



U.S. Department of Energy  
Office of Inspector General  
Office of Audits and Inspections

# Audit Report

## Department's Management of Cloud Computing Services



OAS-RA-L-11-06

April 2011

# Memorandum

DATE: April 1, 2011

Audit Report Number: OAS-RA-L-11-06

REPLY TO

ATTN OF: IG-34 (A11TG021)

SUBJECT: Report on "Department's Management of Cloud Computing Services"

TO: Administrator, National Nuclear Security Administration  
Acting Under Secretary of Energy  
Under Secretary for Science  
Chief Information Officer

## INTRODUCTION AND OBJECTIVE

Cloud computing enables convenient, on-demand access to shared computing resources that can be rapidly provided to users. According to the National Institute of Standards and Technology (NIST) and industry experts, benefits of the cloud computing model include the ability to more effectively manage Information Technology (IT) resources while reducing operating costs. For instance, it permits organizations to plan computer usage and add or subtract resources as necessary rather than invest in hardware and software that may be needed but not necessarily frequently used. In addition, the cloud computing model can increase employee mobility by allowing access to computing resources regardless of physical location. Furthermore, it allows IT personnel to be more flexible in the allocation of resources, allowing them to focus less on maintenance and more on innovation.

As part of the Office of Management and Budget's (OMB) *25 Point Implementation Plan to Reform Federal Information Technology Management*, each agency was required to identify at least three cloud computing uses within its organization, of which one must be implemented by December 2011. Prior to OMB's action, however, the Department of Energy (Department) was already exploring various options to achieve greater efficiencies in service at a lower cost. For example, Argonne National Laboratory (ANL) and Lawrence Berkeley National Laboratory (LBNL) were exploring the use of cloud computing services for scientific computing as part of the Magellan Cloud Computing Project. In addition, other Department sites were evaluating cloud computing solutions that could allow them to utilize cloud services for such things as email, calendaring, and a variety of collaboration tools. Due to the recent push for the use of cloud computing, we initiated this audit to determine whether the Department was adequately managing the expanding use of cloud computing services.

## CONCLUSIONS AND OBSERVATIONS

Our review did not reveal material issues with the Department's limited use of cloud computing services. However, we identified areas that the Department should consider before it moves forward with adopting such technology on a large scale. For instance, we noted

several opportunities for improvement in the Department's cloud computing initiative. In addition, we determined that certain areas related to management of the Magellan Project could be enhanced. Specifically, we noted that:

- The Department had not yet prepared policies and procedures governing security and other risks and had not established coordination requirements among sites to prevent duplication or other problems with cloud deployment; and,
- Problems existed with resource disposition plans and Recovery Act-related job reporting for the Magellan Project.

#### Cloud Computing Program Planning

The Department had not developed or implemented formal policies or procedures related to acquisition and security of cloud computing services. As noted by industry, common issues that should be considered in such a policy are software licensing and information security risks related to privacy, compliance, data location, certification, and records management. Although no policies and procedures were in place, cloud computing applications were being used or tested at several national laboratories, including ANL, LBNL, Pacific Northwest National Laboratory (PNNL) and Los Alamos National Laboratory. As the Department develops and implements policies related to cloud computing, it should consider guidance issued by the NIST and Federal Risk and Authorization Management Program designed to ensure that IT resources are appropriately secured.

We also identified opportunities for the Department to enhance its management and coordination efforts when implementing cloud computing services. In particular, while we noted that there was coordination of certain cloud computing projects among sites, we identified other instances where such was not the case. For example, although Headquarters officials from the National Nuclear Security Administration (NNSA) and Office of Science stated that their sites were not utilizing cloud computing, our review identified that their sites were actually utilizing some form of this technology. Absent effective coordination and leadership by programs and sites, the Department may spend more time and resources than necessary independently acquiring, developing, and/or implementing cloud computing applications.

Without adequate planning, there is an increased risk that users may utilize cloud computing products and services on the Department's networks, unnoticed, without undergoing adequate security evaluations. For instance, PNNL officials stated that a user could purchase certain cloud services without approval that may be difficult to detect on the site's networks. To mitigate this risk, the Department should implement policies and procedures and coordinate its efforts related to cloud computing.

#### Magellan Project

The Department committed more than \$32 million in American Recovery and Reinvestment Act of 2009 (Recovery Act) funding to establish the Magellan Project which provided a test

bed that researchers used for computations for midrange supercomputing for exploring the work of commercial cloud offerings. During our review, we identified potential areas of concern and/or opportunities for improvement related to the Magellan Project. In particular:

- Although ANL and LBNL had acquired and utilized approximately \$16 million worth of IT hardware and software to support the Magellan Project, no decision had been made on what to do with the resources after the project is completed in September 2011. Site officials commented that the hardware and software will most likely become the property of the laboratories and be transferred to other projects; however, they had not designated the equipment for a specific purpose. Absent adequate planning for future use, the Department may not be able to ensure that IT resources are used in the most effective and timely manner.
- Errors related to the number of jobs created by the Magellan Project that were reported to FederalReporting.gov were identified. We noted that officials at ANL were reporting non-Recovery Act and Recovery Act jobs together. Specifically, ANL reported that 46 jobs were created during the fourth quarter of Fiscal Year 2010 even though only 9 Recovery Act related jobs were actually created. Notably, the responsible Headquarters official corrected this reporting error after we brought it to his attention.

### SUGGESTED ACTIONS

To improve the management of the use of cloud computing services and resources, we suggest that appropriate officials from the Offices of the Under Secretary of Energy, Under Secretary for Science, and the NNSA work with the Department and NNSA Chief Information Officers to:

1. Develop and implement effective practices and procedures related to acquisition and security of cloud computing services;
2. Ensure appropriate coordination and monitoring of cloud computing activities among programs and/or sites; and,
3. Improve planning and reporting for the Magellan Project, including developing a plan for the end state of IT resources and ensuring that information reported to FederalReporting.gov is accurate.

A formal response is not required. The suggested actions, if successfully implemented by the Department, should help mitigate the risks associated with the concerns discussed in this report.

We appreciate the cooperation of your staffs and the various Departmental elements that provided information or assistance.

*Daniel M. Weeber*

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Director, Environment, Technology, and  
Corporate Audits Division  
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Attachment

cc: Senior Policy Advisor, Office of the Under Secretary, S-3  
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## **SCOPE AND METHODOLOGY**

This audit was performed between October 2010 and March 2011 at Department of Energy (Department) Headquarters in Washington, DC; Pacific Northwest National Laboratory, Richland, Washington; Lawrence Berkeley National Laboratory, Berkeley, California; and the Argonne National Laboratory, Argonne, Illinois. We also obtained information from the Los Alamos National Laboratory, Los Alamos, New Mexico. To accomplish the audit objective, we:

- Conducted interviews with program and site officials to gain background information on the Department's use of cloud computing technology and identify any concerns, best practices, or future uses of cloud computing technology;
- Obtained and reviewed information from field sites relevant to costs related to cloud computing services with the focus on implementation costs and potential cost savings;
- Obtained and reviewed relevant laws, regulations, or policies; and,
- Analyzed documentation pertaining to policies and controls in place for cyber security, including change management, contingency/disaster recovery, records retention, and system auditability associated with cloud computing services being utilized by programs and sites reviewed.

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 the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. The audit included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. 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. During our audit, we reviewed performance measures related to cloud computing in accordance with the *Government Performance and Results Act of 1993*. We determined that limited performance measures existed for the Magellan Project. We did not rely on computer-processed data to satisfy our audit objective.

The National Nuclear Security Administration waived an exit conference. An exit conference was held with the Office of the Chief Information Officer on March 29, 2011.

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