The Energy-savings Opportunity Sitting on Every Desktop

Computer Power Management

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EPA

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Learn more at **energystar.gov**

Imagine…


FOOD WASTE
20
THE UNITED STATES OF AMERICA
20
THE UNITED STATES OF AMERICA

Today's agenda

- What is computer power management?
- Putting it into context
- Implementation challenges & solutions
- How to move forward in your organization
- Q&A
- Time permitting: myth vs. reality

What is "CPM", and why should I care?

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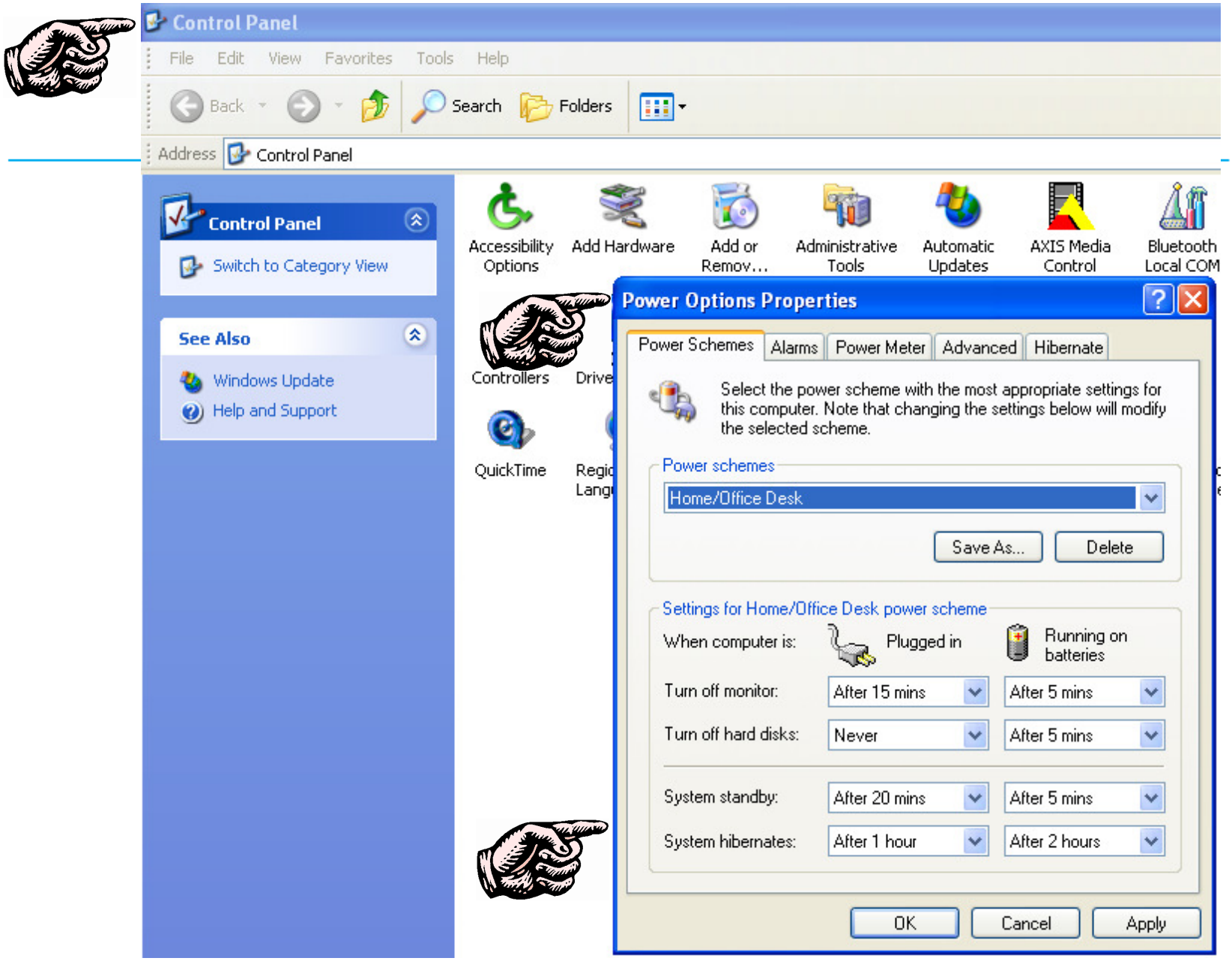
Energy saving features on every computer

- Place computer (CPU, hard drive, etc.) & monitor into low power mode after a pre-set period of inactivity
- Mouse or keyboard input quickly wakes computer
- Built into Windows, Mac OS X, some varieties of Linux
  - Called “standby” and “hibernate” on PC
  - Called “sleep” on Mac

“CPM” settings must be activated!


Control Panel
File Edit View Favorites Tools Help
Back Search Folders
Address Control Panel
Control Panel
Switch to Category View
See Also
Windows Update
Help and Support
Accessibility Options
Add Hardware
Add or Remov...
Administrative Tools
Automatic Updates
AXIS Media Control
Bluetooth Local COM
Controllers
QuickTime
Power Options Properties
Power Schemes
Alarms
Power Meter
Advanced
Hibernate
Select the power scheme with the most appropriate settings for this computer. Note that changing the settings below will modify the selected scheme.
Power schemes
Home/Office Desk
Save As...
Delete
Settings for Home/Office Desk power scheme
When computer is:
Plugged in
Running on batteries
Turn off monitor:
After 15 mins
After 5 mins
Turn off hard disks:
Never
After 5 mins
System standby:
After 20 mins
After 5 mins
System hibernates:
After 1 hour
After 2 hours
OK
Cancel
Apply

Why power management?

- ↓ electricity consumption by $20-100/PC/yr
- ↓ cooling loads (saves additional $3-30/PC/yr)
- ↓ peak load demand charges
- ↓ air pollution
- ↓ carbon footprint
- Executive Order 13423 requires federal agencies to activate “sleep” features

Computer power consumption (hence savings) varies

Use *LESS* Energy	Use *MORE* Energy
Notebook	Desktop
Integrated video/graphics card	High-end video/graphics card
Applications requiring light processor activity	Applications requiring heavy processor activity
LCD monitor	CRT monitor
No screen-saver	Screen-saver
ENERGY STAR qualified	Not ENERGY STAR
Turned off at night	Left on at night

CPM Savings Opportunity:

<100 kWh/yr……vs……>1000 kWh/yr

<$10/yr……vs……>$100/yr

Typical savings for an org. with 1,000 computers

- $40,000* in electricity, or **$160,000** over 4 years
  - Enough electricity to light 240 homes
- Avoid 350 tons of greenhouse gas emissions
  - Equivalent to removing 60 cars from the road
- Online calculator can quickly and easily quantify your savings
  - www.energystar.gov/powermanagement

*Assumes ENERGY STAR qualified computers; night-time turn off rate of 36%; MPM is already activated but CPM is not activated

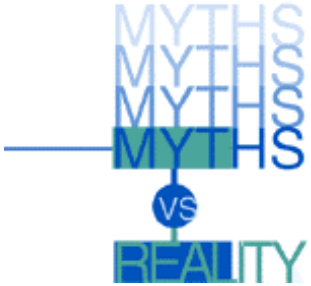
CPM offers a compelling return on investment

- Labor costs: ~ $5 / seat
  - Identifying appropriate solutions
  - Testing & troubleshooting exceptions
  - Ensuring that sleeping computers do not interfere with administrative software updates
- Software costs: ~ $0-15 / seat
  - Many solutions are free
  - Commercial solutions range from roughly $3-15 per PC
- Vs. energy savings of $120-$160 / seat

Assumptions: 1000 seats; labor costs = 2 weeks of work for one network administrator @ $2,500 per week

Myth or Reality?

You'd actually save more energy – and a lot of trouble – if you simply required people to turn off their computers each night.

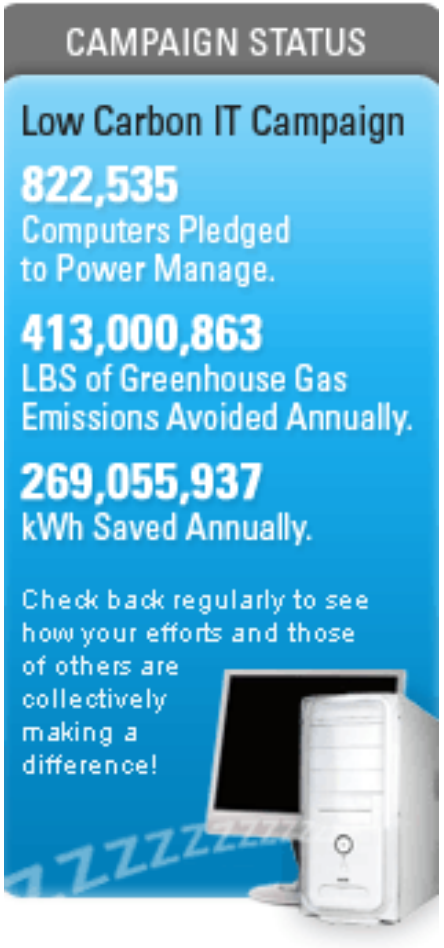


The verdict: Myth!

- While you might save an additional watt or two by turning off a computer vs. placing it in sleep mode, forgetting to shut down your computer just a handful of times will negate an entire year's worth of incremental energy savings.
- Surveys and interviews with IT managers consistently conclude that policies "requiring" users to turn off their PCs at night result in only about 70-90% compliance.

All sorts of leading orgs are embracing CPM

- Anheuser-Busch Companies, Inc.
- CA Department of Motor Vehicles
- City of Newton, MA
- Coeur d'Alene School District
- County of Erie, NY
- FedEx Corporation
- Florida Department of Environmental Protection
- Fox Entertainment Group, Inc.
- HP
- Los Angeles County Department of Public Works
- Raytheon Missile Systems
- Schneider Electric
- Time Warner Cable



Putting it into Context…

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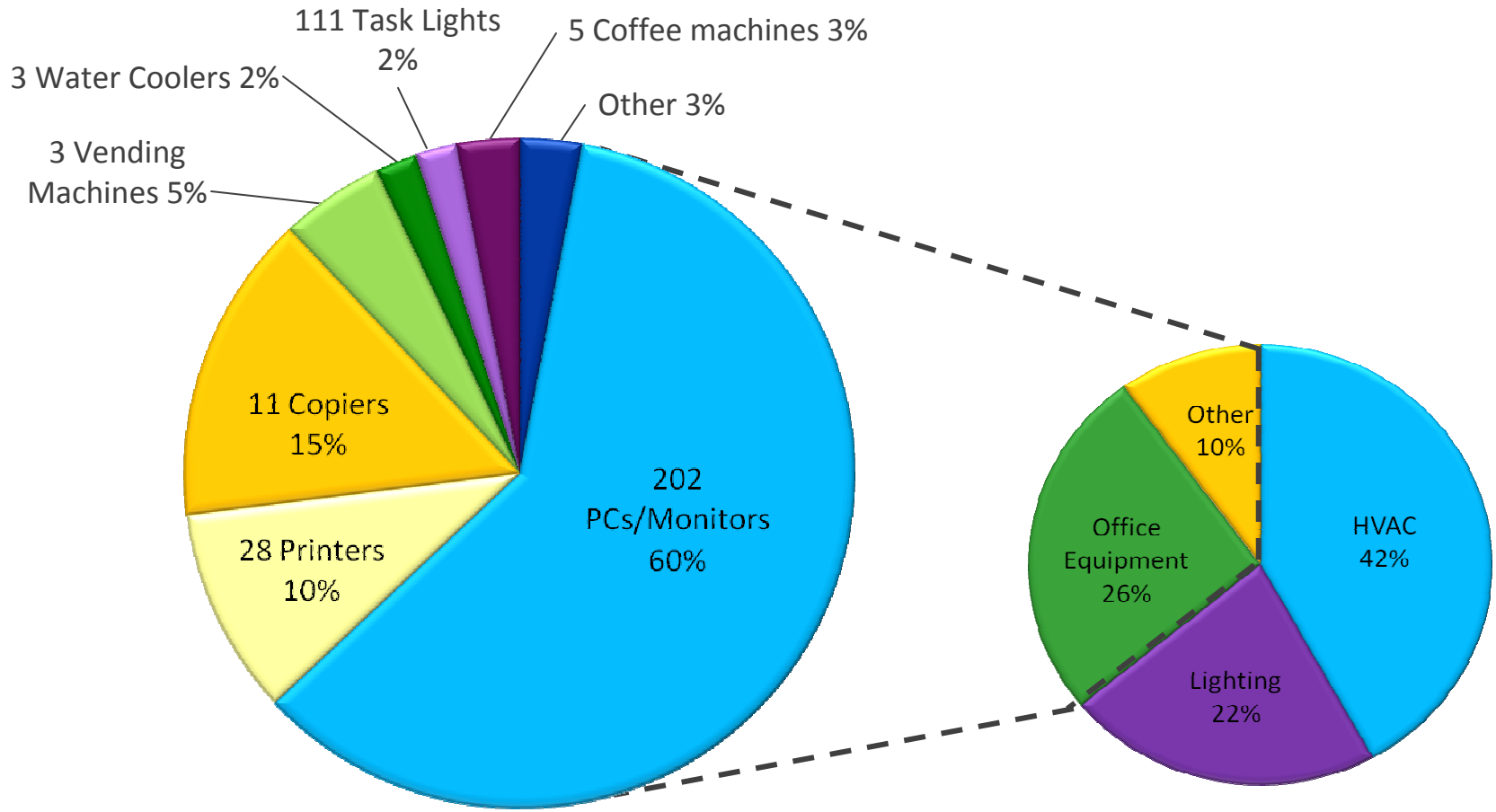
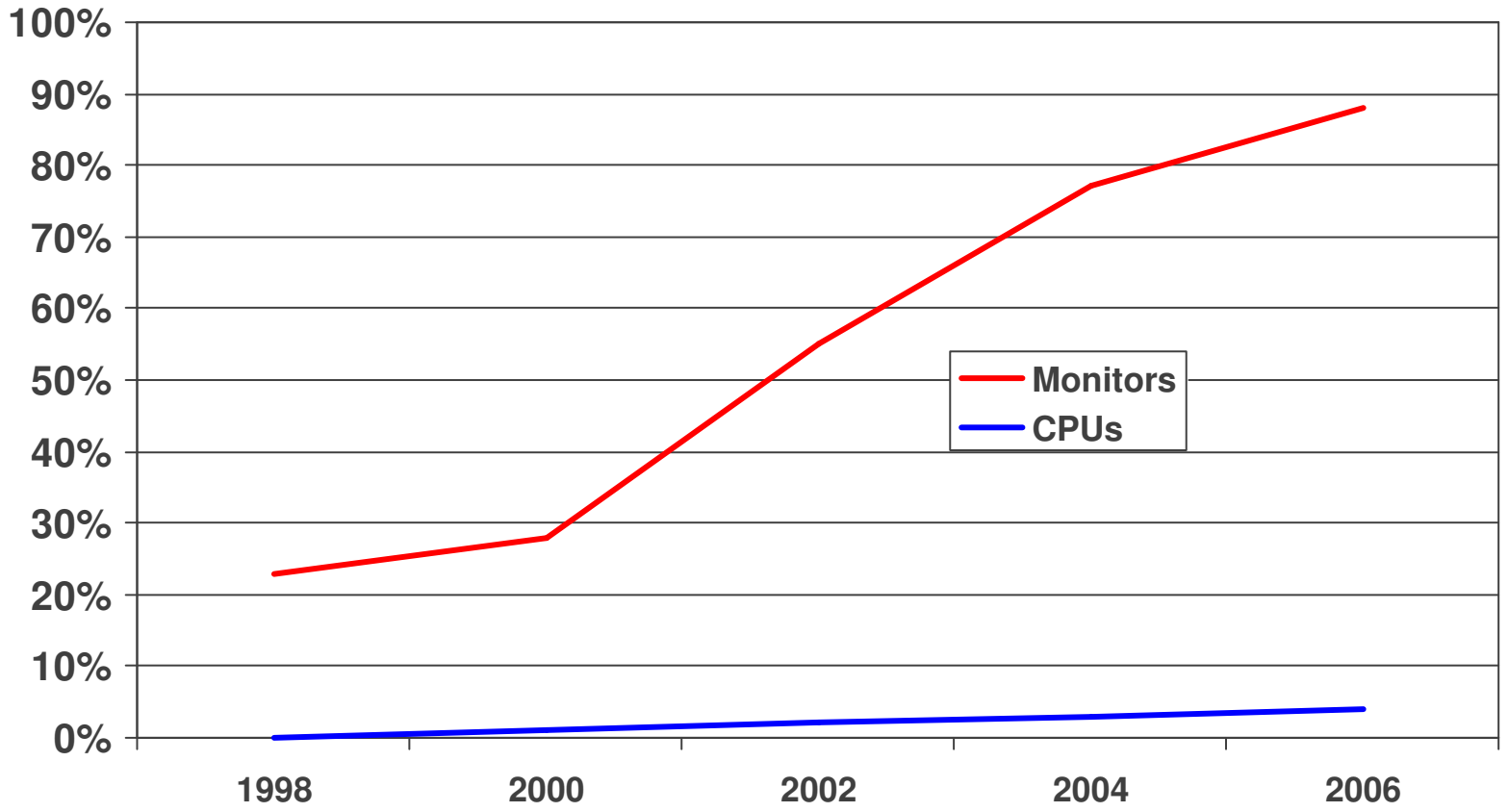
“Plug load” in office buildings is mostly computers



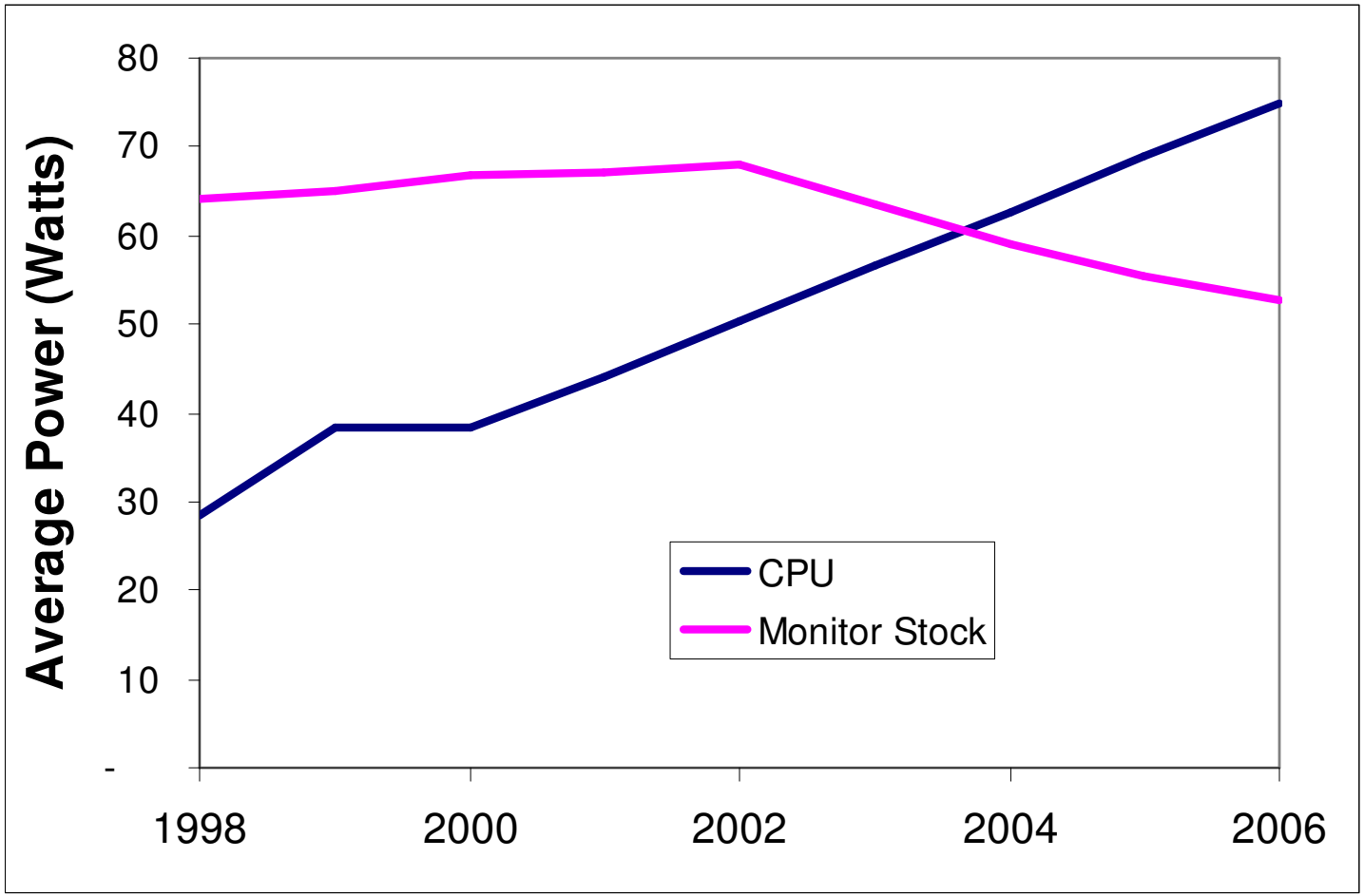
Source: The Cadmus Group (Base Case Energy Use at NYSERDA Office)

Source: Energy Information Administration, 2003

Vast majority of computers are not power-managed



Power consumed by computer now exceeds that of monitor



What just 50% CPM would accomplish in the USA

- Reduce 6 million tons of CO2
- Remove 1 million cars from the road

- Electricity to light 8 million homes

Implementation
Challenges & Solutions

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Monitor power management: no-brainer

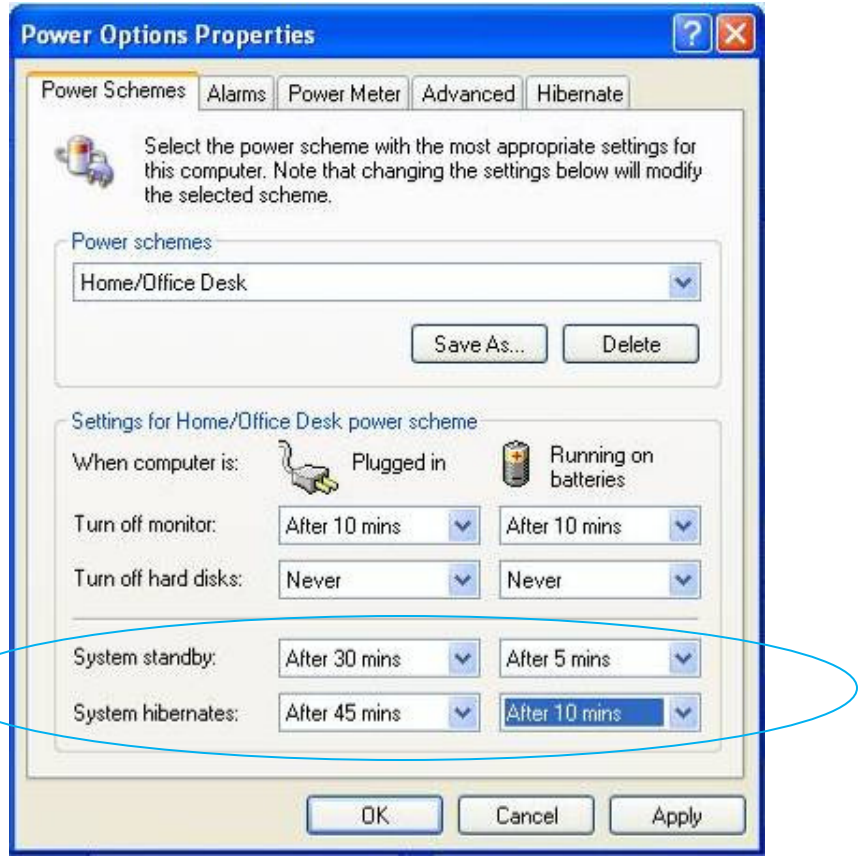
- Easy to activate
- Can't interfere with software patching
- Saves $10-35+ per monitor annually

Most organizations already utilize MPM features – but make sure!

Computer power management: more challenging, more savings

- System Standby (S3)
  - Drops power to 1-3 W
  - Wakes up in a few seconds
  - Saves $10-40 per PC annually

  …or…
- Hibernate (S4)
  - Drops power to 1-3 W
  - Wakes up in 20+ seconds
  - Saves work if power is lost
  - Saves $10-40 per PC annually



For optimal savings & user experience, EPA recommends:

- Setting monitors to enter sleep mode after 5-20* minutes of inactivity
- Setting computers to enter system standby or hibernate after 30-60* minutes of inactivity
  - On notebooks, be sure to activate these settings in the AC power profile — not just the DC (battery power) profile
  - Don't bother with "Turn off hard disks" in AC power profile – savings are trivial
- The lower the settings, the more energy you save

Two challenges

1. Activating sleep settings on many computers at once
2. Ensuring that sleep settings do not interfere with the distribution of administrative software updates
   - E.g., Windows security patches, antivirus definitions

Numerous solutions exist, including free software, and software tools that you may already own

Challenge #1: “free” solutions

- Template Image Replication
  - Manually activate CPM and MPM settings in the master template hard drive image before replication & roll out
- Microsoft’s Windows 7 and Vista
  - Group Policy provides a way to centrally manage MPM and CPM features
- MSFT Group Policy *Preferences*
  - Provides means to centrally manage Vista and XP machines
- Login Scripts
  - Powercfg.exe can be used in a login script to configure MPM and CPM settings in Windows XP and Vista
- EZ GPO
  - Provides Group Policy Objects for centrally configuring power management settings in Windows 2000 & XP
- Windows Task Scheduler
  - Can force logged-out PCs to go into standby or hibernate

Challenge #1: commercial solutions

- Altiris Manageability Toolkit (from Symantec)
- BigFix
- eiPower Saver Solution
- Green IT Power Management (from Triumfant)
- LANDesk Management Suite (from Avocent)
- NightWatchman and SMSWakeUp (from 1E)
- Power Save (from Faronics)
- Remote Desktop (from Apple)
- SMS/SCCM Companion (from Adaptiva)
- Surveyor (from Verdiem)
- SysTrack Power Management (from Lakeside Software)

Info & case studies:
www.energystar.gov/powermanagement

Challenge #2: ensuring that sleep doesn't interfere w/ software updates

- Configure computers to apply software updates as soon as computers become "available" on the network
- Use Windows Task Scheduler to wake up sleeping computers for updates
- Use Wake-on-LAN to wake up sleeping computers to perform on-demand updates
  - Use vPro to wake up sleeping computers
    - Integrates with software update mechanism to switch only required computers on

Case Study: City of Miami

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City of Miami: situation

- 2,800 desktop & notebook PCs on a 4-year replacement cycle
  - Mostly Dell GX620 and HP 7900 models
- PCs were left powered on 24/7 for patching, backups, remote control

- Upgrading 900 PCs and wanted “native” (Microsoft) solutions for PC power management, patching, app deployment, backup and remote control

City of Miami: CPM solution

- Used free EZ GPO tool to activate sleep settings on WinXP computers
  - Monitors sleep after 15 min, computers after 25 min of inactivity
- Deployed Windows Vista on desktops & notebooks
  - Central management of power settings via Group Policies
- Utilized Wake-on-LAN & vPro to "wake up" sleeping computers to deploy updates
  - vPro platform built into Intel motherboards
    - Supports remote management irrespective of OS state
    - Does not require more complex deployment of Wake-on-LAN "Magic Packet"

City of Miami: challenges overcome

- Dealing with exceptions
  - A few PCs were not configured to wake up on USB mouse/keyboard input (solution: Powercfg.exe)
  - A few NICs were not configured to bring PC out of sleep (solution: OEM software tool)
  - A few BIOS settings would not allow PCs to Wake-on-LAN (solution: manual changes to BIOS)
- Learning curve for
  - Wake-on-LAN/vPro technology
  - Enabling Group Policies for Windows Vista

City of Miami: results

- PCs in sleep mode more than 80% of the time
- Total annual savings by Q4 2009: $150,000*
  - Reducing cooling load: $45,000 in additional savings
- 600 tons of CO2 emissions avoided annually
- Total project investment
  - Approx. 140 hours of staff time

Estimated annual savings per PC:

$100-115

*Based on deployment to 1800 PCs by year's end

Case study: West Hartford public schools

- Challenge:
  - Monitor power management settings were not in use
  - Most PCs were not being turned off after hours
- Solution:
  - ENERGY STAR *EZ GPO*
- Results:
  - Puts more than 3,000 computers to sleep when they are inactive
    - Monitors sleep after 30 min of idle
    - Computers sleep after 40 min
  - Avg. of $63.86 savings per PC annually

5 Reasons IT may not initially share your enthusiasm

1. Energy savings aren't rewarded in IT's budget
2. Even a free solution will involve IT staff time to implement
3. CPM could initially complicate how PCs receive security patches and anti virus updates
4. Urgent new security threats emerge regularly to absorb any "free time"
5. Already spending nights and weekends on systems upgrades and other IT initiatives

How To Move Forward In Your Organization

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5 ways to get IT on board

1. Estimate your potential $ savings
2. Share the savings opportunity with your management and any “friends” in IT
3. Counter technical objections with “you might be right: let’s ask an expert”
4. Make one modest request: join a 30-60 min. call with CPM tech expert
5. Share the glory

Try saying…

- We need to address your technical concerns: will you raise them during a brief call with ENERGY STAR?
- How much would we spend for a revenue stream of $20-100 per PC annually?
- I bet the CFO would love this project!
- What if facilities shared some of the savings with IT?

Suggested next steps

1. Review current enterprise power settings and policies
   - Are sleep features enabled on monitors? Computers?
   - What sleep settings are utilized? (e.g., MPM only? After 1 hr?)
   - Do users leave PCs on at night?
   - Roughly how many computers and monitors are there in total?
2. Estimate the savings potential at www.energystar.gov/lowcarbonit
3. Join the ENERGY STAR Low Carbon IT Campaign
   - Simply pledge to activate power management features on your monitors and computers
   - Sign up at www.energystar.gov/lowcarbonit
4. Ask IT to join a free call with ENERGY STAR technical support contractors

5 Reasons to join the ENERGY STAR Low Carbon IT Campaign

1. Free technical expertise and assistance
2. An estimate of your organizations' energy and carbon savings
3. An official certificate of recognition from EPA
4. Template materials to publicize your efforts
5. Possible national recognition from EPA

Summary

- Implementing CPM can save $20-100 per PC annually
- Hundreds of organizations are already saving energy with MPM and CPM
- Join the ENERGY STAR Low Carbon IT Campaign for free technical assistance
  - www.energystar.gov/lowcarbonit

Contact information

- Additional information at:
  www.energystar.gov/lowcarbonit
- Contacts:
  - Mike Walker, Beacon Consultants Network Inc. (EPA Technical Support Contractor): 617-921-8445, mwalker@beaconconsultants.com
  - Robert Huang, The Cadmus Group (EPA Technical Support Contractor): 617-673-7117, rhuang@cadmusgroup.com
  - Steve Ryan, US EPA Energy Star Program Manager: 202-564-1254, Ryan.Steven@epamail.epa.gov

Questions & Answers

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Computer Power Management:

Common Myths

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Myth or Reality?

Sleep features can wear out hardware by forcing the computer to turn on and off several times a day

The Verdict: Myth!

Sleep features can wear out hardware by forcing the computer to turn on and off several times a day

REALITY: Modern computers are designed to handle 40,000 on-off cycles before failure, and you're unlikely to approach that number, even if you keep your computer 5-7 years. Some studies indicate it would require on-off cycling every five minutes to harm a hard drive.

Myth or Reality?

Computer power management saves a substantial amount of energy on notebook computers – not just desktops

The Verdict: Reality!

Computer power management saves a substantial amount of energy on notebook computers – not just desktops

REALITY: While they use less energy than desktops, notebook computers still burn about 20-30 watts of power. System standby and hibernate features reduce notebook power draw to 1-2 watts

TIP: Be sure to activate system standby and hibernate features in the AC power profile – not just the DC power profile

Myth or Reality?

Computers and monitors use more energy with power management settings activated, due to power surges when cycling on and off

The Verdict: Myth!

Computers and monitors use more energy with power management settings activated, due to power surges when cycling on and off

REALITY: the small surge of power created when PCs are turned on is far smaller than the energy used by running the device when it is not needed

Myth or Reality?

System standby and hibernate features can render a computer unstable, causing system crashes and/or preventing it from waking

The Verdict: Myth!

System standby and hibernate features can render a computer unstable, causing system crashes and/or preventing it from waking

REALITY: while problematic in early versions of Windows, these features work almost flawlessly in Windows 2000, XP, and Vista.

Myth or Reality?

Computer users will complain about having to wait for their machines to “wake” from system standby or hibernate

The Verdict: Myth!

Computer users will complain about having to wait for their machines to "wake" from system standby or hibernate

REALITY: Employees typically embrace power management when they understand that they are saving money and preventing pollution. Plus "waking" computers takes far less time than booting.

TIP: Inform employees about power management settings prior to activating them, and share information on the economic and environmental benefits

Myth or Reality?

Employees who access their desktop computers remotely (e.g., through VPN) must have their machines powered 24/7 and should not use computer power management features

The Verdict: Reality!

Employees who access their desktop computers remotely (e.g., through VPN) must have their machines powered 24/7 and should not use computer power management features

REALITY: Technologies that allow users to "wake" sleeping or off computers from *outside* of the network are still in their infancy

TIP: Apply monitor sleep settings to these computers!

Myth or Reality?

Sleeping computers will not receive important software updates such as new antivirus definitions and Windows security patches

The Verdict: Reality and Myth!

Sleeping computers will not receive important software updates such as new antivirus definitions and Windows security patches

REALITY: This can be an initial barrier but there are numerous ways to ensure that software updates are applied, including waking up computers through the network prior to distributing updates.

TIP: ENERGY STAR can help identify the best solution for your IT environment

Myth or Reality?

Because Microsoft ships Vista software with computer power management settings enabled, there is no need to worry about sleep settings on Vista machines

The Verdict: Myth!

Because Microsoft ships Vista software with computer power management settings enabled, there is no need to worry about sleep settings on Vista machines

REALITY: While Microsoft does ship Vista with sleep settings enabled, operating systems are usually installed by PC makers, enterprise IT departments, computer resellers, or 3rd party service providers. Windows default power management settings are not typically retained.

Myth or Reality?

My network administrator says our PCs are “enabled for hibernate,” so we must already be taking advantage of computer power management features.

The Verdict: Myth!

My network administrator says our PCs are "enabled for hibernate," so we must already be taking advantage of computer power management features.

REALITY: For the hibernate feature to be available, it is sometimes necessary to enable it in Windows. This does *not* mean that PCs are configured to automatically enter hibernate after 30 to 60 minutes of inactivity.

TIP: To avoid potential confusion, ask if PCs are "configured to automatically enter system standby or hibernate after 30 to 60 minutes of inactivity."