



OFFICE OF
INSPECTOR GENERAL
U.S. DEPARTMENT OF THE INTERIOR

RECOVERY

RECOVERY OVERSIGHT ADVISORY

Energy Efficiency Impacts on Operations and Maintenance




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Memorandum

To: Chris Henderson
Senior Advisor to the Secretary for Economic Recovery and Stimulus

From: Robert A. Knox 
Assistant Inspector General for Recovery Oversight

Subject: Recovery Oversight Advisory – Energy Efficiency Impacts on Operations
and Maintenance
Report No. RO-B-MOA-095-2010

This advisory presents the results of our review of energy efficiency impacts on operations and maintenance (O&M) and energy reporting, and is part of our ongoing efforts to oversee and ensure the accountability of funding appropriated to the U.S. Department of the Interior (DOI) in the American Recovery and Reinvestment Act of 2009 (Recovery Act). DOI's commitment to implementing energy efficiency projects and reporting energy data is commendable. We discovered opportunities, however, for DOI to better optimize its energy reduction measures and report energy usage data more accurately.

Background

The importance of energy efficiency in meeting the Recovery Act intent is stated in its first sentence:

Making supplemental appropriations for job preservation and creation, infrastructure investment, **energy efficiency** and science, assistance to the unemployed, and State and local fiscal stabilization, for the fiscal year ending September 30, 2009, and for other purposes. [Emphasis added.]

DOI is implementing approximately 390 energy efficiency projects nationwide funded by the Recovery Act. Project types vary widely and include, energy audits, utility metering improvements, building renovations, renewable energy installations, and new building construction. These projects total approximately \$430 million of DOI's overall Recovery Act budget and demonstrate DOI's commitment to improving energy efficiency.

In addition to the Recovery Act's emphasis on energy efficiency, the Energy Independence and Security Act of 2007 (EISA 2007) outlines several energy efficiency mandates and reporting requirements. In order to implement some of the EISA 2007 requirements, Recovery Act funding is being used by at least three DOI bureaus: Bureau of Land Management (BLM), National Park Service (NPS), and U.S. Fish and Wildlife Service (FWS).

During the course of our evaluation, we also reviewed DOI's Strategic Sustainability Performance Plan (SSPP) dated August 31, 2010. The SSPP is required by Executive Order 13514 (EO 13514), dated October 5, 2009, and presents a broad strategy to implement an integrated sustainability approach. While energy efficiency is not listed as one of the 10 SSPP goals, it is related, directly or indirectly, to at least 5 of them, including goal 4: High-Performance Sustainable Design/Green Buildings. Our review is not an evaluation of the SSPP, but the document represents current DOI sustainability efforts, including energy efficiency, and is a contextual reference for our work.

Objective, Scope, and Methodology

Our review had two objectives: (1) to evaluate the impacts of energy efficiency projects on O&M capacity; and (2) to evaluate the reliability of DOI's energy reporting results. We conducted interviews and site visits from June to August 2010 to make an assessment of the O&M capacity and energy reporting processes of BLM, FWS, and NPS.

During the course of our review, we interviewed 48 DOI staff members from all organizational levels, including maintenance mechanics, engineers, sustainability coordinators, and facilities management officers.¹ The majority of interviews were conducted at nine field locations at Grand Staircase Escalante National Monument (BLM-Utah), Grand Teton National Park (NPS-Wyoming), and Nulhegan and Missisquoi National Wildlife Refuges (FWS-Vermont). Other interviews were conducted at bureau and Departmental offices in Salt Lake City, UT; Lakewood, CO; Hadley, MA; and Washington, DC.

We chose site visit locations based on three criteria: (1) a new construction project registered for LEED® certification funded by the Recovery Act; (2) an existing LEED® certified building; and (3) an existing energy efficient (non-LEED® certified) building.² This sample gave us access to a range of facilities with diverse energy efficiency features, field staff with primary responsibility for O&M, and management staff that coordinate and oversee energy reporting functions.

Findings

I. Energy Efficiency Projects Strain O&M Capacity

Training and staffing challenges and communication gaps are the primary reasons we found for potential long-term O&M capacity strains. As a result of these strains, DOI's Recovery Act investments in energy efficiency projects may not have adequate resources to ensure that the expected efficiencies are realized over time.

¹ The staff members included 21 field staff, 13 state/regional staff, 12 bureau staff, and 2 departmental staff.

² LEED® stands for Leadership in Energy and Environmental Design. The LEED® certification program was evaluated by this office for its use by DOI. The report entitled, "Recovery Oversight Advisory - LEED® Certified New Construction Projects" [ROO-ROA MOA-1018-2010] may be found at <http://www.doi.gov/recovery-oversight/roo-reports>.

a) Training Challenges

Energy efficiency technology is increasingly sophisticated. Examples include advanced geothermal heat pump technology, utility metering with remote monitoring capabilities, and innovative thin film photovoltaic technology. One maintenance mechanic with front-line responsibility for facility O&M and for improving energy efficiency in building systems told us that specialized training and years of hands-on experience are needed to achieve and maintain optimum energy efficiency for these types of technologies. Based on our sample, O&M staff often lacked this specialized training and experience. As a result, some bureaus rely heavily on contractors to perform O&M work.

The SSPP includes references to several opportunities for environmental and energy management training for field personnel such as the DOI Conference on the Environment, the Department of Energy's (DOE) GovEnergy Conference, and the Environmental Protection Agency's (EPA) WaterSmart Conference. DOI University (DOI-U) courses are additional training examples noted in the SSPP. We reviewed the DOI-U training guide for fiscal year (FY) 2011, and there are no environmental or energy management courses for FY2011. In addition, none of the four front-line O&M staff members we spoke with participated in any of the training opportunities included in the SSPP. As a result, we are concerned that academic training opportunities, such as seminars and conferences, do not adequately address the need for practical, hands-on training exercises for energy managers and facilities O&M personnel.

We also learned during the course of our review that the 2010 Federal Buildings Personnel Training Act (the Act) was signed into law on December 14, 2010 (Public Law 111-308). Under the Act, the General Services Administration (GSA) will collaborate with stakeholders to identify core competencies for Federal building personnel. These would include energy management, sustainability, water efficiency, and safety in order to operate and maintain Government facilities appropriately. GSA has 18 months from enactment to identify core competencies and relevant curricula as well as appropriate delivery methods. GSA has an additional year to train all Federal and contract employees responsible for building management and maintenance according to the standards it establishes. To accomplish these mandates, GSA will work collaboratively with industry and Federal agencies to develop both academic and practical training applications to implement the Act.

b) Staffing Challenges

Staff spoke of additional challenges related to maintenance staffing that threaten the continuity of long-term institutional knowledge and O&M capacity at DOI facilities. We noted an example during our site visit to Grand Staircase Escalante National Monument (GSENM), BLM-Utah. GSENM currently has three visitor centers all built within the past 10 years. A new building that will co-locate the Kanab field office and the GSENM headquarters is under construction with Recovery Act funds in Kanab, UT. According to one GSENM official, the four buildings total approximately \$24 million in DOI construction investment, \$6.2 million of which is being funded by the Recovery Act. While GSENM does have four maintenance staff positions, there is no facilities manager to oversee them. Instead, the maintenance supervisor is a Rangeland Management Specialist. Two of the four maintenance staff have also been out of the

office for several months. Travel between the GSENM facilities takes 2 - 3 hours from either Kanab or Escalante where the remaining two maintenance staff are stationed. This staffing example raises concerns about O&M capacity at GSENM to effectively maintain advanced energy efficiency systems. In addition, this situation may negatively impact timely and accurate energy usage reporting for these assets.

c) Communication Gaps

Employment of integrated design principles is the first of five Guiding Principles³ established in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding. Effective ongoing communications between design and O&M staff is an important component of this integrated design principle. Ineffective communication hinders long-term O&M effectiveness; if O&M staff does not know how energy efficiency systems are expected to perform, it is unclear how O&M staff should meet those expectations. None of the bureau staff we spoke to identified a formal method by which they communicated the building performance expectations from the design staff to the O&M staff.

Although O&M staff members typically receive manuals from the manufacturer after building construction, we were told this approach is sometimes insufficient to adequately meet their O&M responsibilities. In addition, during our site visits to BLM-Utah and FWS-Vermont, O&M staff stated their preference to be involved in all phases of project development so that they could more effectively perform their duties.

II. Reliability of DOI's Energy Reporting

During our review, we learned that energy usage data reliability is a concern. DOI can only correctly report on what it can accurately measure and verify. We recognize that budget limitations may impact metering upgrades and data reliability. As DOI acknowledged on page 6 of the SSPP, "Current funding levels do not support developing new data collection capabilities or the staff and mechanisms necessary to collect and verify the data required to fulfill the requirements. Without accurate data, it will be difficult to know how well the goals are being implemented."

a) Energy Usage Reporting and Verification

Reporting energy usage data is a complicated process that begins with a DOE data call to the Executive Departments that includes updated reporting spreadsheets and related guidance. Once at DOI, the spreadsheets are distributed to each bureau's senior asset management official and then to the respective energy coordinators. The distribution continues through each bureau's organization until the data request reaches the field staff responsible for compiling the

³"The Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles) are: 1. Employment of integrated design principles; 2. Optimization of energy efficiency and use of renewable energy; 3. Protection and conservation of water; 4. Enhancement of indoor environmental quality; and 5. Reduction of environmental impacts of materials. The Guiding Principles were established in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding, which was implemented by E.O.13423." (DOI Sustainable Buildings Implementation Plan, June 2008.)

information. Once complete, the information is transmitted back up the chain until it ultimately reaches DOE and the Office of Management and Budget.

We learned that energy usage data collection and reporting requirements are typically assigned as a collateral duty to administrative field staff responsible for paying utility bills rather than to staff responsible for monitoring and maintaining energy systems. Technical staff review the data for significant anomalies and irregularities, but communication gaps between those paying the bills and those responsible for energy management and reporting may result in incomplete and/or inaccurately reported data. This would result in additional time and resources to reconcile the incorrect data. We spoke with one regional energy coordinator who said that some field locations submit identical energy usage data year after year, thus raising concerns about data reliability. Other bureaus submit their information late thereby limiting DOI's opportunity to review for accuracy and completeness. As a result, confidence in the reliability of energy usage data is a concern.

Staff at all levels of DOI also voiced frustration and concern about the amount of resources being spent on energy reporting rather than energy management. For example, the reporting guidance prepared by DOE for FY2009 was 20 pages; it is 50 pages for FY2010. We heard that these escalating reporting requirements strain even the most determined staff.

We also found that the EISA 2007 requires DOE to select a preferred building energy use benchmarking system for facility energy managers. For example, the ENERGY STAR Portfolio Manager (one DOE option) is a Web-based tool that could allow bureaus to track energy consumption across their building inventory.⁴ Energy managers enter energy consumption and cost data into a standardized system, assess their progress toward energy efficiency goals, and identify potential energy savings opportunities. We believe using a standardized system would not only improve tracking energy consumption but also streamline the reporting process.

b) Energy Usage Measurement

In keeping with EISA 2007 mandates, energy audits, advanced utility metering, and information technology (IT) improvements can make energy monitoring, measurement, verification, and reporting more efficient and reliable. They can also assist in meeting energy efficiency mandates. Recovery Act funds enabled bureaus to implement some of these unfunded mandates. We learned, however, that DOI does not have formal plans to fund future energy audits or advanced utility metering upgrades.

Two of the four sites we visited did not have adequate metering capacity to accurately report energy data. The SSPP reports a planned 22.5 percent reduction in energy reduction in FY2010 from a FY2003 base year. It is unclear how such a reduction is measured without metering major buildings.

We also noted an example where IT barriers do not allow full functionality of remote monitoring equipment. Specifically, a LEED[®] certified building constructed in 2004 had

⁴ United States Government Accountability Office: "FEDERAL ENERGY MANAGEMENT, Agencies Are Taking Steps to Meet High-Performance Federal Building Requirements, but Face Challenges," October 2009.

proprietary equipment installed to access energy data remotely. This system is blocked by bureau firewalls. As a result, an engineer must travel more than 8 hours round trip to log in to the system manually to view the energy usage data. In this case, access issues defeated the purpose of the centralized monitoring equipment intended to ease the monitoring, measurement, verification, and reporting of energy usage data.

Conclusion

The combined effects of training and staff challenges, communication gaps, energy data unreliability, and energy usage measurement issues raise concerns about DOI's ability to optimize energy reduction measures over time and accurately report energy usage data. It also raises concerns about DOI's ability to effectively implement the SSPP and meet the relevant energy efficiency requirements mandated by EISA 2007.

Recommendations

We recommend that DOI:

1. Identify a point-of-contact to work with GSA to implement the 2010 Federal Buildings Personnel Training Act by developing and implementing training programs that will achieve core competencies by O&M staff given DOI's diverse facilities inventory.
2. Develop and implement a training plan for O&M staff responsible for energy efficiency systems in the short term until the 2010 Federal Buildings Personnel Training Act curricula is developed and implemented.
3. Develop and implement processes to engage O&M personnel throughout all project phases (including planning, design, and construction, for example) in order to facilitate better communication and establish clear and coordinated energy efficiency expectations.
4. Implement a building energy benchmarking system to improve measurement, verification, and reporting of DOI's energy usage data.
5. Develop and implement a Department-wide metering plan and coordinate utility metering efforts in order to improve reliability of energy usage data.

Please provide a written response to this advisory within 30 days of receipt detailing the corrective actions to be implemented to meet our recommendations, as well as targeted completion dates and the title(s) of the official(s) responsible for implementation. We will post this advisory on our Web site (www.doi.gov/recovery/) and Recovery.gov. Information contained in this advisory may also be included in our semiannual reports to Congress. We performed our work in accordance with the Quality Standards for Inspection and Evaluation adopted by the Council of the Inspectors General on Integrity and Efficiency. Please contact me if you have any questions.

cc: Deputy Secretary, U.S. Department of the Interior
Director, Office of Executive Secretariat and Regulatory Affairs
Assistant Secretary for Policy, Management and Budget

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Acting Director, Office of Financial Management
Director, Office of Environmental Policy and Compliance
Director, Bureau of Land Management
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