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Federal Data Center Sustainability Shortfall**Client Challenges:** The US Office of Management and Budget (OMB) launched the Obama administration's Federal Data Center

Consolidation Initiative in 2010. The goal was to have each agency reduce energy requirements by at least 30 percent by 2015 from a 2005 base. Approximately 800 of the 2094 data centers are to be closed by that date as well. Without a fundamental shift in how technology is utilized, OMB noted, energy usage at federal data centers was set to double from 2006 levels, to more than 12 billion kWh in 2011. Progress toward the administration's goals has been limited. Clients have asked RFG to address the challenges and how IT executives and data center managers can improve their data center energy, and overall, effectiveness.

Observations and Recommendations

While the US government dwarfs other organization in data center capacities and complexities, the challenge it is experiencing is the same that other enterprises are trying to solve. Although, it seems many business and government IT executives are not attempting to address the issue at all. RFG's research finds that organizations that believe sustainability is a hype or non-business concern are grossly mistaken and are therefore pouring valuable capital down the power drain.

The energy consumption challenge is not about the power usage "tip of the iceberg" but about the bigger picture of data center best practices and resource optimization. For every dollar saved on the power usage side, organizations can save up to an additional \$15 in other areas. For the US government that is in excess of \$10 billion in potential annual savings.

Findings

A survey conducted in the spring of this year by **MeriTalk** found that agencies had reduced their data center count by 30 percent, realizing a 20 percent savings in IT budgets. The metrics the agencies state they are using to identify opportunities for data center consolidation and optimization are physical server count, annual hardware

spending, and total operational/maintenance costs. In addition, a June MeriTalk survey of 157 federal IT executives found that two-thirds of them did not know what the average kilowatt-per-rack energy consumption was across their data centers. Fully 77 percent could not say what the power usage effectiveness (PUE), a standard measure of energy efficiency, was for their data centers. In the private sector only 18 percent are unaware of their data center's PUE.

This is a major concern, since the Obama administration has chosen PUE to measure the progress of agencies in cutting back their data center energy demands. According to the 2009 Executive Order 13514 (Federal Leadership in Environmental, Energy and Economic Performance), half of agency data centers should be operating at a PUE of between 1.3 and 1.6 by fiscal 2012. Most of the agency data centers operate at a PUE greater than that. In fact, federal data centers consuming less than 1000 kWh have an unweighted average PUE greater than 2.0.

PUE is Not the Only Answer

Companies such as **eBay Inc.**, **Google Inc.**, **Microsoft Corp.** and **Yahoo! Inc.**

have all reported industry-leading PUE numbers for certain sites in the range of 1.08 to 1.20. RFG finds the best practice for most of the top data centers is in the 1.2 to 1.38 range. Having an excellent PUE is a good start but it can hide some poor business practices that can negatively affect operational costs.

PUE = (total facility power) / (IT equipment power)
= [(non-IT equipment power) + (IT equipment power)] / (IT equipment power)

The controlling factor in the PUE numerator is the non-IT equipment power. The management usually responsible for this is the facilities management staff – not the IT staff. Put another way, ***PUE does not address the inefficiencies of the IT equipment power consumption.*** Hence, a successful PUE showing, if that is the key metric for progress, can easily disguise sub-optimization of resources and poor policy decisions by IT executives.

The reality is the greatest savings comes from the implementation of IT best practices, not from infrastructure improvements. Some of the data center efficiency elements that impact power usage and need improvement are:

- Better utilization of storage assets (e.g., archiving, compression, deduplication, golden records, and thin provisioning)
- Lack of a data center architecture and standardization, with hardware and software selection done piecemeal as part of new application development
- Elimination of application redundancy
- Optimum data center consolidation and server and storage virtualization
- Use of assets less than three years old
- Use of power management software.

IT executives need to address green IT holistically if sustainability gains are going to be ingrained and maintained long-term. This means IT executives must assess the gaps between current operational practices and best practices and establish initiatives to close the gaps. But IT operations cannot do this alone; depending on the initiative IT will need the buy-in from one or more of the following players:

- Application development executives
- Business-side stakeholders
- CFO
- Facilities

Application Development

In too many organizations today the application development groups and/or the business units are the ones that dictate the hardware and software to be employed when a new application is built or bought. From a cost and control standpoint this is backwards. Application selection should be constrained to a set of platform options from which to choose and not the other way around. This optimizes platform bases and systems, reduces cost structures, and improves resource productivity. This approach is a foundational element of the cloud computing model and should be implemented regardless of whether cloud computing is used.

Therefore, IT executives need to "reprogram" the applications selection personnel into accepting the cloud computing concepts of componentization, standardization and low cost computing. If past experience is a guide, this will not be an easy task.

One approach to gaining buy-in is the internal marketing of cloud computing throughout the organization and then using acceptance of that precept as a way of

restricting all new development to conform to the model. Another approach is to avoid the cloud computing discussion and push for buy-in of data center componentization and standardization. Note that in either case (and in any other approach) the decisioning process is being flipped on its head – operations considerations influence application selection decisions rather than application decisions drive the hardware and software platforms operations must install and support. This is a major paradigm shift that should be agreed to at the highest levels, converted into a policy, and then driven throughout the enterprise.

Business-side Stakeholders

Aside from the application selection process, business-side stakeholders are involved in a number of other IT-related decisions in areas such as asset ownership, audits, compliance, governance, privacy, risk and security. Many of their decisions impact energy efficiency. One of the most egregious impacts is the requirement that certain business applications run on dedicated servers. This is frequently driven by the business units ownership the hardware platforms and thereby preventing application or hardware usage for any other purpose than that dictated by the unit.

End-user asset ownership and control must cease. IT agility requires the ability to transform IT while containing costs. Some of the accomplishments that have been achieved as a result are:

- 100 percent increase in workload capacities while keeping costs flat.
- Six-fold growth in storage at lower costs.
- Applications reduced by 75 percent
- Power usage slashed by 80 percent
- Server count collapsed by 75 percent
- Floor space sliced by up to 90 percent.

CFO

RFG frequently finds CFOs and IT executives are not on the same wavelength. Thus, they tend to see the same problem through very different lenses. One common example is the one where from an IT perspective it makes most sense for equipment turnover to be in the 36 to 40 month range (most leasing scenarios show this range to have an optimal total cost of ownership (TCO)). But the CFO believes that all hardware should be used for five years.

Whether leased or purchased, IT equipment should not be used beyond the 40 month range. A new RFG study found that 100 legacy Oracle|Sun V240 servers could be replaced by four IBM Power Systems 710 servers. The resultant annual operating expense dropped by more than 90 percent. The savings in power consumption costs exceeds 90 percent and almost cover all non-fixed costs.

Facilities

In most organizations it is the facilities group that is responsible for PUE success or lack thereof. However, this does not relieve IT executives of their responsibility to optimize resources and create a sustainable data center environment. Changes to hardware of any kind – infrastructure or IT – can impact the PUE value. Therefore, IT executives need to work with facilities staff to drive towards a common goal

Summary

Greening IT is not just about cleaning up the infrastructure – that is a small part of the overall picture. Unfortunately, since PUE is the only standard metric available, it is what the government focuses on. IT

executives, whether in business or government, have to make the business executives understand the issues, challenges and responsibilities each has in driving sustainability. Furthermore, green IT is not an end but a journey. Agency, business and IT executives need to commit to ongoing initiatives to improve energy effectiveness and make it part of their core business processes and DNA. This is an case where all parties can win and costs are contained.

The Bottom Line: RFG believes IT executives can cut the costs of operations by up to 50 percent by transforming data center operations through best practices and a focus on data center energy effectiveness (not PUE). Savings for some government agencies could even exceed 50 percent savings. However, this makeover of operations requires the buy-in and ongoing support of agency executives. IT executives should work with their business peers to gain the buy-in required to flip operations from being the receiver of applications and platforms to the deliverer of services whose platforms and services are the building blocks upon which all applications are constructed. The key is not to view sustainability as the goal but to use it as the proxy for driving best practices and resource optimization.

Additional relevant research is available. Interested readers should contact Client Services to arrange further discussion or interview with Mr. Cal Braunstein.