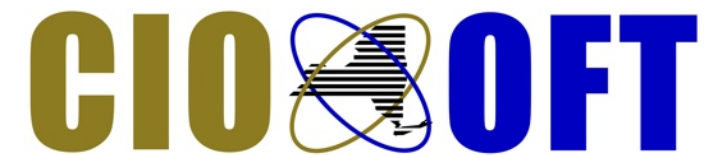


It's ~~Not~~ Easy Being Green

Implementing PC Energy Management in the Enterprise



Brian Duffy
NYS CIO/OFT
February 4, 2010



Roadmap

- Why?
- Options
- The Toolbox
- Implementation
- Future Direction



Executive Order 4

- State agencies must implement policy and programs to:
- **“increase energy efficiency”**
- **“maximize** the use of environmentally preferable or “green” commodities, services and technology”






STATE OF NEW YORK
EXECUTIVE CHAMBER
ALBANY 12224

DAVID A. PATERSON
GOVERNOR

VALERIE GREY
DIRECTOR OF STATE OPERATIONS

MEMORANDUM

TO: Heads of State Agencies and Public Authorities

FROM: Valerie Grey, Director of State Operations
Office of Taxpayer Accountability 

SUBJECT: "Power Down" Technology Policy

DATE: November 2, 2009

This memorandum is an installment in the continuing series of directives to agencies and public authorities regarding efforts to reduce wasteful spending, and focuses on reducing energy consumption by computers, printers, and copiers.

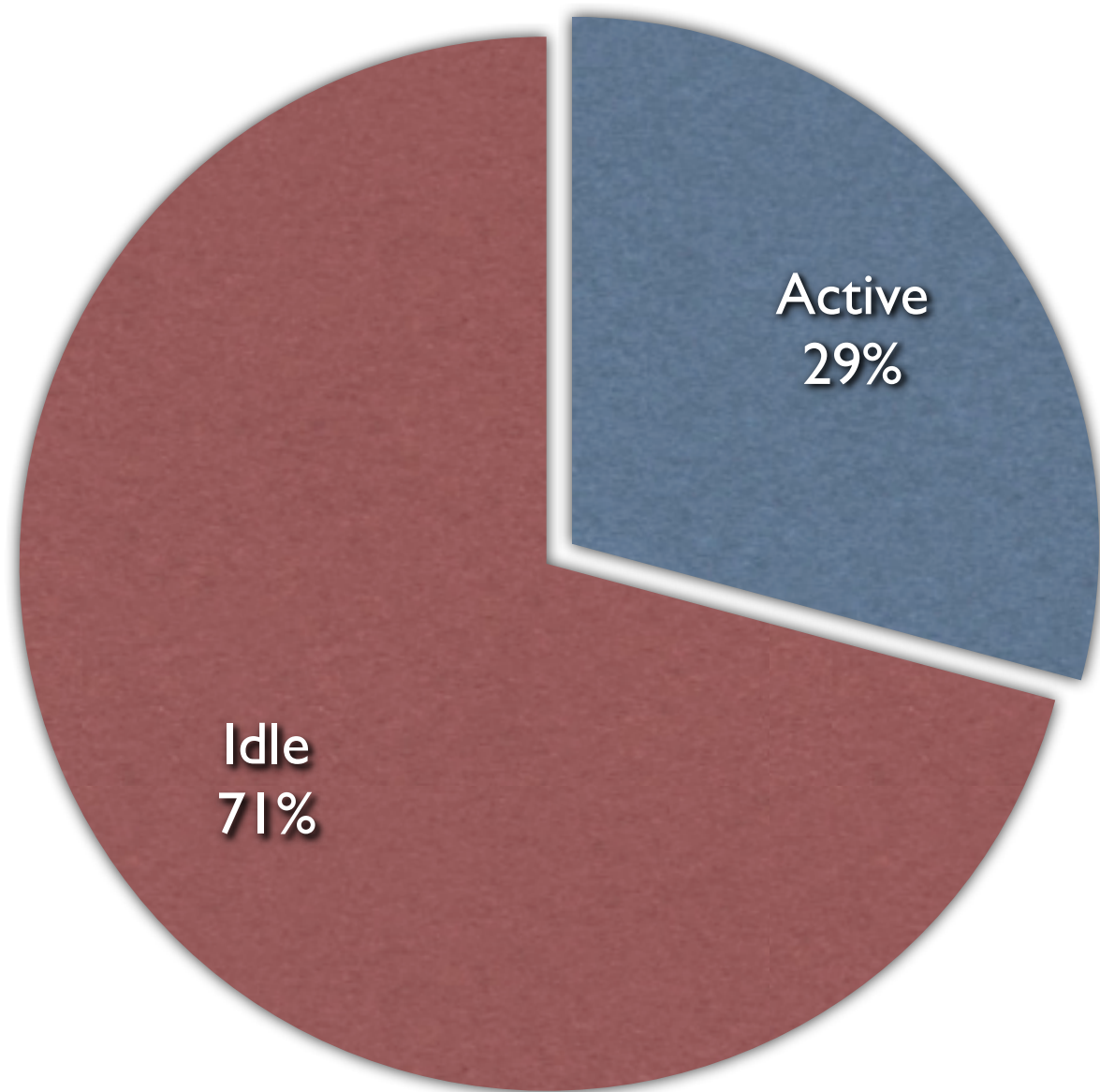
The Office of Taxpayer Accountability (OTA), in conjunction with the Office for Technology (OFT), has developed a "Power Down" policy for computers, printers and copiers in state agencies and public authorities. Implementation of this policy (which has already been successfully carried out by our colleagues at the Department of Environmental Conservation, as well as by the Executive Chamber) will save \$25-30 a year per work station by reducing energy consumption costs.

Please arrange for the following steps to be taken by December 1, 2009:

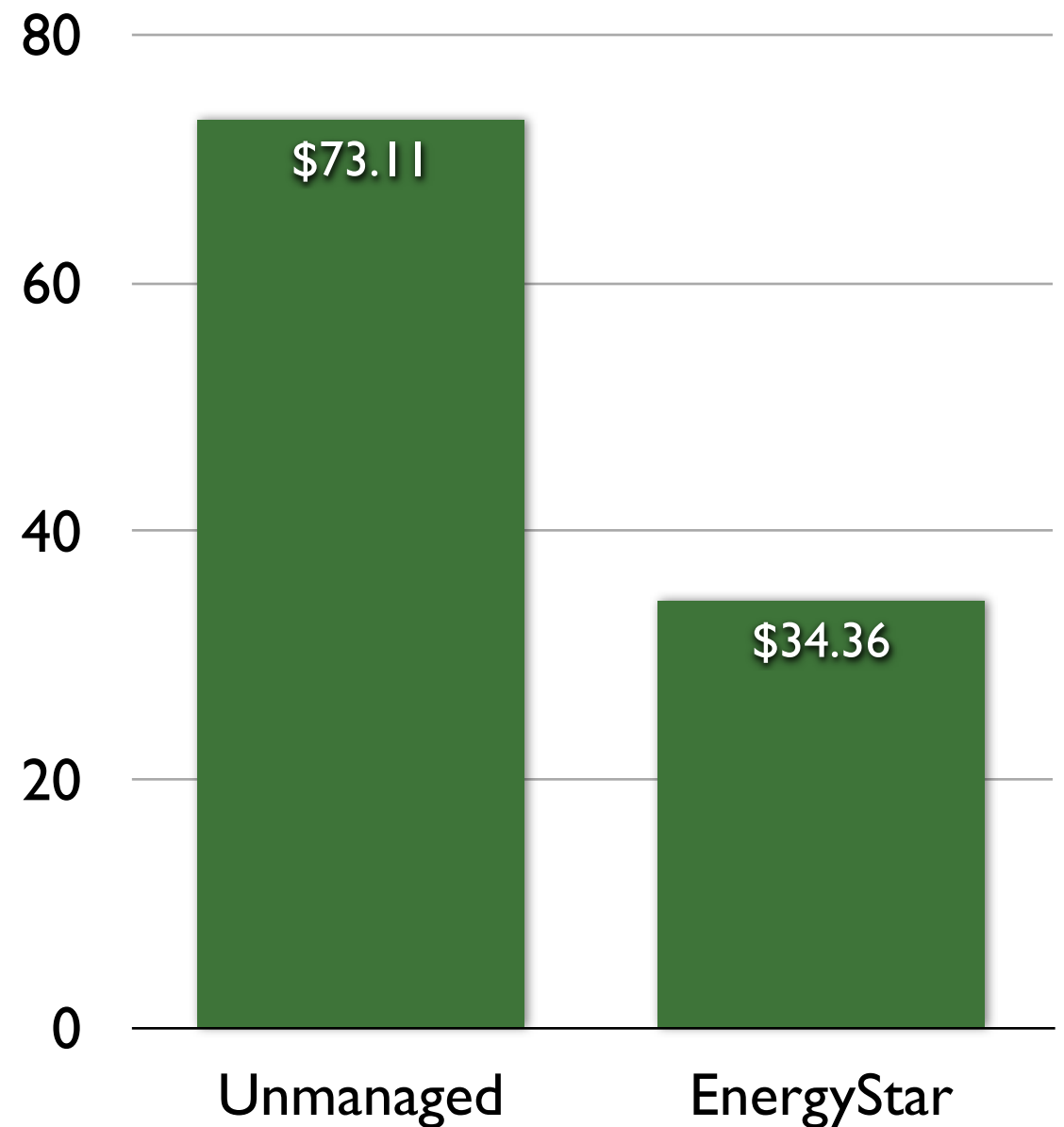
- Set all computers to go into either an "S3 Sleep" mode (for newer computers) or a "hibernation" mode (for older computers) after 30 minutes. Users of older computers that only support the "hibernation" mode will need to press the power button to re-activate the computer. Users of newer computers that support the "S3 Sleep" setting will need to strike a key or move the mouse to re-activate the computer. There is a similar amount of energy savings by using the hibernation or S3 Sleep mode.
- Remove third-party screensaver applications (such as Webshots), which have the ability to prevent computers from entering energy-saving modes.

You're Wasting Money

Business Desktop Utilization



Annual Desktop Energy Cost



Options



Option 0: Do Nothing

- Not really an option

Option 1: Buy a Point Product

- Use a software package specifically designed for desktop power management
 - Costs are typically in the \$15-25/PC range
 - Typically provide robust reporting, useful in areas where you have specific energy or carbon emission reduction requirements.
- Make sure that solutions can integrate with your existing systems management infrastructure

Option 2: Buy a Systems Management Solution

- Some vendors are integrating energy management modules into comprehensive management solutions
 - Costs will vary
 - Provide integration between patch management and software distribution modules
- Systems Management Solution migrations are major projects that affect multiple business areas of an agency
- \$

Option 3: Ask Users to Shutdown PCs

- A cheap, low-tech approach
- But...
 - How do you distribute updates?
 - How do you know if users comply?

Option 4: Leverage Existing Tools

- No procurement; utilize investments that you've already made
- Use open source tools where appropriate
- Allow your customers to realize all of the financial benefits of energy management
- Identify & understand the limits of your tools

Option 4 Chooosen

- Why?
 - We can't recover cost savings!
 - CNS supported workstations are in state, county, leased and private facilities
 - We have to tools to make it happen
 - We have staff with the skills needed to implement a solution -- we don't need to buy those skills.

The Energy Toolbox



Tools

- **EZ-GPO**

- Open-Source (BSD Licensed) tool for configuring Windows XP Power Management
- Sponsored by US Environmental Protection Agency
- Implemented via Active Directory GPO & client service

- **Microsoft SCCM**

- PC Lifecycle Management Solution used to image, distribute software and patch workstation fleet
- “Wakes up” computers for patching via WoL or out-of-band management (vPro)
- Provides business-hour software update capability
- Swiss-army knife for workstation support

EZ-GPO

- Essential to manage power settings consistently on Windows XP
- Not needed for Windows Vista/7 (Microsoft provides native GPO)

Sleep vs. Hibernation

- Use hibernation unless you've verified that S3 sleep works with your hardware/software.
- Hibernation ensures that user data is protected from power failure
- Debugging sleep issues is hard
- Windows XP will default to S1 Sleep if USB keyboards or mice are present
 - Older PCs may not be able to wake from S3 sleep using USB devices
 - Some drivers/motherboards do not support S3 sleep

S1? S3? Huh?

System Power States are defined by the *Advanced Configuration and Power Interface (ACPI)* specification.

S0 Working	System is on. CPU is fully up and running; power conservation is on a per-device basis. (ie. monitor timeout)
S1 Sleep	System appears off. CPU is stopped, but state is preserved. RAM is refreshed; system is in low power mode.
S2 Sleep	System appears off. CPU is unpowered, but state may be preserved. RAM is refreshed; system is using less power than S1.
S3 Sleep (Standby)	System appears off. CPU is unpowered, but state may not be preserved. RAM is slowly refreshed. Most devices are powered off; system is drawing minimal power.
S4 Hibernate	System is completely powered off, but contents of memory saved to hard disk.
S5 Off	System is completely powered off, operating system is shut down.

Wake On LAN

- Critically important to apply software updates in a timely manner
- Network configuration changes are typically required
- We provide a web interface for end users to wake-up PCs.

Wake on LAN Issues

- Some PC vendors disable WoL by default
 - Some vendors provide a “value add” service and will enable WoL on new PCs for a fee
- Tools are available for Dell, Lenovo & HP to enable WoL via script
 - BIOS updates may be required
 - Lenovo leverages IBM Director
- No tools are available to enable WoL for Gateway PCs (specifically E4500)

Implementation



#1 Lesson Learned

Communication is key!

- Users will be annoyed by midday hibernation
- Your colleagues will be annoyed because they are accustomed to “always on” PCs
- You’ll discover “interesting” things about your IT environment

Exceptions

- You must allow for exceptions... but everyone cannot be exceptional!
- Require written justification for power management exceptions.
 - Require periodic re-justification if appropriate
- Be aggressive about resolving technical issues
- CIO/OFT Started with over 330 exceptions (~33%). Today less than 80. (~8%)
 - CIO/OFT exceptions are generally related to issues specific to staff providing technical solutions. (persistent VPN, systems monitoring, etc)

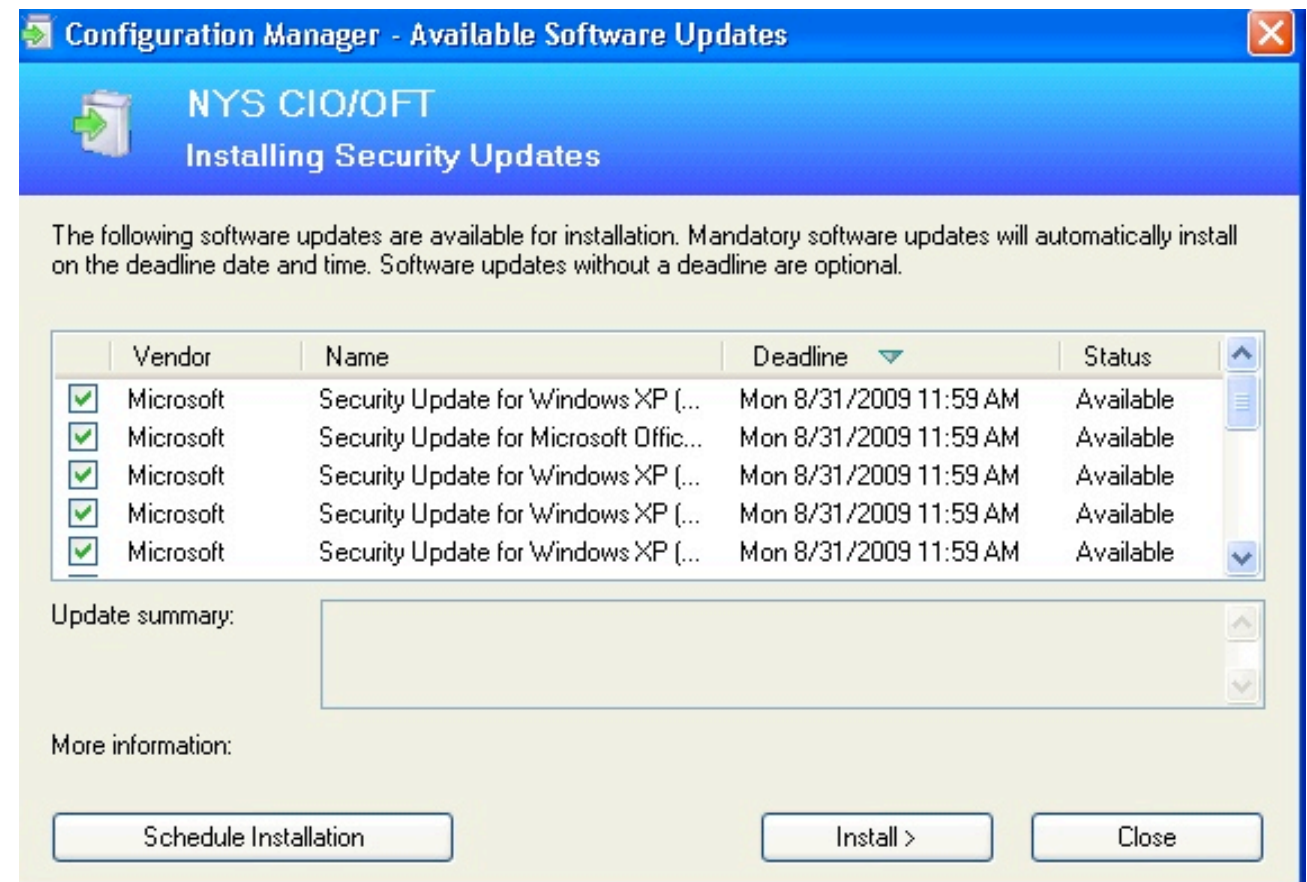
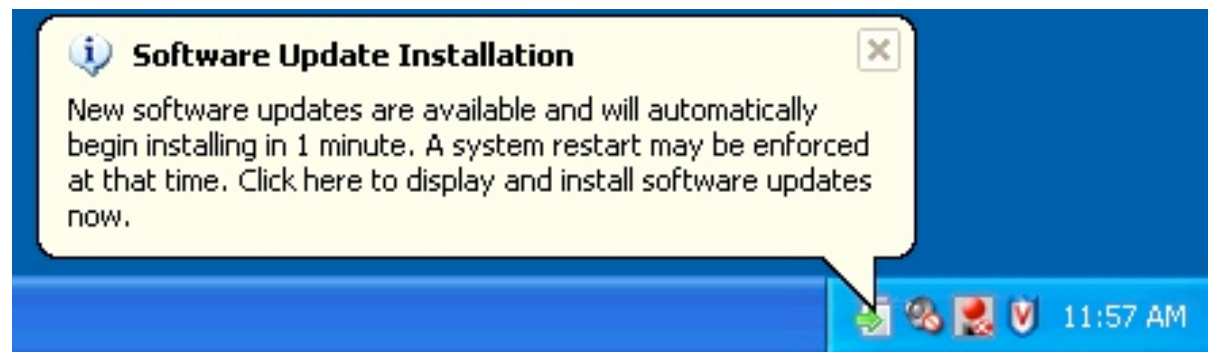
Power Management

- We implement EnergyStar recommendations as follows:
 - Monitor Shuts off after 15 minutes of inactivity
 - Hard Disk Turns off after 20 minutes of inactivity
 - System enters Standby mode after 25 minutes of inactivity
 - System enters Hibernation mode after 30 minutes of inactivity

Update Management

- Energy Management has led CIO/OFT to change the way the software updates are delivered.
- We now allow end users to install updates at a convenient time.
- If the user opts not to install updates, they will automatically be applied at a pre-configured deadline

Update Management



Update Management

- Benefits of this approach:
 - Users are empowered
 - Laptop update compliance improved
 - Less reliance on overnight maintenance windows
- Drawbacks of this approach:
 - A big adjustment for many users
 - Not feasible for some environments
 - Does not address all update activity

Anti-Virus Infrastructure

- Anti-Virus support has been the most challenging technical issue to date
- We're moving away from using native tools for distribution of AV software and engine updates
- Software distribution is being performed by SCCM, which has WoL/vPro integration

Anti-Virus Operations

- DAT File Distribution
 - AV performance bugs do not allow for daytime distribution
 - Interim solution is to use SCCM to initiate overnight wakeup & initiate update.
- Full Disk AV Scan
 - Per vendor recommendation, move to overnight, bi-weekly, full-disk scans.
 - Daytime scanning has a negative impact on users

Future Direction



Leverage Windows Improvements

- Windows XP is nearly a decade old, time to move on
- Focus on testing & deployment of Windows 7 to leverage energy management enhancements
 - Windows 7 reduces idle power consumption by as much as 40%
 - Vista/Windows 7 provides native group policy objects for power management
 - “Hybrid Sleep”

Leverage Hardware Improvements

- Out of band management (Intel vPro/AMT, AMD DASH)
 - Provides “Lights Out” management capability similar to what's available for servers
 - Allows administrators to manage power state
 - Does not require directed broadcast; less network configuration.

Desktop Virtualization

- As networks get faster and protocols get better, thin clients are becoming viable for many types of users.
- Thin Clients draw as little as 5 Watts
- Improving server technology is increasing virtual workstation density.

Appendix

References

- *Green is as Good as Gold; NYS Office of Taxpayer Accountability:* http://taxpayer.ny.gov/Green_Gov.htm
- *Advanced Configuration and Power Interface (ACPI) Spec:* <http://www.acpi.info>
- *Troubleshooting Windows XP Power Mgmt Issues:* <http://support.microsoft.com/kb/907477>
- *NYS Energy Plan:* <http://www.nysenergyplan.com/>
- *Windows 7 Energy Efficiency:* <http://www.msdev.com/Directory/Description.aspx?eventId=1203>
- *Windows Power Management Hardware Resources:* <http://www.microsoft.com/whdc/system/pnppwr/powermgmt/default.mspx>

Photo Credits

- Slide 2: <http://www.flickr.com/photos/paolomargari/2707893385/>
- Slide 3: <http://www.flickr.com/photos/lollie-pop/64839752/>
- Slide 6: <http://www.flickr.com/photos/luvzdollz/3313173219/>
- Slide 13: <http://www.flickr.com/photos/paolomargari/2707893385/>
- Slide 20: <http://www.flickr.com/photos/brraveheart/114402291/>
- Slide 29: <http://www.flickr.com/photos/gregwake/3665765602/>

All photos used are Creative Commons Licensed