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SUBJECT: Reduction in Energy Consumption from Recovery Act Projects at the Goodfellow Federal Center Complex in St. Louis, Missouri, is Not Apparent
Audit Memorandum Number A090184-80

As part of our oversight of General Services Administration (GSA) American Recovery and Reinvestment Act (Recovery Act) projects,[1] we reviewed buildings with limited scope Recovery Act funding in Region 6 for their contribution to federally mandated energy conservation goals. An objective of our review was to determine whether Recovery Act buildings were contributing to the mandated goals and, if not, why. We found that the Goodfellow Federal Center exhibits a pattern of increased electricity usage, despite the receipt of over $42 million in Recovery Act funding.[2]

The Goodfellow Federal Center is located outside the central business district of St. Louis, Missouri. The 65-acre campus contains 24 buildings that provide over 1.8 million gross square feet of office and other space. As part of the Recovery Act, Goodfellow received over $42 million for infrastructure, building modernization, and energy-related improvements. The storm and sanitary sewer system received around $16 million of

[1] The Recovery Act provided GSA with $5.55 billion for the Federal Buildings Fund. In accordance with the Recovery Act, PBS is using the funds to convert federal buildings into high-performance green buildings, as well as to construct federal buildings, courthouses, and land ports of entry. The Recovery Act mandates that $5 billion of the funds be obligated by September 30, 2010, and the remaining funds by September 30, 2011. The GSA Office of Inspector General is conducting oversight of projects funded by the Recovery Act. One objective of this oversight is to determine if PBS is awarding and administering contracts for limited scope and small construction and modernization projects in accordance with prescribed criteria and Recovery Act mandates.

[2] We focused our review on the Goodfellow Federal Center because energy usage on the campus was substantially higher than any of the other buildings in our sample. In addition, it received the most Recovery Act funding in our sample.

funding. Building 110 received around $14.5 million for heating/ventilation/air conditioning (HVAC), interior, electrical, and seismic work, while Building 104 received around $6.3 million for HVAC work.[3] Work on Buildings 110 and 104 was substantially complete by February 2011 and June 2011, respectively, giving PBS around two years of energy consumption data with the upgrades in place.

A primary goal for PBS's Recovery Act projects was to transform federal buildings into high-performance green buildings while decreasing energy consumption. GSA's "Minimum Performance Criteria for Recovery Projects: Existing Buildings: Partial Modernizations and Limited Scope" states that one of the energy goals is to "achieve at least 20% reduction in energy usage from the 2003 baseline for the building." Further, PBS is also subject to Section 431 of the Energy Independence and Security Act of 2007, which mandates an agency-wide goal for reducing energy consumption per gross square foot by 24 percent in fiscal year (FY) 2013 from a FY 2003 baseline. Although this is an agency-wide goal, PBS tracks its individual buildings against this baseline.

Assessment of Energy Use at the Goodfellow Campus

Despite receiving substantial Recovery Act funding for energy-related improvements, Goodfellow neither meets GSA's individual building goal of a 20 percent reduction in energy use, nor contributes significantly towards the mandated 24 percent agency-wide reduction in energy consumption.

To assess energy use at Goodfellow, we examined British Thermal Units (BTUs) per gross square foot and electrical use in kilowatt hours. Both of these assessments, shown in *Figures 1* and *2* on the following page, indicate that the energy reduction goals are not being met.

Figure 1 shows that the Goodfellow campus has achieved a modest energy reduction in BTUs per gross square foot when compared to the FY 2003 baseline - around 2 to 6 percent during a selected year.[4] *Figure 2* shows that the electricity use in kilowatt hours at the Goodfellow campus has increased by over 46 percent in 5 years.

[3] PBS officials informed us that the remaining $5.2 million was for envelope improvements and metering to reduce and manage energy use. Also, the HVAC equipment installed in Building 104 met a new requirement for conditioning the tenant agency's file storage. This high-performance equipment increased energy use.

[4] The amount shown for FY 2013 on the graph represents the 12-month period ended August 2013; September 2013 data was not complete at the time we drafted this memorandum. Changes in energy consumption (increases or decreases) against a baseline year can be attributable to variations in space assignments, on-going building repairs, and weather.

Figure 1 – Goodfellow Campus Energy Consumption – Comparison to 2003 Baseline

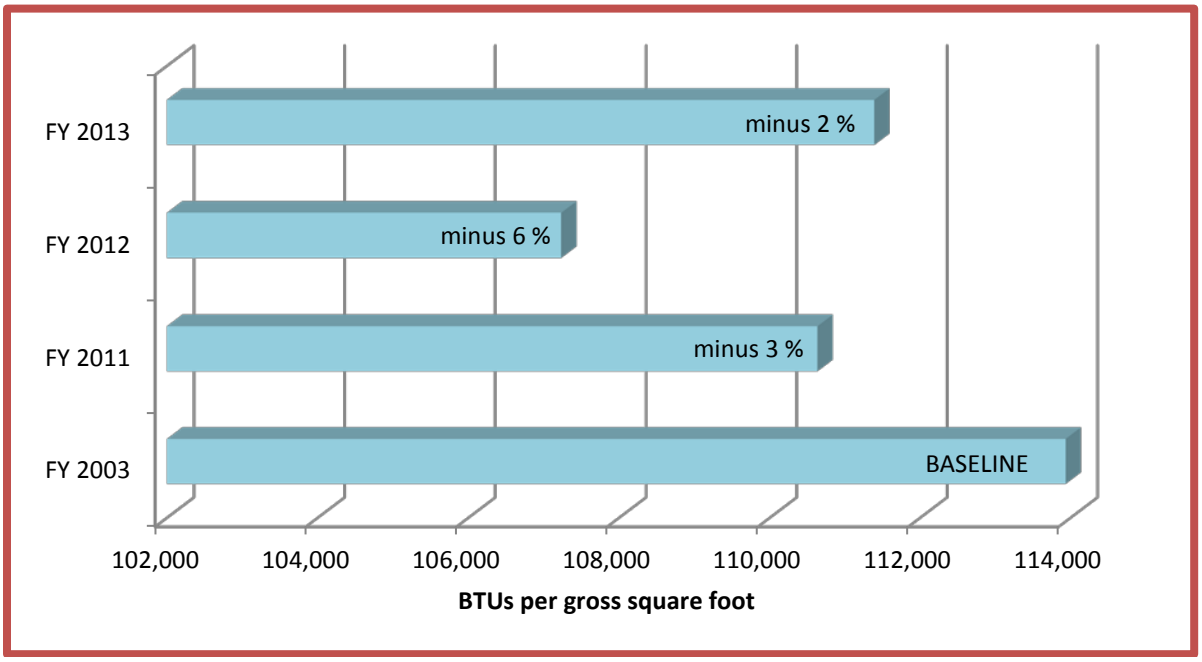
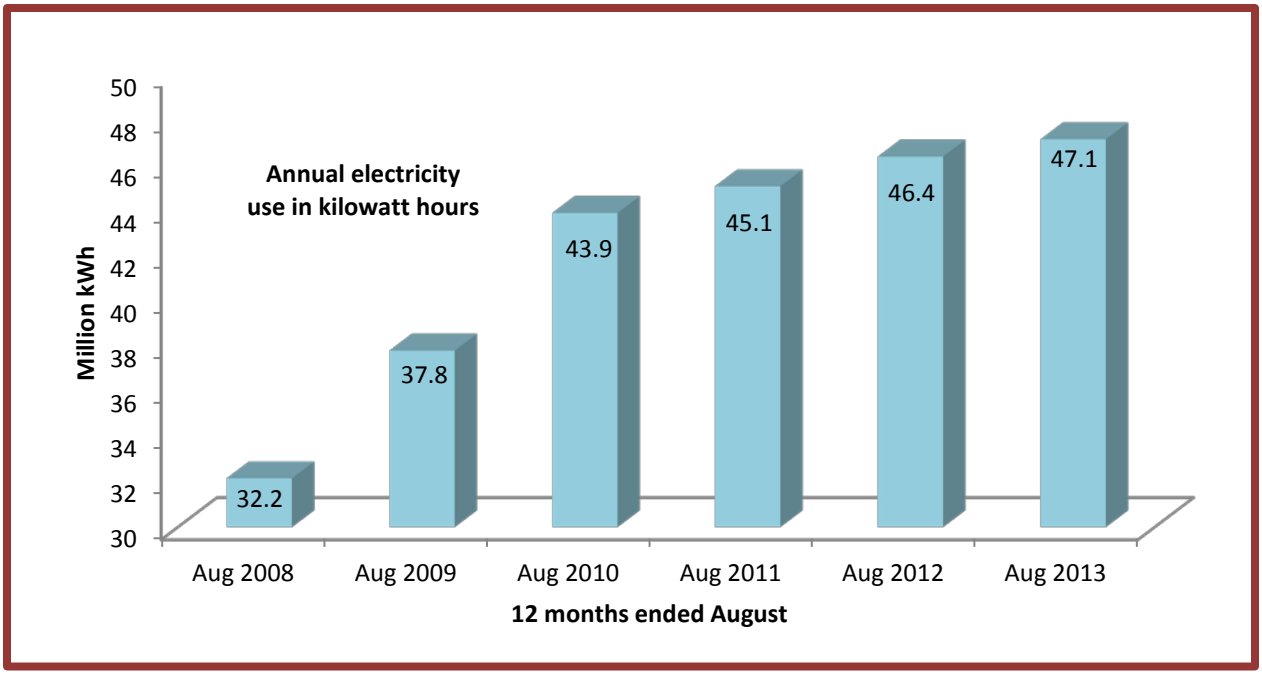


Figure 2 – Electricity Use in Kilowatt Hours – Sept. 2007 through Aug. 2013[5]

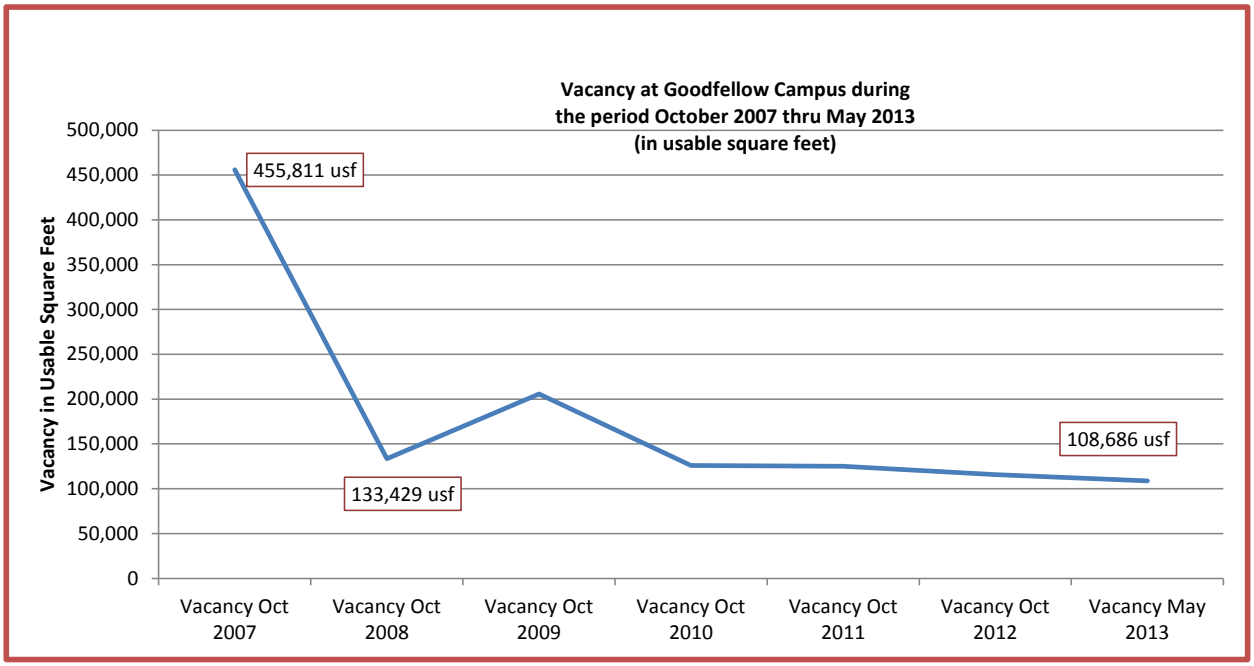


[5] Data for the period September 2007 through August 2012 was corrected by PBS due to the discovery of a long-term metering problem. Most of this corrected data was not transferred into the Energy Usage and Analysis System.

PBS officials told us that the increase in electrical use could represent an ongoing backfill of vacant space on the campus and the presence of tenant agencies' data centers, which are large electricity consumers. We examined the two explanations.

Backfilling of Vacant Space. *Figure 3* shows that ongoing efforts to backfill vacant space was not the sole cause of the increased electricity use observed between September 2007 and August 2013, since there was little reduction in the amount of actual vacant space.

Figure 3 – Vacancy at Goodfellow Campus – October 2007 through May 2013



From October 2007 through May 2013, vacant space decreased by 347,125 usable square feet (usf). However, nearly 93 percent (322,382 usf) of this total reduction occurred between October 2007 and October 2008, prior to the Recovery Act. Since 2008, vacant space on the campus has been reduced by around 2 percent.[6] However, electrical consumption continued to increase. Therefore, backfilling vacant space was not the sole reason for increased electrical consumption.

Data Centers' Energy Consumption. PBS lacks the information needed to assess whether increased data center usage was responsible for the steady increase in electrical consumption. Before 2012, PBS had to rely on campus-wide electrical metering supplied by the local utility because building-level metering was very limited. During 2012, sixteen building-level meters were installed. As a result, there is little to no historical building-level data to assess energy use by the data centers prior to 2012.

[6] (133,429 minus 108,686 usf) divided by a total of 1,276,262 usf.

Even now, PBS does not directly sub-meter the campus' data center electrical use.[7] For example, PBS has no building-level energy information for the largest data center on campus. PBS estimates of the data center's data processing and cooling load varied widely, from 8.3 to 15.6 million kilowatt hours (kWh) annually.[8] However, the meters serving the data center are not yet in use.

One tenant agency installed sub-metering for its own data center in 2011. They documented an overall 17 percent reduction in electricity use due to the implementation of wireless sensor technology.[9] This tenant expanded its data centers by around 30,000 square feet during the period November 2007 through March 2009.[10] This was the only substantial increase in data center space during the period April 2007 through March 2013. However, electrical consumption continued to increase thereafter despite the 17 percent reduction in use noted above.

Conclusion

Goodfellow appears to be neither meeting energy goals for Recovery Act projects nor contributing to the energy consumption goals mandated by the Energy Independence and Security Act of 2007. Reductions in energy use from Recovery Act projects at the Goodfellow campus are not apparent as electricity use has been increasing. However, a complete assessment of the results of the Recovery Act projects and Goodfellow's energy use cannot be made due to the lack of historical information on energy use at the building level. Accordingly, the Goodfellow Federal Center is a worthy candidate for increased energy reduction efforts. The campus ranks 9th in electricity consumption out of 51 buildings/facilities in PBS's inventory that consume more than 10 million kWh annually.[11]

Management Response

In its response, GSA Region 6 GSA management outlined a variety of energy-related projects that were undertaken at the Goodfellow Campus after our review. These initiatives including an Energy Savings Performance Contract covering 14 different energy projects, ongoing work to complete the installation of advanced ION Enterprise Energy Management software to provide energy data for all metered GSA buildings, multiple small repair and alterations projects, and some temporary installations to test energy-saving technologies through the GSA's Green Proving Ground Program. Further, Region 6 has requested Central Office to fund a Targeted Energy Efficient Expert Evaluation project for Goodfellow Building Number 110. Per GSA's response,

[7] We examined output from 17 of 19 electrical meters and discussed the results with PBS officials. We did not find a compelling reason for the electrical use pattern identified in this report.

[8] The estimates are from the FY 2013 PBS estimate for overtime utility services (8.3 million kWh) and a PBS contractor (15.6 million kWh). PBS estimates for overtime utility services for the data center tended to fluctuate between FY 2007 and FY 2013. In only one year did we specifically find an estimate for cooling (HVAC) load at 660,000 kWh.

[9] PBS officials informed us that they have no way of knowing whether the operational settings necessary to sustain the energy reduction were maintained.

[10] This amount includes an 8,460 square foot computer print room maintained in Building 104.

[11] Measuring in kWh per gross square foot.

this project will evaluate and identify opportunities to optimize building schedules and control sequences in the Building Automation System.

If you have any questions regarding this memorandum, please contact me or any member of the audit team at the following:

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Thank you for the assistance and courtesies extended to my staff during this audit.

Memorandum Distribution

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