

Energy Savings Performance Contracts for Federal Data Center Consolidation

White Paper 176

Revision 1

by Kevin Vaughn

> Executive summary

The cost of operating and maintaining federal agency data centers is extremely high. Mandates and initiatives have been put in place to address these costs through energy conservation, but with budgets already strained, the initial capital investment can be a daunting hurdle. This paper describes energy savings performance contracts (ESPCs), explains how to use them as an alternative financing option for consolidation projects, and provides examples.

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Introduction

In late 2010 Doug Bourgeois, vice president and chief cloud executive with VMware, suggested applying an energy savings performance contract (ESPC) as a means to fund Federal Data Center Consolidation Initiatives (FDCCI). He recommended using the Department of Energy's (DOE) ESPC indefinite-delivery, indefinite-quantity (IDIQ) contract, which allows agencies to embark on energy-savings projects without upfront capital costs and without special Congressional appropriations.

Bourgeois characterized the contracts as a solution for agencies with little funding available for data center consolidation. His perception appeared to be shared by conference attendees as well, which aligns with a recent report by government research and market firm Input titled "Assessment of the 2010 Federal Data Center Consolidation Initiative". According to the report, the changes needed to produce a large-scale reduction in an agency's real estate footprint and other physical structure changes will take a lot of money and time.

"Under ESPCs, the private sector companies invest in new physical infrastructure and provide services that lower the cost of operations for agencies," said Bourgeois, who was director of the Interior Department's National Business Center prior to joining VMware. ESPC contracts are not directly tied to data center consolidation, he said, but they can be aligned with such a project.

Two examples of federal agency ESPC projects are included at the next section.

Value of ESPCs for data centers

A significant challenge for federal agencies is securing upfront capital, through special Congressional appropriations, to fund data center consolidation projects. ESPCs provide federal agencies with an alternative financing option for energy savings projects, which requires no up-front capital costs or special Congressional appropriations.

The first federal data center ESPC

In May of 2011, this concept became a reality. The DOE, the Office of the Chief Information Officer, and the Office of Management released a Notice of Opportunity for an ESPC project to make its data centers and IT infrastructure more energy efficient. The project was to include an audit of data centers, server rooms, and office automation in DOE Forrestal and Germantown facilities with the intent to consolidate into a single energy efficient headquarters data center.


The Notice of Opportunity for the DOE ESPC data center project targeted areas for potential energy conservation measures (ECMs) to be explored in addition to any other measures that could result in significant savings.

Energy management:

- Data center power metering
- Data center environmental metering (temperature, pressure, humidity)
- Onsite electrical co-generation (fuel cell, micro turbine, etc.)

Air management:

- Conversion of data center air handling units (AHU) to rack inlet temperature control
- Construction of air-tight zones
- Implementation of hot / cold row and rack containment systems

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Guide for Reducing Data Center Physical Infrastructure Energy Consumption in Federal Data Centers

- Improved hot / cold air delivery and venting
- Supplemental and / or replacement on-floor CRAH units

IT systems:

- Server virtualization and virtualization management to reduce the number of physical servers in use
- Network storage optimization and virtualization to reduce the number of physical storage devices
- Overhead structured cable and network (row/cluster switches) to improve air flow
- IT system power management software to reduce system power consumption
- Implementation of workgroup printers, scanners and fax systems to reduce the number of physical devices
- Implementation of duplex printers to reduce the amount of paper and power used by printers
- Implementation of enterprise IT services consolidation to reduce the number of duplicate email, storage, and other IT systems
- Implementation of thin-client desktops to reduce the power and O&M costs associated with desktop systems
- Implementation of remote access and video teleconferencing technologies and services to reduce travel and support remote telecommuting
- Implementation / use of energy efficient IT equipment, servers, storage and network systems

The first ESPC data center award

In these times of great fiscal challenges, the DOE is leveraging innovative, cost-effective approaches to advance sustainability initiatives and accelerate data center and cloud adoption. Through an ESPC model, the Department is leading the way in IT infrastructure energy cost savings, efficiency, and modernization. This ESPC facilitates the consolidation of data centers and server rooms at DOE headquarters in Washington, D.C., and a facility in Germantown, Maryland. This ESPC also enables the transformation of DOE's IT infrastructure to a more energy efficient and responsive computing environment, while reducing capital costs. This is the first time the federal government has used an ESPC for a data center consolidation project.

Traditionally, ESPCs and Utility Energy Services Contracts (UESC) have been used for facility infrastructure projects, such as lighting efficiency, chiller plant replacements and low-water fixture upgrades. The DOE, is implementing an alternative financing contract for IT infrastructure transformation that embraces the significant potential savings associated with these projects. This ESPC project will focus on IT modernization initiatives geared at reducing energy consumption and streamlining operations through virtualization, cloud services, mobile computing, among other IT-based applications.

In addition, DOE is exploring further opportunities to utilize ESPCs and UESCs to meet the electronic stewardship and data center goals in the Department's Strategic Sustainability Performance Plan (SSPP) and the Federal Data Center Consolidation Initiative.

This is truly taking a holistic look at sustainable IT management across the Department and furthering DOE's commitment to streamlining operations, reducing energy consumption and saving taxpayers money.

ESPC case studies

More than 550 facility-related ESPC projects worth \$3.6 billion were awarded to 25 federal agencies and organizations in 49 states and D.C. as of March 2010, according to DOE's Federal Energy Management Program. These projects saved an estimated 30.2 trillion British Thermal Units (BTUs) annually, equivalent to the energy consumed by a city with a population of 818,000. They also saved \$11 billion in energy costs, DOE said. Below are two examples:

Case study 1

In 2010, Schneider Electric developed an energy savings project for the Federal GSA Region 7 encompassing fourteen federal facilities located throughout Texas (7.3M square feet). To remedy the GSA's inadequate building control systems, Schneider Electric installed BACNET protocol in 13 different office buildings, integrated with a central platform and web server to allow for centralized and seamless facility control. In addition, Schneider Electric served as the prime contractor in designing and installing a total of 919 kW of solar power for the GSA, spread across 5 of the 14 sites. Other Energy Conservation Measures implemented include central plant modifications, lighting upgrades, water conservation measures, and mechanical system upgrades, which together will deliver almost \$1 million in annual savings, guaranteed for 5 years.

The GSA Region 7 ESPC project included improvements to data centers in three buildings. The improvements included retrofitting the 19 computer room air conditioning (CRAC) units with direct digital controls and integrating them with the building automation system (BAS) to provide advance control and monitoring capability. The temperature in the data centers was increased from 70F to 74F with no impact on the data center performance. This modification has resulted in significant energy savings.

Case study 2

Schneider Electric is currently constructing a comprehensive ESPC which includes a 3 Megawatt solar photovoltaic project for the U.S. Coast Guard-Puerto Rico spread across 200 buildings at three different sites in Puerto Rico. Through a 23-year Energy Services Agreement, a third party owns the solar photovoltaic system and will sell the generated power to the Coast Guard at a rate below the price of Utility power. This was a first-of-its-kind Energy Services Agreement arranged within a federal ESPC, setting an important precedent for energy efficiency projects within the market sector. Schneider Electric is installing cool roofs at each site and plans to implement additional ECMs in the near future. Other energy conserving measures include lighting, roofing, water, and air conditioning units.

Implementation of ESPCs

An ESPC is a partnership between a federal agency and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit for the federal facility and identifies improvements to save energy. In consultation with the federal agency, the ESCO designs and constructs a project that meets the agency's needs and arranges the necessary funding. The ESCO guarantees that the improvements will generate energy cost savings sufficient to pay for the project over the term of the contract, which can be up to 25 years. After the contract ends, all additional cost savings accrue to the agency.

ESPCs help federal agencies meet energy efficiency, renewable energy, water conservation, and emissions reduction goals by streamlining contract funding for energy projects. The streamlined process provides multiple benefits, including:

Increased quality and value through:

- Access to private-sector expertise in energy efficiency, renewable energy, water conservation, and reduced emissions
- Built-in incentives for ESCOs to provide high-quality equipment, timely services, and thorough project commissioning
- Infrastructure improvements to enhance mission support
- Healthier, safer working and living environments
- A guarantee of performance from the ESCO ensuring a partner with a vested interest in delivering a successful project

Flexible, practical contract and procurement processes to ensure your project, your way

Expert, objective technical support through FEMP assistance, including:

- Legal and funding guidance
- Project facilitators
- Advanced technology experts
- Training for federal agencies

Smart project management that:

- Ensures building efficiency improvements and new equipment without upfront capital costs
- Funds energy improvements without relying on special Congressional appropriations
- Guarantees energy and related operation and maintenance cost savings
- Enhances the ability to plan and budget energy, operation, and maintenance accounts
- Minimizes vulnerability to budget impacts due to volatile energy prices, weather, and equipment failure

Department of Energy process for ESPCs

The DOE has qualified a shortlist of 16 ESCOs to deliver energy savings performance contracts through an IDIQ contract designed to make ESPCs as practical and cost-effective as possible for federal agencies. DOE awarded these "umbrella" contracts to ESCOs based on their ability to meet terms and conditions established in IDIQ contracts. Any federal agency can issue an ESPC task order under the DOE's IDIQ contract as long as it meets the established requirements and procedures.

Implementing an ESPC for data centers

The success of an ESPC depends on clear definition of the desired outcome. In order to set this expectation, a feasibility assessment should be performed on the site to identify the needs, level of savings potential, and performance requirements. This will enable the agency determine a strategy based on the results they hope to achieve.

The agency can utilize the DOE IDIQ contract to select an ESCO using the following process:

- Agency solicits expressions of interest and qualifications from all ESCOs under the ESPC IDIQ.
- Agency selects two or more ESCOs to further qualify through interviews, references, detailed examples of similar projects, etc.

- Agency selects one (or more) contractor(s) to conduct a preliminary audit (PA), which provides potential scope, estimated savings, and estimated cost for the recommended project. If more than one contractor is requested to conduct a PA, the agency can use the results of the PAs to select a single contractor.
- Agency negotiates and enters into an Investment Grade Audit (IGA) contract with selected ESCO, which provides final scope, guaranteed fixed pricing, and guaranteed savings for the project.

Sources of funding

Funding a data center consolidation or upgrade can be done with a variety of sources through an ESPC. Primarily, energy savings will be utilized to pay off financing over the term of the contract. In this model, a third-party financier provides the up-front capital for the project and as energy savings accrue, those savings are paid to the financier until the financing agreement is complete. Any savings above the financing payments or those that accrue once the term is up remain with the agency as a cost reduction.

ESPCs also often result in savings from reduced operational and maintenance costs. These savings should be discussed and agreed upon between the ESCO and the federal agency to ensure they are real dollar savings that will be seen in the budget. Utility incentives and tax incentives are also commonly used as funding sources. The ESCO will identify and secure these funding sources for the agency.

Capital dollars may also be used to fund an ESPC. Often times, capital dollars are limited and coupling this funding source with another can expand the upgrades the agency is able to achieve with their capital investment. If capital funding is used for the entire project, the agency will keep all of the energy savings that accrue throughout the contract term.

Conclusion

ESPCs provide a great opportunity for federal agencies to meet their data center consolidation requirements and data center upgrade needs. With no up-front capital required, these improvements can be made immediately and with confidence, knowing the program is supported by the DOE and all projects are backed by a guarantee of performance.



About the author

Kevin Vaughn is the Program Director for Schneider Electric's Federal Energy Solutions business. In this capacity, Kevin leads the business development and implementation of Schneider Electric's federal energy savings performance (ESPC) program. Kevin has over 25 years of energy related experience including engineering, construction management and sales management. Kevin has earned degrees in physics (DePauw University) and mechanical engineering (N.C. State University) as well as an M.B.A in finance and marketing (University of Chicago).



Resources

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Data Center Science Center
DCSC@Schneider-Electric.com

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