BIA's direct payment of utility bills, in accordance with FEMP's Energy Reporting Guidance. This revision reduced Interior's FY 2003 baseline to 80,731 Btu per gross square feet. A revised baseline worksheet is provided in Attachment 4.

In accordance with "Guidelines Establishing Criteria for Excluding Buildings from the Energy Performance Requirements of Section 543 of the National Energy Conservation Policy Act, as amended by the Energy Policy Act of 2005," Interior has categorized energy usage primarily from pumps, aerators, fish feeders, hatchery production, exterior lighting and security at FWS facilities, monitoring stations, and laboratory bio-waste incinerators at USGS facilities, and electricity use at BLM's Helium Plant and BOR's Desalination Plant and Brine Injection Plant as "assumed exclusion of structures and processes not qualified as Federal buildings." These energy processes do not have an associated building gross square footage and will significantly skew building energy usage. In addition, these processes are driven by mission and operational requirements.

2. Non-Fleet Vehicle and Equipment Fuel Use

In FY 2012, Interior used 4.03 million gallons of auto gasoline, diesel, biodiesel, off-road diesel, and propane for use in vessels, heavy equipment, standby generators, all terrain vehicles, blowers, mowers, outboard motors, and other small equipment not reported on-line via GSA's Federal Automotive Statistical Tool. A total of 208,904 gallons of aviation gasoline and jet fuel were used.

B. Renewable Energy

1. On-Site Generated Renewable Energy

Interior is dedicated to fulfilling the renewable electricity goals of the EAct 2005 and EO 13423 by purchasing and generating electricity from renewable sources. In FY 2012, Interior used 53,948 MWh of renewable electricity from self-generation with on-site bonus and through renewable electricity purchases and credits. This represents 8.6 percent of Interior's total facility electricity use and exceeds the EAct 2005 goal of 5 percent of facility electricity use. Of the 8.6 percent, 4.7 percent represents on-site renewable energy

generation including bonus; 1.5 percent represents renewable electricity purchased through the utility company; and 2.4 percent represents the purchase of renewable energy certificates. The use of on-site renewable energy sources is encouraged if the development of the resource is economically, environmentally, and technically feasible.

Interior has implemented approximately 1,600¹ on-site renewable energy projects including stand-alone and grid-connected PV systems, solar thermal (hot water) projects, geothermal (ground source) heat pumps, incremental hydropower, and wind projects. The following new renewable electricity projects were implemented or studied in FY 2012:

In FY 2012, BIA completed two employee quarters projects—five homes at **Ute Mountain Agency**, Colorado, and two homes in **Moencopi**, Arizona—with rooftop PV systems designed to supply one-third of each unit's expected electricity needs. Another three homes at **Lower Brule Agency** in South Dakota will utilize ground source heat pumps.

BLM completed three LEED buildings in FY 2012: the **Farmington Field Office** (LEED Gold) and **Warehouse** (LEED Certified) in Farmington, New Mexico and the **Kanab Field Office** (LEED Gold) in Kanab, Utah. The Farmington Field Office and Warehouse substantially decrease fossil fuel energy use and save the government operational and maintenance funds. Solar PV panels will offset 30 percent of the annual office and warehouse electric demand. The Kanab Field Office incorporates a number of innovative energy efficiency measures, including a new 30 kW grid-connected PV system and a groundsource heat pump system. BLM also installed a grid-connected PV system at **Olancho Fire Station**, California, which will generate approximately 31,000 kWh of renewable electricity every year, and a 20 kW grid-independent PV system in **Coldfoot**, Alaska.

BOR has constructed a new office building designed for LEED Platinum status for approximately 170 employees in its **Date Street Complex** in Boulder City, Nevada. The project was funded through ARRA at a total cost of about \$14.8 million. The 43,000 square-foot office building includes state-of-the-art materials and fixtures that cut energy use and reduce costs. BOR added a 588-panel, 135 kW capacity solar farm to generate enough electricity to provide 62 percent of the building's annual energy demand.

In FY 2012, FWS opened a new net-zero energy, LEED Platinum designed building at **San Luis National Wildlife Refuge** (NWR) in California. A roof-mounted 55 kW PV system is designed to generate all the electricity needs for the building. The **San Diego Bay NWR Complex**, California, also opened a brand new building designed for LEED Gold status and featuring a 30 kW PV system. The **Long Island NWR**, New York, also opened a new visitor center and headquarters with a 6.5 kW PV system. New buildings were opened at **Kealia Pond NWR**, Hawaii, and **E.B. Forsythe NWR**, New Jersey, each incorporating solar power. Finally, FWS installed hydroelectric turbines with 16 kW capacity at **Craig Brook NFH** in Maine.

NPS completed a number of new on-site renewable energy projects during FY 2012. **Alcatraz Island Golden Gate National Recreation Area**, California, completed a multi-phased installation of a 307 kW PV system to replace diesel generated power on the island. A new microgrid system comprises eight 100 kW grid-tied inverters, the rooftop PV

¹ One project may include multiple renewable energy components at single site, i.e., photovoltaic parking lot lights.

array, the lead acid battery pack, backup diesel generators, and a Web-based monitoring and control system. Over a year, the solar-powered microgrid will reduce the running time of the diesel generators from 100 percent to 40 percent. The brand new **Mesa Verde Visitor Center and Research Center**, Colorado, designed to LEED Platinum standards, features a 67 kW PV system expected to deliver 100,500 kWh of renewable electricity per year, an 80 square foot solar hot water heater, and a 20 kW microhydro system. The on-site renewable energy systems are capable of providing 95 percent of the building's energy requirements. NPS has gained its first net-zero visitor center, the Anthony C. Beilenson Visitor Center at the King Gillette Ranch in the **Santa Monica Mountains National Recreation Area** in California. The visitor center is in line for LEED Platinum certification for its design. The King Gillette visitor center boasts a mix of both new technology and older insights into green building: 94 kW capacity PV panels, LED lighting, geothermal heating and cooling, as well as a use of natural light and green building materials. The visitor center is operated by four partner agencies: NPS, California State Parks, Santa Monica Mountains Conservancy, and Mountains Recreation and Conservation Authority. **Lava Beds National Monument** in California completed a major PV project in FY 2012. The 59 kW system generates more than 106,000 kWh of renewable electricity throughout the year. **Grand Portage National Monument**, Minnesota, completed a new dormitory designed for LEED certification with a roof-mounted 6.5 kW PV system capable of generating about 12,000 kWh of electricity each year.

The USGS **National Wildlife Health Center** in Madison, Wisconsin, completed (95 percent) of an ESPC. The project estimates an annual energy savings of 5,825 MMBtu and \$82,000. These savings represent an 18.8 percent total reduction in the site's energy consumption. A 72.2 kW PV system was installed that provides 3.9 percent of the electric energy requirements of the site and provides energy savings of 93,300 kWh and \$8,700 per year. Passive-solar day-lighting strategies were also employed. The **Patuxent Wildlife Research Center** in Laurel, Maryland, built a zero-energy residential home with ARRA funding under a joint project with the FWS. The 1500 square foot, two-story home designed to LEED Silver specifications was completed in FY 2012. The structure has a 4.9 kW PV array on the roof that supplies all the electricity needed for the home. Sustainable building materials were used including above code R-insulating values in this modular home that produced less construction waste with a tighter build. The stormwater is captured and diverted to ground water supplies. All appliances, lighting and electronics are ENERGY STAR® models. The **Woods Hole Gosnold Building**, Massachusetts, uses renewable energy as a major component of the facility's sustainable design. Extensive passive solar design strategies were incorporated into the entire building, including the "Nice Day Switch," which allows occupants to turn off the heating or cooling system and to open clearstory windows for natural ventilation, sunscreens that lessen the need for mechanical air conditioning, and structural light. The facility also utilizes an active solar technology comprised of 300 individual solar evacuated tubes mounted in ten roof-top solar array panels that circulate hot water to radiant floor zones throughout all spaces in the building. The tubes collect enough solar energy to heat the addition.

2. Purchased renewable energy

Interior continues to purchase energy from renewable sources. In FY 2012, Interior bureaus purchased a total of 24,204 MWh of renewable energy from utility providers and through renewable energy certificates.

BIA, BLM, and USGS purchased 15,000 MWh of renewable energy certificates, generated from renewable energy sources including wind, agricultural byproducts, and wood and wood residuals.

In FY 2012, 6.5 percent of all electricity consumed at the **Interior Complex**, in Washington, DC, was from renewable sources. NBC purchased approximately 1,200 MWh of renewable electric power through an area-wide contract established and administered by the General Services Administration. Of this, 25 percent was wind power and 75 percent was from landfill gases.

Seventeen National Park units purchased 8,005 MWh of renewable electricity from their utility providers. Most notably: **Grand Teton National Park**, Wyoming; **Zion National Park**, Utah; **North Cascades National Park**, Washington; **Mesa Verde National Park**, Colorado; and **Lincoln Home National Historic Site**, Illinois.

3. Water Conservation

EO 13514 established the FY 2012 water intensity reduction goal of 10 percent relative to the FY 2007 baseline. In FY 2012, Interior reported potable water consumption of 3,282 million gallons at a cost of \$ 19.7 million. This established Interior's FY 2012 water intensity at **55.6 gallons per gross square foot**, which represents an 11.3 percent reduction relative to the FY 2007 baseline.

Interior remains committed to the efficient use of non-potable water resources and will continue to make improvements in our delivery and use of water wherever feasible. Interior bureaus briefly assessed non-potable water use and found that non-potable water is used for mission related functions. These water uses include: care and feeding of animals and wildlife including endangered species; establishment and propagation of wildlife habitats; power generation and the distribution of water as a result of water rights, contracts, or Tribal agreements; and wildland firefighting. When final CEQ guidance for industrial, landscaping, and agricultural water use is issued, bureaus will reassess its non-potable water uses.

In FY 2012, NPS continued the restoration of the original water cisterns at **Castillo de San Cristobal** and **Castillo San Felipe del Morro** at **San Juan National Historic Site**, Puerto Rico. Harvested rain water will be directed out of the cisterns to a treatment system that will improve water quality to be used for toilets, showers, hose bibs and water closets. When completed, the cisterns will have a storage capacity of more than 1.2 million gallons and will save NPS \$12,000 annually in water costs.

NPS completed the renovation of the reflecting pool between the Lincoln Memorial and the World War II Memorial at the **National Mall and Memorial Parks** in Washington, DC in the summer of 2012. The old pool, which was completed in 1924, held approximately 7 million gallons of water, much of which evaporated or continually leaked out. This ongoing loss of water resulted in the regular purchase of potable water from the District of Columbia. The new 5 million gallon pool is filled with re-circulated water, which is pumped from the Tidal Basin, filtered, and then pumped into the pool. This new system continuously circulates and filters the water using ozonation, a natural water treatment process requiring no chemicals. When the reflecting pool needs to be cleaned, the water is returned to the Tidal Basin. Furthermore, NPS has nearly completed the first of three phases to restore turf and

improve drainage on the National Mall. The first phase includes gutters surrounding three Mall Lawn Panels and two large underground cisterns that will collect stormwater. Meanwhile, a below-grade pump station and a new irrigation system will distribute the collected water. When all three phases of the project are completed, the amount of potable water required for irrigating the Mall lawn panels will be reduced by approximately 7.56 million gallons per year (a savings of 67.5 percent). The collection of stormwater will also improve regional water quality by reducing the amount of flow from the Mall into the Washington area combined sewer system and keep raw sewage and pollutants out of Chesapeake Bay tributaries.

Another example of water conservation comes from BOR's **Snake River Area Office** in Boise, Idaho, which reduced water usage by replacing all water head sprinklers with drip irrigation and increasing mulching to retain moisture. The existing wood bark was replaced with two inches of permabark to increase moisture retention. Composting was established on site with grass clippings and leaves, which will then be put back into flower beds and around trees and bushes for added water retention. An outside water meter has been installed to measure and record irrigation water use separately from potable building water. This device will document water use and encourage reductions on potable water used for landscaping.

NBC continued upgrades to the **Main Interior Building** (MIB) in Washington, DC, including the replacement of shower heads with low flow shower heads, the addition of aerators to faucets in all kitchenettes and restrooms, the installation of 1.4 gallons per flush (gpf) flush toilets and 0.6 gpf urinals in selected locations, and the use of xeriscaping to replace landscaping around MIB.

4. **Metering of Electricity Use**

The EAct of 2005 requires that all appropriate buildings be metered for electricity by the end of FY 2012. In FY 2012, Interior increased its electricity metering to cover 99.3 percent of its 6,603 appropriate buildings. Of these 6,528 had standard meters and 298 had advanced meters. By the end of FY 2013, Interior anticipates that 100 percent of its appropriate buildings will be metered.

5. **Federal Building Energy Efficiency Standards**

Section 109 of EAct 2005 requires that, if life-cycle cost-effective, all new Federal buildings must be designed to achieve energy consumption levels 30 percent below those of the current version of the applicable ASHRAE standard or the International Energy Conservation Code. Since the beginning of FY 2007, 267 of 270 new building designs have been designed to be 30 percent more energy efficient than the relevant code or has been designed to the highest level of energy efficiency that is life cycle cost effective. Of the new building designs reported since 2007, design documentation for 3 BIA buildings have not been located to confirm that they were designed to the highest level of energy efficiency.

SECTION 3 – Implementation Highlights during FY 2012

A. HIGHLIGHTS OF FY 2012

1. **Where applicable, Agencies should provide a summary highlights of the following strategies their energy management programs employed during FY 2012:**

a) Life-Cycle Cost Analysis

Interior utilizes life-cycle cost analysis in making decisions about investments in products, services, construction, and other projects to lower costs and to reduce energy and water consumption.

Interior actively manages a portfolio of construction capital investments in order to maximize the return on investment to the taxpayer and Government at an acceptable level of risk. Interior's Asset Management Plan outlines the process whereby Interior is moving from a current reliance on a project-based review process to a life-cycle, asset-based portfolio management process. Effective capital planning within Interior requires improved long range planning and a disciplined budget process as the basis for managing a portfolio of assets to achieve performance goals and objectives with minimal risks, lowest life cycle costs, and greatest overall benefits to the business of the bureaus and the Department.

Interior has developed and continues to refine its approach to establishing a more consistent, structured, performance-based, integrated approach to its Construction Capital Planning Investment Control (CPIC) process. As Interior's portfolio-based approach matures, the Department and the bureaus will continue to improve their ability to manage risks and returns of capital assets throughout their life cycles necessary to ensure that Interior's investments are well conceived, cost-effective, and support strategic mission and business goals. The analysis of these investments is a living tool that will be continually revisited, refined and updated. It is articulated in a business case, the extent of which is commensurate with the cost and impact of the investment on the organization and mission.

b) Retrofits and Capital Improvement Projects

In FY 2012, Interior obligated \$6.4 million in facility energy and water efficiency improvements through direct obligations, and \$969 thousand through ESPCs, which represents a total investment of 8.2 percent relative to total facility energy costs. The following entries provide examples of the work being done in DOI facilities.

NBC is installing blast mitigation windows, which are energy efficient, in the **Main Interior Building** (MIB) using a UESC with Washington Gas Energy Services. Window installation began in FY 2012. Additional energy conservation projects at MIB include: the installation of motion sensors in MIB wings 3-6, and the installation of NEMA motors and cogged V-belts on air handling units, the installation of Green Roofs on 5 Wings of MIB, and the completion of design documents for **South Interior Building** Green Parking Lot.

BIA **Ojo Encino Day School** in New Mexico is currently being constructed using Structural Insulated Panel Systems (SIPS). Formed off-site and trucked to the school, each panel sandwiches framing, insulation and sheathing, leading to a dramatically increased insulation R-factor. The result will be lower heating and cooling costs. **Dibe Yazhi Habitiin**

Olta School (Borrego Pass), Crownpoint, New Mexico, is undergoing a roof repair, upgrades to heating and cooling systems, the replacement of windows for energy efficiency, and the installation of new energy efficient lighting, as part of an ARRA-funded infrastructure improvement project at the K-8 school which serves 136 students.

Greyhills High School, Tuba City, Arizona, is undergoing a cooling and heating system upgrade. **Southwestern Indian Polytechnic Institute**, Albuquerque, New Mexico, replaced three large steam boilers with five hot water boilers which greatly reduced the natural gas consumption. The project included replacement of 1200 feet of leaking chlorinated polyvinyl chloride piping with steel piping.

BOR Regions have been evaluating and replacing older refrigerant-based equipment with new EPA-approved ones. The Mid-Pacific Region has upgraded its HVAC system at the **Northern California Area Office Upper Vista House**. Three **Klamath Basin Area Office** (Oregon) buildings and two buildings at the **Central California Area Office-New Melones** campus are upgrading HVAC systems as well. The **Columbia Cascades Area Office**, Yakima, Washington, **Snake River Area Office**, Boise, Idaho, **Curecanti Field Office**, Montrose, Colorado, and **Elephant Butte Power Plant**, New Mexico, have all installed energy efficient (and, in some cases, LED) light fixtures.

FWS replaced air-conditioning units and upgraded the furnace in the Aquarium at **Warm Springs NFH** in Warm Springs, Oregon. FWS completed Phase 2 renovation of the HVAC system at the **National Wildlife Visitor Center** at Patuxent Research Refuge, Maryland, via a UESC with Pepco Energy Services Company. The project includes but is not limited to replacement of HVAC1 air handler, return fan and condensing unit, cleaning and maintenance of seven reheat coils, partial conversion to variable air volume boxes for the gift shop and restrooms, replacement of roof exhaust fans, modernization of digital controls, and installation of variable speed drives for fan motors. Finally, FWS reports completion of all ARRA funded energy efficiency projects (15 projects totaling \$17,480,747) in FY 2012.

In FY 2012, NPS **John Muir National Historic Site Visitor Center** in Martinez, California, underwent a renovation project to incorporate sustainable, green, and environmentally friendly equipment and products into the construction. These included installing LED light fixtures, occupancy sensor switches, solar light tubes and reuse of existing skylights, point-of-use water heaters, timed faucets, dual flush pressure assisted toilets, high efficiency hand dryers, high-efficiency HVAC system, non-electric dual height water fountain, bamboo wood flooring, recycled content carpet tiles, low-VOC paint, formaldehyde-free insulation, and fiber cement lap exterior siding. The Administration Headquarters Building at **Point Reyes National Seashore** earned EPA ENERGY STAR® Certification for the many actions, including posting building energy use to increase employee awareness and encourage conservation, changing lighting to ENERGY STAR®-certified lighting, and installing skylights and 10 kW solar array. NPS continues to maintain the Energy Smart PARKS partnership with DOE, which is used to provide parks with technical expertise to support efficiency activities.

USGS **Boise District Office** in Boise, Idaho, renovated Building 3 with \$1.3 million of direct agency and ARRA funds to transform the building from a warehouse to a modern office building. Improvements included use of utility-supplied geothermal heat to service a new HVAC system with a new ENERGY STAR® boiler and hot-water heater. Additional efficiency upgrades were completed on the plumbing fixtures, lighting, and building envelope. The **Upper Midwest Environmental Sciences Center** in La Crosse, Wisconsin,

installed a new condenser water cooling system. The **Columbia Environmental Research Center** in Columbia, Missouri, completed a laboratory consolidation project that eliminated nine smaller buildings and constructed one new, more efficient laboratory building (LEED Silver), and replaced the fume hood exhaust system in the main laboratory building with a more efficient system. The **Earth Resources Observation and Science Center**, Sioux Falls, South Dakota, installed LED lights for outdoor lighting and replaced windows with energy efficient models. The **Great Lakes Science Center** in Ann Arbor, Michigan, replaced exterior windows, doors and process distribution lines. After the conclusion of its ESPC, the **National Wildlife Health Center** in Madison, Wisconsin, estimates an annual energy cost savings of \$83,187 with a payback period of 13 years, and annual energy consumption savings of 5,594 MMBtus or 19.3 percent compared with the baseline. The ESPC projects include chiller plant improvements and new boilers, pumps and controls in the Main Building and an upgrade to the HVAC fan systems coupled with a new automated building control system.

c) Use of Performance Contracts

i) Use of Energy-Savings Performance Contracts (ESPCs)

In FY 2012, USGS **National Wildlife Health Center** (NWHC), Wisconsin, continued project work under an ESPC. The NWHC used ARRA funding to support very specific energy conservation measures (ECMs). The seven specific ECMs that were funded by ARRA are: two lighting projects, two exhaust fan replacement projects, replacement of three furnaces and one boiler, replacement of four air handlers, and replacement of building control systems. The value of the ECMs is estimated to be approximately \$6.7 million. The non-ARRA projects include boiler plant improvements in the TIB, chiller plant improvements in the Main Building, a 72.2 kW solar PV system, and a waste sterilization heat recovery system to improve energy efficiency.

BLM successfully completed its multi-phased, regional ESPC covering 12 states. The ESPC spanned over 6 fiscal year (FY 2006 – FY 2011) with a total project investment of \$23.5 million. The final phase of the ESPC, awarded in FY 2010, was augmented with over \$13 million in ARRA funding.

In accordance with the Presidential Memorandum on performance contracting, Interior committed to awarding additional performance contracts of \$5 million by the end of December 2013. USGS is undertaking a multiple site ESPC with separate bundles of projects. Bundle "A" East includes: **National Center**, Reston, Virginia, **Leetown Science Center**, Kearneysville, West Virginia, **Patuxent Wildlife Research**, Laurel, Maryland, **Northern Appalachian Center**, Wellsboro, Pennsylvania, and **Conte Anadromous Fish Lab**, Turners Falls, Massachusetts.

USGS Bundle "B" West includes: **EROS Data Center**, Sioux Falls, South Dakota, **Upper Midwest Environmental Science Center**, La Crosse, Wisconsin, **Columbia Environmental Research Center**, Columbia, Missouri, **National Wetlands Research Center**, Lafayette, Louisiana, **Western Fisheries Research Center**, Seattle, Washington, **Northern Prairie Wildlife Research**, Jamestown, North Dakota.

NPS **Isle Royale National Park**, Michigan, awarded Phase 1 of its two-phased project. Phase 1 consists of lighting upgrades, the installation of solar hot water heaters, various water conservation measures and appliance replacement. Phase 2 consists of the

installation of renewable energy systems.

NPS **Lowell National Historic Site**, Massachusetts, is pursuing an ESPC to upgrade its facilities.

ii) Use of Utility Energy Services Contracts (UESCs)

In FY 2009, Washington Gas Light conducted an extensive energy audit at the **Main Interior Building**, Washington, DC. In FY 2010, Washington Gas Light conducted extensive studies on various blast resistant windows that also provided thermal insulation. NBC, in collaboration with the General Services Administration, selected the best product that satisfied historical, security and energy efficiency requirements. The UESC was awarded in FY 2011. Installation began in FY 2012.

FWS executed a UESC with PEPCO Energy Services for approximately \$953,000 to complete the renovation of the heating ventilation, and air conditioning system at the **National Wildlife Visitor Center** in Laurel, Maryland. The project includes the replacement of HVAC air handler, return fan and condensing unit, cleaning and maintenance of seven reheat coils, partial conversion to VAV boxes for the gift shop and restrooms, replacement of roof exhaust fans, modernization of digital controls, and installation of variable speed drives for fan motors. The contract work was completed in FY 2012.

iii) Use of Other Types of Contracts

BOR's **Ephrata Field Office**, Washington, completed energy efficiency projects and other upgrades through an energy contract with the Bonneville Power Authority (similar to a UESC). Upgrades included installing motion sensors in applicable office space to control lighting, increasing building insulation, installing instant hot water heaters, and replacing old HVAC systems with more efficient models.

d) Use of ENERGY STAR® and Other Energy-Efficient Products

Interior selects, when commercially available, ENERGY STAR®, FEMP Designated, and other energy-efficient products when acquiring energy-consuming products. Energy efficient technologies include high-efficiency lighting and ballasts, exit signs, energy efficient motors, and the use of packaged heating and cooling equipment with energy efficiency ratios that meet or exceed Federal criteria for retrofitting existing buildings.

e) Sustainable Building Design and High-Performance Buildings

Interior is striving to be a government leader by implementing sustainability policies that meet or exceed EO 13423 and 13514 requirements and integrate the five Guiding Principles into the design, construction, operations, and maintenance of Interior-owned and leased buildings. Sustainable building design principles have been incorporated into the siting, design, and construction of Interior projects. Energy managers work closely with their engineers, architects, and design offices to address energy conservation retrofits and new building designs, and ensure that buildings comply with Federal energy laws and regulations. All cost effective, energy conservation opportunities are analyzed for consistency with resource management objectives. Energy conservation efficiency standards are included as an integral part of all engineering design and construction project technical specifications.

Interior has 36 buildings listed in the U.S. Green Building Council's LEED Certified Project Directory:

- BIA ***Baca Dlo'ay Azhi Community School***, Prewitt, New Mexico – LEED Certified
- BIA ***First Mesa Elementary School***, Polacca, Arizona – LEED Certified
- BIA ***Pueblo Pintado Community School***, Pueblo Pintado, New Mexico – LEED Gold
- BIA ***Pueblo Pintado Dorm II***, Pueblo Pintado, New Mexico – LEED Silver
- BIA ***Standing Rock Elementary School***, North Dakota – LEED Gold
- BIA ***Turtle Mountain High School***, Belcourt, North Dakota – LEED Silver
- BIA ***Tse'hootsooi' Elementary School***, Fort Defiance, Arizona – LEED Silver
- BLM ***Escalante Science Center***, Escalante, Utah – LEED Gold
- BLM ***Gateway III Office Tower*** (leased), Salt Lake City, Utah – LEED Certified
- BLM ***Red Rock Canyon Visitor Center***, Las Vegas, Nevada – LEED Gold
- BLM ***Safford Field Office***, Arizona – LEED Silver
- FWS ***Neosho Hatchery Visitor Center***, Neosho, Missouri – LEED Gold
- FWS ***Nulhegan Basin Administration Building and Visitor Contact Facility***, Silvio O. Conte NFWR, Brunswick, Vermont – LEED Silver
- FWS ***Anahuac NWR***, Anahuac, Texas – LEED Gold
- NPS with the GSA ***Carl T. Curtis Midwest Regional Headquarters***, Omaha, Nebraska – LEED Gold
- NPS ***Blue Ridge Parkway Destination Center***, Asheville, North Carolina – LEED Gold
- NPS ***Denver Service Center Office Building*** (Leased) – LEED Gold
- NPS ***Denali National Park Entrance Area Visitor Center***, Denali National Park, Alaska – LEED Silver
- NPS with Xanterra Parks and Resorts ***Annie Creek Gift Shop***, Crater Lake National Park, Oregon – LEED Silver
- NPS ***South Rim Maintenance and Warehouse Facility***, Grand Canyon National Park, Arizona – LEED Certified
- NPS with Xanterra Parks and Resorts ***Employee Housing***, Yellowstone National Park, Montana – LEED Certified
- NPS ***Apgar Transit Center***, West Glacier, Montana – LEED Gold
- NPS ***Eielson Visitor Center***, Denali National Park, Alaska – LEED Platinum
- NPS ***Gettysburg National Military Park Visitor Center***, Pennsylvania – LEED Gold
- NPS ***Golden Gate Recreation Area Cavallo Point***, Sausalito, California – LEED Gold
- NPS ***Hawaii Volcanoes National Park Visitor Emergency Operations Center*** – LEED Platinum
- NPS ***Mill Complex, Forest Center and Wood Barn***, Woodstock, Vermont – LEED Platinum
- NPS ***Lassen Volcanic National Park***, Redding, California - LEED Platinum
- NPS ***Old Faithful Visitor Education Center***, Yellowstone National Park, Wyoming – LEED Gold
- NPS ***Twin Creeks Science and Education Center***, Great Smoky Mountains National Park, Tennessee, LEED Gold

- NPS **Quarry Lower Visitor Center**, Dinosaur National Monument, Colorado – LEED Gold
- NPS **Laurance S. Rockefeller Preserve Center**, Grand Teton National Park, Wyoming – LEED Platinum
- NPS **Hopewell Culture Museum Collection Facility**, Chillicothe, Ohio – LEED Gold
- NPS **Lake Mead Interagency Communication Center**, Boulder City, Nevada – LEED Gold
- NPS **West Side Visitor Center**, Pinnacles National Monument, California – LEED Platinum
- USGS **Columbia Environmental Research Center**, Columbia, Missouri – LEED Silver

Recent projects that are LEED registered or under development include:

BIA: **Ojo Encino Day School**, New Mexico; **Crown Point School**, New Mexico; **Kaibeto Boarding School**, Arizona; **Dilcon Community School**, Arizona; **Circle of Life School**, Minnesota; **Crow Creek Tribal School**, South Dakota; **St. Francis Indian School Gymnasium Addition**, South Dakota; **Loneman Replacement School**, South Dakota; **Pine Ridge Dormitory**, South Dakota; **Dennehotso Boarding School and Dormitory**, Arizona; **Kickapoo Nation School**, Kansas; **Nazlini Fire Station**, Arizona; **Riverside Academic High School and Dormitories**, Oklahoma; **Fort Totten LEC Renovation**, North Dakota; **BIA Reston Office**, Virginia; **Sanostee Day School**, New Mexico; **Navajo Indian School Dormitory**, Arizona; and **Tse Ho Tso Middle School**, Arizona.

BLM: **Ely Seed Warehouse**, Nevada; **Boise District Radio Shop Building**, Idaho; **Desert Discovery Center**, California; **Plymouth Mountain Hot Shots Facility**, Nevada; **Red Rock Canyon Desert Learning Center**, Nevada; **Fort Howes Fire Station**, Montana; **Fillmore Field Office**, Fillmore, Utah; **New Mexico State Office**, Santa Fe, New Mexico; **Rawlins Field Office**, Rawlins, Wyoming; **Kanab Field Office**, Kanab, Utah; **Black Rock Administration Building**, Nevada; **Farmington Field Office**, Farmington, New Mexico; and **Farmington Field Office Warehouse**, Farmington, New Mexico.

BOR: **Grand Coulee Dam Materials Storage Building**, Washington; **Animas-La Plata Project**, New Mexico; **Folsom Dam Main Administration Building**, California; **Upper Snake River Field Office**, Idaho; and **Upper Columbia Area Office**, Idaho; **Date Street Complex**, Boulder City, Nevada.

FWS: **Desert National Wildlife Refuge Administrative Headquarters Building and Visitor Center**, Nevada; **Big Stone NWR**, Minnesota; **Tamarac NWR**, Minnesota; **Anahuac NWR**, Texas; **Iroquois NWR**, New York; **Kealia Pond NWR**, Hawaii; **Long Island NWR Complex**, New York; **Red River NWR Headquarters and Visitor Center**, Louisiana; **Paris Office/Visitors Center**, Tennessee; **Commerce City Visitor and Education Center**, Colorado; **Mammoth Spring Environmental Center**, Arkansas; **Maintenance/Fire Cache Building**, Texas; **Port Louisa NWR Headquarters**, Iowa; **San Diego Bay NWR Complex**, California; **San Luis NWR Complex**, California; **Texas Chenier Plains NWR Office/Visitor Center**, Texas; **Hagerman NWR Office/Visitor Center**, Texas; **Audubon NWR Administrative Office/Visitor Center**, North Dakota; **Arrowwood NWR Headquarters/Visitor Center**, North Dakota; **Alligator River / Pea Island NWR Visitor Center**, North Carolina; **Tennessee NWR Visitor Center and**

Headquarters, Tennessee.

NPS: **Beaver Meadows Visitor Center**, Colorado; the **Marina Service Building**, Cottonwood Cove, Nevada; **Canyon Village Master Site**, Wyoming; the **Jeff Smiths Parlor Museum Building** and the **Meyer Building**, Alaska, **Furnace Creek Visitors Center**, Death Valley National Park, California; **Mesa Verde Research and Museum Collection Center**, Colorado; **Moose Headquarters Building**, Wyoming; **Old Faithful Photo Shop**, Wyoming; **Fort Vancouver Visitor Center**, Washington; **Grand Canyon Science Resources Management Building**, Arizona; **Anthony C. Beilenson Visitor Center**, Santa Monica Mountains National Recreation Area, California; **Paiute Apartments**, Grand Canyon National Park, Arizona; **Grand Portage National Monument Dormitory**, Minnesota; and **Point Reyes Hostel**, Point Reyes National Seashore, California.

USGS: **Upper Midwest Environmental Sciences Center**, Segment D, Wisconsin.

f) Energy Efficiency/Sustainable Design in Lease Provisions

All new building lease solicitations include a preference for buildings that meet the goals of the Guiding Principles, where applicable, in the selection criteria for acquiring leased buildings. Build-to-suit lease solicitations incorporate criteria for sustainable design and development, energy efficiency, and verification of building performance in accordance with the Guiding Principles.

g) Distributed Generation, including use on on-site renewable energy resources and combined cooling, heating, and power systems

Interior continues to pursue projects that self-generate energy using renewable sources (such as photovoltaics or wind turbines) or renewable energy thermal projects (such as solar thermal, biomass, or geothermal) where life cycle cost effective.

The following are examples of distributed generation and off-grid generation that were implemented in FY 2012:

BLM installed a grid-independent solar PV system in **Coldfoot**, Alaska.

FWS installed grid-independent solar PV systems at **Kodiak NWR**, Alaska, **Koyukuk/Nowitna NWR**, Alaska, and **Long Island NWR Complex**, New York; ground source heat pumps at **Patuxent Research Refuge**, Maryland, and **Ruby Lake NWR**, Nevada; and solar hot water at **San Diego Bay NWR**, California, and **Togiak NWR**, Alaska.

NPS installed solar-powered lights in parking areas and comfort stations and PV panels to power the convenience store, campground office, and ranger station at **Assateague Island National Seashore**, Maryland. Solar Energy is in use on Adam's Key at **Biscayne National Park** in Florida. As a result of installing a 15 kW Eagle roof tile system to provide renewable energy to two residences and a generator, the park has reduced generator use and expects a \$40,000 annual savings in energy costs. **Vicksburg National Military Park**, Mississippi, installed solar powered lights parking and walkway lights at the main Visitor Center and the USS Cairo Museum. **Jewel Cave National Monument**, South Dakota, converted its commercially powered radio repeater to solar power in FY 2012. During a 21

acre fire that was caused by a power line being knocked down by a falling tree, the conversion of the radio repeater to solar power allowed for critical radio communications during the emergency.

USGS **Woods Hole Gosnold Building**, Massachusetts, installed a solar thermal evacuated tube for radiant floor heating. Additionally, USGS employs a large number of solar power monitoring stations throughout the nation.