Step-by-step instructions

(extract from the Energy Star website: www.energystar.gov.au)

These Step by step instructions explain how to enable ENERGY STAR features on most common types of computers and monitors.

Acknowledgement

A lot of useful information for this summary came from the "User Guide to Power Management for PCs and Monitors", written by Bruce Nordman and others at the Environmental Energies Technology Division. Lawrence Berkeley National Laboratory, University of California.

Introduction

One of the requirements of the Energy Star standard is that when the computer 'wakes up' from its low power mode, all the programs and documents that the user left open should be exactly as they were. Because of this requirement, many of the energy-saving features have to be configured using the computer's operating system – and require the operating system to cooperate with the computer's hardware – so we have organised the following information according to the type of operating system, please select the one you're interested in.

All users of IBM-compatible (Intel x86-compatible) PCs should check the section on BIOS Power Settings first.

> ***Don't forget***:
>
> Even if your computer has no energy saving features, you can still save power by switching it off when it's not in use. At the very least, switch off the monitor.
>
> Some people think this is bad for computers and monitors, but in the vast majority of cases it's perfectly safe and far from wearing-out your computer, switching it off will usually reduce wear and tear both on key systems like the hard disk and on the monitor.
>
> Obviously, it takes longer to restart a computer that's been switched off so you will probably only want to do this when you won't be using the computer for several hours, but even if you won't be using your computer for even half an hour, it's still worth switching off the monitor.

BIOS Power Settings

It will usually be necessary to make a few changes to the computer's BIOS (Basic Input Output Options) before changing the operating system settings. Making these changes is typically quite simple, but because there are many different systems in use today it is impossible for us to give you detailed instructions on every BIOS – check the documentation that came with your computer or the manufacturer's or distributor's website.

- If you're buying new computers, you can ask the manufacturer or supplier to deliver them with the Energy Saving features already enabled –especially if the new computers are coming from one of our Energy Star Manufacturing Partners.

However, when it comes to enabling existing PCs, there are many similarities among BIOS configuration systems, so reading this section as well as the documentation for the specific BIOS systems you have, should help you to understand how power management settings.

Also note that power management in newer systems is more standardized than in earlier ones, making it both easier to use and more likely to be effective once it is enabled.

Typical PC BIOS Controls

A critical part of power management is the major system timers; these are typically called *doze*, *standby* (or *sleep*), and *suspend*, and occur in that order.

- *Doze* reduces power during periods of inactivity by lowering processor (CPU) speed and powering down unused logic and memory.
- *Standby* usually sends a signal to power down the monitor, but may also slow down the whole system (in a BIOS without a *Doze* mode).
- *Suspend* typically sends the command to go to lowest power operation by sending the off signal to the monitor and CPU and cutting system board power.

Troubleshooting note

There may be options for *standby* (sometimes also called *doze)* to specify how much to reduce the processor speed, e.g., *Doze speed* or *Standby Speed*. Where they exist, these are usually specified as percentages or ratios in relation to the normal processor speed (e.g. they will slow the processor to ½ or ¼ of it's normal speed). These options may be important on older or slower networks, where the server 'polls' clients at regular intervals; network connections or file sharing can be lost if the processor speed falls too low. You can normally leave these setting at its factory default unless problems occur. If they do, try reducing the *Standby speed* (if available) to a lower number (i.e. divide by 4 instead of 8 or 16). This speeds up the processor and increases its ability to respond to network activity. If the problems persist, try disabling the *Standby* option.

In addition to changing the processor (CPU) options, the BIOS will often allow you to change the options for the hard disk; normally the two can be set separately. The timer for the hard disk is usually independent since most activity that needs to reawaken the CPU does not require hard disk access; when an interrupt or other signal 'awakens' the processor it can usually take charge and spin up the hard disk.

- If you have problems when the processor has been set to allow power saving, try disabling that feature, but still letting the hard disk speed spin down;
- if problems persist even with this option, you can disable all power saving for the system unit, but still allow the monitor to power down.

Changing BIOS options

It is impossible for us to give detailed instructions on changing the BIOS settings because they vary so much from one computer to another. However, a few general points apply to almost all of them:

- Do not adjust any BIOS settings unless you are sure of what you are doing. You my make the computer unusable if you change the wrong settings.
- There should be printed documentation that came with your computer which explains the various setup options and what they do – if you cannot find this

information contact the BIOS manufacturer. Often manufacturer's websites will include useful information.

- When the computer is first switched on, you should see a message on screen that tells you to press a specific key to enter the computer's setup mode. Examples include, 'Press [DEL] to enter setup', or 'Hit F2 for setup'.
- Once you have entered the BIOS setup mode, look for an option called 'power' or 'power management'. If you can't see anything that looks like this, it is likely that your computer does not support energy saving.
- Write down the current settings before you change them, then if you get unexpected results you'll be able to put things back the way they were.
- Some BIOS manufacturers claim that the BIOS settings will over-ride the software settings, while others claim that the software will have precedence. In order to avoid conflicts, we recommend writing down the new settings before you leave the BIOS setup mode, then be sure to use the same settings when enabling software power saving features (see the notes under your specific operating system).

Hardware monitor controls

Modern monitors should be controlled by signals coming from the PC, the standard is called Display Power Management Signaling (DPMS) and it allows monitor power-saving systems to be set using the operating system. However, a few monitors have additional power management settings that are set using switches or on-screen controls on the monitor itself. These may include:

- an on/off switch,
- a control for the power management method used (e.g. DPMS, blank screen, or switched outlet),
- the BIOS may use the PC timers for monitor power management with the first stage initiated as the PC is put into the standby mode.

Once these settings have been enabled (where they exist), you will need to ensure that they match the software settings.

If you set-up power management using the operating system, but it fails to work, check to see whether there is some hardware control (of the type listed above) that also needs to be enabled.

Information on specific PC operating systems

For PCs running DOS

Unfortunately, DOS was released before the Energy Star standard was released, and as a result it is usually not compatible with Energy Star features. However, there are a number of things you can do:

- In some cases, power saving options in the BIOS (Basic Input Output Options) can be enabled on computers running DOS, but you will need to test them with your programs to make sure that no data is lost when the computer goes into a power saving mode.
- Monitor power management also works on a few systems running DOS – try checking the documentation that came with your system. However, the chances are that if you have an Energy Star computer, it is probably sufficiently up-to-date and powerful for you to consider upgrading to a more recent operating system that does support Energy Star.
- And don't forget that even if your computer has no energy saving features, you can still save power by switching it off when it's not in use. Some people think this is bad for computers, but in the vast majority of cases it's perfectly safe and far from wearing-out your computer, switching it off will usually reduce wear and tear on key systems like the hard disk. Obviously, it takes longer to restart a computer that's been switched off so you will probably only want to do this when you won't be using the computer for several hours.
- If the computer has no energy-saving features and needs to be left on for some reason (such as waiting for an after hours backup), you can still switch off the monitor – which may reduce power consumption by as much as 50%.

For PCs running Windows 3.0

Like DOS (which it largely relies on), Windows 3.0 was released before the Energy Star standard came into widespread use, and as a result it too is usually not compatible with some Energy Star features. However, there are a number of things you can do:

- As with computers running DOS, in some cases, power saving options in the BIOS can be enabled on computers running Windows 3.0, but you will need to test them with your programs to make sure that no data is lost when the computer goes into a power saving mode.
- Monitor power management works on a few systems running Windows 3.0 – try checking the documentation that came with your system, but if you have an Energy Star computer, there's a good chance that it is sufficiently up-to-date and powerful for you to consider upgrading to a more recent operating system that does support Energy Star.

- Change the Windows 3.0 screensaver options:
    1. Open the Control Panel folder (usually located under the Main icon on the Program Manager).
    2. Open Desktop.
    3. Locate the Screen Saver settings.
    4. Set the screensaver to Blank Screen.
    5. Set the delay time. We recommend a 10–15 minute delay for typical office use.
    6. Select Test. The screen will go blank immediately and the monitor should then power down soon afterwards.
- It is also worth checking whether any other screen saver software has been installed on the computer. A few of these programs can display screensaver graphics for a limited time, and will then switch to a blank screen (the 'Ecologic' feature in After Dark® is an example of this).
- And don't forget that even if your computer has no energy saving features, you can still save power by switching it off when it's not in use. Some people think this is bad for computers, but in the vast majority of cases it's perfectly safe and far from wearing-out your computer, switching it off will usually reduce wear and tear on key systems like the hard disk. Obviously, it takes longer to restart a computer that's been switched off so you will probably only want to do this when you won't be using the computer for several hours.
- And it's also worth noting that even if the computer has no energy-saving features but it needs to be left on for some reason (such as waiting for an after-hours backup), you can still switch off the monitor – which may reduce power consumption by as much as 50%.

For PCs running Windows 3.1

According to Microsoft's technical support, Windows 3.1 includes support for Advanced Power Management (APM). This is primarily intended to extend battery life on laptops and notebooks, but it may be possible to use it on desktop PCs that have power-saving features.

If your computer supports APM (check the manufacturers documentation and the section on BIOS Power Settings), but there are no power management features visible in the Control Panel, then the APM options have probably not been installed. Use the following procedure to install them:

1. Exit Windows.
2. Run Windows Setup from the Windows directory, and select one of the following system types:MS-DOS System with APM Intel 386SL Based System with APM

3. Select 'Intel 386SL Based System with APM' if your computer has an Intel 386SL or 486SL processor and supports the SL enhanced options for APM. Otherwise, select 'MS-DOS System with APM.'
4. Continue the setup to install the necessary files.
5. Restart Windows.
6. A Power icon should now appear in the Control Panel.
7. Choose the Power icon to configure power-management settings.
8. For more information about the settings, press F1 or choose the Help button while using the Power Management dialog box.

For PCs running Windows 95/98

Monitors

Energy Star monitors need the PC to initiate the first stage of power management, but the monitor can power down to successive stages on its own. The timing of these successive stages may be fixed, or may be configured through switches or buttons on the monitor itself, or even through on-screen menus on some newer monitors. You will also need to enable the monitor's power-saving features using Windows 95's Display Properties.

1. Open the Display properties by double-clicking the 'Display' icon in the Control Panel
2. Click the 'Screensaver' tab at the top of the Display Properties box.
3. At the bottom of the Screensaver tab you'll see a section marked 'Energy Saving features of monitor' – the Energy Star logo should be visible next to it. If the 'Energy Saving features of monitor' is greyed-out (i.e. unavailable) go to step 8, below)
4. Click on 'Low power standby' so that it's ticked and set the time at 15 minutes
5. Then tick 'Shut off monitor' and enter a time of 30 minutes (you can change both these times if you want – but these work well in most offices)
6. Press 'Enter' or click on the 'OK' button to accept the changes.
7. If you really want a screen saver, set the delay time to be less than the 'Low power standby' time.
8. If the 'Energy Saving features of monitor' tab is greyed-out, but you're sure that the monitor is Energy Star compliant, go to the 'Settings' tab, click the 'Advanced Settings' button, and then the 'Monitor' tab.
9. Tick the check box marked 'Monitor is Energy Star compliant' – the 'Energy Saving features of monitor' will now be available. Go back to step 4.

If you enable power-saving but it doesn't work, check the information under Hardware monitor controls.

Other power-saving features

As well as saving power using the monitor, Windows 95 provides power management control over the rest of the computer.

With the PC on and running Windows 95

- Open My Computer on the main screen.
- Open Control Panel.
- Look for the icon marked Power
- If there's no Power icon, open System Devices and look for Advanced Power Management (APM).
- If the Enable power management support option box is checked, then APM support is enabled. We recommend that the remaining three options be set to 'off'. If Force APM 1.0 Mode is on, then the newer APM version (1.1) will not be used. Disable Intel SL support will disable doze mode if needed. Disable Power Status Polling will eliminate compatibility problems with the mouse on some systems.
- Open the Power control panel. Power management can be set to Advanced, Standard or Off. We recommend setting it to Advanced. Standard also enables power management.
- Note: The Power Status and Battery Meter items do not need to be enabled on the PC's 'task bar' for power management to operate; these are for laptop computers.
- Make sure that the options you set with the software match those you that have already set using the BIOS.

If you are sure that your computer does support power management, but there is no Power icon visible, you will need to enable power management settings via the BIOS (See BIOS Power Settings) and then, unfortunately, you will need to re-install Windows 95.

For PCs running Windows NT 4

Version 4.0 of Windows NT Workstation (the version of NT that runs on clients, as opposed to Windows NT Server, the network operating system that runs on servers), does not support the power-saving features of Energy Star-compliant monitors. According to Microsoft, this is a deliberate design feature. However, the following version of Windows NT (version 5, within Windows2000), does include extensive power management features. Check Microsoft's website (www.microsoft.com/windows) for further information.

For PCs running Windows2000/XP[1]

Using "Power Options" in "Control Panel", you can reduce the power consumption of any number of your computer devices or of your entire system. You do this by choosing a power scheme, which is a collection of settings that manages the power usage by your computer. You can create your own power schemes or use the ones provided with Windows.

You can also adjust the individual settings in a power scheme. For example, depending on your hardware, you can:

- Turn off your monitor and hard disks automatically to save power.
- Put the computer on standby when it is idle. While on standby, your entire computer switches to a low-power state where devices, such as the monitor and hard disks, turn off and your computer uses less power. When you want to use the computer again, it comes out of standby quickly, and your desktop is restored exactly as you left it. Standby is particularly useful for conserving battery power in portable computers. Because Standby does not save your desktop state to disk, a power failure while on Standby can cause you to lose unsaved information.
- Put your computer in hibernation. The hibernate feature saves everything in memory on disk, turns off your monitor and hard disk, and then turns off your computer. When you restart your computer, your desktop is restored exactly as you left it. It takes longer to bring your computer out of hibernation than out of standby.

Typically, you turn off your monitor or hard disk for a short period to conserve power. If you plan to be away from your computer for a while, you put your computer on standby, which puts your entire system in a low-power state.

Put your computer in hibernation when you will be away from the computer for an extended time or overnight. When you restart the computer, your desktop is restored exactly as you left it.

To use Windows "Power Options", you must have a computer that is set up by the manufacturer to support these features. For more information, see the documentation that came with your computer.

For PCs running OS/2

Whenever OS/2 is installed on a new machine, it should automatically check to see if the BIOS support power management. If the installer program successfully identifies the BIOS as Energy Star compliant, it should then install the OS/2 power management software automatically.

To check the power management settings, perform the following with the computer switched on and OS/2 running:

- First open the OS/2 System folder,
- Then open the System Setup folder,
- And finally, open the Power object.

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[1] Extract from Windows XP Help & support online documentation.

If you see the Power Status window, power management has been installed and is enabled. However, if you see the Power Properties window, you will need to select the Power Management On button; this will enable power management.

If the Power object is not present in the System Setup folder, and you are sure that your BIOS supports power management, then the necessary software has not been installed. You can use the OS/2 Selective Install utility to install the software.

You can also check the OS/2 website (www.software.ibm.com/os/warp/warp-client/) for more information on compatibility and system setup.

For PCs running Unix

There are many different varieties of Unix, each with different kinds of software and or configuration information. Check the documentation that came with your computer for information on power-saving features.

There is also a vast amount of Unix-related information on the Internet.

If you are running Sun's Solaris operating system, see the information under Enabling Power Management in Sun Systems.Other computers and systems

For Apple Macintosh computers

Early versions of power management for Apple PCs completely powered down the PC, instead of entering a low power mode. This made it slow to restart the computers, so most users disabled the feature. Fortunately, most recent Apple models have full power management features, including reduced processor speeds, a range of delay times, a separate hard drive spin-down option, and monitor power-saving features.

Monitor power management for Apple systems

In the Apple world, monitor power management is much more widespread than system unit power management – which means that many Energy Star monitors are paired with older, non-Energy Star computers. Fortunately, monitor power management for Apples is available independently of other power management.

Apple systems use software to control monitor power management and there are a number of different types of software used for power management. Some screensaver programs have explicit power management options which can send the appropriate signals to the monitor. Other power management options include add-on software from third parties (such as Connectix Desktop Utilities or Sleeper). Such software can often accomplish limited monitor power management even if the computer does not have power management capability. Some Apple systems were shipped with a utility called Energy Saver, which uses DPMS signals to send the monitor into suspend mode. Finally, some monitors are shipped with software that causes the system to send DPMS signals.

To determine what types of power management software you have, starting from the desktop, look under the Apple icon on the top left of the screen and select Control

Panels. Look for control panels that mention energy saving, on older Apples it may also be worth checking the options available through your screen saver.

System unit power management for Apple systems

First generation Energy Star Apple PCs do not have low power modes. In order to meet Energy Star energy consumption requirements, these machines automatically shut themselves off after a specified delay time. This means losing network connections and possibly losing data, and requires rebooting the system on wake-up. Understandably, few users find this to be a viable option, and the feature is usually disabled. However, most recent Apple computers have much more advanced power management capabilities; a list of all Energy Star-compliant Apple computers can be found by searching Apple's website (www.apple.com) for the term 'Energy Star'.

While Apple Macintosh computers have the equivalent of a BIOS, users make changes to its settings using the relevant control panels.

In general, Apple models equipped with a version of the Mac OS earlier than 7.5 will have limited system unit power management capability, while models running later versions have many more capabilities. To check which version of the operating system (system software) you are using, from the desktop bring up the 'About This Macintosh' window under the Apple symbol at the top left of the screen.

You may be able to upgrade the version of the Mac OS you are running to add power management, but usually if you have an earlier version, your Mac will be too old to support full power management anyway.

An overview of the Mac's energy related Control Panels

Note: This information is based on material from Apple's website.

There are four different energy-related control panels in System 7.5.

- Auto Power On/Off: Turns the computer ON and OFF at specified times.
- CPU Energy Saver: Turns the computer OFF at specified times, but not ON.
- Screen: Puts an internal monitor into energy-saving mode.
- Energy Saver 1.0: Puts an external monitor into energy-saving mode.
- Energy Saver 2.0: Combines functionality of CPU Energy Saver, Energy Saver 1.0, and Auto Power On/Off. Energy Saver 2.0 is compatible only on PCI-based Power Macintosh computers, which includes the Power Macintosh 5400, 6400, 7200, 7500, 7600, 8500, and 9500 series computers.

These control panels only work on certain Macintosh computers. In addition, the Energy Saver 1.0 control panel requires an Energy Star-compliant monitor as well as a Macintosh computer compatible with this software.

Auto Power On/Off

This feature lets you set your Macintosh computer to power ON and OFF at a pre-determined time, on a daily basis, or for one particular day.

This control panel can only be used on computers that can be turned off by using the Shut Down command (soft power off) and that have the 'Cuda' ADB controller chip or a version of the Motorola 68HC05 microcontroller chip.

Note: Not included with all system software prior to System 7.5

CPU Energy Saver

This feature lets you set your Macintosh to turn OFF at a specified time. However, you cannot set your system to turn ON with this feature. It can only be used on computers that can be turned off by using the Shut Down command (soft power off), such as the Quadra 700. This feature is only installed by System 7.5 if Auto Power On/Off is NOT compatible with the Macintosh and CPU Energy Saver IS compatible with the Macintosh.

Note: This control panel did not ship with system software older than System 7.5, although it was released separately before System 7.5.

Energy Saver 1.0

This feature lets you set your Macintosh to put external monitors into sleep mode. It was originally designed to work with the built-in video of Macintosh LC III, Quadra 610-950, Power Macintosh, and Performa 450-467, 63x, 611x.

This feature requires an Energy Star-compliant monitor. Compliant models include:

- Apple Color Plus 14-in. Display
- Macintosh Color Display (newer M1198LL/B version)
- Apple AudioVision 14 Display
- Apple Multiple Scan 14, 15, 17, and 20 Displays

Note: Not included with system software prior to System 7.5, although it was made available separately.

If Energy Saver is installed on a computer that has an incompatible monitor, the monitor goes black after the specified inactivity period has passed, but the incompatible monitor is NOT in low power mode, and therefore is NOT saving energy. Monitors that do not support this Energy Saver function, or monitors that use video cards, are not harmed by the installation of this control panel, but they do not save energy with Energy Saver installed.

Screen

This control panel lets you set your Macintosh computer to put internal monitors into sleep mode.

The Screen control panel can only be used on certain 'all-in-one' Macintosh systems, such as the LC/Performa 500-series.

Energy Saver 2.0

This control panel combines functionality of CPU Energy Saver, Energy Saver 1.0, and Auto Power On/Off. Energy Saver 2.0 is compatible only on PCI-based Power Macintosh computers, which includes the Power Macintosh 5400, 7200, 7500, 7600, 8500, and 9500 series computers.

Note: Energy Saver 2.0 is available only in System 7.5.2 or later when used on a PCI-based Power Macintosh computer.

Enabling Power Management in Sun Systems

Note: this information is taken from the *User Guide to Power Management for PCs and Monitors*, written by Bruce Nordman and others at the Environmental Energies Technology Division. Lawrence Berkeley National Laboratory, University of California.

Sun desktop workstations in the sun4m and sun4u platform groups support power management, but server computers in the sun4c and sun4d do not support power management. You need to be running Solaris 2.3, or preferably Solaris 2.5 which has the full power management features described here. Sun sun4u systems are shipped with power management enabled, with a 30 minute delay timer; sun4m systems need to have the power management software installed before it can be used. Diskless machines cannot be enabled for power management.

To enable power management, start the dtpower utility by either selecting its icon, type /usr/openwin/bin/dtpower & (as the superuser), or select Power Manager from the Workspace menu under the Programs option of the default OpenWindows menu. Drag the inactivity slider or type in the adjacent box to set the inactivity timer (e.g. 60 minutes) for the screen, any other power-management capable devices, and the 'system' (the processor). On sun4u systems you can define the times between which AutoShutdown can occur (e.g. between 6pm and 8am), and whether the AutoWakeup feature is enabled to reawaken the system at the end of the AutoShutdown period (e.g. before the user arrives at work). Select Apply to put these changes into effect, then Quit the tool or close the window. Power management can also be configured by editing the configuration file directly. See the system documentation for further details.

There are several issues to be aware of before implementing power management on a Sun. If electronic mail is delivered to that system, it may be returned as undeliverable if the system remains off for three days; using a separate server for mail delivery avoids this potential problem. Remote access to a system in hibernate is not possible from either network or dial-in modems. Periodic 'cron' jobs are not executed when the system is in hibernate. See system documentation for further details on these and other possible concerns.

The accessory outlet on Sun workstations is not switched off by powering off the processor, and so does not help accomplish power management.

For all other computers

Install a power control device

When appropriate and cost-effective, consider installing power-controlling devices. These devices can be used on any kind of PC or monitor, and either require no configuration, or come with their own configuration software. The US EPA's Energy Star program includes such devices and their website (www.epa.gov/energystar) has lists of compliant devices. The ACEEE 'Guide to Energy-Efficient Office Equipment' is also a source of information on this, but is currently a little out of date; see their website (www.aceee.org) for more information.

At present we are not aware of Australian distributors for any of these devices, but will be posting updated information here as soon as we have it.

Network issues

Servers

Normally network servers will not use power-saving features because they need to be constantly accessible to all users without any delays. However, there is usually no reason why the monitors on network servers should not be powered down (or even switched off) whenever they not actually being used. On a network with several servers this can save quite a lot of money.

Clients

In most cases, if the client PC hardware and the operating system both support Energy Star features, you should not have any problems with your network. However, if either the client's operating system or your network operating system are older versions you may find that they can lose their network connections after the client has 'woken-up' from its power-saving mode. In such cases there are several options you can consider:

- Where the feature is available, increase the standby processor speed so that the client responds to network activity more rapidly (see BIOS Power Settings for instructions on how to do this).
- In some cases the BIOS will allow you to specify what kinds of system activity will 'wake up' the computer. If the computer is not responding to network requests properly when powered down, try checking that the BIOS is configured to wake the computer in response to the specific Interrupt Request (IRQ) that the network interface card is using.
- Try disabling CPU power-saving, but leaving the hard disk enabled,

- if that doesn't work, disable all power-saving on the system unit but leave the monitor's power-saving enabled – that should avoid all networking problems but still ensure considerable savings.

Peer-to-peer networks

Networking problems appear to be slightly more common on peer-to-peer networks than on client-server networks, especially with older network operating system software. The troubleshooting tips for clients on client-server networks also apply to most peer-to-peer systems. For details see: On a network – Clients.

If you have a peer-to-peer network and it doesn't support any form of power-saving you can still save a lot of energy and money by enabling power saving on monitors (where it exists) or simply switching them off when not in use. This is particularly important if you normally leave your computers on at night, or on weekends, to allow for data to be backed-up.