Raritan®

Know more. Manage smarter.™

EO 13514 and Smart Federal Government Data Center Management

Overview

In fiscal year 2009, the U.S. government used an astounding 1,095.7 trillion BTUs of energy. This total included everything from keeping the lights on at the Lincoln Memorial to maintaining military bases overseas.[1] Just considering domestic power consumption, the government accounted for about 1.5% of all energy consumed in the U.S.

In dollar terms, the government was projected to spend $28.8 billion on energy consumption in fiscal year 2010, up 36% from the $21.2 billion spent in 2009.[2]

On October 5, 2009, President Obama signed an executive order that extended and expanded the federal government's efforts to control and reduce the use of energy across all departments. This executive order, EO 13514, was "to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of greenhouse gas emissions (GHG) a priority for Federal agencies."

To achieve that goal, all major federal agencies were given a series of deadlines, culminating with a January 31, 2011 deadline that required a comprehensive GHG inventory report from each of the agencies to the Council on Environmental Quality (CEQ) Chair and Office of Management and Budget (OMB) Director.

In addition to guidance, recommendations and plans, EO 13514 also laid out numerical targets for agencies. Among these are taking steps to cut energy use and reduce heat-trapping emissions 28% by 2020, compared with 2008 levels,[3] and to ensure that 95% of all new contracts, including nonexempt contract modifications, require products and services that are energy efficient.

> "As the largest energy consumer in the United States, we have a responsibility to American citizens to reduce our energy use and become more efficient. Our goal is to lower costs, reduce pollution and shift federal energy expenses away from oil and towards local, clean energy."
>
> **President Barack Obama**

By identifying and using tools and practices that can target areas for improvement, federal agency data centers can not only perform more efficiently, but lead the way in reducing energy usage and helping their agencies meet the objectives of this important executive order.

This white paper will examine three areas of data center management relating to the measurement, use and saving of energy. It will also suggest criteria that can help you decide whether one or more of these areas can help you achieve the goals established by EO 13514.

Reducing energy use through efficient power management

The U.S. Postal Service Office of Inspector General recently announced plans to consolidate the four data centers they currently run into a single, energy-efficient facility.[4]

Unless your agency has plans to do the same, it's likely that you'll have to continue to work within the constraints of your existing infrastructure.

To meet the new guidelines, without sacrificing current standards of productivity and uptime, you'll need more power-related information and control than ever before. Not only to know how much power your operations are using, but also how much is left to support IT growth and consolidation.

A comprehensive power management solution can provide this information and control, while addressing other important questions, such as: "How do I ensure uptime and reliability?" "How can I accommodate high-density installations?"

By using a solution that offers you the ability to accurately monitor power consumption, identify areas of concern and bring all the relevant data right to your fingertips, you can meet the energy management and reporting directives of EO 13514 more intelligently and more efficiently. An effective solution will give you the information you need to:

- ▶ Assess at a moment's notice how much power you're using

- ▶ Use the power you have more efficiently

- ▶ Improve server uptime and reliability

- ▶ Implement higher rack densities

When evaluating a power management solution for your data center, consider these questions:

- ▶ Will it provide highly accurate and detailed information about the power in your data center?

- ▶ Does it consolidate data on how much power various operations are using? And how much more you have available for growth and change?

- ▶ Will it help you plan for higher rack densities?

- ▶ Can it add power management intelligence to your existing PDUs or stand-alone IT equipment?

- ▶ Will it help you find stranded power at IT racks?

- ▶ Does it provide energy-saving features like individual outlet metering and control?

- ▶ Can it identify power usage, capacity and costs, with +/- 1% billing-grade accuracy, kWh energy usage and costs per customer, department or application?

Reducing energy use through precise environment management

According to David J. Cappuccio, Gartner Managing Vice President and Chief of Research for the Infrastructure Teams, "Data center managers can save up to 3% in energy costs for every degree of upward change in the baseline temperature, known as a set point. The higher set point means less frequent use of air conditioning, which saves the energy used to run cooling systems."

Unfortunately, if you can't accurately measure the temperature and humidity at the IT equipment racks in your data center, you won't be able to identify issues like hot spots, which can affect your servers' performance. By placing temperature, humidity, air flow and air pressure sensors strategically in your cold air and hot air aisles, at the top, middle and bottom of a rack, and in cool air plenums and vents, the information gathered can help you identify areas to save energy on cooling while you maintain a healthy environment for your servers.

An effective environment management solution, therefore, should provide the following features:

▶ Easy and inexpensive deployment at the rack

▶ Cooling charts that show if you are compliant with industry and internal guidelines

▶ Tools that calculate possible energy savings from simply increasing rack temperatures

▶ Thresholds with alerts that notify you if conditions exceed preset limits

▶ Software that allows you to chart trends over time

"Data center managers can save up to 3% in energy costs for every degree of upward change in the baseline temperature, known as a set point. The higher set point means less frequent use of air conditioning, which saves the energy used to run cooling systems."

David J. Cappuccio
Managing Vice President and Chief of Research for the Infrastructure Teams, Gartner

When evaluating solutions that will help you manage the environment in your data center, these considerations should be taken into account:

▶ Does the solution provide psychrometric charting to calculate possible energy savings from increasing the cool air inlet temperature?

▶ Can it generate billing-grade, accurate energy cost billback reports to drive behavior?

▶ Can it forecast energy savings to help determine which servers to decommission?
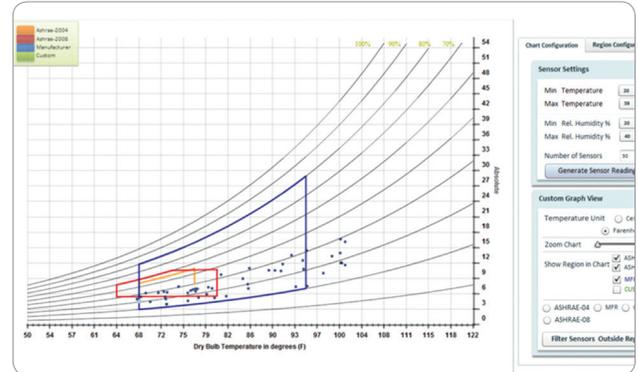
Reducing energy use through more informed energy management

According to a report from Pike Research, cloud computing will have important implications for both energy consumption and greenhouse gas (GHG) emissions. It forecasts that cloud computing could lead to a 38% reduction in worldwide data center energy expenditures by 2020.[5]

In fact, the federal government has already taken some preliminary steps in this energy-, greenhouse gas- and cost-saving direction: Federal Chief Information Officer Vivek Kundra announced on April 17, 2010 that over $3 billion has been saved so far, in part by moving more than 137,000 employees of the General Services Administration and Agriculture Department to private cloud servers.[6]

This is just one of the initiatives that federal data center administrators can explore to reduce the use of energy in their facilities. Others include:

▶ Create energy usage baselines and certify changes in energy and carbon footprint

▶ Generate energy cost reports for customers or departments to drive behavior

▶ Identify and act on active power, energy, cost and environmental trends

▶ Measure power usage effectiveness (PUE) and evaluate changes that can improve your PUE ratio

But before you start, you should establish a baseline. You'll have to answer questions like: "What is my total real energy usage now?" and "Which departments are using how much energy?" This will help you understand both what (e.g., servers, network storage devices, etc.) and who is drawing the energy in your facility.

Deploying an effective solution will help you know more about your energy use so you can intelligently manage energy costs and usage, and reduce GHG emissions. To find out which solution is right for your data center, see if it offers:

▶ Psychrometric charting to calculate possible energy savings from simply increasing temperatures

▶ Agentless graceful shutdown of Windows®, Linux® and UNIX® device groups, so you can shut down unused IT devices such as servers in labs during weekends

▶ Energy cost billback reports to drive behavior

▶ Decommission flags to forecast energy savings when eliminating servers

▶ Compare the impact of various energy-saving initiatives to your baseline power consumption

By measuring IT equipment power consumption, and consolidating that information into actionable reports, you can save power and money, calculate PUE to Green Grid's PUE Level 2 and Level 3, as well as meet your EO 13514 energy and GHG requirements.

Definition of Green Grid PUE Levels

	Level 1 Basic	**Level 2 Intermediate**	**Level 3 Advanced**
IT equipment power measurement source	UPS	PDU	Server
Total facility power measurement source	Data center input power	Data center input less shared HVAC	Data center input less shared HVAC plus building, lighting, security
Minimum measurement interval	Monthly/weekly	Daily	Continuous

Source: Greengrid.org

Raritan has the management solutions to meet your needs

Raritan offers power, environment and energy management solutions that can help you achieve the directives in EO 13514. They consist of three major components: intelligent rack PDUs (iPDUs) and inline meters, environmental sensors and power management software.

Our **iPDUs** and inline meters give you more control of power and cooling. Raritan's PX™ series offers hundreds of models to meet all your data center applications, including models with outlet switching, individual outlet metering, high power for blade servers and high density applications, and 400V power distribution.

▶ Remote power monitoring and metering of current (amps), voltage, power (kVA, kW) and energy consumption (kWh)

▶ ISO/IEC +/- 1% billing-grade accuracy

▶ Environmental monitoring (up to 16 sensors per iPDU)

▶ Power information from individual outlets, lines and circuit breakers

▶ Support for APC, Eaton, ServerTechnology and many other PDUs

▶ Remote reboot of unresponsive devices

▶ User-configurable, outlet-level delays for power sequencing

▶ SNMPv2 and SNMPv3 TRAPs, SETs, GETs alerts via email and syslog

▶ Outlet grouping over IP within the same iPDU and across multiple PDUs

▶ Local power monitoring via LED display of voltage and current at both the line and circuit level

▶ Web GUI interface, Ethernet, RS-232 serial access, USB-A and USB-B connections

▶ HTTP, HTTPS, SSH, Telnet and SNMP support

PX-5534

▶ Advanced authorization options, including permissions, LDAP(S) and Active Directory®

▶ 256-bit AES encryption and strong passwords

Our intelligent rack iPDUs and inline meters are designed to accept plug-and-play **environmental sensors**. Placed strategically in your cold and hot air aisles, at the top, middle and bottom of the rack, and in cool air plenums and vents, the information gathered by our sensors is sent via the iPDUs to be recorded and analyzed by our energy management software.

▶ Temperature and humidity sensors in a variety of configurations, such as one humidity and three temperature sensors on one wire, to make it easy to meet ASHRAE cool-air inlet positioning guidelines

▶ Contact closure sensors

▶ Differential air pressure sensors, which measure the differences in air pressure between two adjacent data center locations, such as above and below a raised floor

▶ Airflow sensors, which measure airflow accurately from 0-4 meters/sec. Typically mounted at a perforated tile in front of the inlet side of a cabinet; but can also be mounted in an air duct (plenum) to detect a failed fan/motor

Raritan's **energy management software** provides easy-to-use, real-time, accurate energy information. It offers vendor-agnostic centralized power monitoring, along with features like agentless graceful OS shutdown, outlet control and thermal and energy analytics. These features help you manage power usage, capacity and costs by providing kWh usage and energy costs per customer, department or application, and line loads for balancing capacities, rack inlet temperatures and even carbon footprint.

▶ Vendor-agnostic monitoring and management of virtually all rack PDUs

▶ User-configurable dashboard

▶ Power capacity gauge

▶ Power and energy analytics

▶ Cooling charts which map temperature vs. humidity

▶ Power capacity "days of supply" forecast

**Temperature/
Humidity Sensors**
per ASHRAE Standard

Hot Aisle

Cold Aisle
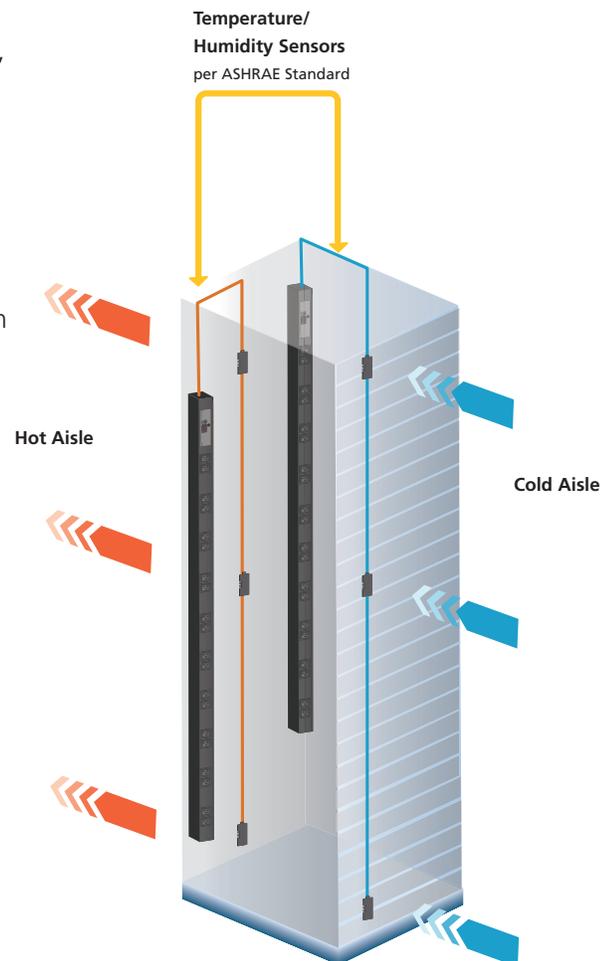
Conclusion

EO 13514 is an important initiative for your data center, for the federal government and for the nation. But it is not without challenges. With limited budgets, time and facilities, reducing energy use and heat-trapping emissions by 28% by 2020 will take commitment, planning and innovative solutions.

You are ready to meet the challenge. And Raritan is ready with the solutions to help you achieve your goals.

Reference:
http://www.fedcenter.gov/programs/eo13423/
http://www.fedcenter.gov/programs/eo13514/

Citations:
1. *http://www.eia.doe.gov/aer/txt/ptb0113.html.* (2010). Retrieved 2011, from U.S. Energy Information Administration website: http://www.eia.doe.gov
2. *http://www.environmentalleader.com/2009/12/08/federal-government-energy-consumption-to-rise-36-in-2010/.* Federal government energy consumption to rise 36% in 2010. (2009, December 8). *Environmental Leader*, Retrieved from http://www.environmentalleader.com/
3. *http://www.nytimes.com/2010/01/30/science/earth/30efficient.html.* Broder, J. M. (2010, January 29). U.S. Government Plans to Reduce Its Energy Use. *The New York Times*, Retrieved from http://www.nytimes.com
4. *http://www.greenbiz.com/news/2011/04/12/usps-data-center-consolidation-reduce-energy-use-redundancy#ixzz1KpbRRzw.* (2011). USPS Data Center Consolidation to Reduce Energy Use, Redundancy. (2011, April 12). *GreenerComputing*, Retrieved from http://www.greenbiz.com
5. *http://www.pikeresearch.com/newsroom/cloud-computing-to-reduce-global-data-center-energy-expenditures-by-38-in-2020.* Cloud Computing to Reduce Global Data Center Energy Expenditures by 38% in 2020. (2010, December 6). *PikeResearch*, Retrieved from http://www.pikeresearch.com
6. *http://www.broadbandexpert.com/blog/high-speed-internet/broadband/cloud-computing-and-restructuring-will-save-federal-government-billions-of-dollars/.* Hoot, F. (2011, April 18). Cloud computing and restructuring will save federal government billions of dollars [Web log post]. Retrieved from broadband expert: http://www.broadbandexpert.com