OFFICE OF INSPECTOR GENERAL

U.S. Department of Energy

AUDIT REPORT

DOE-OIG-18-07 November 2017

NATIONAL NUCLEAR SECURITY ADMINISTRATION'S ENERGY SAVINGS PERFORMANCE CONTRACTS

Department of Energy
Washington, DC 20585

November 6, 2017

MEMORANDUM FOR THE ADMINISTRATOR, NATIONAL NUCLEAR SECURITY ADMINISTRATION

FROM: Michelle Anderson
Deputy Inspector General
for Audits and Inspections
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "National Nuclear Security Administration's Energy Savings Performance Contracts"

BACKGROUND

The National Nuclear Security Administration (NNSA) uses Energy Savings Performance Contracts (ESPCs) to help reduce the overall energy used at its Management and Operating Contractor run sites. An ESPC is a contract between a Federal Agency and an energy service company. Such a contract allows a Federal Agency to undertake energy-savings projects without first obligating capital funds or requesting special Congressional appropriations. These projects incorporate energy savings measures, which are upgrades to equipment and controls intended to save energy and associated costs. There are currently over $300 million worth of ESPCs managed by NNSA. Under ESPCs, energy service companies have guaranteed that the savings generated will cover the costs of those projects over the terms of the contracts (up to 25 years). These guarantees use projections of energy cost escalation from the start of the contract. The Federal Agency pays for the contract using the savings generated from the project and keeps all additional cost savings after the contract ends.

The Federal agency is responsible for oversight of installation of energy saving equipment, verification of its functionality and performance, and, where agreed upon in the contract, maintenance of the equipment. Failure to perform such oversight can reduce the effectiveness of the installed energy savings measures and result in significant losses to the government. Due to the importance of ensuring energy savings are being achieved, and an allegation that NNSA had modified ESPCs to accept increased costs and reduced energy savings, we conducted this audit to determine whether the NNSA is realizing guaranteed energy savings from its ESPCs.

RESULTS OF AUDIT

Energy savings measures in ESPCs at the Los Alamos National Laboratory (Los Alamos) and Y-12 National Security Complex (Y-12) did not always achieve the full energy savings under the contracts. Specifically, we found that:

- NNSA entered into an ESPC at Los Alamos, which guaranteed savings of at least $33.4 million, which included the installation of energy savings lighting equipment that was not installed. Specifically, we found that the energy service company for the Los Alamos ESPC did not install all the lighting occupancy sensors (sensors) required under its contract. The missing sensors that we identified in our judgmental sample could have generated approximately $9,000 in savings over 4 years from 2012 through 2015.

- NNSA paid an energy service company the full contracted amount even though the company reported that it failed to meet guaranteed savings that were to be achieved from upgrading thermostats at Los Alamos. While the Contracting Officer stated that this issue was addressed in a June 2013 contract modification, we did not identify any changes to the contract addressing the allowability of the payment associated with this $57,610 savings shortfall.

- Los Alamos used different thermostat settings than what the ESPC specified for several buildings, resulting in NNSA not achieving the full savings from the thermostat upgrades that were completed. Specifically, an energy service company upgraded the control systems for heating and cooling systems in eight buildings at Los Alamos, with Los Alamos being responsible for maintaining and operating these systems from day to day. We found that 98 (roughly 93 percent) of the 105 upgraded thermostats we reviewed had at least one setting that was changed that could result in NNSA not achieving full energy savings. In addition, Los Alamos electricity meter data confirmed that NNSA had not achieved full energy savings in most buildings with thermostat upgrades.

- A Y-12 ESPC, which guaranteed savings of at least $54 million, has not achieved the full savings from one of its energy savings measures that involved reconnecting a condensate return system in a facility. Specifically, the condensate return system in one building failed immediately after being placed into operation in 2012, forcing Y-12 to shut down the system. Because subsequent repairs were not successful, NNSA continued to not realize energy savings in this building. However, the energy service company reported that other energy savings measures performed above expectations for the first 4 years of the contract. While the energy savings opportunity losses from the condensate return system were offset by the other installed energy savings measures achieving better than expected energy efficiencies, such efficiencies are not guaranteed for the remaining 15 years of this contract. As a result, the Y-12 ESPC is at higher risk of not achieving the guaranteed energy savings. Accordingly, it is important to ensure all energy savings measures are operating in accordance with the ESPC.

In addition, we were tasked with validating an allegation that NNSA modified an ESPC for work at Los Alamos that increased the cost, extended the schedule, and reduced the scope of the contract. Specifically, we determined that, within established boundaries for ESPCs, NNSA increased the contract's cost to compensate the energy service company for its costs incurred from government-caused delays, such as the energy service company's idle labor costs while waiting for Los Alamos to finish addressing unexpected asbestos contamination in several other areas with proposed upgrades. These changes required a cost increase to the contract of nearly $5 million and an additional 2 years of contract term to pay back the additional cost. While this modification resulted in a less cost-effective ESPC, the additional costs were covered by

guaranteed energy savings within 25 years, as required by law. However, it is important to note that ESPCs are paid for by the savings generated from the installation of energy savings measures. Once the contract term is over, the money generated by the energy savings is kept by the government. If two years are added to a contract without additional cost savings being generated, the government will have to pay the energy service company costs. In this case, the government will pay an additional amount of approximately $5 million without the generation of additional energy savings.

The identified issues occurred because of inadequacies in oversight and follow-up, construction support, and project planning. Specifically, the energy service company for the Los Alamos ESPC did not install all the sensors as required. NNSA accepted the work despite the missing sensors due to weaknesses in oversight and follow-up. Further, the energy service company guaranteed $1,048,987 in energy savings for 2012, but reported that it achieved only $991,377, a shortfall of $57,610. NNSA and energy service company officials stated the shortfall was caused by work delays when Los Alamos could not provide adequate support for construction efforts. Finally, NNSA did not achieve full savings from Los Alamos thermostats and from the Y-12 condensate return system because of inadequate planning. For example, NNSA did not adequately consult with the site contractor to determine the viability of planned energy savings measures.

The issues we identified with the implementation of the energy savings measures installed under these ESPCs could lead to approximately $9 million in savings that may not be realized over the life of the respective ESPCs (which guarantee savings of approximately $87 million), if not corrected. For example, not having Los Alamos thermostat set in accordance with the contract could result in lost electrical savings of roughly $2.5 million over the life of the contract. Further, while natural gas usage data was unavailable, our analysis of Los Alamos thermostat settings indicates that it is highly unlikely that NNSA will realize the full natural gas energy savings guaranteed. ESPCs are required under 10 Code of Federal Regulations 436, *Federal Energy Management and Planning Programs*, to not have any net costs to the government, as all energy savings measures installation costs should be covered with the energy savings generated. Payments made to the energy service company are based on the aggregate savings of the installed energy savings measures. Accordingly, shortfalls in energy savings from one energy savings measure may be offset by overruns in another. However, if these maintenance and operations issues are not addressed, the government is at risk of paying millions more than the original baseline energy cost.

These issues are similar to those identified in our September 2009 report on *Management of Energy Savings Performance Contract Delivery Orders at the Department of Energy* (DOE/IG-0822, September 2009). Specifically, among others, we found that NNSA had not ensured that equipment installed as part of an ESPC at Y-12 was appropriately operated and maintained to achieve anticipated energy savings, or taken actions to include all costs necessary to implement energy savings initiatives when evaluating whether ESPCs were likely to be cost-effective. Management generally concurred with the report's recommendations and indicated that corrective actions had been initiated or were planned to address the issues identified in the report. We consider management's comments and corrective actions to be responsive to our recommendations. Management Comments are included in Appendix 3.

Attachment

cc: Deputy Secretary
Chief of Staff

NATIONAL NUCLEAR SECURITY ADMINISTRATION'S ENERGY SAVINGS PERFORMANCE CONTRACTS

TABLE OF CONTENTS

Audit Report

Appendices

DETAILS OF FINDING

In Energy Savings Performance Contracts (ESPCs), savings can be achieved when the Federal Agency and the energy service company perform to the agreed upon contract requirements. The cost of energy savings given under the ESPCs are based on energy rate projections at the start of the contract. The Federal agency is responsible for oversight of installation of energy saving equipment, verification of its functionality and performance, and, where agreed upon in the contract, maintenance of the equipment. At National Nuclear Security Administration (NNSA) sites, these duties require the additional cooperation of the Management and Operating contractors. Failure to adequately perform these duties can lead to the energy savings measures not providing the full guaranteed energy savings. This can result in significant losses to the government when the costs of the ESPCs are taken into account.

Energy Savings Guarantee

Energy savings measures did not always achieve the full energy savings in an ESPC at the Los Alamos National Laboratory (Los Alamos), which guaranteed savings of at least $33.4 million, and an ESPC at the Y-12 National Security Complex (Y-12) which guaranteed savings of at least at $54 million. Specifically, we found that NNSA did not realize energy savings at Los Alamos from lighting occupancy sensors (sensors) that were not installed as required, from upgrades that were not completed on time, and from improper thermostat settings. NNSA also experienced energy savings shortfalls at Y-12 from a nonfunctional condensate return system. The energy savings measures at NNSA sites that were operating at less than intended efficiency could lead to millions of dollars of savings that will not be achieved over the life of the ESPCs, if not corrected. There are also an indeterminate number of natural gas savings not being achieved by Los Alamos energy savings measures. Furthermore, we identified costs at Los Alamos that may not be allowable per the terms of the ESPC.

Lighting Occupancy Sensors

NNSA entered into an ESPC that included the installation of over 1,211 sensors, however, we found that NORESCO, the energy service company for the Los Alamos ESPC, did not install all the sensors as required. We reviewed a judgmental sample of sensors that NORESCO documentation listed as being installed. While some of the rooms were locked and not accessible, we were able to review the listed installation locations for 341 out of the 488 total sensors in our sample. Of the 341 sensors that should have been installed, 71 (about 21 percent) were missing. (See Table 1)

Table 1: Review of Los Alamos Sensors Not Installed or Working

Building Number	# of Sensors in Sample Universe	# of Sensors Reviewed	Sensors Installed	Sensors not Installed	Percent of sensors not installed
59-3	48	40	33	7	17.5%
3-216	114	81	55	26	32.1%
3-40	88	67	48	19	28.4%
3-1698	85	66	60	6	9.1%
3-1498	153	87	74	13	14.9%
Totals	**488**	**341**	**270**	**71**	**20.8%**

For our examination, each sensor in our sample should have been installed based on the Final As-Built Report. The Final As-Built Report documented all the sensors that NNSA and NORESCO agreed had been installed for 25 Los Alamos buildings. We presented the details of our examination to the NNSA Contracting Officer Representative (COR), including the room numbers of the missing sensors. The COR responded by stating he was very surprised and concerned with the results. NNSA performed their own investigation regarding the missing sensors. Their investigation confirmed the results in Table 1.

We presented this issue to the NNSA Contracting Officer who stated a June 2013 contract modification was intended to account for work that was not completed. However, upon our review of this modification, we discovered that the lighting work removed from the scope of the contract did not include the missing sensors for buildings in our sample. In fact, a NORESCO official confirmed that for the buildings in our sample, NORESCO was using all sensors in the Final As-Built Report documentation to calculate savings even after this contract modification. In addition, when we asked a NORESCO official why NORESCO had not included the missing sensors in their most recent Measurement and Verification (M&V) report to NNSA, he stated, "I mistakenly left out the missing occupancy sensor information off of the site visit report." Had the missing occupancy sensors been identified in the M&V report, NORESCO would have had to deduct the savings attributable to these sensors from their annual claimed savings. These missing sensors from our judgmental sample would have generated approximately $9,000 in energy savings since the beginning of the ESPC performance period. Nevertheless, NNSA did not deduct $9,000 from its payment to NORESCO.

Payment for Savings not Achieved

NNSA paid NORESCO in full even though NORESCO reported that it failed to meet guaranteed energy savings at Los Alamos. Specifically, NORESCO guaranteed $1,048,987 in energy savings for 2012, but reported that it achieved only $991,377. NNSA did not deduct the savings shortfall from subsequent payments to NORESCO, despite their stated intent to do so when making the payment for 2014 savings. NNSA generally pays its energy service companies before they can verify annual savings. NNSA does this with the understanding that it can deduct any savings that are not achieved from future payments if the energy service contractor acknowledges in the M&V report that savings were not achieved. At Los Alamos, e-mails

documented in the contract file indicated that NNSA intended to deduct the $57,610 shortfall from the payment made for 2014 savings. However, payment documentation showed that NNSA did not deduct this amount, but rather paid the invoice in full. When we presented this issue to the NNSA Contracting Officer, she stated that the issue was addressed in a June 2013 contract modification that was intended to address the impacts of delays in the installation of energy savings measures. However, our review of the contract file found nothing to indicate that the savings shortfall caused by these delays was considered during this modification. In particular, this modification made no change to the guaranteed savings or payment for 2012. Since NNSA did not modify the contract to allow NORESCO to claim the unrealized savings from this work delay, we question whether NNSA's payment of this amount to NORESCO for the associated savings was allowable under the terms of the ESPC.

We confirmed that NNSA made modifications to the contract to address increased contract costs caused by work delays, but did not identify any changes to address the associated savings shortfall of $57,610. For example, one change made in this modification was to remove $202,358 in lighting upgrades that NORESCO was unable to complete from the ESPC's scope. The scope was removed because Los Alamos did not interrupt ongoing experiments in the locations of some proposed upgrades, or because it was not economical to remediate contamination. In addition, NNSA increased the contract's cost to compensate NORESCO for its costs incurred from government-caused delays, such as NORESCO's idle labor costs while waiting for Los Alamos to finish addressing unexpected asbestos contamination in several other areas with proposed upgrades. These changes required a cost increase to the contract of nearly $5 million and an additional 2 years of contract term to pay back the additional cost. This action substantiated the allegation that NNSA had modified an ESPC to accept increased costs and reduced installation of energy savings measures. While this modification resulted in a less cost-effective ESPC, the additional costs were covered by guaranteed energy savings within 25 years, as required by law. However, it is important to note that ESPCs are paid for by the savings generated from the installation of energy savings measures. If two years are added to a contract without additional cost savings being generated, the government will have to pay two more years' worth of energy savings to the energy service company. In this case, the government will pay an additional amount of approximately $5 million without the generation of additional energy savings.

Thermostat Settings

Los Alamos used different thermostat settings than what the ESPC specified for several buildings, resulting in NNSA not achieving the full savings from the thermostat upgrades. Specifically, NORESCO upgraded the control systems on heating and cooling systems in eight buildings at Los Alamos. These upgraded controllers provide energy savings by automatically shutting off the heating and cooling systems at night and on the weekends, and by holding the thermostats to specified temperatures settings during the day. To achieve this level of control and resulting savings, each thermostat has seven individual settings that must be set according to the terms of the ESPC. NORESCO was responsible for the initial installation of these control systems, and specified the settings required to achieve the proposed energy savings. Accordingly, NORESCO was paid based on the proposed savings from their specified settings as long as the control systems were functional and capable of generating savings. However, Los

Alamos was responsible for maintaining and operating these systems from day to day, and NNSA's payments to NORESCO were made regardless of whether Los Alamos maintained the settings according to the terms of the ESPC. As such, it is essential that Los Alamos maintain these settings as described in the ESPC to achieve the energy savings. We met with Los Alamos facility employees responsible for the heating and cooling systems to review temperature settings for the eight buildings with upgraded control systems. Los Alamos officials stated that, since Los Alamos did not have fully developed heating and cooling automation systems, they were unable to provide temperature setting data for all the units. However, we reviewed 105 thermostats and found that 98 (roughly 93 percent) had at least one setting that would result in NNSA not achieving full energy savings. For example, at the time of our review, none of the 23 thermostats in one building were set to turn off their heating and cooling system at the time required in the ESPC for the guaranteed energy savings. In addition, NNSA has not achieved full energy savings in most buildings with thermostat upgrades. Specifically, we obtained electricity meter data for the eight buildings with NORESCO-installed control systems. The electricity data was incomplete for one building, and a second building experienced a dramatic decrease in energy consumption when Los Alamos changed the building's use. In the remaining six buildings, NORESCO projected that their installed upgrades would reduce annual electricity consumption by 2.5 million kilowatt hours, and reduce annual electricity demand by 1,874 kilowatts. However, our review of actual electricity usage and demand data taken from those buildings' meters before and after the upgrades indicated that fiscal year 2014 annual electricity consumption decreased by only roughly 1.2 million kilowatt hours relative to fiscal year 2011 (year prior to start of ESPC), with annual electricity demand decreasing by less than 600 kilowatts. This is a savings shortfall of approximately 46 percent of the guaranteed electricity usage savings and 70 percent of the guaranteed electricity demand savings for these six buildings under the contract. According to our calculations, the shortfall from these six buildings would result in avoidable electricity costs of approximately $310,000 since the beginning of the ESPC's performance period. These calculations do not account for all changes in the buildings, but they indicate that there are savings shortfalls of guaranteed electrical usage and demand savings under the ESPC. We presented this information to the NNSA Contracting Officer, who agreed with our analysis and pursued follow-up actions with the Los Alamos Field Office. NNSA told us that, since our review, Los Alamos addressed this issue in all buildings with this issue by making the modifications needed to allow the thermostats to function with the proper settings where possible. We have not verified NNSA's comments as the actions were taken after we completed our audit fieldwork.

Condensate Return System

NNSA has not achieved the full savings from reconnecting a condensate return system at Y-12. NNSA contracted with the energy service company, Johnson Controls Inc. (JCI) in 2009 to install several energy savings measures at Y-12. One of these energy savings measures was to reconnect the steam condensate return system for Y-12's old steam plant to the new steam plant. Reconnecting Y-12's condensate return system would allow Y-12 to conserve water and gas by reusing hot water that had condensed from steam in buildings throughout the complex. Although JCI was contracted to reconnect the steam condensate lines to the steam plants, it was not responsible for performing repairs to the old and previously failed steam condensate lines in individual buildings. Y-12 had the responsibility for performing repairs to equipment in the buildings.

Building 9212's condensate return system failed immediately after it was placed into operation in 2012, forcing Y-12 to shut down the system in that building. A Y-12 official stated that the failure indicated that there were pre-existing problems in this building, but also stated that Y-12 was not aware of the issue at the start of the ESPC in 2009. However, a 2008 survey of the Y-12 site identified the poor condition of the condensate return system in Building 9212, citing numerous continuous leaks, inoperable pumps, and deteriorated piping. In 2012, within a year of the system failure, Y-12 began developing plans to repair the system in this building. However, as of July 2016, repair attempts have been unsuccessful, and the system in this building remained offline. Because the repairs were not successful, NNSA continued to not realize energy savings due to non-functioning equipment in Building 9212. JCI's annual M&V reports state that NNSA did not realize energy savings costing NNSA approximately $900,000 over the past 4 years.

In contrast, we observed that other new equipment installed by JCI at Y-12 appeared to be operating and capable of generating the guaranteed energy savings. An NNSA official told us that Y-12 needed the facility upgrades that JCI has implemented, and that the site contractor was working closely with JCI to ensure that upgrades were successful. Further, NNSA has assigned maintenance responsibilities to JCI for several energy savings measures. As a result, despite the energy savings opportunity losses from the condensate return system, according to JCI's annual M&V reports, other energy savings measures performed above expectations by over $1.1 million in the first 4 years of the contract, offsetting the losses. However, such efficiencies are not guaranteed in the future. As a result, the Y-12 ESPC is at higher risk of not achieving the guaranteed energy savings. Accordingly, it is important to ensure all energy savings measures are operating in accordance with the ESPC.

Contract Oversight

The identified issues occurred because of inadequacies in NNSA's oversight and follow-up, site support of construction, and planning. In particular, NNSA did not provide sufficient oversight or perform sufficient follow-up to identify missing sensors prior to contract acceptance. In addition, NNSA and NORESCO officials stated that Los Alamos could not always provide adequate support during the construction phase to allow NORESCO to complete upgrades on time to meet guaranteed savings. Finally, NNSA did not achieve the full savings from Los Alamos thermostats and from the Y-12 condensate return system because of inadequate planning.

NORESCO did not install all sensors as required because of inadequate NNSA oversight and follow-up. Specifically, the COR accepted NORESCO's installation of energy savings measures without effectively ensuring that NORESCO's work had been thoroughly and adequately reviewed. Under the terms of the contract, a representative delegated by NNSA was responsible for reviewing installed energy savings measures to accept the installed work and to validate savings in subsequent years. Accordingly, a Los Alamos Field Office inspector reviewed completed construction against NORESCO's preliminary As-Built documentation, and denoted many, but not all, of the sensors we identified as missing. The inspector stated that he did not identify all missing sensors because his reviews were hasty, as the project had fallen behind schedule. However, the missing sensors that the Inspector had identified during his review were still on the Final As-Built Report that NNSA accepted, in some cases 6 or more months later.

When we asked the Inspector and the COR why the Final As-Built Report was accepted with known discrepancies, the COR and the Inspector stated that they did not review the Final As-Built Report, and accepted it under the assumption that Los Alamos' quality assurance procedures required Los Alamos to review the Final As-Built Report, and that Los Alamos would inform the COR of any changes. However, NNSA did not specifically direct Los Alamos to perform such a review, and, Los Alamos' quality assurance procedures only require detailed reviews of work performed by Los Alamos subcontractors. Therefore, a Los Alamos official stated Los Alamos performed no such review as it was not required. The missing sensors were never acknowledged by a NNSA or contractor official during any of the subsequent annual inspection reports, even though when we accompanied Federal and contractor officials during an inspection we observed a NORESCO official stating that some sensors were missing. Finally, there have been three CORs in 3 years on this ESPC, which NNSA and Los Alamos officials told us creates further challenges to effective oversight.

Regarding the $57,610 in guaranteed savings not met, we were informed that NORESCO failed to meet these savings at Los Alamos because Los Alamos could not always provide the energy service company with necessary support, including providing building escorts, in a timely fashion for the energy service company to complete construction work on schedule. This delay in installing energy saving measures resulted in $57,610 in guaranteed savings that were not achieved. Specifically, the Field Office Contracting Officer formally directed Los Alamos "to provide effective support of the ESPC entered into by NORESCO and the NNSA." Despite this direction, Los Alamos could not always support the ESPC, leading NORESCO to experience many work delays. For example, an NNSA official told us that NORESCO was not always timely in providing work schedules to Los Alamos, and Los Alamos was not always timely in providing escorts for NORESCO workers to perform upgrades in sensitive areas. Similarly, when NORESCO identified unknown problems with existing equipment at Los Alamos, they were forced to delay upgrades to that equipment until Los Alamos could complete necessary repairs. Likewise, Los Alamos asbestos removal delayed NORESCO's installation of lighting upgrades. NNSA and Los Alamos officials told us this delay occurred because Los Alamos project team members had not properly understood site hazards or performed diligent research into available lessons learned from previous, similar work. In each case, NORESCO encountered an issue that was outside of their assigned responsibilities under the ESPC, and had to wait for support from Los Alamos.

Because NNSA and NORESCO did not adequately identify site conditions when planning thermostat upgrades, Los Alamos, in many cases, needed to perform additional modifications in order to set thermostat settings as described in the contract. In particular, Los Alamos officials told us that building maintenance coordinators had not been consulted about the practicality of the planned energy savings measures in their buildings prior to their installation. As a result, the thermostat settings that were required to save energy under the ESPC were not practical for the heating and cooling systems they control, considering the mission requirements and uses of those buildings without modification. In one case, the energy service company set a heater to turn off at night during the winter, which contributed to a pipe bursting and flooding in one building at Los Alamos, causing extensive damage that, according to a Los Alamos official, cost roughly $750,000 to repair. To allow the building heating and cooling systems to maintain safe and comfortable temperatures, Los Alamos officials initially set thermostat settings differently than

the settings the energy service company used to calculate savings in the ESPC. In addition, NNSA and Los Alamos officials told us that, within a few years of their installation, several upgraded thermostats in one building had their settings changed because of changing mission needs in the building. In another instance, Los Alamos had some temperature settings set differently because the Laboratory official responsible for setting some building temperatures was unaware of the required temperature settings in the ESPC. NNSA and Los Alamos officials told us that the inadequacies we identified in planning stemmed from weaknesses in the design review process. NNSA has told us that, since our review, Los Alamos has made both physical and programming modifications to allow the thermostat settings to function as described. We have not verified NNSA's comments as the actions were taken after we completed our audit fieldwork.

Finally, Y-12 was unable to validate the functionality of the condensate return system in Building 9212 before NNSA authorized JCI to reconnect the equipment. A Y-12 official stated that the condensate return pumps in Building 9212 had been shut down for some time before planning began on the ESPC that reconnected the condensate return system. Y-12 officials told us that they were not aware that modifications to the building's steam condensate return system were needed in order to achieve planned energy savings.

Costs of ESPCs

The energy savings measures at NNSA sites that were operating at less than intended efficiency could lead to millions of dollars in savings that will not be achieved over the life of the ESPCs (which guarantee savings of approximately $87 million) if not corrected. For example, our sample of missing sensors alone has the potential to cost the government approximately $70,000 in lost energy savings over the life of the Los Alamos contract.[1] In addition, not having the Los Alamos thermostats set in accordance with the NORESCO contract would have resulted in lost energy savings of an additional $2.4 million over the life of the Los Alamos contract, had they not been corrected.[2] Further, the maintenance issues on the Y-12 condensate return system may potentially cause the government to not realize up to $6.3 million in energy savings over the life of the contract.[3] While these savings opportunity losses were offset by other energy savings measures that performed above expectations for the first 4 years of the contract, such offsets are not guaranteed in the future. Accordingly, it is important to ensure all energy savings measures are operating in accordance with the ESPC. NNSA is required to pay the energy service contractors in full for the lost savings from thermostat settings and from condensate return system maintenance, as those contracts assigned the responsibilities for operations and maintenance to the site Management and Operating contractors.

[1] Year 1 savings not achieved of approximately $2,300 per year, increase by a rate of 4 percent per year compounded for 21 years and 1 month. The 4% escalation rate is the approved utility escalation rate given in Attachment 0A of the annual M&V Reports.
[2] Year 3 savings not achieved of approximately $79,000 per year, increased by a rate of 4 percent per year compounded for 21 years and 1 month. The 4% escalation rate is the approved utility escalation rate given in Attachment 0A of the annual M&V Reports.
[3] Year 3 savings not achieved of $226,146 per year, increased by an average rate 5 percent compounded per year for 19 years. The 5% escalation rate is a weighted average of the escalation rates for electricity demand, electricity consumption, natural gas usage, and water usage, given in the approved proposal for this ESPC.

Table 2: Potential Lost Savings

	Lost savings per year	Lost savings since the contract start	Potential lost savings over the life of the contract, if not corrected.
Los Alamos - Occupancy Sensors	$2,300	$9,000	$70,000
Los Alamos - Thermostat Settings	$79,000	$310,000	$2.4 million
Y-12 - Condensate Return System	$226,000	$900,000	$6.3 million
Totals:	**$307,000**	**$1.2 million**	**$8.8 million**

There are also savings not being achieved by Los Alamos energy savings measures that cannot be calculated. In particular, we could not calculate the amount of natural gas savings not being achieved because natural gas is not metered at individual buildings. Our analysis of Los Alamos thermostat settings indicates that it is highly unlikely that NNSA will realize the full natural gas energy savings guaranteed. Natural gas savings account for approximately 75 percent of annual energy savings for the thermostat upgrades at Los Alamos. As a result, we believe the natural gas savings not being achieved by the thermostat upgrades could significantly exceed the $2.4 million of savings not being achieved, all at taxpayer expense.

Furthermore, some of the costs we identified at Los Alamos may not be allowable per the terms of the ESPC. NORESCO reported a savings shortfall of $57,610 for 2012. This amount should have been deducted from NNSA's guaranteed savings payment to NORESCO the following year. However, NNSA made all payments to NORESCO in full. Further, NNSA incurred a savings shortfall of approximately $9,000 because NORESCO did not complete required equipment installations. Accordingly, we question whether the associated payments of roughly $67,000 were allowable under the terms of their contract.

RECOMMENDATIONS

To ensure that the National Nuclear Security Administration achieves energy savings from ESPCs, we recommend the Administrator, National Nuclear Security Administration, direct the head of Contracting Authority, Acquisition and Project Management to:

1. Ensure that As-Built reports and Measurement and Verification reports are adequately reviewed prior to acceptance, installations are adequately confirmed, and missing energy installments such as sensors are brought to the attention of the Contracting Officer Representative;

2. Ensure that the planning requirements for energy savings projects adequately incorporate site support requirements and the consideration of knowledge of site conditions, lessons learned, and feedback; and

3. Direct the Contracting Officer to review ongoing ESPCs at Los Alamos for unallowable costs questioned in this report and recover those amounts deemed to be unallowable.

MANAGEMENT RESPONSE

Management generally concurred with the report's recommendations and indicated that corrective actions had been initiated or were planned to address the issues identified in the report. To address our recommendations, management stated that it will reinforce and clarify procedural and control expectations for ESPC planning, to include site support and requirements for acceptance of work for energy savings installations. In addition, management stated that the Contracting Officer will review the findings in the report and make a final determination regarding the allowability of questioned costs. Management Comments are included in Appendix 3.

AUDITOR COMMENTS

We consider management's comments and corrective actions to be responsive to our recommendations. In particular, we recognize that management has already taken actions in response to our audit work, including making modifications needed to allow thermostats to function with the proper settings. While a portion of the lost savings we identified appear to be allowable under the terms of the EPSCs, we believe that when the issues causing lost savings are corrected, NNSA will prevent significant future avoidable costs and ensure that the ESPCs remain cost effective in the future.

OBJECTIVE, SCOPE, AND METHODOLOGY

Objective

To determine whether the National Nuclear Security Administration is realizing guaranteed energy savings from its Energy Savings Performance Contracts (ESPCs).

Scope

The audit was conducted from October 2015 through November 2017. We conducted work at the National Nuclear Security Administration - Albuquerque Complex in Albuquerque, New Mexico, the Los Alamos National Laboratory (Los Alamos) in Los Alamos, New Mexico, and the Y-12 National Security Complex (Y-12) in Oak Ridge, Tennessee. At the time of our review, NNSA's only leveraging of private sector financing for energy savings was through ESPCs. At the time of our review, eight such ESPCs were open at National Nuclear Security Administration sites. This audit was conducted under Office of Inspector General project number A16AL007.

Methodology

To accomplish our objective, we:

- Reviewed laws, regulations, executive orders, and other guidance applicable to energy savings performance contract;

- Judgmentally selected the ESPCs at Los Alamos and Y-12 for in-depth survey work. We judgmentally selected 3 of 8 ongoing ESPCs open at National Nuclear Security Administration sites. Because selection was not statistically driven the results and overall conclusions are limited to the contracts reviewed and cannot be projected to the entire population subject to audit;

- Reviewed documentation relating to ESPC delivery orders active at Los Alamos and Y-12;

- Interviewed Federal and contractor officials responsible for oversight, installation, and maintenance of installed energy savings measures at Los Alamos and Y-12;

- Sampled and physically inspected energy savings measures installed at Los Alamos and Y-12, and examined utility consumption and demand data for selected energy savings measures. We judgmentally selected buildings with installed energy savings measures to review. Because selection was not statistically driven the results and overall conclusions are limited to the contracts reviewed and cannot be projected to the entire population subject to audit; and

- Compared physically observed conditions with reported conditions.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Accordingly, we assessed significant internal controls and compliance with laws and regulations necessary to satisfy the audit objective. In particular, we assessed the Department's implementation of the GPRA Modernization Act of 2010 and found the Department had established performance measures related to the operations of its ESPC task orders within the Department. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We partially relied on computer-processed data to accomplish our audit objective. We validated such data by confirming our results with National Nuclear Security Administration officials and performed other procedures to satisfy ourselves as to the reliability and accuracy of the data we obtained.

Management waived an exit conference on October 18, 2017.

RELATED REPORTS

Office of Inspector General Reports

- Audit Report on *Energy Savings Performance Contract Review Board* (OAI-L-16-04, December 2015). The review of the Sustainability Performance Office management of the Energy Savings Performance Contract (ESPC) Review Board identified an area in which the Review Board's responsibilities and procedures could be clarified to help ensure that the Department's ESPCs are in the Government's best interests. Specifically, we noted that some sites have demonstrated a reluctance to submit ESPC proposals to the Review Board because of concern over protecting procurement sensitive information. Action to clarify the Review Board's role in protecting the procurement sensitivity of ESPC proposals should enable the Sustainability Performance Office to better ensure that the Review Board receives ESPC proposals, identifies problems, and communicates issues prior to awarding ESPCs. The Office of Inspector General provided a suggested action to the Sustainability Performance Office to clarify and communicate the Review Board's responsibilities and processes for protecting ESPC procurement sensitive information to Departmental Program Offices and sites.

- Audit Report on *Energy Savings Performance Contract Biomass Project at the Oak Ridge National Laboratory* (OAI-L-16-03, November 2015). The review of the ESPC-financed biomass project at the Oak Ridge National Laboratory (ORNL) identified an issue with the original terms and conditions of the ESPC that could have complicated the resolution process that ultimately resulted in demolishing and replacing the biomass plant with a natural gas system. In particular, per the terms in the contract negotiated in 2008, the ORNL Site Office was responsible for equipment repair or replacement of the biomass plant after the original warranty period expired. The ESPC stipulated that the biomass plant had a 1-year manufacturer's warranty that began at project acceptance. In March 2012, the ORNL Site Office extended a "conditional" project acceptance of the ESPC with the caveat that Johnson Controls complete several outstanding items. It was this conditional acceptance that led to the ORNL Site Office's and Johnson Control's opposing views as to whether the warranty period had started, and if the plant was under warranty at the time the corrosion was discovered. Due to the nature of the conditional acceptance, the ORNL Site Office and Johnson Controls sought to reach a mutually acceptable resolution to the failed biomass plant which resulted in the agreement to substitute the biomass plant with a natural gas boiler and leave other ESPC terms unchanged. The Office of Inspector General stated that it was important for the Department to understand the contract terms, performance responsibilities, warranty conditions, and financial risks associated with ESPCs, especially when the ESPC includes a new and innovative technology such as biomass.

- Audit Report on *The Department of Energy's Administration of Energy Savings Performance Contract Biomass Projects* (DOE/IG-0892, August 2013). The review of the ESPC-financed biomass project at ORNL identified planning and operational issues with the project. Specifically, the ORNL Site Office had not required site characterization

testing and mitigation of adverse conditions prior to awarding the ESPC; mitigated the risk of bio-fuel shortages and cost fluctuations; and verified the quantity of bio-fuel deliveries. The problems identified with the ORNL Biomass Plant were due, in part, to inadequate guidance and oversight. Notably, the Department lacked sufficient guidance for managing the construction of large-scale ESPC projects. Also, the Department had not developed a process to identify, document, and disseminate lessons learned from ESPC projects across the Department complex.

- Audit Report on the *Management of Energy Savings Performance Contract Delivery Orders at the Department of Energy* (DOE/IG-0822, September 2009). The audit revealed the Department had not always effectively used ESPC orders to achieve energy savings. Specifically, the Department had not ceased payments to the energy services company after projects had stopped generating savings; verified the ESPC orders had generated the contractually required energy savings; ensured equipment installed was appropriately operated and maintained; and taken actions to include all costs necessary to implement the project when evaluating the project's cost-effectiveness. In addition, site offices had not ensured adequate management existed for individual orders; the Department had not implemented an effective training program for contract and technical support personnel; and the Federal Energy Management Program had not developed specific guidance regarding estimates of the costs of energy improvements.

Government Accountability Office Report

- Government Accountability Office Report on *Energy Savings Performance Contracts* (GAO-15-432, June 2015). • Government Accountability Office found that cost and energy savings that contractors reported to agencies for most ESPCs met or exceeded expectations, but some of these savings may be overstated. Contractors calculate and report savings annually in accordance with their contracts with the agencies. These plans include assumptions about the agencies' use of equipment that might change over the life of the contract. If changes reduce project savings, such as when an agency does not operate or maintain the equipment as agreed, contractors are not required to reduce the amount of savings they report or measure the changes' effects. Federal guidance states that when reviewing contractor's report, agencies should understand changes in project performance and savings levels and what actions should be taken to address deficiencies.

MANAGEMENT COMMENTS

Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585

August 2, 2017

MEMORANDUM FOR APRIL STEPHENSON
ACTING INSPECTOR GENERAL

FROM: FRANK G. KLOTZ F. Klotz 8/2/2017

SUBJECT: Comments on the Office of Inspector General Draft Report Titled *National Nuclear Security Administration's Energy Savings Performance Contracts* (NNSA-2017-001127/A16AL007)

Thank you for the opportunity to review and comment on the subject draft report. The National Nuclear Security Administration (NNSA) agrees with the auditors' conclusion that opportunities exist to improve planning, site support, and controls over acceptance of work for energy savings installations. The report, however, could be improved by providing a more balanced assessment of the performance of Energy Savings Performance Contracts (ESPCs) at NNSA sites.

The auditors' approach assumes 100 percent of the potential savings estimated by the Energy Service Companies (ESCOs) are achievable. For each ESPC, range estimates of potential savings are calculated as a baseline for reimbursing the ESCOs and evaluating the cost benefit of contracts. It is uncommon to achieve all of the potential savings due to various factors, including changes in facility usage and occupancy, mission needs and priorities, maintenance priorities, cost-benefit of implementation requirements, etc. To only highlight the minor areas where sites have not achieved the full "potential" savings could be misleading.

ESPCs are structured and executed to provide for savings, while minimizing risk and incurring no net cost to the Government. Y-12 and Los Alamos ESPCs are expected to generate approximately $40 million in net savings over 25 years. The costs questioned by the auditors of approximately $67,000 is only about 0.2 percent of the Los Alamos contract amount alone, and does not significantly diminish the cost-benefit of the ESPCs. Overall, ESPCs at Y-12 and Los Alamos are considered to be productive and cost beneficial.

To address the report recommendations, NNSA will reinforce and clarify procedural and control expectations for ESPC planning, to include site support and requirements for acceptance of work for energy savings installations. The Contracting Officer will also review the findings in the report and make a final determination regarding the allowability of the questioned costs. The estimated completion date for these actions is December 31, 2017.

FEEDBACK

The Office of Inspector General has a continuing interest in improving the usefulness of its products. We aim to make our reports as responsive as possible and ask you to consider sharing your thoughts with us.

Please send your comments, suggestions and feedback to OIG.Reports@hq.doe.gov and include your name, contact information and the report number. Comments may also be mailed to:

Office of Inspector General (IG-12)
Department of Energy
Washington, DC 20585

If you want to discuss this report or your comments with a member of the Office of Inspector General staff, please contact our office at (202) 253-2162.