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BUILDING A COALITION FOR COMPUTER POWER MANAGEMENT

How the Department of Energy Saved $16 Million in Electricity

Convincing a large organization to pursue computer power management (CPM) can be tough. Especially when you're talking about a federal agency with numerous autonomous divisions and a culture that's the opposite of command and control at the Department of Defense (DoD). Add to this scenario that you're not the CIO's right-hand man – or in charge of energy management, for that matter – and you're in a position like that of Jeff Eagan.

Eagan worked in the Office of Environmental Policy and Assistance at the Department of Energy (DOE). Among his responsibilities, Eagan was the Electronics Stewardship Coordinator for DOE. He had long been convinced that DOE could save a substantial amount of energy – and taxpayer money – by utilizing CPM features on its computers, but his efforts to engage management on the subject had been frustrated. To begin with, IT operations were balkanized: there were 17 separate IT departments. Secondly, there wasn't much serious interest in computer energy conservation. It took the confluence of two departmental initiatives – and some dogged determination – to break the logjam.

The first initiative was a DOE-wide effort to consolidate its 17 IT departments, and to establish a common operating environment (COE). In the COE project, called Excite, Eagan saw an opportunity to include department-wide default settings for CPM.

A second event provided him with a much-needed boost: DOE entered into a memorandum of understanding (MOU) with the Office of the Federal Environmental Executive (OFEE) to begin to strategically manage office electronics – including their electricity consumption. It was called the Federal Electronic Challenge (FEC). Even so, an MOU is not a directive – the result is not necessarily a change in internal policy. Eagan still had to push for CPM to be included in DOE's IT consolidation project. IT managers initially felt that they had enough on their plates already – adding CPM seemed like "piling on." Even with the signed MOU, Eagan would need to build relationships with staff in charge of energy, cyber security, and IT to get CPM implemented.

Building the Power Management Team

The Federal Electric Challenge (FEC) encouraged green IT advocates to build teams composed of a broad range of constituencies. This could include IT staff, property managers, energy specialists, procurement staff, and cyber security. Team organizers had to identify the self-interest of each group and form an alliance of representatives working toward the same goals.

What is Computer Power Management (CPM)?

CPM features—commonly known as "sleep" settings—automatically place monitors and computers into a low-power sleep mode after a pre-set period of inactivity. Touching the mouse or keyboard wakes up monitors and computers within seconds, allowing users to resume work without delay. CPM features don't just save energy and money: they are good for the environment. Saving energy reduces air pollution associated with the burning of fossil fuels, and ultimately lowers the risk of global warming.

To support these efforts, skilled Environmental Protection Agency (EPA) staff at the FEC provided technical assistance and an ambitious recognition and awards program. Eagan encouraged the new DOE COE IT leadership to take advantage of this FEC awards program to gain staff support. He also demonstrated the easy-to-use procurement tool known as EPEAT (Electronics Product Environmental Assessment Tool), which further encouraged them to consider power savings as an important goal. The energy staff and facilities people were supportive but did not have major authority over computer operations. The IT experts were ready to consider power management, but a major hurdle remained.

Cyber Security a Major Driver for CPM

Given that the National Nuclear Security Agency falls under the DOE umbrella, including weapons labs and "the bomb," it's no surprise that the DOE is on every hacker's shortlist. Initially, power management supporters like Eagan worried that cyber security specialists, who wield great power in IT communities, would oppose their efforts. However, in 2005 DOE had a security incident that prompted the agency to request that all end-users turn off their computers every evening. At the time, probably 40% of PCs were left on all the time, making them easier targets for worms and other malware. Unfortunately, the new policy was not a resounding success, and a considerable percentage of users continued to leave their PCs on (and vulnerable) at night.

Enter CPM, which *automatically* shuts down inactive PCs. Suddenly, DOE's cyber security team was on board, providing compelling support for the department's CPM initiative.

Tackling Power Consumption

In the beginning, DOE used its Tivoli network management system to perform scheduled computer shutdowns at midnight every night. At the time, computer software patches were automatically followed by a forced reboot of the PCs. Under this regime, IT ran a program that warned users of the impending shutdown 30 minutes prior. Later, the program was changed to allow users to opt out of the shutdown, and the PCs were not patched until they rebooted.

One of the big challenges was that DOE had to write the warning application itself. This was in the early days of power management, and the warning was critical to preventing a computer from shutting down when a user was in the middle of important work. Nowadays, however, this warning is unnecessary: newer versions of Windows do not allow the PC to enter sleep mode if the processor, keyboard, or mouse are active.

When DOE looked into using Windows standby features to *automatically put PCs into low power mode after a period of inactivity* rather than at a set time every night (thus implementing true CPM), the agency found that the administrative tools in the Windows Server 2000 operating system were insufficient.

As a result, DOE looked for third-party software to help administer CPM settings on its networks. The department was already using BigFix – an enterprise systems management solution – to distribute software updates. Although BigFix's power management module was still under development, DOE decided to move forward, in part because the tool offered versatile controls and an easy-to-use interface for IT administrators. One thing Eagan liked was its promise to do a good job of estimating savings. In the end, DOE collaborated with BigFix to refine the company's CPM functionality. The department also moved up computer shutdown from midnight to 9 p.m., and today BigFix powers down an estimated 5,000 computers at DOE headquarters each night.

Rolling Out Wake-On-LAN

Since completing its earlier CPM efforts, DOE has begun implementing Wake-On-LAN (WOL), which gives IT administrators the ability to centrally "wake" computers for maintenance at any time. (For more information on WOL, see http://www.energystar.gov/index.cfm?c=power_mgt. pr_power_mgt_wol.) This provides flexibility in the scheduling of software updates, because at any time WOL can wake up computers that have been shut down or fallen into sleep mode so that they can receive vital security patches. Without WOL, software updates at DOE would have to be downloaded and installed during the daytime, before the 9 p.m. shutdown. So that users did not have to sit through a forced reboot during the work day, PCs were further configured to skip the reboot when patching was finished. This was good for users, but sub-optimal from a security perspective: since many software

security patches require a reboot, PCs were often left "unprotected" until the 9 p.m. shutdown.

The WOL rollout is part of a five-year, $25 million upgrade to DOE's infrastructure: the first thing the department did was replace the routers that did not support VLAN routing, a functionality that WOL requires. Where in place, WOL wakes the computers in the middle of the night, and BigFix distributes the software updates and then shuts down the PCs. (BigFix has WOL capabilities, but DOE was unable to use these because of compatibility issues.)

Ultimately, WOL will allow DOE to configure computers to *automatically* enter sleep mode after a period of inactivity – instead of waiting until 9 p.m. For example, when a computer is abandoned at 5 p.m., it will shortly thereafter drop into a low-power sleep mode, resulting in additional energy savings. Utilizing WOL, IT staff will be able to remotely wake computers to apply software patches and for other maintenance tasks.

Overall Savings

To compute its savings, DOE put its data through the FEC's Electronics Environmental Benefits Calculator (www. federalelectronicschallenge.net/resources/bencalc.htm.[1]) What was remarkable was how important CPM was to the department's overall FEC savings. CPM was by far the largest driver of savings, accounting for 80% of the total benefits. For all of its efforts to save energy and prevent waste with electronics, DOE reaped $16 million in direct savings for fiscal year 2008. That equates to 33,000 metric tons of avoided CO2 emissions. To achieve these savings, DOE implemented CPM in 92% of its facilities, which accounted for more than 95% of its 150,000-plus work stations.

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[1] To estimate the savings you might expect from your monitor and computer power management implementation, see the ENERGY STAR Low Carbon IT online savings calculator at www.energystar.gov/lowcarbonit.