ENERGY STAR® Program Requirements for Computers

Partner Commitments
Draft 1 Version 6.0

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for Computers. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for Computers. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform Computer testing. A list of EPA-recognized laboratories and certification bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR qualified Computers.

    5.1. Partner shall adhere to the following product-specific commitments regarding use of the ENERGY STAR certification mark on qualified products:

        5.1.1. Partner must use the ENERGY STAR mark in one of the following ways:

            1) Via permanent or temporary label on the top or front of the product. All temporary labeling must be affixed to the product with an adhesive or cling-type application; or

            2) Via electronic labeling. Electronic labeling must meet the following requirements:

                a. The ENERGY STAR mark in cyan, black, or white must appear at system start-up, and must display for a minimum of 5 seconds;

                b. The ENERGY STAR mark must be at least 10% of the screen by area, must not be smaller than 76 pixels x 78 pixels, and must be legible.

            EPA will consider alternative proposals for electronic labeling on a case-by-case basis.

Note: EPA is aware of concerns expressed by stakeholders on the timing requirements in the electronic labeling option and how they apply as devices continue to become capable of faster startup times. EPA shares an interest in ensuring that ENERGY STAR recognition via electronic labeling remain relevant in future product designs. EPA welcomes and encourages stakeholder proposals on improvements to the requirement.

5.1.2. Partner must use the ENERGY STAR mark in product literature (i.e., user manuals, spec sheets, etc.).

5.1.3. Partner must use the ENERGY STAR mark on product packaging for products sold at retail.

5.1.4. Partner must use the ENERGY STAR mark on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.

1) If additional information about the ENERGY STAR program or other products is provided by the Partner on its website, Partner must comply with the ENERGY STAR Web Linking Policy, which can be found at www.energystar.gov/partners;

Verifying Ongoing Product Qualification

6. Participate in third-party verification testing through a Certification Body recognized by EPA for Computers, providing full cooperation and timely responses, EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

   7.1. Partner must submit the total number of ENERGY STAR qualified Computers shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).

   7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.

   7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

   Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner;

8. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.

9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Training and Consumer Education

10. Partner shall agree to complete steps to educate users of their products about the benefits of power management by including the following information with each Computer (i.e., in the user manual or on a box insert):

10.1. Energy saving potential;

10.2. Financial saving potential;

10.3. Environmental benefits;

10.4. Information on ENERGY STAR and a link to www.energystar.gov; and

10.5. ENERGY STAR logo (used in accordance with "The ENERGY STAR Identity Guidelines" available at www.energystar.gov/logos).

11. In addition, a link should be made available to www.energystar.gov/powermanagement from Computer product pages, product specifications, and related content pages.
12. At the manufacturer's request, EPA will supply suggested facts and figures related to the above criteria, template elements, or a complete template suitable for use in user guides or box inserts.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified displays and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption,

greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.

- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.

ENERGY STAR® Program Requirements
Product Specification for Computers

Eligibility Criteria
Draft 1 Version 6.0

Following is the Version 6.0 ENERGY STAR Product Specification for Computers. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

A) Product Types:

1) Computer: A device which performs logical operations and processes data. For the purposes of this specification, computers include both stationary and portable units, including desktop computers, integrated desktop computers, notebook computers, small-scale servers, thin clients, and workstations. Although computers are capable of using input devices and displays, such devices are not required to be included with the computer upon shipment. Computers are composed of, at a minimum:

a) A central processing unit (CPU) to perform operations. If no CPU is present, then the device must function as a client gateway to a server which acts as a computational CPU;

b) User input devices such as a keyboard, mouse, or touchpad; and

c) An integrated display screen and/or the ability to support an external display screen to output information.

Note: The Computer definition is revised to account for ultra-thin and thin clients (which lack a CPU), to remove legacy input references (digitizer and game controllers), and to add touchpad as an input option.

EPA welcomes general feedback on additional definitions necessary to reflect current technologies that impact the ENERGY STAR Computer program requirements.

2) Desktop Computer: A computer whose main unit is designed to be located in a permanent location, often on a desk or on the floor. Desktop computers are not designed for portability and are designed for use with an external display, keyboard, and mouse. Desktop computers are intended for a broad range of home and office applications.

a) Integrated Desktop Computer: A desktop computer in which the computing hardware and display are integrated into a single housing, and which is connected to ac mains power through a single cable. Integrated desktop computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of desktop computers, Integrated Desktop Computers are typically designed to provide similar functionality as Desktop systems.

3) Notebook Computer: A computer designed specifically for portability and to be operated for extended periods of time both with and without a direct connection to an ac mains power source. Notebook computers include an integrated display and are capable of being powered by an integrated battery or other portable power source. In addition, most notebooks use an external power supply and have an integrated keyboard and pointing device. Notebook computers are typically designed to provide similar functionality to desktops, including operation of software similar in functionality as that used in desktops.

a) Tablet Computer: A Notebook Computer with a reversible touch-sensitive screen and a non-detachable physical keyboard. For the purposes of this specification, Tablet Computers are subject to all Notebook Computer requirements.

b) Slate Computing Device: A computer is a Slate Computing Device if it has all of the following characteristics:

(1) either lacking a physical keyboard or with a detachable physical keyboard;

(2) relying solely on touchscreen input;

(3) having solely a wireless network connection (e.g., Wi-Fi, 3G); and

(4) primarily powered from an internal battery (with connection to the mains for charging, not primary powering of the device).

Note: Revised definitions for Tablet Computer and Slate Computing Device are added above to add clarity to the program scope.

c) Mobile Thin Client: A computer meeting the definition of a Thin Client, designed specifically for portability, and also meeting the definition of a Notebook Computer. These products are considered to be Notebook Computers for the purposes of this specification.

Note: Mobile Thin Clients were excluded from Thin Client qualification in the Version 5 specification. EPA's review of usage patterns and power data, as well as stakeholder feedback, led to the conclusion that such products were best considered as Notebook Computers from an energy standpoint. The proposed definition above is intended to provide clarity on how these products are being considered in Version 6.0.

4) Small-scale Server: A computer that typically uses desktop components in a desktop form factor, but is designed primarily to be a storage host for other computers. Small-scale Servers are designed to perform functions such as providing network infrastructure services (e.g., archiving) and hosting data/media. These products are not designed to process information for other systems or run web servers as a primary function. A Small-scale Server has the following characteristics:

a) Designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box/product;

b) Designed to operate 24 hours/day, 7 days/week, with minimal unscheduled downtime (on the order of hours/year);

c) Capable of operating in a simultaneous multi-user environment serving several users through networked client units; and

d) Designed for an industry accepted operating system for home or low-end server applications (e.g., Windows Home Server, Mac OS X Server, Linux, UNIX, Solaris).

5) Thin Client: An independently-powered computer that relies on a connection to remote computing resources (e.g., computer server, remote workstation) to obtain primary functionality. Main computing functions (e.g., program execution, data storage, interaction with other Internet resources) are provided by the remote computing resources. Thin Clients covered by this specification are (1) limited to devices with no rotational storage media integral to the computer and (2) designed for use in a permanent location (e.g. on a desk) and not for portability.

a) Integrated Thin Client: A Thin Client in which computing hardware and display are integrated into a single housing, and which is connected to ac mains power through a single cable. Integrated Thin Client computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of Thin Clients, Integrated Thin Clients are typically designed to provide similar functionality as Thin Client systems.

b) Ultra-thin Client: A computer with lesser local resources than a standard Thin Client that sends raw mouse and keyboard input to a remote computing resource and receives back raw video from the remote computing resource. Ultra-thin clients cannot interface with multiple devices simultaneously nor run windowed remote applications due to the lack of a user-discernible client operating system on the device (i.e., beneath firmware, user inaccessible).

Note: EPA added clarifying definitions for sub-types of Thin Clients:

- *Integrated Thin Client*: The test methodology for Short Idle measurement allows for evaluation of Thin Clients with integrated displays. The definition proposed is similar to the existing Integrated Desktop Computer description.
- *Ultra-thin Client*: EPA raised this product type as a potential product area within the computer specification in specification revision launch materials. Some stakeholders supported further investigation, though concerns were raised over appropriate testing conditions for such products. No data was received as part of the dataset development effort. EPA welcomes proposals for defining this product type and additional data.
- *Mobile Thin Client*: As noted above, a definition for Mobile Thin Client is placed under the Notebook Definition and provides clarity on how these products are being considered in Version 6.0.

6) Workstation: A high-performance, single-user computer typically used for graphics, CAD, software development, financial and scientific applications among other compute intensive tasks. Workstations covered by this specification (a) are marketed as a workstation; (b) provide mean time between failures (MTBF) of at least 15,000 hours (based on either Bellcore TR-NWT-000332, issue 6, 12/97 or field collected data); and (c) support error-correcting code (ECC) and/or buffered memory. In addition, a workstation meets three or more of the following criteria:

a) Provide supplemental power support for high-end graphics (e.g., PCI-E 6-pin 12V supplemental power feed);

b) Wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;

c) Do not provide support for Uniform Memory Access (UMA) graphics;

d) Provide 5 or more PCI, PCI-E, or PCI-X slots;

e) Provide multi-processor support for 2 or more processors (shall support physically separate processor packages/sockets, i.e., requirement cannot be met with support for a single multi-core processor); and/or

f) Qualification by 2 or more Independent Software Vendor (ISV) product certifications; these certifications can be in process, but shall be completed within 3 months of qualification.

Note: The Workstation definition has remained functionally the same since its introduction in the Version 4.0 specification. EPA does not propose changes at this time, but welcomes stakeholder feedback on any revisions necessary to maintain the relevance of this definition as an appropriate descriptor of products in the category.

B) Product Category: A second-order classification or sub-type within a product type that is based on product features and installed components. Product categories are used in this specification to determine qualification and test requirements.

C) Computer Components:

1) Discrete Graphics Processing Unit (GPU): A graphics processor with a local memory controller interface and local graphics-specific memory.

2) Display: A display screen and associated electronics encased in a single housing, or within the computer housing (e.g., notebook or integrated desktop computer), that is capable of displaying visual information from a computer via one or more inputs (e.g., VGA, DVI, HDMI, DisplayPort, IEEE 1394). Examples of computer display technologies are the cathode-ray tube (CRT) and liquid crystal display (LCD).

Note: The Display definition is revised to more closely conform to revisions to the ENERGY STAR Displays specification.

3) External Power Supply (EPS): Also referred to as External Power Adapter. A component contained in a separate physical enclosure external to the computer casing, designed to convert line voltage ac input from the mains to lower dc voltage(s) in order to provide power to the computer. An external power supply shall connect to the computer via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

4) Internal Power Supply (IPS): A component internal to the computer casing and designed to convert ac voltage from the mains to dc voltage(s) for the purpose of powering the computer components. For the purposes of this specification, an internal power supply shall be contained within the computer casing but be separate from the main computer board. The power supply shall connect to the mains through a single cable with no intermediate circuitry between the power supply and the mains power. In addition, all power connections from the power supply to the computer components, with the exception of a DC connection to a display in an Integrated Desktop Computer, shall be internal to the computer casing (i.e., no external cables running from the power supply to the computer or individual components). Internal dc-to-dc converters used to convert a single dc voltage from an external power supply into multiple voltages for use by the computer are not considered internal power supplies.

D) Operational Modes:

1) Active State: The power state in which the computer is carrying out useful work in response to a) prior or concurrent user input or b) prior or concurrent instruction over the network. Active State includes active processing, seeking data from storage, memory, or cache, including Idle State time while awaiting further user input and before entering low power modes.

2) Idle State: The power state in which the operating system and other software have completed loading, a user profile has been created, activity is limited to those basic applications that the system starts by default, and the computer is not in Sleep Mode. Idle State is composed of two sub-states: Short Idle and Long Idle.

a) Long Idle: The mode where the Computer has reached an Idle condition (i.e., 15 minutes after OS boot or after completing an active workload or after resuming from Sleep Mode) and the main Computer Display has entered a low-power state where screen contents cannot be observed (i.e., backlight has been turned off) but remains in the working mode (ACPI G0/S0). If power management features are enabled as-shipped in the scenario described in this definition, such features shall engage prior to evaluation of Long Idle (e.g. display is in a low power state, HDD may have spun-down), but the Computer is prevented from entering Sleep Mode. P_{LONG_IDLE} represents the average power measured when in the long idle mode.

b) Short Idle: The mode where the Computer has reached an Idle condition (i.e., 5 minutes after OS boot or after completing an active workload or after resuming from Sleep Mode), the screen is on and set to as-shipped brightness, and Long Idle power management features have not engaged (e.g. HDD is spinning and the Computer is prevented from entering sleep mode). P_{SHORT_IDLE} represents the average power measured when in the Short Idle mode.

Note: Definitions for Short Idle and Long Idle are added above, based on definitions from *Ecma-383* and edited for clarity.

3) Off Mode: The lowest power 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. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.

4) Sleep Mode: A low power mode that the computer enters automatically after a period of inactivity or by manual selection. A computer with Sleep capability can quickly "wake" in response to network connections or user interface devices with a latency of less than or equal to 5 seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep Mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.

E) Networking and Additional Capabilities:

1) Additional Internal Storage: Any and all internal hard disk drives (HDD) or solid state drives (SSD) shipping with a computer beyond the first. This definition does not include external drives.

2) Full Network Connectivity: The ability of the computer to maintain network presence while in Sleep Mode or another low power mode of equal or lower power consumption ("LPM") and intelligently wake when further processing is required (including occasional processing required to maintain network presence). Presence of the computer, its network services and applications, is maintained even though the computer is in a LPM. From the vantage point of the network, a computer with full network connectivity that is in LPM is functionally equivalent to an idle computer with respect to common applications and usage models. Full network connectivity in LPM is not limited to a specific set of protocols but can cover applications installed after initial installation. Also referred to as "network proxy" functionality and as described in the *Ecma-393* standard.

   a) Network Proxy - Base Capability: To maintain addresses and presence on the network while in LPM, the system handles IPv4 ARP and IPv6 NS/ND.

   b) Network Proxy - Full Capability: While in LPM, the system supports Base Capability, Remote Wake, and Service Discovery/Name Services.

   c) Network Proxy - Remote Wake: While in LPM, the system is capable of remotely waking upon request from outside the local network. Includes Base Capability.

   d) Network Proxy - Service Discovery/Name Services: While in LPM, the system allows for advertising host services and network name. Includes Base.

3) Network Interface: The components (hardware and software) whose primary function is to make the computer capable of communicating over one or more network technologies. Examples of Network Interfaces are IEEE 802.3 (Ethernet) and IEEE 802.11 (Wi-Fi).

4) Wake Event: A user, scheduled, or external event or stimulus that causes the computer to transition from Sleep Mode or Off Mode to an active state of operation. Examples of wake events include, but are not limited to: movement of the mouse, keyboard activity, controller input, real-time clock event, or a button press on the chassis, and in the case of external events, stimulus conveyed via a remote control, network, modem, etc.

5) Wake On LAN (WOL): Functionality which allows a computer to transition from Sleep Mode or Off Mode to an Active State of operation when directed by a network Wake Event via Ethernet.

F) Marketing and Shipment Channels:

1) Enterprise Channels: Sales channels typically used by large and medium-sized business, government, educational, or other organizations to purchase computers for use in managed client/server environments.

2) Model Name: A marketing name that includes reference to the computer model number, product description, or other branding references.

3) Model Number: A unique marketing name or identification reference that applies to a specific hardware and software configuration (e.g., operating system, processor type, memory, GPU), and is either pre-defined or selected by a customer.

G) Product Family: A high-level description referring to a group of computers sharing one chassis/motherboard combination that often contains hundreds of possible hardware and software configurations.

2 SCOPE

Note: The overall scope presented in this section is consistent with the existing Version 5 with two exceptions: (1) clarifications are added for tablet and slate computers; and (2) the topics of Integrated Thin Clients and Ultra-thin Clients are introduced for further evaluation through this specification development process.

2.1 Included Products

2.1.1 Products that meet the definition of a Computer and one of the following Product Type definitions, as specified herein, are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2:

i. Desktop Computers and Integrated Desktop Computers;

ii. Notebook Computers and Tablet Computers that do not meet the definition of Slate Computing Device;

iii. Workstations;

iv. Small-scale Servers that are marketed and sold for non-data center use; and

v. Thin Clients.

2.2 Excluded Products

Note: EPA is interested in reviewing the topic of DC-powered Computers with stakeholders. EPA understands that DC-powered versions of current non-portable product types are becoming more prevalent in the marketplace and would be interested in discussing the viability of including them either in Draft 2 or in future specification revisions.

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/products.

2.2.2 The following products are not eligible for qualification under this specification:

i. Computer Servers, as defined in ENERGY STAR Computer Server specification;

ii. Small-scale Servers that are marketed and sold for use in data centers;

iii. Handheld Computers (including Slate Computing Devices and eReaders);

iv. Mobile Thin Clients not meeting the definition of Notebook Computer;

Note: Slate Computing Devices are marketed independently of the notebook computer and smartphone designations. Battery life and weight are key considerations for this type of product, resulting in optimized power use under normal operation. Further, slates do not see significant periods of use while plugged into wall ac power, as can be the case for notebooks.

As a result of its analysis of industry data, EPA anticipates limited operational energy savings opportunity in this category. Slates are therefore not proposed for coverage in this Computer specification. Further, as devices operating primarily from a rechargeable integrated battery, EPA proposes that such products instead be covered under the ENERGY STAR Battery Charging Systems program once specification revisions are complete. For further information, please go to www.energystar.gov/RevisedSpecs and follow the link to "Battery Charging Systems." EPA welcomes stakeholder feedback on this proposal and will clarify this definition to reflect final guidance.

v. Game Consoles;

vi. Personal Digital Assistant devices (PDAs);

vii. Smart Phones; and

viii. Handheld gaming devices, typically battery powered and intended for use with an integral display as the primary display.

3 QUALIFICATION CRITERIA

3.1 Significant Digits and Rounding

3.1.1 All calculations shall be carried out with directly measured (unrounded) values.

3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 Power Supply Requirements

3.2.1 Power supply test data and test reports from testing entities recognized by EPA to perform power supply testing shall be accepted for the purpose of qualifying the ENERGY STAR product.

3.2.2 Internal Power Supplies (IPS): Internal Power Supplies used in Computers eligible under this specification must meet the following requirements when tested using the *Generalized Internal Power Supply Efficiency Test Protocol, Rev. 6.5* (available at www.efficientpowersupplies.org).

i. IPS with maximum rated output power less than 75 watts shall meet minimum efficiency requirements as specified in Table 1.

ii. IPS with maximum rated output power greater than or equal to 75 watts shall meet both minimum efficiency requirements and minimum power factor requirements, as specified in Table 1.

Table 1: Requirements for Internal Power Supplies

Loading Condition (Percentage of Nameplate Output Current)	Minimum Efficiency	Minimum Power Factor
20%	0.82	-
50%	0.85	-
100%	0.82	0.90

Note: The requirements for Internal Power Supplies are maintained from Version 5, with an updated reference to the current *Generalized Internal Power Supply Efficiency Test Protocol, Rev 6.5.* EPA is open to discussion of incentives to encourage incorporation of IPS more efficient than these baseline ENERGY STAR requirements.

3.2.3 External Power Supplies (EPS): EPS shall meet the level V performance requirements under the International Efficiency Marking Protocol and include the level V marking. Additional information on the Marking Protocol is available at www.energystar.gov/powersupplies.

- Single-output EPS shall meet level V requirements when tested using the *Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies, Aug. 11, 2004*.
- Multi-output EPS shall meet the level V requirements when tested using the *EPRI Generalized Internal Power Supply Efficiency Test Protocol, Rev. 6.4.2*.

Note: EPA has removed references for EPSs with integral cooling fans. Such power supplies were first brought to EPA's attention in the context of Game Consoles. Because there is now a separate ENERGY STAR Game Console specification development effort, and no other EPSs with integral cooling fans have come to EPA's attention through product qualifications, EPA does not believe the added complexity of the specialized requirement is needed.

3.3 Power Management Requirements

Note: EPA supports the trend toward more dynamic implementation of low power modes. One such example is the implementation of low power mode in Slates, where "system" sleep functions enable by default to support longer battery life yet are not part of a distinct mode.

EPA has not proposed related modifications to the Power Management requirements in this section, but encourages stakeholder feedback on appropriate modifications that support innovative power management techniques.

3.3.1 Products shall include power management features in their "as-shipped" condition as specified in Table 2, subject to the following conditions:

i. For Thin Clients, the WOL requirement shall apply products designed to receive software updates from a centrally managed network while in Sleep Mode or in Off Mode. Thin Clients whose standard software upgrade framework does not require off-hours scheduling are exempt from the WOL requirement.

ii. For Notebooks, WOL may be automatically disabled when the product is disconnected from ac mains power.

iii. For all products with WOL, directed packet filters shall be enabled and set to an industry standard default configuration.

330 **Table 2: Power Management Requirements**

Mode or Mode Transition	Requirement	Desktops	Integrated Desktops	Notebooks	Workstations	Small-scale Servers	Thin Clients
System Sleep Mode	(1) Sleep Mode shall be set to activate after no more than 30 minutes of user inactivity. (2) The speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode.	Yes	Yes	Yes	Yes	No	Yes (*Category B, only*)
Note: To better delineate the requirement from Display Sleep Mode, the title of the Sleep Mode requirement present in Version 5 is revised to add the word "System." The System Sleep requirement for Thin Clients is revised to accommodate EPA's revised categorization for these products.							
Display Sleep Mode	(1) Display Sleep Mode shall be set to activate after no more than 15 minutes of user inactivity.	Yes	Yes	Yes	Yes	Yes	Yes
Note: A stakeholder proposed a requirement for automatic display dimming independent of the general Display Sleep Mode. EPA believes that the addition of Short Idle testing will capture savings due to such a feature in the ENERGY STAR requirements and encourage its implementation. EPA welcomes stakeholder feedback.							
Wake on LAN (WOL)	(1) Computers with Ethernet capability shall provide users with an option to enable and disable WOL for Sleep Mode. (2) Computers with Ethernet capability that are shipped through enterprise channels shall either: (a) be shipped with WOL enabled by default for Sleep Mode, when the computer is operating on ac mains power; or (b) provide users with the ability to enable WOL that is accessible from both the client operating system user interface and over the network.	Yes	Yes	Yes	Yes	Yes	Yes

Mode or Mode Transition	Requirement	Desktops	Integrated Desktops	Notebooks	Workstations	Small-scale Servers	Thin Clients
Wake Management	(1) Computers with Ethernet capability that are shipped through enterprise channels shall: (a) be capable of both remote (via network) and scheduled (via real-time clock) wake events from Sleep Mode, and (b) provide clients with the ability to centrally manage (via vendor tools) any wake management settings that are configured through hardware settings if the manufacturer has control over such features.	Yes	Yes	Yes	Yes	Yes	Yes
Network Power Management	TBD						
Note: The ENERGY STAR specification currently recognizes both Full Network Connectivity and Energy Efficient Ethernet (via test method conditions) as ways to reduce the energy devoted to networking. A stakeholder suggested that EPA collect recommendations from stakeholders on further techniques of managing network power and anticipated changes in network connectivity in future computers. EPA welcomes stakeholder feedback. EPA is further interested in stakeholder feedback on the appropriateness of incentivizing or requiring EEE (Energy Efficient Ethernet) in the current specification.							

3.4 User Information Requirements

3.4.1 Products shall be shipped with informational materials to notify customers of the following:

i. A description of power management settings that have been enabled by default,

ii. A description of the timing settings for various power management features, and

iii. Instructions for properly waking the product from Sleep Mode.

3.4.2 Products shall be shipped with one or more of the following:

i. A list of default power management settings.

ii. A note stating that default power management settings have been selected for compliance with ENERGY STAR (within 15 min of user inactivity for the display, within 30 min for the computer, if applicable per Table 2), and are recommended by the ENERGY STAR program for optimal energy savings.

iii. Information about ENERGY STAR and the benefits of power management, to be located at or near the beginning of the hard copy or electronic user manual, or in a package or box insert.

3.4.3 Provisions 3.4.1 and 3.4.2 may be met through use of either electronic or printed product documentation, provided it adheres to all of the following:

i. Documentation is shipped with the product (e.g., in a printed manual or insert, on included optical media, in a file installed with the software load shipped to the customer); and

ii. Documentation is included either (a) only with ENERGY STAR qualified Computers; or (b) as part of the standard documentation if and only if accompanied by EPA-approved customer guidance on how to identify if their computer configuration is ENERGY STAR qualified.

Note: Section 3.4.3 is added to provide clarity on acceptable "standard" language for use in meeting the User Information Requirements.

- Item (i) clarifies that either electronic or printed media may be used as long as it accompanies the product to the consumer; EPA believes that clear guidance on this point supports Partner efforts to reduce unnecessary paper waste while maintaining the consumer-education intent of the requirement.

- Item (ii) reflects an arrangement requested by Partners during Version 5 implementation that has potential to educate consumers on the benefits of power management without causing confusion over the ENERGY STAR status of the purchased product. Multiple stakeholders approached EPA requesting an allowance for standard language that is provided in product documentation for all products, not just ENERGY STAR qualified units. Manufacturers with broad product lines cited the complexity and expense of issuing documentation only with ENERGY STAR units.

3.5 Requirements for Desktop, Integrated Desktop, and Notebook Computers

3.5.1 Categories for TEC Criteria: Desktops, Integrated Desktops shall be evaluated in the categories described in Table 3, and Notebook Computers shall be evaluated in the categories described in Table 4.

Note: Table 3 and Table 4 are revised to reflect the categories derived subsequent to the *Ecma-383* 3rd Edition revision process (http://www.ecma-international.org/publications/standards/Categories_to_be_used_with_Ecma-383.htm). The following minor modifications are introduced:

- *CPU Cores*: The Ecma recommendations present an upper bound of four cores in NB3 and NB4, and an upper bound of 6 cores in DT2 and DT3. To ensure higher core counts are addressed by the program, these upper bounds are removed.

- *Channels of Memory*: Similar to the step taken for CPU cores, the upper channel bound of four was removed for DT2, DT3, NB3, and NB4.

- *Base Graphics and Graphics Adders:* In DT3, the Base Graphics are changed from G1 to G5; in NB4, Base Graphics are changed from G1 to G3. To reflect subsequent modification of the Ecma graphics categorization structure from four categories to seven (as incorporated in this draft), the upper bound of the ranges is changed from G4 to G7.

i. For the purposes of determining TEC levels, desktops and integrated desktops must qualify under categories DT 0, DT1, DT 2, or DT 3 as defined in Table 3.

Table 3: Categorization of Desktop and Integrated Desktop Computers

Category	DT 0	DT 1	DT 2	DT 3
CPU Cores	Cores ≤ 2	Cores ≤ 2	Cores ≥ 3	Cores ≥ 3
Channels of Memory	Channels = 1	Channels = 2	Channels ≥ 2	Channels ≥ 2
Base Memory	1 GB	2 GB	2 GB	4 GB
Base Graphics	Integrated Graphics	Integrated Graphics	Integrated Graphics	Discrete Graphics = G5
Graphics Adders	Discrete Graphics ≤ G7	Discrete Graphics ≤ G7	Discrete Graphics ≤ G7	G5 < dGfx ≤ G7 (greater than G5 and less than or equal to G7)

ii. For the purposes of determining TEC levels, notebooks must qualify under categories NB 0, NB 1, NB 2, NB 3, or NB 4 as defined in Table 4:

Table 4: Categorization of Notebook Computers

Category	NB 0	NB 1	NB 2	NB 3	NB4
CPU Cores	Cores ≤ 2	Cores ≤ 2	Cores = 2	Cores ≥ 3	Cores ≥ 3
Channels of Memory	Channels < 4	Channels < 4	Channels ≥ 2	Channels ≥ 2	Channels ≥ 2
Screen Size	Screen Size ≤ 11.6” (Diagonal)	11.6 < Screen Size ≤ 13.3” (Diagonal)	-	-	-
Base Memory	1 GB	2 GB	2 GB	2 GB	4 GB
Base Graphics	Integrated Graphics	Integrated Graphics	Integrated Graphics	Integrated Graphics	Discrete Graphics = G3
Graphics Adders	Discrete Graphics ≤ G7	Discrete Graphics ≤ G7	Discrete Graphics ≤ G7	Discrete Graphics ≤ G7	G3 < dGfx ≤ G7 (greater than G3 and less than or equal to G7)

3.5.2 Calculated Typical Energy Consumption (E_{TEC}) per Equation 1 shall be less than or equal to the maximum TEC requirement (E_{TEC_MAX}), as calculated per Equation 2, subject to the following requirements:

i. The Additional Internal Storage adder ($TEC_{STORAGE}$) shall be applied if there are one or more internal storage devices present in the product, in which case it shall only be applied once.

ii. For a product to qualify for the Full Network Connectivity weightings, the following criteria shall be satisfied:

- Products shall meet a non-proprietary Full Network Connectivity standard that has been approved by the EPA and the European Union as meeting the goals of ENERGY STAR. Such approval must be in place prior to submittal of product data for qualification.
- Products shall have the applied level of functionality enabled and configured by default upon shipment. If Full Network Connectivity features are not enabled by default, the system shall be tested and reported with Conventional TEC weightings.

iii. For Desktop computers that lack a discrete Sleep Mode but have an Idle State power level less than or equal to 10.0 W, power in Long Idle (P_{LONG_IDLE}) may be used in place of power in Sleep (P_{SLEEP}) in Equation 1. In such instances, the second term of Equation 1, (P_{SLEEP} * T_{SLEEP}), is replaced by (P_{LONG_IDLE} * T_{SLEEP}); Equation 1 remains otherwise unchanged.

Note: Provision 3.5.2.iii reflects a clarification distributed to stakeholders. As noted in the clarification, EPA encourages stakeholder comments on this proposal and how it may be refined further for Version 6.0.

Equation 1: TEC Calculation (E_{TEC}) for Desktop, Integrated Desktop, and Notebook Computers

$$E_{TEC} = (8760 / 1000) * \{(P_{OFF} * T_{OFF}) + (P_{SLEEP} * T_{SLEEP}) + (P_{LONG\_IDLE} * T_{LONG\_IDLE}) + (P_{SHORT\_IDLE} * T_{SHORT\_IDLE})\}$$

Where:

- P_{OFF} *= Measured power consumption in Off Mode (W)*
- P_{SLEEP} *= Measured power consumption in Sleep Mode (W)*
- P_{LONG_IDLE} *= Measured power consumption in Long Idle Mode (W)*
- P_{SHORT_IDLE} *= Measured power consumption in Short Idle Mode (W)*
- T_{OFF}, T_{SLEEP}, T_{LONG_IDLE}, *and* T_{SHORT_IDLE} *are mode weightings as specified in Table 5 (for Desktops and Integrated Desktops) or Table 6 (for Notebooks).*

Equation 2: E_{TEC_MAX} Calculation for Desktop, Integrated Desktop, and Notebook Computers

$$E_{TEC\_MAX} = TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT\_DISPLAY}$$

Where:

- TEC_{BASE} , TEC_{MEMORY} , $TEC_{GRAPHICS}$, $TEC_{STORAGE}$, *and* $TEC_{INT\_DISPLAY}$ *are adders as specified in Table 9.*

Note: Equation 1 is revised to reflect the partition of Idle State into Short Idle (with subscript *SHORT_IDLE*) and Long Idle (*LONG_IDLE*).

Equation 2 now includes an additional term for an integrated display adder.

Table 5: Mode Weightings for Desktop and Integrated Desktop Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery/Name Services	Full Proxying
T_{OFF}	45%	TBD			
T_{SLEEP}	5%				
T_{LONG_IDLE}	15%				
T_{SHORT_IDLE}	35 %				

Table 6: Mode Weightings for Notebook Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery / Name Services	Full Proxying
T_{OFF}	25%	TBD			
T_{SLEEP}	35%				
T_{LONG_IDLE}	10%				
T_{SHORT_IDLE}	30 %				

Note: Table 5 and Table 6 reflect the set of conventional usage pattern weightings included in Appendix A of the *Ecma-383* standard. Since the relative weight of each mode has changed, and Short Idle must now be accounted for, weightings for Full Network Connectivity will be considered in future drafts. At that time, EPA will reference existing feedback from industry stakeholders on proposed Full Network Connectivity weightings as under Version 5.

Table 7: Base TEC Allowances for Desktop and Integrated Desktop Computers

Product Category	TEC_{BASE} (kWh) : Version 6.0	TEC_{BASE} (kWh) : Version 7.0
DT 0	100.0	TBD
DT 1	103.0	
DT 2	135.0	
DT 3	190.0	

436 **Table 8: Base TEC Allowances for Notebook Computers**

Product Category	TEC_{BASE} (kWh) : Version 6.0	TEC_{BASE} (kWh) : Version 7.0
NB 0	25.0	TBD
NB 1		
NB 2		
NB 3	27.0	
NB 4	30.5	

437 **Table 9: Function Adders for Desktop, Integrated Desktop, and Notebook Computers**

Function			Desktop	Integrated Desktop	Notebook
TEC_{MEMORY} (kWh) *i*			0.80		
$TEC_{GRAPHICS}$ (kWh) *ii*	**Graphics Category**	**G1** *(FB_BW ≤ 16)*	29.0		9.0
		G2 *(16< FB_BW ≤ 32)*	41.0		12.0
		G3 *(32 <FB_BW ≤ 64)*	64.0		20.0
		G4 *(64 <FB_BW ≤ 96)*	83.0		25.0
		G5 *(96 <FB_BW ≤ 128)*	125.0		38.0
		G6 *(128 < FB_BW < 192-bit)*	125.0		38.0
		G7 *(FB_BW ≥ 192-bit)*	157.0		48.0
$TEC_{STORAGE}$ (kWh) *iii*			26.0		2.6
$TEC_{INT\_DISPLAY}$ (kWh) *iv*	**Diagonal Screen Size, d (inches)**	**d < 12.0**	n/a	(1971/250) * (0.1667 * A + 2r + 1)	
		12.0 ≤ d < 25.0	n/a	(657/125) * (0.00725 * A + 3r + 2)	
		25.0 ≤ d < 30.0	n/a	(657/125) * (0.09 * A + 3r - 20)	

i TEC_{MEMORY} Adder: Applies per GB in excess of the Category Base Memory from Table 3 or Table 4, as appropriate to the product type.)
ii $TEC_{GRAPHICS}$ Adder: Applies for Discrete Graphics installed in the system in excess of the Category Base Graphics from Table 3 or Table 4, as appropriate to the product type.)
iii $TEC_{STORAGE}$ Adder: Applies once if system has more than one Additional Internal Storage element.)
iv $TECINT_{DISPLAY}$ Adder: r = Screen resolution in megapixels; A = Viewable screen area.

Note: Table 7, Table 8, and Table 9 capture revised levels for the Desktop and Notebook Categories. These tables also include a placeholder for a future out-year Base TEC allowance. EPA will work closely with stakeholders to develop this Version 7.0 proposal and will confirm the appropriateness of out-year levels prior to their taking effect. Based on the potential benefit to partners of greater certainty, the rapid evolution of computer products, and their history of quick market uptake of ENERGY STAR ICT requirements, EPA sees benefit in establishing requirements through this stakeholder process that will highlight top performers in a Version 7.0, effective in early 2015. EPA will propose levels in Draft 2.

In establishing the proposed performance levels, EPA evaluated a dataset that combined Version 5 qualification data with stakeholder submittals from the Version 6.0 dataset development effort. In total, the dataset included 1088 Desktops, 281 Integrated Desktops, and 2135 Notebooks. A masked version of the dataset is attached to this distribution.

The proposed requirements represent roughly the current top 25% of models in this dataset, which EPA believes is reasonably reflective of the current computing market. The following special considerations apply to EPA's analysis.

- *Data Quality*: For Version 5 qualification data, Memory Channels were not collected and the seven-category structure for Graphics did not exist. To assign Memory Channel values, EPA used CPU platform and DIMM count information to derive appropriate assumptions. For Graphics categories, EPA considered information on GPU names submitted with qualification data and stakeholder feedback when assigning values, and G3 was applied for all other systems with discrete graphics where graphics information was unavailable. Lastly, some systems submitted for inclusion in the EPA dataset contained errors regarding memory channel and graphics. In these cases, EPA took the same approach as taken when augmenting the V5 dataset.

- *Display Power*: The inclusion of Short Idle mode, where the display is active, impacts the Notebook and Integrated Desktop Categories, Yet, Version 5 qualification data does not include Short Idle data. EPA addressed this challenge by (a) evaluating stakeholder-provided data to identify percentage differences between Short and Long Idle power consumption and applying the same difference to the Version 5 data (b) basing the display adder on the Version 6.0 Displays specification.

- *Adder Development*: The adders were derived using component Idle Power data and TEC usage mode weightings incorporated in this draft to determine energy (kWh) values. The proposed adder TEC values were included when assessing the anticipated qualification rates.

- *Graphics Categories*: The set of seven graphics categories is harmonized with recommendations from the *Ecma-383* process. These categories are based on Frame Buffer Bandwidth, a change from Version 5.

3.6 Requirements for Workstations

3.6.1 Weighted power consumption (P_{TEC}) as calculated per Equation 3 shall be less than or equal to the maximum weighted power consumption requirement (P_{TEC_MAX}) as calculated per Equation 4.

Equation 3: P_{TEC} Calculation for Workstations

$$P_{TEC} = (P_{OFF} * T_{OFF}) + (P_{SLEEP} * T_{SLEEP}) + (P_{IDLE} * T_{IDLE})$$

Where:

- P_{OFF} = *Measured power consumption in Off Mode (W)*
- P_{SLEEP} = *Measured power consumption in Sleep Mode (W)*
- P_{IDLE} = *Measured power consumption in Idle Mode (W)*

- *T_{OFF}, T_{SLEEP}, and T_{IDLE} are mode weightings as specified in Table 10*

Table 10: Mode Weightings for Workstations

T_{OFF}	T_{SLEEP}	T_{IDLE}
0.35	0.10	0.55

Equation 4: P_{TEC_MAX} Calculation for Workstations

$$P_{TEC\_MAX} \leq 0.28 * \{P_{MAX} + (N_{HDD} * 5)\}$$

Where:

- *P_{MAX} = Measured maximum power consumption (W)*
- *N_{HDD} = Number of installed hard disk drives (HDD) or solid state drives (SSD)*

Note: EPA has not proposed changes to the existing Version 5 efficiency criteria for Workstation qualification. In the 2010 annual *ENERGY STAR Unit Shipment and Market Penetration Report* (the most recent completed publication of this report), ENERGY STAR Workstations were reported to be at a 20% market penetration level under Version 5.

3.6.2 Desktop Workstations: Products marketed as workstations may qualify for ENERGY STAR under the Desktop requirements in Section 3.5, instead of the Workstation requirements in Section 3.6.1, at the Partner's option. EPA will identify Workstations qualified as Desktops as "Desktops" in all ENERGY STAR marketing materials, on qualified product lists, etc.

3.6.3 Active State: To qualify for ENERGY STAR, a Workstation must be submitted for qualification with the following information disclosed in full:

i. SPECworkstation results: Overall Score, Energy, Time to Completion.

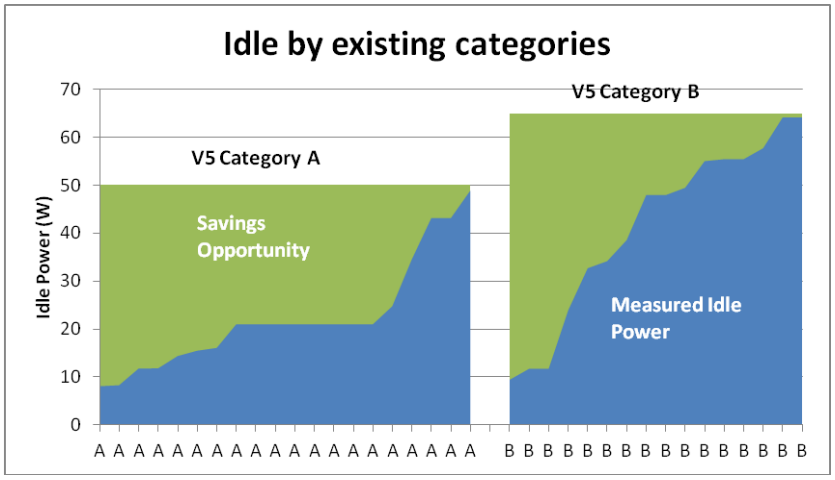
Note: EPA will require disclosure of Workstation Active State information, which EPA understands to be of great interest to Workstation purchasers and users. This data will be used to inform active power requirements in future revisions of the Computers specification.

At this time, the only operating system supported by the benchmark is Microsoft Windows. For Workstations utilizing other operating systems, EPA proposes that Windows be loaded for testing purposes to allow benchmark operation; once available, benchmark versions developed for the as-shipped benchmark will be required.

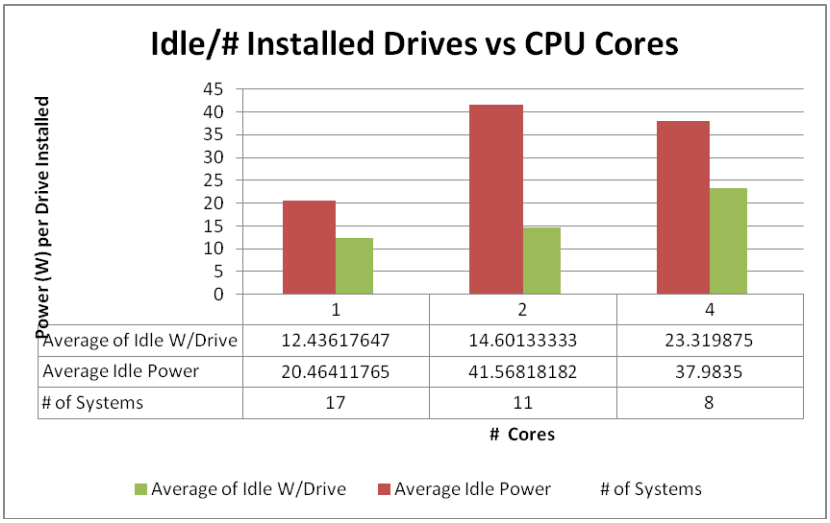
3.7 Requirements for Small-scale Servers

Note: While the number of Small-scale Servers qualified to the program remains small in comparison to Desktops and Notebooks, Version 5 saw an increase in qualifications with 97 products or product families qualified as of January 2012. While Version 5 was in effect, industry launched lines of components (CPUs, in particular) that provide adequate processing for this product type with significantly lower power requirements than standard desktop requirements at program launch. This contrasts with the existing efficiency criteria, which reference general Desktop criteria from Version 4.0 of the program.

Taking these factors into account, along with analysis of qualification data, EPA proposes to revise criteria in this product category to recognize more efficient platforms. Removing duplicates, 36 units were in the dataset. The following table compares measured Idle power with the existing Version 5 requirements.



A significant savings opportunity was evident over a large portion of the dataset. Further, the existing category delineation, based on presence of a multi-core processor and one gigabyte of memory, does not create a clear difference in the pattern of Idle power consumption. This is confirmed with a comparison of system Idle power versus Idle power divided by the number of installed drives:



The first two groups of columns represent the change between one and two CPU cores. While power more than doubles (red columns), the Idle power per hard drive installed is close to equivalent (green columns). This suggests that it was primarily the presence of extra drives, rather than the move from one to two cores, that is associated with an increase in Idle power.

EPA proposes replacing the existing categories with a single base Idle Power value and Installed Storage adder for Small Scale Servers with more than one integral storage medium (hard drive or solid state drive). EPA seeks information on ways to encourage implementation of Sleep Mode for this product type.

3.7.1 Measured Off Mode power (P_{OFF}) shall be less than or equal to the maximum Off Mode power consumption requirement (P_{OFF_MAX}) listed in Table 11, as calculated per Equation 5, subject to the following requirements:

i. Products shall be evaluated using the highest letter category to which they apply.

ii. The Off Mode Wake-On-LAN (WOL) adder (P_{OFF_WOL}) shall only be applied to products that offer WOL that is enabled by default upon shipment.

Equation 5: Calculation of P_{OFF_MAX} for Small-scale Servers

$$P_{OFF\_MAX} = P_{OFF\_BASE} + P_{OFF\_WOL}$$

3.7.2 Measured Idle State power (P_{IDLE}) shall be less than or equal to the maximum Idle State power consumption requirement (P_{IDLE_MAX}) specified in Table 11, as calculated per Equation 6.

Equation 6: Calculation of P_{IDLE_MAX} for Small-scale Servers

$$P_{IDLE\_MAX} = P_{IDLE\_BASE} + (N - 1) * P_{IDLE\_HDD}$$

Where:

- *N is equal to the number of installed storage devices in the Small Scale Server (either hard drives or solid state drives).*

Table 11: Classification & Power Consumption Requirements for Small-scale Servers

Operational Mode Requirements				
$P_{OFF\ BASE}$ (watts)	**$P_{OFF\ WOL}$ (watts)**	**P_{IDLE_BASE} (watts): Version 6.0**	**P_{IDLE_BASE} (watts): Version 7.0**	**$P_{IDLE\ HDD}$ (watts)**
1.0	0.4	24.0	TBD	8.0

3.8 Requirements for Thin Clients

3.8.1 Measured Off Mode power (P_{OFF}) shall be less than or equal to the maximum Off Mode power consumption requirement (P_{OFF_MAX}) in Table 12, as calculated per Equation 7, subject to the following requirements.

i. The Off Mode Wake-On-LAN (WOL) adder (P_{OFF_WOL}) shall only be applied to products that offer WOL that is enabled by default upon shipment.

Equation 7: Calculation of P_{OFF_MAX} for Thin Clients

$$P_{OFF\_MAX} = P_{OFF\_BASE} + P_{OFF\_WOL}$$

3.8.2 For Category B (products that offer a Sleep Mode), measured Sleep Mode power (P_{SLEEP}) shall be less than or equal to the maximum Sleep Mode power consumption requirement (P_{SLEEP_MAX}) in Table 12, as calculated per Equation 8, subject to the following requirement.

i. The Sleep Mode Wake-On-LAN (WOL) adder (P_{SLEEP_WOL}) shall only be applied to products that offer WOL that is enabled by default upon shipment.

Equation 8: Calculation of P_{SLEEP_MAX} for Thin Clients

$$P_{SLEEP\_MAX} = P_{SLEEP\_BASE} + P_{SLEEP\_WOL}$$

3.8.3 Measured Idle State power (P_{IDLE}) shall be less than or equal to the maximum Idle State power consumption requirement (P_{IDLE_MAX}) specified in Table 12, subject to the following requirement.

i. Integrated Thin Clients: TBD

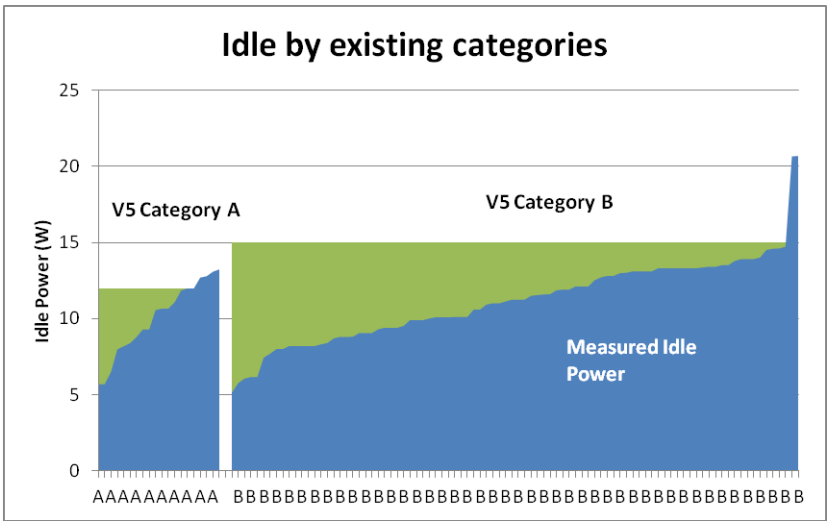
Note: Data on Integrated Thin Clients is currently limited and was insufficient to allow for development of appropriate Short Idle levels. EPA seeks feedback and data that will inform development of these levels. In forthcoming drafts, based on work with stakeholders, EPA will propose guidance on calculation of Idle limits for Integrated Thin Clients.

Table 12: Classification & Power Consumption Requirements for Thin Clients

Thin Client Classification		Operational Mode Requirements					
Product Category	**Category Description**	**P_{OFF_BASE} (watts)**	**P_{OFF_WOL} (watts)**	**P_{SLEEP_BASE} (watts)**	**P_{SLEEP_WOL} (watts)**	**P_{IDLE_MAX} (watts): Version 6.0**	**P_{IDLE_MAX} (watts): Version 7.0**
A	All Thin Clients that do not support Sleep Mode.	0.5	0.4	n/a	n/a	12.0	TBD
B	All Thin Clients shipped with a Sleep Mode enabled by default.	0.5	0.4	2.0	0.4	15.0	TBD

Note: Table 12 reflects revisions to the product categorization, Off Mode power, and adders for Wake on LAN implementation.

Upon reviewing a dataset of products combining responses to EPA's call for data and Version 5 qualification activity, it is not clear that the existing product categorizations based on local multimedia encoding or decoding capability, offer an appropriate split between power consumption as intended; as evident in the following chart, 60% of products in Category B are capable of meeting the 12 W Category A Idle Power level, and the relative spread of Idle power between the categories is similar.



Thus, EPA proposes to define categories based on Sleep Mode capability for Version 6.0. EPA envisions that this approach will encourage adoption and development of low power modes in Thin Clients (test data showed that less than 40% of units in the dataset are capable of Sleep) and provide a more stringent Idle power target for former Category B systems without Sleep Mode. Off-mode power is proposed at 0.5W in recognition of proposed EU regulation at this level, effective early 2013.

3.9 Toxicity and Recyclability Requirements

3.9.1 Computer products shall contain restricted levels of the following materials, where the maximum concentration values tolerated by weight in homogeneous materials are: lead (0.1%), mercury (0.1%), cadmium (0.01%), hexavalent chromium (0.1%), polybrominated biphenyls (PBB) (0.1%), or polybrominated diphenyl ethers (PBDE) (0.1%). Batteries are exempt. The following exemptions are granted for components in Displays:

- Lead in glass of fluorescent tubes not exceeding 0.2% by weight.
- Copper alloy containing up to 4% lead by weight.
- Electrical or electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix.
- Lead in dielectric ceramic in capacitors for a rated voltage of 125 Vac or 250 Vdc or higher.

3.9.2 Computer products shall be designed for ease of disassembly and recyclability where external enclosures, sub-enclosures, chassis and electronic subassemblies are easily removable with commonly available tools, by hand, or by a recycler's automated processes. Products shall identify and provide ease of access to, and removal of, materials with special handling needs.

3.9.3 For purposes of ENERGY STAR third-party certification, toxicity and recyclability requirements shall not be reviewed when products are initially qualified or during subsequent verification testing. Instead, consistent with the RoHS Directive (for toxicity) and IEEE 1680 standard (for design for recyclability), manufacturers shall maintain documentation on file that products meet these requirements. EPA reserves the right to request this documentation at any time.

3.9.4 To the extent product models are sold in countries other than the U.S., they are not subject to requirements in 3.9.1, 3.9.2, and 3.9.3.

Note: While energy efficiency remains the basis upon which top performers are selected, EPA has a longstanding practice of including criteria related to other aspects of product performance in ENERGY STAR specifications to ensure that overall product performance is maintained relative to a non-qualifying product. To the extent these types of requirements are included, the Agency leverages existing standards and looks to achieve a minimally acceptable level of performance (i.e. not one that is overly stringent/difficult to achieve). By including additional criteria, the ENERGY STAR program seeks to avoid associating the label with poor quality or otherwise undesirable product models, thereby preserving the influence of the label in the market.

In developing these requirements, EPA drew from existing standards for toxicity and design for recyclability. EPA looked to the RoHS Directive for a toxicity limit because Computer products manufacturers have extensive experience with designing products free from certain toxic materials in compliance with the RoHS Directive. The RoHS Directive, formally known as Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment, was amended by 2005/618/EC and went into effect in 2006. Most global manufacturers have been in compliance with RoHS since 2006, when the directive first took effect. Products that currently meet the EU RoHS Directive would satisfy this toxicity requirement. In some cases, the RoHS Directive allows for specific, limited exemptions for specific materials and provides expiration dates for these exemptions. EPA intends to harmonize with the RoHS Directive by adding language in Section 3.9 allowing the same exemptions as those outlined in the current RoHS Directive.

EPA welcomes feedback from stakeholders to understand if any materials exempted for a given period of time under the RoHS Directive currently apply to components typically found in Computer products. EPA does not intend to require documentation of the need for exemption beyond what is needed by the Partner to demonstrate compliance with the RoHS Directive.

The proposed design for ease of disassembly and recyclability is harmonized with the IEEE 1680.1 standard. Based on the Electronic Product Environmental Assessment Tool (EPEAT) product registry, more than 50 manufacturers have registered greater than 3,000 products that meet these requirements.

EPA has clarified (Section 3.9.4) that these requirements are exempt from the ENERGY STAR third-party certification process. Further, EPA has included language making clear that the non-energy requirements proposed here are not intended for international adoption. Further, EPA anticipates that existing reporting efforts would satisfy compliance with these requirements.

4 TESTING

4.1 Test Methods

4.1.1 When testing Computer products, the test methods identified in Table 13 shall be used to determine ENERGY STAR qualification.

Table 13: Test Methods for ENERGY STAR Qualification

Product Type or Component	Test Method
All	ENERGY STAR Test Method for Computers, Rev. TBD

Note: The revision reference will be updated upon finalization of the ENERGY STAR Test Method. Rev. February-2012 that accompanies this Draft 1 specification.

4.2 Number of Units Required for Testing

4.2.1 Representative Models shall be selected for testing per the following requirements:

i. For qualification of an individual product configuration, the unique configuration that is intended to be marketed and labeled as ENERGY STAR is considered the Representative Model.

ii. For qualification of a product family of all product types, with the exception of Workstations, product configurations that represent the worst-case power consumption for each product category within the family are considered Representative Models.

iii. For qualification of a product family of Workstations under the Workstation or Desktop product type, the product configuration that represents the worst-case power consumption with a single GPU within the family is considered the Representative Model. Note: Workstations that meet ENERGY STAR requirements with a single graphics device may also qualify a configuration with more than one graphics device, provided the additional hardware configuration is identical with the exception of the additional graphics device(s). The use of multiple graphics includes, but is not limited to, driving multiple displays and ganging for high performance, multi-GPU configurations (e.g. ATI Crossfire, NVIDIA SLI). In such cases, and until such time as SPECviewperf® supports multiple graphics threads, manufacturers may submit the test data for the workstation with the single graphics device for both configurations without retesting the system.

4.2.2 A single unit of each Representative Model shall be selected for testing. If the initial unit tested is less than or equal to the applicable requirement for TEC or Idle but falls within 10% of that level, one additional unit of the same model with an identical configuration must also be tested.

4.2.3 Test values shall be reported test for both units. To qualify as ENERGY STAR when testing of an additional unit is required, both units must meet the maximum TEC or Idle level for that product and that product category. All tested units shall meet ENERGY STAR qualification requirements.

4.2.4 The requirements detailed in 4.2.2 and 4.2.3 are required only for TEC qualification (Desktops, Integrated Desktops, Notebooks, Workstations) and Idle qualification (Small-Scale Servers, Thin Clients). For product categories subject to power limits in Off Mode or Sleep Mode, only one unit is required to be tested for these modes to evaluate qualification.

4.3 Qualifying Families of Products

4.3.1 Models that are unchanged or that differ only in finish from those sold in a previous year may remain qualified without the submission of new test data assuming the specification remains unchanged. If a product model is offered in the market in multiple configurations or styles, as a product “family” or series, the partner may report and qualify the product under a single model number, as long as all of the models within that family or series meet either of the following requirements:

- Computers that are built on the same platform and are identical in every respect except for housing and color may be qualified through submission of test data for a single, representative model.

- If a product model is offered in the market in multiple configurations, the partner may report and qualify the product under a single unique model identifier number that represents the highest power configuration available in the family, rather than reporting each and every individual model in the family; there must not be higher consuming configurations of the same product model than the representative configuration. In this case, the highest configuration would consist of: the highest power processor, the maximum memory configuration, the highest power GPU, etc. For systems which meet the definition for multiple categories (as defined in section 3.B) depending on the specific configuration, manufacturers will have to submit the highest power configuration for each category under which they would like the system to qualify. For example, a system that could be configured either as a Category A or a Category B desktop would require a submittal of the highest power configuration for both categories in order to qualify as ENERGY STAR. If a product could be configured to meet all three categories, it would then have to submit data for the highest power configuration in all categories. Manufacturers will be held accountable for any efficiency claims made about all other models in the family, including those not tested or for which data was not reported.

4.3.2 All units/configurations associated with a product model designation, for which a Partner is seeking ENERGY STAR qualification, must meet the ENERGY STAR requirements. If a Partner wishes to qualify configurations of a model for which non-qualifying alternative configurations exist, the Partner must assign the qualifying configurations an identifier in the model name/number that is unique to ENERGY STAR Qualified configurations. This identifier must be used consistently in association with the qualifying configurations in marketing/sales materials and on the ENERGY STAR list of qualified products (e.g. model A1234 for baseline configurations and A1234-ES for ENERGY STAR qualifying configurations).

4.4 International Market Qualification

4.4.1 Products shall be tested for qualification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

4.5 Customer Software and Management Service Pre-Provisioning

4.5.1 If a manufacturing Partner is hired by a customer to load a custom image to an ENERGY STAR qualified computer, the Partner shall take the following steps:

i. Inform the customer that their product may not meet ENERGY STAR with the custom image. A sample notification letter is available on the ENERGY STAR Web site.

ii. Encourage the customer to test the product for ENERGY STAR compliance.

iii. Encourage the customer, should the product no longer meet ENERGY STAR, to make use of EPA's free technical assistance that can assist with Power Management performance, which can be found at www.energystar.gov/fedofficeenergy.

5 USER INTERFACE

5.1.1 Manufacturers are encouraged to design products in accordance with the user interface standard IEEE P1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see http://eetd.LBL.gov/Controls.

6 EFFECTIVE DATE

6.1.1 Effective Date: The Version 6.0 ENERGY STAR Computers specification shall take effect on the dates specified in Table 14, below. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

Table 14: Specification Effective Dates

Effective Date	
Version 6.0	TBD
Version 7.0	TBD

7 CONSIDERATIONS FOR FUTURE REVISIONS

Note: In this section, EPA intends to identify out-year requirements and levels for future versions of the program. The goal of this section is to identify areas of future review for the program and roadmap for industry and the efficiency community areas requiring further consideration.

7.1 TBD

APPENDIX A:
Sample Calculations

Note: As in Version 5, this appendix will ultimately include sample calculations for reference in calculating performance levels for products covered in this specification.