

Technical White Paper



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Manage, Monitor, and Report: Implementing a Power Management Strategy with System Center Configuration Manager 2007 R3

Technical White Paper

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Situation

Microsoft is committed to an ambitious goal of cutting its enterprise carbon emissions by 30% over a five-year period. To help contribute to this goal, Microsoft IT wanted to build on its System Center Configuration Manager 2007 desktop management infrastructure to implement a flexible and centralized power management solution. MSIT also wanted to fully leverage power management capabilities in products such as Windows 7. The solution needed to effectively manage, monitor, and report client power utilization across the enterprise.

Solution

Using System Center Configuration Manager 2007 R3, Microsoft IT deployed a power management solution to 165,000 desktop and laptop computers. Through new tools that enable centralized management, powerful reporting, and a deep understanding of current power settings, MSIT realized significant energy and cost savings. The solution provides a high degree of flexibility, and different levels of enforcement. In addition to delivering on power usage and carbon reduction goals, the solution also delivers on the Microsoft IT-specific goal of driving product feedback to deliver a successful power management product.

Benefits

- 27 percent drop in the amount of power used by the managed desktop computers
- 12.33 kilowatt hours per desktop computer per month savings
- A projected savings of \$12 - \$14 USD per desktop computer per year, based on currently reported data
- Centralized power management and enhanced reporting capabilities
- Leveraging existing client management infrastructure minimizes cost and expense

Products & Technologies

- System Center Configuration Manager 2007
- System Center Configuration Manager 2007 R3

EXECUTIVE SUMMARY

According to most experts, the IT industry contributes two percent of the world's carbon emissions. Microsoft® is committed to reducing its own, and the global IT carbon footprint. Software and technology innovations from Microsoft enable people and organizations worldwide to reduce their impact on the environment. In addition to providing key technologies and solutions that help support 'Green IT' initiatives, many Microsoft customers can learn valuable lessons from the Microsoft IT deployment and management experience of those same solutions and technologies.

The purpose of this white paper is to describe how Microsoft IT (MSIT) successfully deployed Microsoft System Center Configuration Manager 2007 R3 to provide a centralized power management solution to 165,000 physical client desktop and laptop computers across the enterprise. The paper shows how Microsoft IT leveraged System Center Configuration Manager 2007 R3 to implement a cohesive power management strategy that takes full advantage of the native power management features integrated into products such as Windows® 7, Windows XP, and Windows Vista®.

By deploying Configuration Manager 2007 R3, Microsoft IT added centralized client power management tools and reporting functionalities to its existing Configuration Manager 2007 client management hierarchy. The solution builds on existing Configuration Manager 2007 capabilities, including software distribution and hardware inventory capabilities. Configuration Manager 2007 R3 provides centralized, console-based administration of power management settings and policies, and delivers robust power management reports.

With Configuration Manager 2007 R3, MSIT now has the ability to more deeply understand the current power settings environment, assess power saving opportunities, and centrally manage client system power settings. All of these capabilities help to realize energy and cost savings.

Intended for technical decision makers, and other IT professionals that are interested or involved in environmental sustainability, or Green IT initiatives, this paper describes the Configuration Manager 2007 architecture that Microsoft leveraged to enable the solution. This paper details the Configuration Manager 2007 R3 deployment, placing special emphasis on defining the power management strategy, and the realized benefits of implementing an enterprise-wide power management solution.

It is important to note that this document should not function as a deployment roadmap. Organizational operational environments differ, and the unique needs of individuals and operational criticalities should be considered. The goal is to define a suitable power management strategy that produces net power savings, without compromising user productivity.

Note: *For security reasons, the sample names of forests, domains, internal resources, organizations, and internally developed security file names used in this paper do not represent real resource names used within Microsoft and are for illustration purposes only.*

INTRODUCTION

Microsoft has built energy saving features directly into its products and offers solutions such as virtualization and collaboration tools. Virtualization products reduce electrical power consumption within datacenters, reduce hardware acquisition costs, automate desktop and server management, and centralize application deployment. At Microsoft, the use of collaboration products and technologies, such as video conferencing, Microsoft Office Live Meeting, Microsoft Office Communications Server, Microsoft Office Groove®, and Microsoft Office SharePoint® Server have reduced the need for business travel, saving money and reducing greenhouse gas emissions.

Microsoft has committed to the goal of reducing its own carbon emissions per unit of revenue by at least 30 percent compared with 2007 levels by 2012, and has implemented supporting environmental sustainability initiatives, such as:

- Virtualization of enterprise servers and applications
- Development and deployment of collaboration tools and telework technologies supported by an evolving business climate that supports remote collaboration, with the goal of reducing business related travel by 30 percent
- Establish product provisioning standards and PC Recycling through well-defined refurbishment channels

With the release of Configuration Manager 2007 R3, Microsoft IT was able to implement a comprehensive power management solution that leveraged and centrally administered power management capabilities in products such as Windows 7, Windows XP, and Windows Vista.

At the same time, MSIT wanted to improve its ability to manage client computers. Most MSIT customers were changing their default power settings within 30 days of receiving a new computer. In addition, MSIT could not effectively report on power usage. MSIT wanted to build on its existing System Center Configuration Manager 2007 desktop management infrastructure to implement a flexible and centralized client power management solution.

System Center Configuration Manager 2007 Architecture at Microsoft

Microsoft IT has used System Center Configuration Manager 2007 to manage the majority of desktop clients for several years. Distributed geographically, the hierarchy is comprised of a central site and five child primary sites. Globally, the hierarchy covers approximately 255,000 active physical and virtual, desktop and laptop computers. Configuration Manager 2007 client management services include:

- Security updates management
- Software distribution
- Asset management
- Operating system deployment
- Desired configuration management

The following diagram represents the Configuration Manager 2007 hierarchy at Microsoft. It also shows the total number of client computers managed by each site.

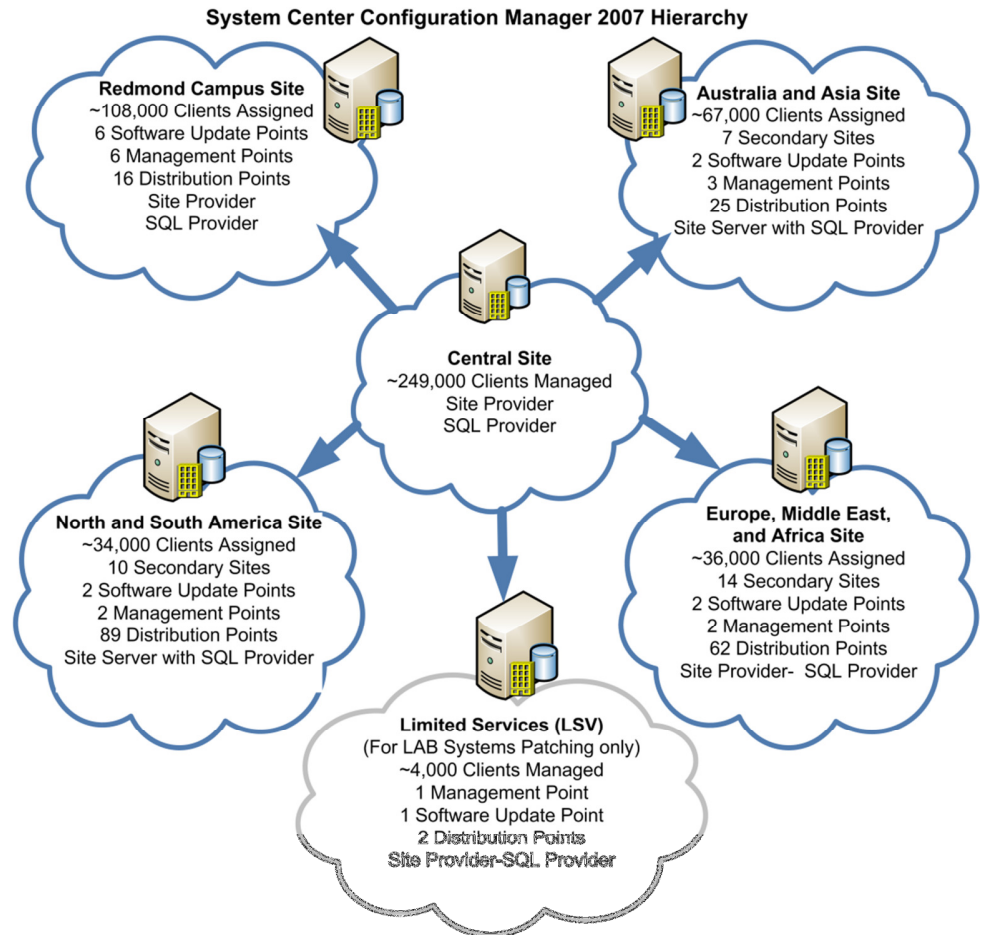


Figure 1. System Center Configuration Manager 2007 Hierarchy

Note: The count and percentage details highlighted in this white paper are constantly evolving. This white paper reflects data gathered in July and August 2010.

Not shown in the above diagram is a separate beta deployment site, also referred to as dogfood. The dogfood site manages about 6,000 client computers, contains a primary site, and provides a test environment.

Distribution by Operating System

The majority of client computers at Microsoft run Windows 7. However, a substantial number of client computers run Windows Server®. Typically, these computers are used for development and test purposes. A small percentage of computers run earlier Windows operating systems. The following diagram represents the MSIT managed client desktop and laptop operating system distribution.

Microsoft IT - Machine Distribution By Operating System

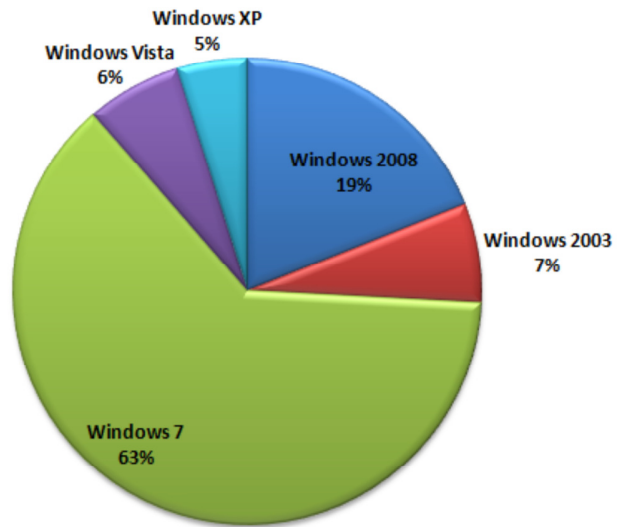


Figure 2. Distribution of client operation systems at Microsoft

SITUATION

Before the availability of Configuration Manager 2007 R3, Microsoft IT recognized the need for a comprehensive power management solution. MSIT relied primarily on providing recommended client power saving settings through standard installation images, which were included on new desktop and laptop computers. The same operating system installation images are also available for download and installation from other locations on the corporate network.

Because of the growing importance of environmental sustainability, MSIT made queries to determine the percentage of users that were changing their standard settings. MSIT found that up to 80 percent of users were changing their power management settings within 30 days.

With the exception of a one-time program that enforced display or monitor time-out settings managed through a Group Policy Preference Mode available in Windows Vista, Microsoft IT did not have a formal implementation of client power management.

In addition to wanting to utilize the native power management capabilities in products such as Windows 7, Windows XP, and Windows Vista, and manage client power settings through a centralized solution, MSIT believed that increasing awareness through the organization, and down to individual users, could also significantly reduce power waste. The tools in place before the deployment of Configuration Manger R3 could not report on current client power settings, nor could they report whether client computers were wasting energy.

MSIT wanted to provide awareness through the management and reporting of client power settings. The solution needed to be flexible enough to accommodate partial enforcement on client computers, while easily allowing clients to be exempted from or added into the client power management program.

SOLUTION

Configuration Manager 2007 R3 offered Microsoft IT an opportunity to add client power management and power activity reporting functionality to the existing client management hierarchy. Configuration Manager 2007 R3 allowed MSIT to centrally manage the power settings of client systems, gain a deeper understanding of the current power settings environment, and assess power saving opportunities. All of these capabilities helped MSIT to realize significant energy and cost savings.

Pilot Deployment

Before rolling out client power management to the entire enterprise in early 2010, MSIT deployed a pilot. The pilot deployment included 6,000 users in the dogfood site, and provided feedback from key stakeholders. Based on the feedback and pilot results, MSIT refined its strategy and settings for the broader production deployment. For example, the standard Windows 7 installation images established a 30-minute time-to-sleep setting. For the pilot, MSIT initially enforced a 60-minute time-to-sleep setting for all of the participating computers during both peak and non-peak hours. For the production deployment, computer power settings were unchanged, as long as the existing settings were better than those that would be enforced.

A number of users that had extended their computer power settings from the installation image settings provided initial feedback that the pilot's 60-minute time-to-sleep setting might not be adequate during peak business hours. Microsoft IT addressed the issue with a two-pronged approach.

1. Allow people to opt-out of enforcement entirely by providing one or more legitimate business reasons.
2. Extend the peak hour time-to-sleep setting to six hours to help retain participation of users that were not accustomed to, or felt inconvenienced by, the modified power settings. For the broader deployment, a plan was created to, over the course of several months, gradually enforce more aggressive power settings and implement communication deliverables to effectively reach users and encourage continued participation.

Even an extended time-to-sleep power setting on some client computers represented an improvement, as many computers had been configured to never go to sleep. The flexibility of maintaining multiple power plans for peak and off-peak hours allowed for optimal power savings during off-peak hours, while providing MSIT an opportunity to measure incremental setting changes against user impact during peak hours.

Production Deployment

The production implementation of Configuration Manager 2007 R3 involved five phases:

- Infrastructure Upgrade
- Communication and User Preparation
- Monitor and Plan
- Enforcement
- Compliance Reporting

Infrastructure Upgrade

Before leveraging Configuration Manager 2007 R3 power management, monitoring, and reporting capabilities, client and server component installations were required. MSIT upgraded approximately 40 servers to Configuration Manager 2007 R3. Similar to other Configuration Manager infrastructure upgrades, Microsoft IT began with the central site in the hierarchy, and then moved onto all child primary sites, and secondary site servers.

The following were installed within the Configuration Manager 2007 hierarchy:

Server Role	Installed
Site Server (Primary Site)	Prerequisite Hotfix (KB 977384) and R3
Site Server (Secondary Site)	Prerequisite Hotfix (KB 977384) and R3
Provider (if on remote server)	Prerequisite Hotfix (KB 977384)
Management point Distribution point Software update point SQL Database Server (if remote)	Nothing installed
Admin Console	Prerequisite Hotfix (KB 977384) and R3

Table 1. Configuration Manager 2007 R3 components installed during infrastructure upgrade

Note: For detailed steps about the Configuration Manager 2007 upgrade procedures, please refer to the Configuration Manager 2007 documentation library at <http://technet.microsoft.com/en-us/library/bb680651.aspx>

After the server infrastructure upgrade, MSIT deployed an upgrade to 255,000 Configuration Manager 2007 SP2 computers. The upgrade package was created when Configuration Manager 2007 R3 was installed on the Configuration Manager Site Server. Microsoft IT used the software distribution feature to install the upgrade on client computers. The upgrade installed the necessary components for the power management client agent.

With the upgrade complete, MSIT performed the following tasks on the site server to enable power management:

- Enable the power management client agent.
- Import Power Management Reports onto the Reporting Site Server.

Finally, client computers began reporting power management data as part of the Configuration Manager 2007 R3 hardware inventory scan.

Communication and User Preparation

Microsoft IT created a communication plan that supported two main objectives:

1. Drive awareness.
2. Allow users adequate time to decline participation in the program, prior to enforcement.

MSIT communicated several key points to customers. First, client power management efforts align with and support the Microsoft IT goal to reduce carbon emissions by 30 percent.

Second, client power management can reduce client computer power consumption, which in turn reduces both the carbon footprint and operational expenses. Finally, client power management makes sense and is the right thing to do.

Microsoft IT established a four-week period between initial communications and the enforcement of the power management settings. One to two weeks before enforcement, customers received reminder e-mails. IT Communications worked closely with local IT managers to create communications, which enabled regional localization of messages.

Clear communication about whom the program affected, the extent of impact, and a link to a process to decline participation were critical to the success of the program. Even though the majority of users would perceive little or no impact, it was key that they reach the few that might.

Monitor and Plan

Monitoring and planning required effective baseline data gathering. After the infrastructure upgrade, and before enforcement, Microsoft IT collected client baseline data for four weeks. The time period assured an adequate amount of data for qualitative and comparative analysis after enforcement began.

Monitoring

The monitoring process allowed MSIT to gain an understanding of the existing usage patterns of users. The baseline data also enabled MSIT to plan a roadmap to achieve power management policies that aligned or exceeded industry standard settings, including those recommended by Energy Star and Climate Savers. Energy Star standard settings turn off the display after 15-20 inactive minutes, and put the computer in sleep mode after 30-60 inactive minutes. Data showed that 34 percent of computers were non-compliant for the display setting, and 62 percent of computers were non-compliant for the sleep setting.

Power Policy Planning

Configuration Manager 2007 R3 provides the flexibility to leverage standard Operating System power management features. Alternatively, customized plans can meet specific organizational requirements, as was the case for Microsoft IT. Updates to the Configuration Manager collection structure helped target custom power plans based on device type and business hours.

While planning power policies, MSIT created different power plans for peak and off-peak business hours. User activity patterns from power management reports provided the data to establish peak business hours. MSIT designated peak business hours between 7:00 A.M.-7:00 P.M. in each region's local time. The peak hours plan has a higher value for sleep setting than the off-peak hours plan.

MSIT began its broad rollout with a conservative six-hour time-to-sleep setting during peak business hours to start comparing actual power savings against user impact. MSIT plans to incrementally enforce lower time-to-sleep settings during the next several months. Results of the previous settings will determine the next settings enforced, with a goal of finding the optimal balance between energy savings and end user productivity.

Based on monitoring, Microsoft IT defined the following initial power settings for the client environments:

Power Setting	Power Plan Applicable	Power Setting Values	
		Plugged-In	Battery
Display After	Customized Peak and Off-Peak Plan	20 min	10 min
Sleep After	Customized Peak plan - Peak hours (7:00 A.M.-7:00 P.M.)	6 hours	15 min
Sleep After	Customized Off-Peak plan – Off-Peak hours (7:00 P.M. -7:00 A.M.)	60min	15 min

Table 1. Power settings defined for the Microsoft IT client operational environment

MSIT determined that about 38 percent of client computers had better power management settings than those enforced through Configuration Manager 2007 R3. A key strategy excluded those computers from Configuration Manager 2007 R3 enforcement, as long as they remained in the same state.

Desktop and laptop-specific settings factored into the power management logic. Software update timing influenced the timing of wake-up timers in the power management policy. Wake-up timers can only be set for desktop computers. Another key desktop computer setting was Hybrid Sleep, which was enabled. For laptops, enabling Hybrid Sleep disables the Hibernate option. Because of this, Hybrid Sleep was disabled for laptops.

Power Policy	Laptop	Desktop
Self-wake-up	Not Applicable	3:00 A.M.
Hybrid Sleep	Disabled	Enabled

Table 2. Power setting differences between desktop and laptop computers

Enforcement phase

During the enforcement phase, Microsoft IT completed the following tasks:

- Configure power settings as part of the appropriate power plans.
- Associate the power plans at the collection level.
- Identify target computers for enforcement, and plan for exceptions.
- Enforce power management on the 165,000 client computers that were eligible for client power management.

The enforcement strategy accommodated the following conditions:

- Separate enforcement for desktops and laptops.
- Segregate clients with better settings.
- Segregate sleep and display enforcement.
- Exclude incapable computers.
- Exclude clients who decline participation.

Identifying target computers

Computers compatible with Configuration Manager 2007 R3 support the following power states:

- Sleep
- Hibernate
- Wake from sleep
- Wake from hibernate.

MSIT determined that 31 percent of client computers were incompatible for power management and identified those computers as Incapable.

Virtual machines are incompatible for power management and desktops running Windows Server operating systems may not be compatible, depending on the role of the server and server features installed. MSIT determined that laptops and desktops with the following configurations were incompatible for power management:

- Windows Server 2008 with Hyper-v role enabled
- Some legacy hardware
- Capable hardware with power management features disabled in BIOS
- Virtual Machines

The remaining base population consisted primarily of Windows 7 computers. Three percent of the Windows 7 population were disqualified because they were obsolete, or because their BIOS did not support power management.

Exception Process

Microsoft IT created an exception process that allowed users to decline participation if their computers performed critical business functions. Examples include computers that manage electrical equipment, terminals used for the constant projection of information, and computers that run critical nightly jobs. Users needed to provide a valid business justification for declining participation. MSIT made participation the default so that users would have to consciously decline.

Designing the Collection Structure

Designing the collection structure that mapped to the enforcement strategy was a key activity. The following graphic shows the design of collection structure and collection criteria adopted by MSIT.

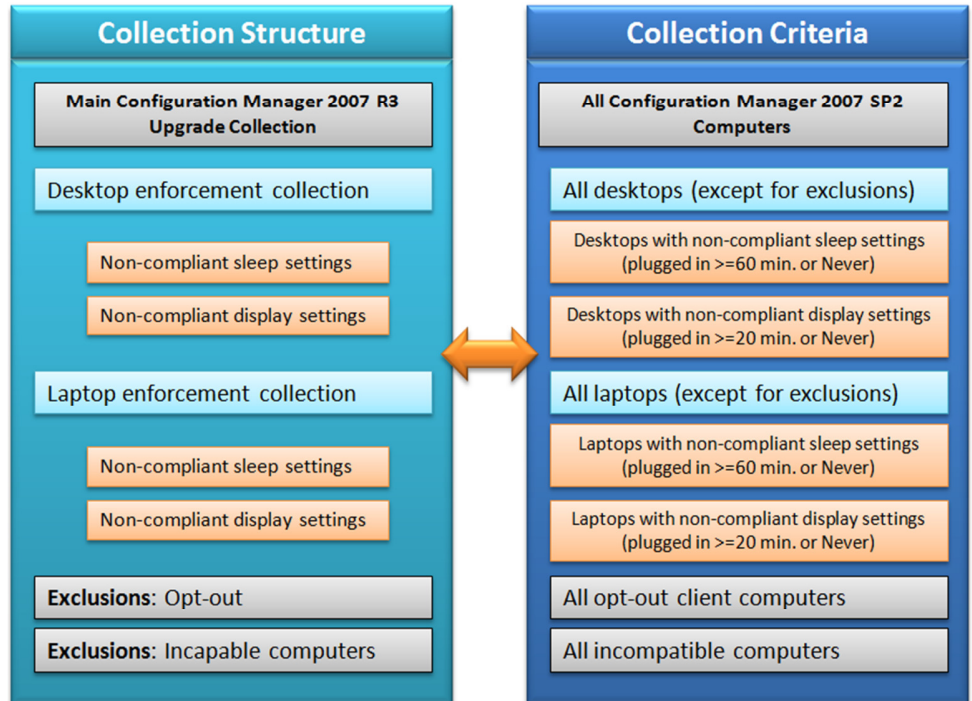


Figure 3. Collection structure and collection criteria

The collection structure and criteria illustrated above are specific to the MSIT environment. For example, the non-compliant sleep and display rules for desktops and laptops may not be required for all enforcement strategies. A simpler strategy could enforce power plans for all applicable client computers without any segregation.

Every collection in the structure allowed for two power plans. MSIT applied different power plans for peak and non-peak hours. The power plans exposed 15 different power management settings for various configurations.

Once configured, a Configuration Manager 2007 R3 policy delivered the settings to the 165,000 computers that were eligible for client power management. The process was similar to a software distribution or a software update policy. After turning on enforcement, all computers received their power management settings during the next hourly computer policy refresh cycle. In turn, Configuration Manager 2007 R3 power plans leveraged the Windows power management capabilities to apply the power settings.

Compliance Reporting

The compliance reporting process compared data before and after enforcement. Microsoft IT utilized default reporting options in Configuration Manager 2007 R3. Review of daily and monthly reports on Power Consumption, Power Cost, and Environmental Impact helped quantify the power management benefits. Using these reports, MSIT determined the number of client computers that had power policies applied during enforcement, the number impacted, and those computers that failed to report data.

Since the reports are collection based, MSIT also planned the collection structure based on reporting and validation requirements. Several reports helped to troubleshoot and take corrective actions, such as the Power Computer Activity and the Power Insomnia reports.

In addition to default reports, Microsoft IT built a custom reporting data warehouse to meet business requirements not covered by the collection building approach. Requirements included power management details by country, by business division, and even by building. Configuration Manager 2007 R3 retains daily reports for 31 days and monthly reports for 12 months. To retain the reports for a longer duration, MSIT created a separate report retention environment using a SQL Server 2008 Data Warehouse.

The next sections show default reports populated with actual Microsoft IT data. This demonstrates the actual savings after client power policies were enforced.

Power Environmental Impact Report

This report displays a graph showing carbon dioxide emissions saved by a group of computers selected through a given collection either for a month or for a number of months.

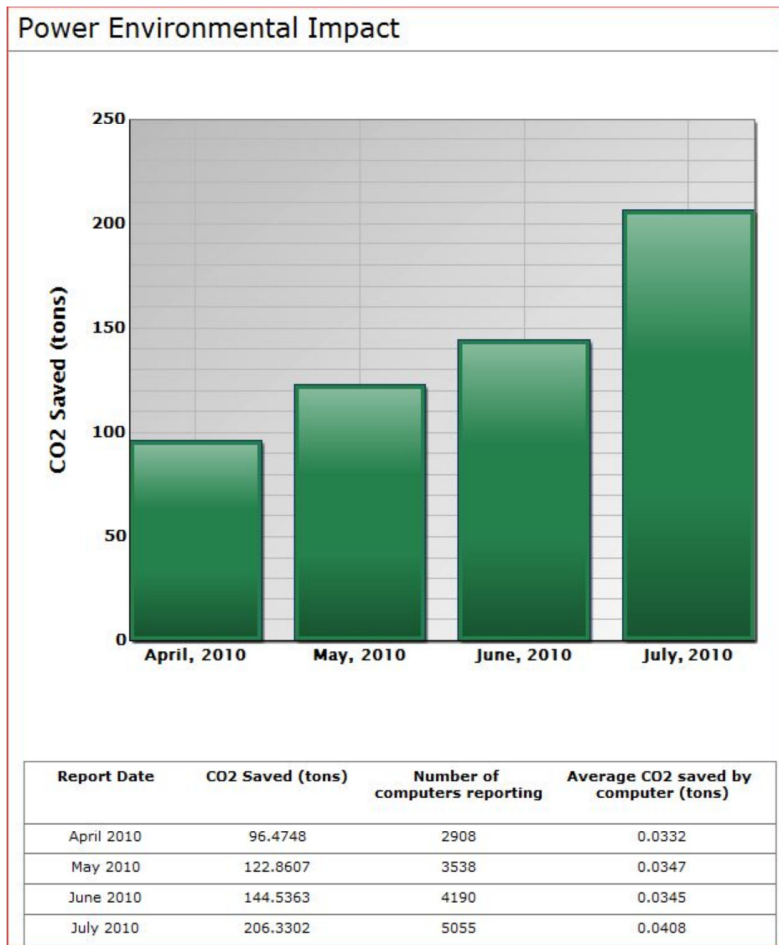


Figure 4. Power Management Environment Impact monthly report

The graph displays CO2 tons saved for a number of computers from April to July, including their average savings per month. This report, like other Configuration Manager 2007 R3 reports, utilizes only those computers considered active.

Microsoft IT also leveraged a daily report on environmental impact, which displays the CO2 savings for a group of computers selected through a collection for the past 31 days.

Power Capabilities Report

This report displays the power management capabilities of client computers in a specified collection. Incapable, capable, or both can be displayed.

Computer Name	OS	Sleep	Hibernate	Wake from Sleep	Wake from Hibernate
000	Microsoft Windows Server 2008 R2 Enterprise	✘	✘	✘	✘
000	Microsoft(R) Windows(R) Server 2003 Standard x64 Edition	✘	✔	✘	✘
000	Microsoft(R) Windows(R) Server 2003 Standard x64 Edition	✘	✔	✘	✘
000	Microsoft(R) Windows(R) Server 2003, Enterprise Edition	✘	✘	✘	✘
000	Microsoft Windows XP Professional	✘	✘	✘	✘
000	Microsoft Windows XP Professional	✘	✔	✘	✘
000	Microsoft(R) Windows(R) Server 2003, Standard Edition	✘	✘	✘	✘

Figure 5. Power Capabilities report

Incapable desktop or laptop computers do not support any or all of the power states depicted above. The capability information provided by this report allows organizations to identify issues and take corrective actions.

Power Computer Activity Report

This report displays a graph showing monitor, computer and user activity for a specified collection over a 24-hour period. Below is a snapshot of the report taken before and after power policies were applied.

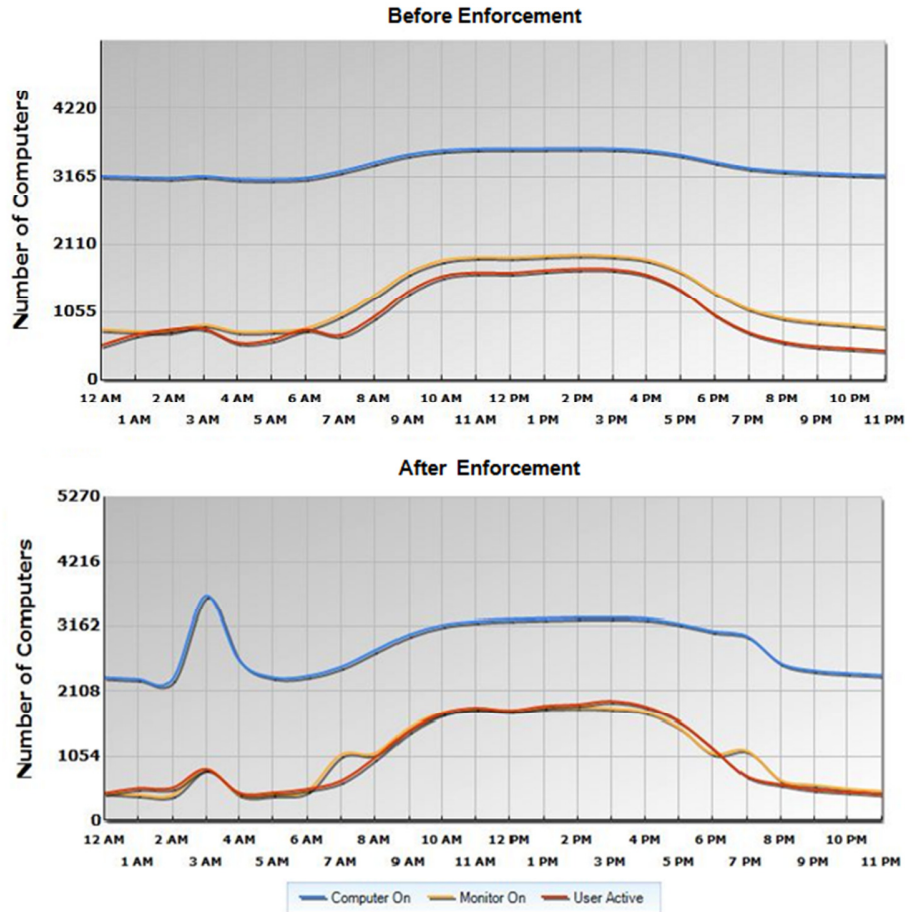


Figure 6. Power computer activity before and after enforcement

The graph indicates that computers powered on followed the pattern of active users and monitors powered on. Before enforcement, in off-peak hours the number of active computers stabilized at approximately 3,100. After enforcement, the off-peak hours trend dropped down to approximately 2,000-3,000, indicating that desktops went to sleep. The usage increase at 3 A.M. indicates that desktops woke up to receive updates, before going back to sleep again.

Power Consumption Report

This report shows the total power consumption for all computers and average consumption per computer for a specified collection, over a defined time period.

Power policies were enabled in July 2010. In the snapshot, the July 2010 per computer average was less than the other months, even though a greater number of computers reported. The measurable reduction demonstrates the impact of the Configuration Manager 2007 R3 power saving policies.

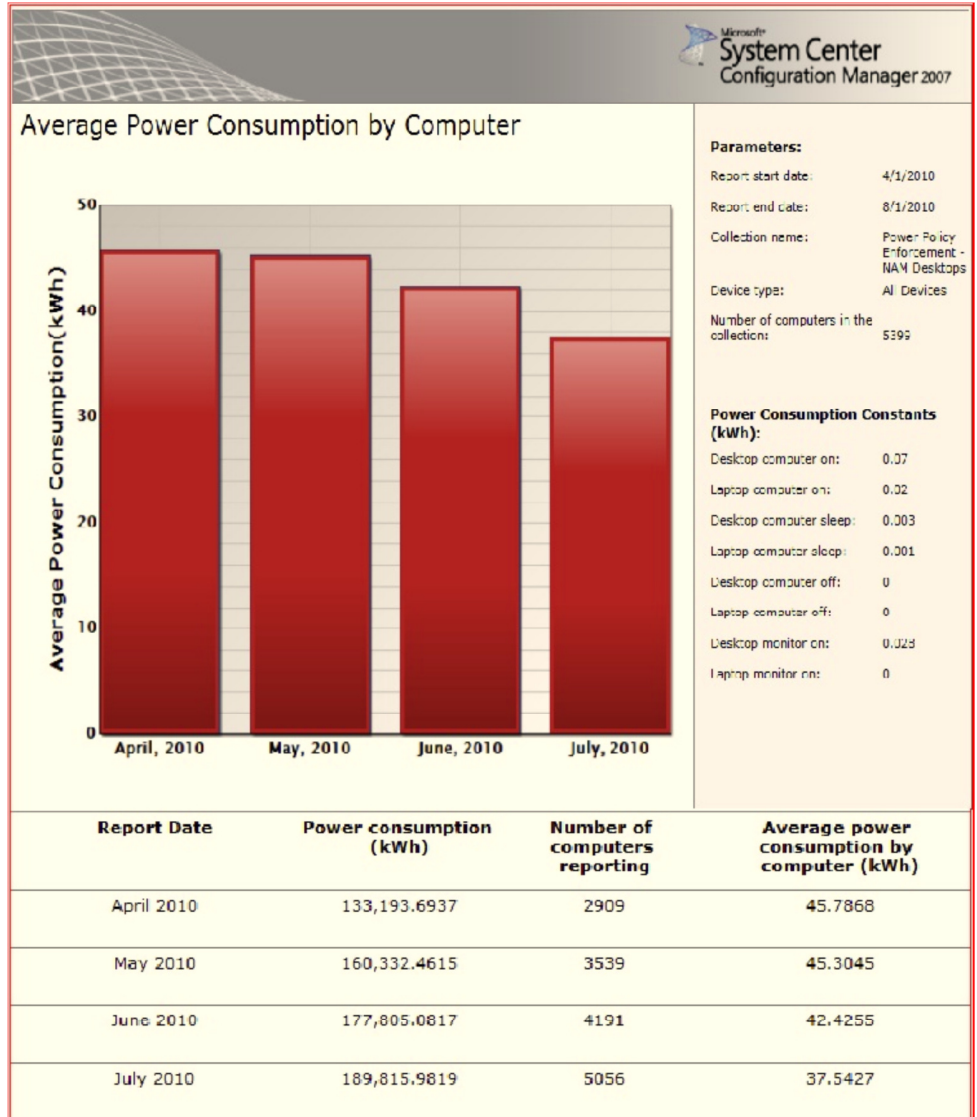


Figure 7. Power Consumption monthly report

In addition to the monthly consumption report, Microsoft IT also utilized a daily consumption report for the first 30 days after enforcement. The daily report displays power consumption data at a more granular level.

Power Cost Report

This report displays the total power consumption cost for a specified collection of computers over a specified duration. Microsoft IT found this dollar representation to the power consumption report useful in communicating cost savings.

Like other reports, this report has a daily component that reports the power cost value for total power consumption of a specified collection over the past 31 days.

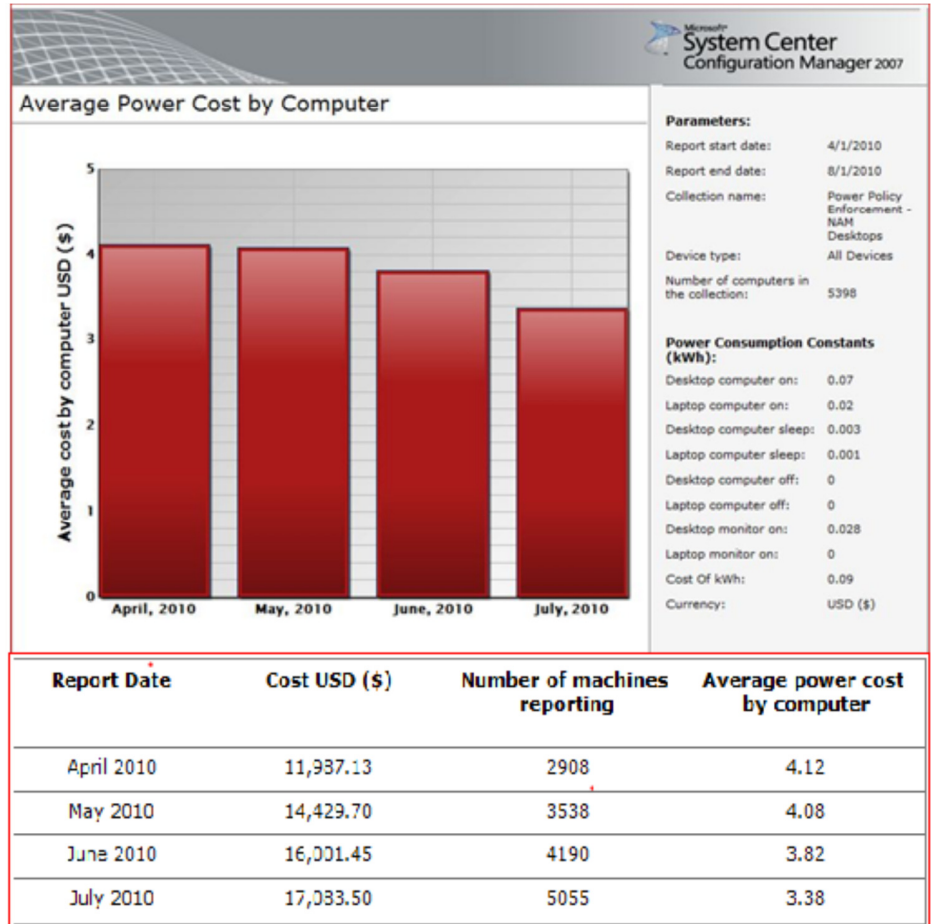
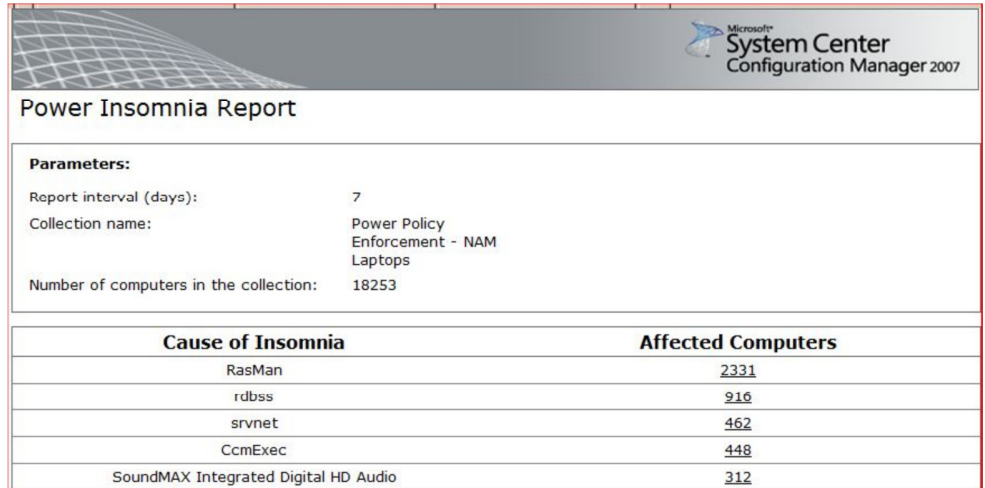


Figure 8. Power Cost report

Power Insomnia Report

Microsoft IT used this report for troubleshooting and fine-tuning. It displays a list of applications that prevent a machine from sleeping or hibernating, also referred to as insomnia.



Microsoft System Center Configuration Manager 2007	
Power Insomnia Report	
Parameters:	
Report interval (days):	7
Collection name:	Power Policy Enforcement - NAM Laptops
Number of computers in the collection:	18253
Cause of Insomnia	Affected Computers
RasMan	<u>2331</u>
rdbss	<u>916</u>
srvnet	<u>462</u>
CcmExec	<u>448</u>
SoundMAX Integrated Digital HD Audio	<u>312</u>

Figure 9. Power Insomnia Report

The report captures the last registered application that caused machine insomnia within the seven-day period. Microsoft IT was then able to narrow the scope of the duration to identify which applications affected a larger machine population and plan for corrective actions.

BENEFITS

Because MSIT leveraged existing Configuration Manager 2007 hierarchies, the power management solution implemented with Configuration Manager 2007 R3 helped Microsoft IT save on energy costs while minimizing effort and expense.

Currently the entire capable, qualified client computer population at Microsoft is under Configuration Manager 2007 R3 enforcement. Since client power management enforcement began, Microsoft has realized the following results:

- A 27 percent drop in the amount of power used by the managed desktop computers.
- 12.33 kilowatt hours per desktop computer per month savings.
- A projected savings of \$12 - \$14 USD per desktop computer per year, based on currently reported data.

Cost savings are based on the power constants exposed through default reports. The power management savings are a result of avoiding idle power consumption that would otherwise occur during off-business hours, weekends, or long inactive periods.

The Configuration Manager 2007 R3 reporting functionality provides Microsoft IT with information that can be leveraged to further improve power savings. Microsoft IT has reported savings realized by Configuration Manager 2007 R3 in two ways. One is power consumption reduction per computer, which equates to monetary savings. The other is carbon emission reduction per computer, expressed as CO2 savings.

Actual savings can vary, depending on implemented power policy values and other factors, such as the constants used for calculation and geographical differences in the cost of electricity. The following description may provide some guidance.

Default reports, such as 'Power Cost' and 'Power Environmental Impact' can derive the average savings per computer, per month in terms of kWh, dollars, and CO2 saved in tons. The reports complement each other, as they provide different views of common savings data. While 'Power Cost' is a dollar view of power consumption, 'Power Environmental Impact' represents CO2 savings. For example, one kWh reduction yields 0.0015 tons in CO2 savings. By identifying the difference in average values per computer before and after enforcement, savings can be quantified against the enforced base.

BEST PRACTICES

Microsoft IT captured a number of best practices during the Configuration Manager 2007 R3 planning and deployment. The following reflect lessons learned, what worked well, and what required improvement.

- **Pre-deployment baseline determination is critical to measuring project success.** To ensure enough data for a meaningful analysis, data gathering should continue for an adequate amount of time before enabling client power management policies. This depends on hardware inventory cycles and the amount of comparison data desired. Microsoft maintains a three-day hardware inventory reporting cycle. With these conditions, it became a best practice at Microsoft to gather data for a period of four to six weeks prior to enabling power management policies. Configuration Manager 2007 R3 monthly reports were more effective because of the appreciable baseline period.
- **Reduce collection complexity.** Minimize the number of collections. This reduces complexity in the configuration of power plans, reporting, and troubleshooting.
- **Plan for an exception process to accommodate exclusions of business critical computers.** Because not all computers can be included in a client power management program, a structured exception process is key to identifying and excluding those computers.
- **Carefully consider results of the pilot programs.** Finalize power management settings by carefully considering pilot results. Also, consider feedback from stakeholders and end-users about their business requirements and their experience during the pilot.
- **Consider other initiatives.** It is important to understand other client desktop or laptop initiatives. This understanding helps avoid potential functional conflicts. In addition, introducing multiple changes at once can significantly impact user productivity.
- **Create a structured communication and feedback mechanism.** A structured communication plan and feedback mechanism helps to ensure transparency, and minimizes impact on user productivity. A communication channel in addition to e-mail can help communicate program objectives. Microsoft IT built out an intranet website, which included program objectives, the phased deployment schedule, answers frequently asked questions, exception process information, and a link to the formal exception application process.
- **Communicate clearly and concisely.** Consider planning the number and frequency of communications in advance. This helps to ensure reach and thoroughly prepare users for any changes and potential impact.

CONCLUSION

The adoption of a client power management initiative based on Configuration Manager 2007 R3 helped Microsoft IT realize improvements in client computer power usage, reduce carbon emissions, and reduce cost.

Configuration Manager 2007 R3 enables Microsoft IT administrators to make informed decisions. Data collected by Configuration Manager 2007 R3 provides MSIT administrators with the knowledge of existing trends and settings, and the necessary tools to make educated decisions about power settings. Looking forward, MSIT will further adjust the power management policies to contribute to the success of the Microsoft Green IT commitment.

The powerful reports generated by Configuration Manager 2007 R3 help to support projects by vividly illustrating the energy, cost, and CO2 savings realized through adoption of power management. The power management capabilities of Configuration Manager 2007 R3 are a strategic tool in helping organizations to lower their power costs and achieve their Green IT goals.

FOR MORE INFORMATION

- For detailed steps about the Configuration Manager 2007 upgrade procedures, refer to: <http://technet.microsoft.com/en-us/library/bb680651.aspx>
- System Center Configuration Manager 2007 R3 home page: <http://www.microsoft.com/systemcenter/en/us/configuration-manager/cm-r3.aspx>
- Configuration Manager 2007 R3 – upgrade procedures: <http://technet.microsoft.com/en-us/library/ff977066.aspx>
- Configuration Manager 2007 R3 – Data sheet: http://download.microsoft.com/download/0/A/C/0AC0350B-296E-4A9E-A0D4-9A7CA47E33EE/SC_Power_Management_DS_final.pdf
- To read about how Virtualization saves Microsoft customers nearly a half-million dollars per year, visit <http://www.microsoft.com/presspass/press/2009/feb09/02-09VirtualizationSavingsPR.mspix>.
- To download a whitepaper that discusses achieving cost and resource savings through Unified Communications, visit <http://download.microsoft.com/download/0/8/3/0839AB32-2EE5-4CB8-B488>.

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