



PC Power Management: Group Policy Controls and Beyond

Whitepaper

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PC Power Management: Group Policy Controls and Beyond

You need a power management strategy. Can you do it all with only the tools in the box?

By Jeremy Moskowitz. Moskowitz, Inc., Microsoft MVP

Executive Summary

A business's bottom line is more important than ever. It doesn't take a genius to know that when your company uses less electricity you save energy, and save on overall company costs.

The in-the-box tools you can utilize for workstation and laptop Power Management are a good start, but can they go far enough to help realize true gains, flexible reporting, and granular management?

This paper focuses on how IT Practitioners and IT Managers can leverage the in-the-box tools using Group Policy to get started saving energy and money, and also learn the limitations of those tools and other options to fill the gaps.

Challenge

The goal of the IT department is to try to align itself with the goals of the business. Many businesses are trimming as much fat as they can, without cutting into the bone.

Indeed, more than ever, a business's primary goal is to keep running, saving costs whenever possible, and leveraging IT technology to automate the process whenever possible.

Active Directory administrators have long enjoyed the benefits of its Group Policy mechanism. Group Policy is a settings delivery mechanism that can ensure the configuration of the desktop, look-and-feel settings, security settings and, more recently, power management settings.

Savvy IT administrators would be wise to get to know Group Policy at a deeper level, since it usually touches every PC (and possibly every Mac) in the company. However, what's also true is that Group Policy isn't always able to fulfill the needs of all IT administrators and managers.

Let's start out with exploring what power management capabilities are in the box using Group Policy, what works, and what needs work.

“Group Policy isn't always able to fulfill the needs of all IT administrators and managers”

Group Policy 101 and Group Policy Preferences 101

You're already using Group Policy on every PC in your Active Directory. That's a fact.

Even if you're not actively taking advantage of its fullest potential, you're at least using it to set some baseline security standards, daily, to your computers and users.

Group Policy has two basic moving parts: The Group Policy Object (GPO) and the Client-Side Extension (CSE):

- ▶ The GPO stores the “directives” for your clients to perform.
- ▶ The CSE is the mechanism on the client that embraces the GPO and performs the directives.

Administrators interface with Group Policy using the Group Policy Management Console, or GPMC. This is how

they create GPOs containing directives, and how clients pick up those directives with the CSEs to process and perform.

Administrators can choose directives for a physical Active Directory site, the whole domain, or a specific Organizational Unit (OU) with optional child OUs. This basic flexibility helps admins control where their GPOs and policy directives will be delivered.

Group Policy’s policy settings can be delivered to either Users or Computers. But in most cases, the policy settings are unique to either the User or the Computer side. Group Policy’s strength is that in most cases, users are not able to work around set policies, because the user interface is locked out.

Group Policy Preferences is a newer addition to Microsoft’s Group Policy strategy. It gives administrators access to even more settings, including a wide variety of power management settings.

The Group Policy Preference CSE (the part that performs the directives) is built into Windows 7, but must be added to both Windows Vista and Windows XP. That is, the GPO directives will not be performed by either Windows Vista or Windows XP until the proper CSE is installed (more on this concept later).

It should be noted that Group Policy Preferences are dissimilar to Group Policy in one major, but significant, way. Even though it is the job of both Group Policy and Group Policy Preferences to make settings on client systems, only Group Policy performs a lockout of the user interface. Said another way, Group Policy Preferences settings can be undone by a user, as desired. It is true, however, that admins can choose to keep reapplying Group Policy Preferences to client systems. But, again, if a user wants to work around Group Policy Preferences settings, they are free to do so.

You can see a quick rundown of Group Policy and Group Policy Preferences in the following table:

Group Policy	Group Policy Preferences
CSEs built-in	CSE built-in for Windows 7. Need to install correct CSE for Windows XP and Windows Vista.
Performs UI lockout when clients process policy	Does not perform UI lockout when clients process policy. Users are free to work around.
Most Power Management settings on Computer side	Has same Power Management settings on User and Computer side

Exploring Group Policy and Group Policy Preferences Power Management Settings

In this section, we will take a brief survey of the power management capabilities of Group Policy and Group Policy Preferences.

My goal is not to provide a specific strategy for conservative power usage, but rather to express what’s possible using the Group Policy management tools that are available in the box, based on what operating systems you are using.

Tip: If you’d like to see one specific strategy for Group Policy Preferences power management check out Alan Burchill’s blog entry “How to use Group Policy Preferences to manage Windows Power Plans” found at <http://bit.ly/ABurchill>. They are good guidelines, but remember that your scenario could be different (more or less complex).

Group Policy Settings for Power Management

Group Policy settings for Power Management can be found by launching the Group Policy editor and leveraging the policy settings found at Computer Configuration | Policies | Administrative Templates | System | Power Management.

Inside, you'll find:

General Settings that allow you to:

- Select an Active Power Plan
- Specify a Custom Active Power Plan

Hard Disk Settings:

- Turn Off the Hard Disk (On Battery)
- Turn Off the Hard Disk (Plugged In)

Sleep Settings:

- Allow Applications to Prevent Automatic Sleep (On Battery)
- Allow Applications to Prevent Automatic Sleep (Plugged In)
- Allow Automatic Sleep with Open Network Files (On Battery)
- Allow Automatic Sleep with Open Network Files (Plugged In)
- Allow Standby States (S1-S3) When Sleeping (On Battery)
- Allow Standby States (S1-S3) When Sleeping (Plugged In)
- Require a Password When a Computer Wakes (On Battery)
- Require a Password When a Computer Wakes (Plugged In)
- Specify the System Hibernate Timeout (On Battery)
- Specify the System Hibernate Timeout (Plugged In)
- Specify the System Sleep Timeout (On Battery)
- Specify the System Sleep Timeout (Plugged In)
- Specify the Unattended Sleep Timeout (On Battery)
- Specify the Unattended Sleep Timeout (Plugged In)
- Turn Off hybrid Sleep (On Battery)
- Turn Off hybrid Sleep (Plugged In)
- Turn on the Ability for Applications to Prevent Sleep Transitions (On Battery)
- Turn on the Ability for Applications to Prevent Sleep Transitions (Plugged In)

Notification Settings:

- Critical Battery Notification Action
- Critical Battery Notification Level
- Low Battery Notification Level
- Reserve Battery Notification Level
- Turn Off Low Battery User Notification

Video and Display:

- Reduce Display Brightness (On Battery)
- Reduce Display Brightness (Plugged In)
- Specify the Display Dim Brightness (On Battery)
- Specify the Display Dim Brightness (Plugged In)
- Turn Off Adaptive Display Timeout (On Battery)
- Turn Off Adaptive Display Timeout (Plugged In)
- Turn Off the Display (On Battery)
- Turn Off the Display (Plugged In)
- Turn On Desktop Background Slideshow (On Battery)
- Turn On Desktop Background Slideshow (Plugged In)

Button Settings:

- Select the Lid Switch Action (On Battery)
- Select the Lid Switch Action (Plugged In)
- Select the Power Button Action (On Battery)
- Select the Power Button Action (Plugged In)
- Select the Sleep Button Action (On Battery)
- Select the Sleep Button Action (Plugged In)
- Select the Start Menu Power Button Action (On Battery)
- Select the Start Menu Power Button Action (Plugged In)

Tip: For more on “sleeping states,” as defined by Microsoft, check out an MSDN document at <http://msdn.microsoft.com/en-us/library/ms798270.aspx>.

You can see where these policy settings are located, as seen in Figure 1.

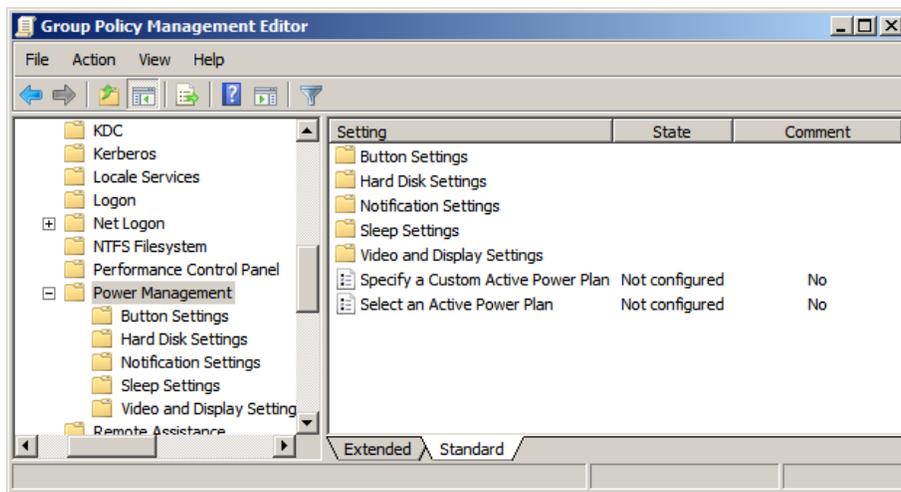


Figure 1: Group Policy settings for power management

This might seem like a lot of coverage and as if a lot of common situations are handled.

But note that every single Power Management policy setting listed above is exclusively for Windows Vista and greater (including Windows 7), with some only being available for Windows 7. This means that if you're trying to address power concerns for Windows XP machines, you'll need to manage them with the Group Policy Preferences (explored in the next section.)

Moreover, while there are specific policy settings that can allow or prevent the system from sleeping, the policy itself relies on the application knowing how to plug into that feature. That is, there is no way to specify which applications, when running, should prohibit the system from going into sleep mode. This could cause problems for computers running batch jobs and other time-critical functions when no one is present. Again, if the application doesn't support the power management feature, the policy settings are unable to help manage this particular problem. Additionally, there is no concern for preventing shutdown during backups, saving Microsoft Office files before shutting down or changing states, or other intelligent features.

Note that there is one Power Management-specific policy setting on the User side located at User Configuration | Policies | Administrative Templates | System | Power Management. That policy is named Prompt for password on resume from hibernate / suspend and will work on machines running Windows XP and greater.

Group Policy Preferences for Power Management

The Group Policy Preferences section of the Group Policy editor has Power Options settings for both Windows XP and Windows Vista (and later). And, these settings are able to be delivered to either the User or Computer side.

This provides a nice ability to dictate a specific group of settings for a collection of computers, or if you prefer, to dictate a specific way to control power usage for a collection of users.

In Figure 2, you can see how to use the Group Policy Preferences Power Options node to create a new Power Options, Power Scheme, or Power Plan item.

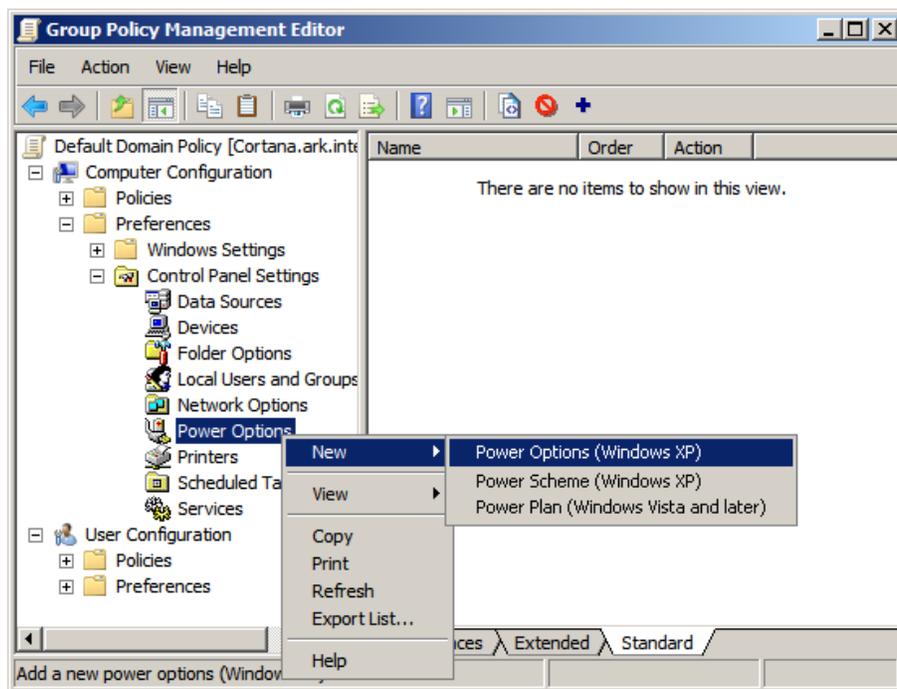


Figure 2: Group Policy Preferences settings for power options Power Plan Options for Windows XP

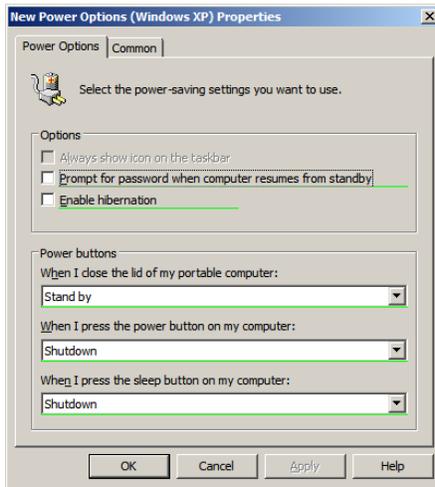


Figure 3: Group Policy Preferences—Windows XP power options Power Scheme Options for Windows XP

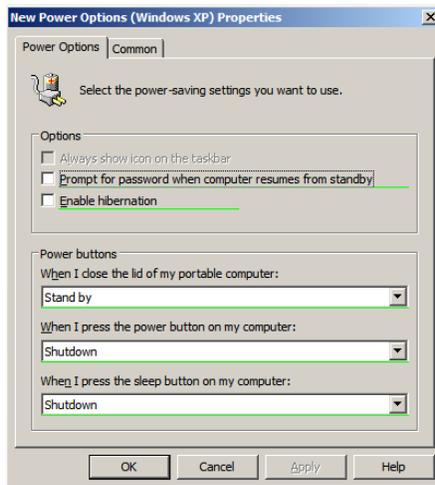


Figure 4: Group Policy Preferences—Windows XP Power Scheme Options

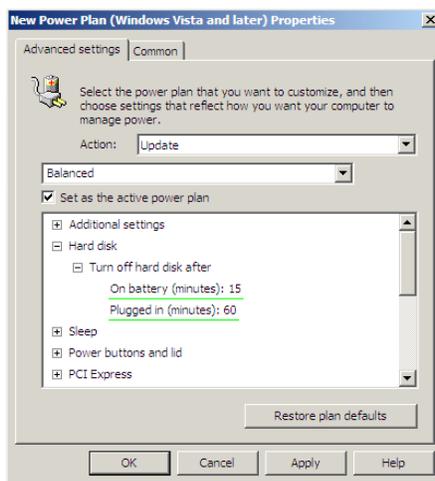


Figure 5: Group Policy Preferences—Windows Vista and Windows 7 Power Plan properties

Power Plan Options for Windows XP

Here, you can see the power options for Windows XP. You are able to specify activity items like what happens when the computer’s lid is closed or the power button is pressed.

Power Scheme Options for Windows XP

Using the Power Scheme Options for Windows XP, you can specify what pre-configured Power Scheme you want to use (in this case, the Home/Office Desk scheme) and alternatively dictate specific settings. For instance, you can specify when the hard disks should spin down when the computer is plugged in vs. when it’s running on batteries as seen in Figure 4.

Power Scheme can be delivered via Group Policy Preferences. In this case, regular users cannot manipulate the settings. However administrative users can immediately change them after delivery.

Power Plan Options for Windows Vista and Windows 7

In this example, you can see a Power Plan settings configuration for Windows Vista or Windows 7. The Power Plan for Windows Vista or Windows 7 replaces the Windows XP Power Options and Power Scheme and makes them into one unified, power-management-settings dialog. You have similar abilities in Windows XP, plus some new capabilities

While the Windows Vista and Windows 7 Power Plan settings are thorough, there could be some problems with its generalized approach. Specifically, you may want to make a policy that:

- ▶ Affects the computer (and affects almost everyone)
- ▶ Except when certain users get affected by their own Power Plan settings on their desktop

This sounds like it would work out perfectly, but in practice, this is difficult to get perfectly right. Unfortunately, while it’s true that you can use Computer Configuration preferences to set a baseline for a collection of computers, it’s also true that User-side Power Plan items replace the active settings, and remain active even after the user logs off. Therefore, you may get inconsistent application of your desired settings, and not achieve a solution to the very problem you are attempting to fix.

Additional Group Policy-based Power Management Challenges

As you can see, Group Policy does provide a fair amount of ability to get you started. But then savvy IT managers need to think about the challenges in the bigger picture.

The first thing to note is that Microsoft is still working on, but hasn’t yet delivered, a version of the Group Policy CSE for Windows Vista that performs Power Plan management. To be clear, there is a version of the Group Policy Preferences CSE, but the current version is not capable of Windows

Vista Power Plan management. This CSE is forthcoming, but a final date has not yet been released. Note that Windows 7 machines are not affected by this wait; they are capable of using Group Policy–based Power Plan settings right away.

Dealing with computers that are now set to go to sleep can be another challenge. True, you’re saving money with the power setting. But how are you planning on keeping them up-to-date and patched if the machine is sleeping at night? If your security updates aren’t scheduled to be delivered until 1:00 am, what’s the plan for getting those machines switched back on and ready to receive the latest patches?

Unfortunately, Group Policy has no built-in wake-on-LAN process or procedure to help with this. The only possibility is to set a scheduled task on each workstation to wake it at the appointed time. The issue, then of course is that if the time to deliver security patches should ever change, you would need to revisit the scheduled task that performs the wake up, and that could be a huge undertaking.

Additionally, Group Policy is only pulled by the client from Active Directory at computer startup (for the Computer), at logon (for the User), and in the background (for both Computer and User) about every 90 minutes. If your company made a critical power-savings configuration change, then people shut their machines down for the day, it’s very conceivable that those computers would simply “miss the message” and not get the directives until (at least) the next day or (at worse) days later when they return to the office.

Lastly, Group Policy generally does an excellent job of doing what you tell it to do. However, Group Policy is not a guaranteed mechanism. There is no perfect way to ensure that across all your controlled machines the specific directives you choose are there with any certainty. While there is simple “What is going on at Computer 7” reporting, there is simply no built-in way to get robust reporting about which computers got your directives, which did not, and why. This can be a real challenge when describing the current state of affairs to upper management. True, you can get reports on an ad-hoc basis—one-offs. But Group Policy simply does not have an enterprise reporting console built-in.

Overcoming the In-the-Box Limitations of Enterprise Power Management

(This section written by Faronics and Moskowitz, inc.)

Group Policy settings and Group Policy Preferences settings can bring a baseline of power management settings to a network that currently has none. Setting it up takes Group Policy skills to ensure that the precise power management settings are being delivered to the Users and Computers you want.

When you’re ready to move beyond the in-the-box power management capabilities that Group Policy can bring, try Faronics Power Save. With Faronics Power Save, you can go beyond the capabilities in the box.

Let’s do a quick benefits analysis to see if Faronics Power Save is right for your environment. Here are some questions to ask yourself:

How will I intelligently plan power management for my workstations?

Implementing Group Policy–only solutions won’t account for intelligent, on-the-fly decisions that might need to be made. For instance, you wouldn’t want a machine to sleep when it’s running a critical application. And, you may want to set rules to only sleep if the machine’s CPU, disk, or network activity is below a certain level. Therefore, consider a solution that can determine, in real-time, if the computer should sleep (or not) depending on your specified criteria.

How will I wake up machines to patch and update them?

If you are only using the in-the-box tools, there is no way to leverage Group Policy to wake up your machines via Wake-On-LAN so that they can receive patches and updates when necessary. So, even if you spent the time hand-crafting your power management solution around Group Policy, the “last mile” of waking them up for patch management would be not possible.

How will I report on what energy consumption is already taking place and how am I progressing and saving money?

Group Policy has a basic reporting function; but it’s certainly not robust. There’s no way to query a collection of machines

(or all machines) and determine if they're correctly adhering to your desired settings. Additionally, there's no way to set any "baseline metrics" of power usage (based on machine type) and know that you're starting to save money by leveraging power management features. Consider a solution with a centralized management console to provide at-a-glance knowledge of how your investment is progressing.

How will I address my various Windows clients (Windows XP, Windows Vista, Windows 7)?

As you've learned, to manage power using Group Policy, each type of machine requires a CSE (client-side extension). While the Windows 7 CSE is built in, the Windows XP and Windows Vista CSEs (and the proper ones, at that) need to be installed. After that, Group Policy settings and Group Policy Preference settings need to be precisely expressed for each operating system using three technologies: Power Plans, Power Options, and Power Schemes. Consider a solution that has one unified way to manage your entire Windows investment, regardless of the Windows version.

How will I save power on my Macintosh machines?

Macintosh computers are not native Active Directory clients. While there are third-party tools that enable Macintosh machines to join Active Directory, and some that provide Group Policy support, those solutions would also have to specifically address power management in addition to Group Policy. Additionally, like Windows machines, Macintosh machines have built-in power-management support. The challenge is to have a unified and consistent way to manage these machines. Consider a solution that can manage both Windows and Macintosh machines in a unified manner, and have consistent application of power management policies.

Enterprise Power Management Call to Action

When you're ready to move on to enterprise-ready power management features, Faronics Power Save could be just what you're looking for.

At www.faronics.com/powersave you'll find a return-on-investment calculator that you can use right now to plug in information about your situation and see how much you'll save going forward. Here's an example savings graph of a typical company with just 1,000 computers.

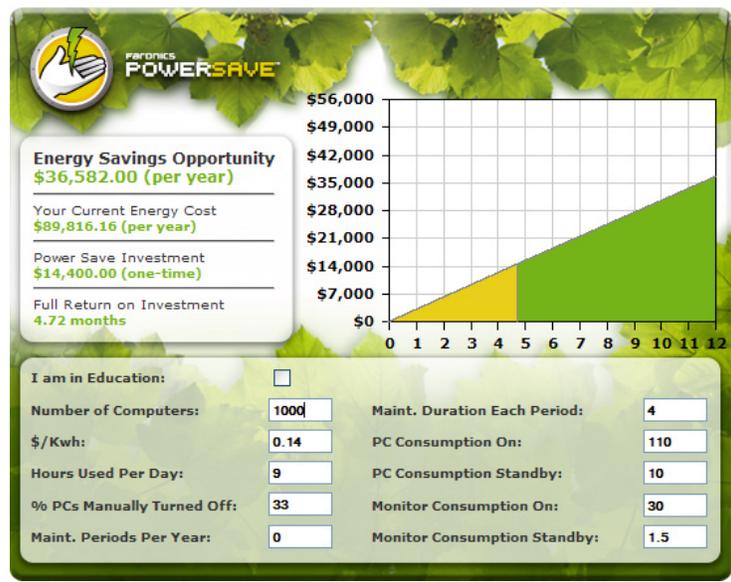


Figure 6: Use the Faronics ROI calculator to see how much you can save

On the same page, you'll be able to download a full 30-day trial version of Faronics Power Save for both Windows and Macintosh.

About the Author

Jeremy Moskowitz, MCSE, MCSA and Group Policy MVP is the Chief Propeller-Head for Moskowitz, Inc. and an independent consultant and trainer for Windows technologies. He runs www.GPanswers.com, a community forum for people to get their toughest Group Policy questions answered.



Mr. Moskowitz can be found speaking at IT conferences and inside corporations all over the world, and has authored or co-authored many books, including his latest two, *Group Policy: Management, Troubleshooting, and Security* (Sybex), and the new *Creating the Secure Managed Desktop: Group Policy, SoftGrid, Microsoft Deployment Toolkit, and Management Tools*, both with content available as eBook downloads from GPanswers.com/books.

Since becoming one of the world's first MCSEs, he has performed Active Directory, Group Policy, and Windows infrastructure planning and implementation for some of the nation's largest organizations. Jeremy frequently contributes to *Windows IT Pro Magazine*, *Redmond Magazine*, and *Microsoft TechNet Magazine*.

Jeremy teaches Group Policy intensive training and workshop classes recommended by Microsoft. Learn more at www.GPanswers.com/workshop.

About Faronics

Faronics' solutions help organizations increase the productivity of existing IT investments and lower IT operating costs. In today's economic climate of increasingly tightened budgets, continuous market pressure, and more work to do than time available, this is critical.

With a well-established record of helping organizations manage, simplify, and secure their IT infrastructure, Faronics makes it possible to do more with less by maximizing the value of existing technology.

Incorporated in 1996, Faronics has offices in the USA, Canada, and the UK, as well as a global network of channel partners. Our solutions are deployed in over 150 countries worldwide, and are helping more than 30,000 customers.



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