



ENERGY STAR® Program Requirements for Computers

Eligibility Criteria Preliminary DRAFT

Below is the **PRELIMINARY DRAFT** Version 4.0 product specification for ENERGY STAR qualified computers. A product must meet all of the identified criteria to earn the ENERGY STAR.

1) **Definitions:** Below are the definitions of the relevant terms in this document.

- A. **Computer:** A desktop, tower or mini-tower, or portable unit, including high-end desktop computers, personal computers, workstations, notebooks, network computer desktops, X terminal controllers, desktop-derived servers, and computer-based point-of-sale retail terminals.
- B. **Integrated Computer System:** Systems in which the computer and visual display are combined into a single unit. Such systems must meet all of the following criteria: it is not possible to measure the power consumption of the two components separately by disconnecting external cables or using mechanical switches; and the system receives its AC power through a single cable.
- C. **Display:** A commercially-available, electronic product with a display screen and its associated electronics encased in a single housing, or within the computer housing (e.g., notebook or integrated computer), that is capable of displaying output information from a computer via one or more inputs, such as a VGA, DVI, and/or IEEE 1394. The display usually relies on a cathode-ray tube (CRT), liquid crystal display (LCD), or other display device.
- D. **Network Interface:** The components (hardware and software) whose primary function is to make the computer capable of communicating over one or more network technologies.
- E. **Server:** A computer that primarily provides services to other devices on the network rather than to an individual interactive user. For purposes of this specification, this includes the following desktop derived, non-redundant type servers: EPS12V and the EPS1U. Both are derived largely from desktop computer designs, but have slightly different form factors and may often have multiple processors, different operating systems, and larger data storage capabilities.
- F. **Active Mode:** The mode in which the computer, while connected to a power source, is producing useful work; for example, running application software. To clarify, the low end or minimum power draw of active mode is idle. The high end of active mode would be the maximum power draw capable by the computer.
- G. **Idle Mode:** A subset of active mode, this is the mode in which the operating system and other software have completed loading, the machine is not asleep and no activity, including peripheral or network, requiring CPU processing time is occurring. **Note:** this is a new definition created specifically for this computer specification. EPA encourages manufacturers to provide feedback on whether this adequately defines the characteristics of idle mode.
- H. **Sleep Mode:** A low power state that a computer enters automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly “wake” in response to inputs from network connections or user interface devices. Computers may have more than one sleep mode, but the lowest power sleep mode is the one to which these criteria apply.
- I. **Standby Mode:** The lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer’s instructions.
- J. **Inactivity:** A period of time during which a computer is not actively engaged in user-desired

application activity and does not encounter any user input from key peripherals.

- K. **Wake Events:** A user, programmed, or external event or stimulus that causes the computer to transition from its Sleep Mode to either active or idle mode of operation. Examples of wake events include, but are not limited to, movement of the mouse, keyboard activity, or a button press on the chassis, and in the case of external events, stimulus conveyed via a remote control, network, modem, etc.

2) **Performance Specification and Test Procedures:** The following table presents EPA’s proposed new performance levels for computers and the test procedures manufacturers will be required to use to qualify models. The effective date for the Tier I requirements is provided in Section 5, below. **Note:** All computer models must be able to transition from the sleep mode to full active state in no less than **X** seconds.

Note: It is important that quality, performance, and energy saving features are maintained while using ENERGY STAR qualified computers; therefore, EPA would like to require a maximum response time when the computer transitions from sleep to active mode (for example, a computer must return to active from sleep within 5, 10, or 15 seconds). Manufacturers are encouraged to provide feedback to EPA on what is reasonable from a design perspective while meeting end user expectations of the product.

Table 1: Tier I Proposed Performance Requirements and Test Procedures

Requirement	Product Category Requirements	Test Protocol	Source
Standby Mode	Desktops and Workstations: ≤ 2 W Notebooks: ≤ 0.5 W (<i>ENERGY STAR proposed EPS level 1/06</i>) Integrated Computers: ≤ 3 W	IEC 62301	International Electrotechnical Commission (IEC): www.iec.ch
Sleep Mode	Desktops, Notebooks, Workstations ≤ 5 W Integrated Computers ≤ 7 W Shipment Requirement: Manufacturers must set the default to activate the display’s low-power or sleep mode within 15 minutes of user inactivity. Products may have more than one sleep mode, but these criteria address only the single lowest power consumption sleep mode.	Existing ENERGY STAR test protocol	ENERGY STAR Computer Specification (Version 3.0)
Active Mode	Idle Mode (<i>further research needed</i>) Desktops: ≤ 50 to 60 W Notebooks: ≤ 15 W Integrated Computers: ≤ 52 to 62 W Desktop Derived Servers and Workstations: ≤ 90 to 100 W	TBD	TBD
	Internal & External Power Supplies Desktops, Workstations and Integrated Computers with an Internal Power Supply: 80% minimum efficiency at 20%, 50%, and 100% of rated output Desktop Derived Servers with an Internal Power Supply: EPS12V: 75% minimum efficiency at 20% of rated output; 80% minimum efficiency at 50% of rated output; 77% minimum efficiency at 100% of rated output EPS1U: 78% minimum efficiency at 20% of rated output; 83% minimum efficiency at 50% of rated output; and 80% minimum efficiency at 100% of rated output Notebooks and other Computers with an External Power Supply: ENERGY STAR External Single Voltage Ac-Ac and Ac-Dc Power Supply specification	IPS: Draft Internal power supply test protocol EPS: ENERGY STAR External Power Supply Protocol	IPS: www.efficientpowersupplies.org EPS: www.energystar.gov/powersupplies

Note: Guidelines A and B, which appear in section IV.D1.i of current specification, have been removed in this new version due to the fact that all computers found in the marketplace today are shipped with network capability and should be evaluated under the same performance level(s).

Off Mode Requirements: The off mode or standby mode requirements follow Federal Energy Management Program (FEMP) recommendations: http://www.eere.energy.gov/femp/technologies/eep_standby_power.cfm

Standby Mode for Notebooks: During the Intel Technology Symposium in September 2004, EPA presented a potential Tier I standby level of ≤ 1 W for notebooks. Under the IEC 62301 test protocol, only the electricity consumed by the external power supply itself is considered when measuring standby power for a notebook. Therefore, to harmonize with the ENERGY STAR external power supply specification proposed 0.5 W no load requirement, EPA is proposing the same performance level for notebooks in standby mode.

Sleep Mode: The proposed ≤ 7 W minimum sleep mode level for integrated computers represents the sum of the proposed ≤ 5 W level for desktops and the sleep level requirement in the existing ENERGY STAR Version 4.0 monitor Tier II specification (≤ 2 W) effective January 1, 2006. Unlike the existing specification, the sleep mode requirements proposed above do not provide a sliding scale for computers with higher capacity power supplies. It is EPA's understanding that there are power architectures available today that allow sleep mode power to remain relatively low, even for computers that have high capacity power supplies. EPA is also proposing that the manufacturer set the sleep mode default time to 15 minutes of user inactivity. The existing specification requires this default time to be set at 30 minutes.

Idle Mode: Research shows that typical office computers sit idle anywhere from 90 – 98% of their operating hours. Idle mode could be the single most important contributor to total annual energy use in most computers and is the reason why EPA is proposing this new requirement. By including idle mode and power supply efficiency requirements EPA can more fully address total energy consumption while the computer is operating (e.g., Active mode). Additional research is needed in this area and EPA would like to work with manufacturers to determine the appropriate levels and test protocol.

Internal Power Supply Requirements: The proposed efficiency levels provided in Table 1 for desktops, workstations, and integrated computers are based on Intel's internal computer power supply design guide recommendations (www.formfactors.org) and internal power supply test data. It is EPA's understanding that internal power supplies are either already available or will be available in the near future that can meet the Intel design guide efficiency levels. Therefore, EPA is proposing 80% efficiency at 20%, 50%, and 100% loads for desktops, workstations, and integrated computers. Desktop derived servers are separated into two classifications: EPS12V and EPS1U (rack type). Based on Intel's latest recommendations, EPA proposes 75% minimum efficiency at 20% of rated output; 80% at 50% of rated output; and 77% at 100% of rated output for EPS12V. For EPS1U models EPA proposes 78% minimum efficiency at 20% of rated output; 83% at 50% of rated output; and 80% at 100% of rated output.

3) Additional Requirements

User Interface: Although not mandatory, manufacturers are strongly recommended to design products in accordance with the Power Control User Interface Standard — IEEE 1621 (formally known as "Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments"). Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard see <http://eetd.LBL.gov/Controls>.

4) **Effective Date:** The Tier 1 effective date is proposed for January 1, 2007.

5) Programmatic Changes from MOU to New Partnership Agreement Format

Note: Beginning in 2001, EPA and DOE began transitioning ENERGY STAR product categories and their partners to a new streamlined Partnership Agreement. For many of the product categories this new Agreement was phased in as specifications were revised. As such, computer partners will be expected to meet the requirements of the new Agreement once this new specification is finalized. Outlined below are the key changes to the existing computer MOU requirements based on this new Agreement format. EPA will distribute the Partner Commitments along with the next Draft version of the specification.

- Manufacturers are required to use the ENERGY STAR mark on the qualified product, on product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site. EPA may also decide to provide several additional labeling options depending on manufacturer concerns and/or interests including, but not limited to: electronic, temporary, permanent, and/or an advertising equivalent. EPA is willing to talk to manufacturers about these labeling options to ensure that they meet both EPA's and manufacturers' needs.
- Manufacturers will be required to qualify at least one ENERGY STAR computer model within one year of activating the computer portion of the agreement.
- Grandfathering is not allowed under this Version 4.0 specification. ENERGY STAR qualification under the existing Version 3.0 specification is not automatically granted for the life of the product model. All products, including models originally qualified under Version 3.0 with a **date of manufacture** on or after the proposed **January 1, 2007** effective date, must meet the new Version 4.0 requirements in order to use the ENERGY STAR on the product or in product literature. The date of manufacture is specific to each unit, and is the date (e.g., month and year) of which a unit is considered to be completely assembled.
- Manufacturers must provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR qualified models. This data can be aggregated and submitted through a third-party (e.g., trade association) to protect the identity of the submitters, if necessary.

6) Tier II/Phase II

Note: During the 2004 Intel Symposium EPA presented its preliminary ideas for Tier II/Phase II requirements. Additional research will be undertaken to help EPA thoroughly define the opportunities that exist in addressing whole machine performance and the power management issue. Tier I and Tier II specification development will not run concurrently. EPA proposes that Tier II/Phase II take effect 12-18 months after Tier I: approximately, January or July 1, 2008. Once Tier II/Phase II is finalized, manufacturers will have at least 9 months before the effective date to redesign and test products in order to remain qualified as ENERGY STAR under the new Tier II requirements.

a. **Fixing the Network Problem**

EPA's goal in addressing power management under Tier II/Phase II is to ensure that all machines remain asleep and connected to the network when not being used by a client. The following is some sample language:

Computers shall maintain general network connectivity while in their sleep mode, responding to standard routine packet types, ignoring those packet types that can be ignored without detriment, and waking up the system when necessary. Computers should be able to resume their sleep mode quickly (e.g., ≤ X seconds) from network wake when appropriate.

Note: Recent studies show that power management is disabled or non-functioning on about 95% of office desktop computers. While comparable data for notebooks (while AC connected) or residential PCs is unavailable the same trend is expected to hold. Over the last several months EPA has participated in discussions with manufacturers, and will continue to do so during this specification development process, to determine a solution to this problem.

b. System Energy Efficiency

Prescriptive Approach

Specify standby, sleep, and idle mode requirements, power supply efficiency, as well as efficiency requirements for the CPU, video card, software, etc.

Performance Benchmark Approach

Use a software benchmark to measure the performance of the computer while simultaneously measuring the energy required to create that performance. Performance per unit energy becomes the efficiency metric and basis for comparison.