ENERGY STAR® Program Requirements for Computers

Partner Commitments
Draft 2 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.
3. **Ensure that any model associated with the ENERGY STAR name or mark** meets the following standards:
   - 3.1. The generally accepted material restriction of hazardous substances (RoHS) regulations including exemptions in force at the date of product manufacture: 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.
   - 3.2. The generally acceptable attributes of a recyclable product at the date of product manufacture: where 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.

Notes:

The explicit intention is to harmonize with EU RoHS.

For purposes of ENERGY STAR third-party certification, these requirements shall not be reviewed when products are initially qualified nor during subsequent verification testing. Rather, EPA reserves the right to request supporting documentation at any time.

Using the ENERGY STAR Name and Marks

4. 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.
5. 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.
6. Provide clear and consistent labeling of ENERGY STAR qualified Computers.
   - 6.1. Partner shall adhere to the following product-specific commitments regarding use of the ENERGY STAR certification mark on qualified products:

6.1.1. 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 4% 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: Based on discussions with stakeholders, placement of the physical label is now flexible to accommodate aesthetic considerations. The size of the electronic mark is reduced from a minimum of 10% of the screen size to 4%. Minimum pixel dimensions are maintained.

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

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

6.1.4. 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

7. 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

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

8.1. 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).

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

8.3. 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;

9. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.
10. 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

11. 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):
    11.1. Energy saving potential;
    11.2. Financial saving potential;
    11.3. Environmental benefits;
    11.4. Information on ENERGY STAR and a link to www.energystar.gov; and
    11.5. ENERGY STAR logo (used in accordance with "The ENERGY STAR Identity Guidelines" available at www.energystar.gov/logos).
12. In addition, a link should be made available to www.energystar.gov/powermanagement from Computer product pages, product specifications, and related content pages.
13. 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 2 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.

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).

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.

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 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).

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.

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 Card (dGfx): One or more graphics processors (GPU) with a local memory controller interface and local graphics-specific memory.

2) Graphics Processing Unit (GPU): TBD

Note: In response to stakeholder feedback, EPA has clarified the terminology used to reference discrete graphics (see definition for Discrete Graphics Card, above). EPA's intent is to define GPU to closely capture the graphics-oriented processor package. Stakeholder input is welcomed on the appropriate definition for GPU as the term is generally used in the industry.

3) 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).

a) Enhanced-performance Integrated Display: An integrated Computer Display that has all of the following features and functionalities:

(1) A contrast ratio of at least 60:1 at horizontal viewing angles of at least 85°;

(2) A native resolution greater than or equal to 2.3 megapixels (MP); and

(3) A color gamut of at least sRGB (IEC 61699 2-1).

Note: The definition for Enhanced-performance Integrated Display is based on the definition included in Draft 3 of the ENERGY STAR Version 6.0 Displays Specification. This definition is referenced to allow for appropriate allocation of the Integrated Display adder for Desktop and Notebooks (see Section 3.5.2).

4) 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.

5) 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.

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.

e) Out-of-Band (OOB) Management: Functionality which allows a computer to be remotely managed over a network independent of the computer's operational modes and operating environment. Examples of OOB management operations include, but are not limited to: inventory, monitoring, power control, boot control, alerts, offline mailboxes, text console redirection, media redirection, BIOS management, firmware update, event logging, etc. Examples of OOB management standards are DMTF initiatives DASH and SMASH that define a suite of standards for client and server systems management.

Note: A stakeholder proposed the definition above for Out-of Band Management. EPA has included the definition in the draft to stimulate discussions with stakeholders regarding a potential Full Network Connectivity option.

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

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;

iii. Slate computing devices;

iv. Workstations;

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

vi. Thin Clients.

Note: Slate Computing Devices are proposed for inclusion in the Computer Specification with the revisions to section 2.1.1. EPA's proposal in Draft 1 had been to cover such products under the Battery Charging Systems program currently under development.

Since Draft 1, EPA received numerous stakeholder recommendations, particularly from the federal purchasing community, to include slates in the Computers Specification to aid in allowing such products to access existing procurement procedures in place for bulk purchases of computing equipment. These stakeholders also relayed that they are purchasing slates as notebook replacement products. Based on stakeholder data, EPA understands that slate products are designed to minimize energy use and maximize battery lifetime and that most energy losses due to inefficiency will occur during battery charging; such was EPA's rationale for originally assigning products to the Battery Charging Systems program.

To accommodate the procurement considerations noted above while also remaining consistent with EPA's existing understanding of the energy profile of these products, EPA proposes that slate products' battery charging systems be tested and used to determine qualification for ENERGY STAR. Appropriate sections of the ENERGY STAR Battery Charging Systems test procedure would be introduced into the program requirements to accomplish this. No other modes or states are proposed for considered in the efficiency evaluation (e.g., Idle, Low Power Mode).

2.2 Excluded Products

Note: EPA raised the topic of DC-powered computers in Draft 1 and received limited stakeholder feedback. EPA remains interested in discussing the viability of including them either in Version 6 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 eReaders);
iv. Mobile Thin Clients not meeting the definition of Notebook Computer;
v. Ultra-thin Clients
vi. Game Consoles;
vii. Personal Digital Assistant devices (PDAs);
viii. Smart Phones; and
ix. Handheld gaming devices, typically battery powered and intended for use with an integral display as the primary display.

Note: The possibility of including Ultra-thin Clients in the scope of this specification was raised in Draft 1 and previous Version 6.0 specification development materials. The primary example brought to EPA of such products is a class of "smart displays" containing features of a thin client integrated into a computer display chassis. Other than this type of product, stakeholder feedback largely focused on scope and definition challenges in relation to the existing Thin Client category.

In the absence of information on the efficiency opportunity of these products, EPA proposes to exclude Ultra-thin Clients from the Version 6.0 program scope.

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

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: Draft 1 included a request for feedback on ways to provide incentives for the use of power supplies more efficient than the baseline ENERGY STAR criteria. In response, a stakeholder submitted a detailed proposal that recommended a series of TEC allowances for systems with such power supplies. EPA is evaluating this proposal and welcomes stakeholder feedback.

3.3 Power Management Requirements

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.

322 **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*)
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
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
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

Note: EPA did not receive feedback regarding Network Power Management or steps that could be taken to allow the Version 6.0 specification to recognize power management innovation during its life. As such, Table 2 is unchanged. A comment was received regarding Energy Efficient Ethernet. EPA will continue to support the technology through reference to provision 3.a. on page 9 of the Ecma-383 standard, 3rd Edition, which requires EEE-compliance on both sides of the network link during testing if available in the unit under test. EPA continues to welcome stakeholder feedback on this topic.

Additionally, EPA welcomes stakeholder comments on the possibility of reducing the time requirement for System Sleep Mode below the current 30 minutes. The rising influence of the mobile market may be opening up new possibilities to either reduce this number across all categories or develop finer distinctions to be applied for each product category.

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 <u>all</u> 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.

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.

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	dGfx = G5
Graphics Adders	dGfx ≤ G7	dGfx ≤ G7	dGfx ≤ 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	dGfx = G3
Graphics Adders	dGfx ≤ G7	dGfx ≤ G7	dGfx ≤ G7	dGfx ≤ G7	G3 < dGfx ≤ G7 (greater than G3 and less than or equal to G7)

Note: Prior to the release of Draft 1, ITI had proposed an alternative methodology for categorizing and measuring the energy efficiency of desktop and notebook computers. EPA continues to welcome comment and feedback on this proposal as a possible alternative to the established ENERGY STAR methodology.

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. The Integrated Display adder ($TEC_{INT\_DISPLAY}$) applies only for Integrated Desktops and Notebooks. For Enhanced-performance Integrated Displays, the adder is calculated as presented in Table 9 and Equation 3.

Note: Guidance regarding Enhanced-performance Integrated Displays has been added above. Equation 3 is taken from the v6.0 Draft 3 of the ENERGY STAR Displays specification and will be revised as necessary to maintain harmonization as the Displays specification is further developed.

iii. 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 such as ECMA 393 or another standard that has been approved by the EPA 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.

iv. For Desktop Computers that lack a discrete System Sleep Mode but have a Long 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: A clarification for the 10.0 W limit has been added based on comments from stakeholders.

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.*

Equation 3: $TEC_{INT\_DISPLAY}$ Calculation for Enhanced-performance Integrated Displays

$$TEC_{INT\_DISPLAY}' = 1.2 * TEC_{INT\_DISPLAY}$$

Where:

- *$TEC_{INT\_DISPLAY}$ is the adder calculated as specified in Table 9.*

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: A stakeholder suggested that the TEC Weightings required revision. EPA believes that the foundation of the TEC model remains consistent with the data used in development of Version 5 – a study of power state transitions in over 70,000 computers. The table below compares TEC weighting methods for Desktops and Notebooks. For Desktops, slightly more emphasis is given to Idle Modes. For Notebooks, where power levels in Off and Sleep are similar, increased emphasis is also placed on higher power states.

Desktop Computers		
	V5 (1)	V6, Draft 1 (2)
Off	55 %	45%
Sleep	5 %	5%
Long Idle	40 %	15%
Short Idle		35 %
Notebook Computers		
Off	60 %	25%
Sleep	10 %	35%
Long Idle	30 %	10%
Short Idle		30 %

Sources:

(1) http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/computer/Microsoft_PowerTransitionReport.pdf?f0fe-40d2

(2) Ecma-383, 3rd Edition, Annex B.

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

Product Category	TEC_{BASE} (kWh)
DT 0	74.0
DT 1	128.0
DT 2	145.0
DT 3	205.0

Table 8: Base TEC Allowances for Notebook Computers

Product Category	TEC_{BASE} (kWh)
NB 0	24.0
NB 1	
NB 2	30.0
NB 3	32.0
NB 4	55.0

Note: The EPA dataset used to set the above levels consists of several thousand entries and represents the great majority of products currently sold on the market. After the release of Draft 1, EPA and stakeholders engaged in a joint review of the dataset to ensure the integrity of its contents and investigate the need for further changes to the proposed Base TEC levels. As a result of this review process, the Base TEC values for the Desktop and Notebook categories have been revised from those proposed in Draft 1. The newly proposed levels are set to capture the most efficient portion of the market for all subcategories (NB0, NB1, DT0, etc.) of Desktop and Notebook computers. EPA thanks all stakeholders who participated in this review process and who contributed their valuable time and insight to make the levels above as representative of the market as possible.

The following additional issues were investigated as well:

- Integrated Display Adder: See discussion following Table 9.

- Switchable Graphics: A stakeholder recommended review of switchable graphics in future versions of the program. EPA appreciates this feedback and proposes to make reporting on the presence of switchable graphics a requirement for qualification in this version of the Computers specification.

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]			n/a	*(4.0 * r) + (0.05 * A)*	*(2.0 * r) + (0.02 * A)*

Note: Integrated Display Adder (**$TEC_{INT\_DISPLAY}$**): The formula and approach has been revised to streamline the adder calculation and address the difference in tested brightness level between this program and the source of the adder approach: the ENERGY STAR Displays program. Because integrated displays in Integrated Desktops and Notebooks cannot be universally assumed to be capable of the nit level used in the Displays test method, the brightest possible level appropriate to all products is included in the test method (90 nits for Notebooks and 150 nits for Integrated Displays). To account for the lower brightness values, the Integrated Display Adder for Integrated Desktops is modified to incorporate a term of 4.0 watts per megapixel, and the adder for Notebooks includes 2.0 watts per megapixel.

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 dGfx 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.

Enhanced-performance Integrated Displays: Stakeholders raised this topic and its impact on the existing Integrated Display adder, providing data that EPA interprets as supporting the power impact of the different panel technologies. EPA proposes handling such integrated displays in a manner consistent with approaches from the ENERGY STAR Display program, namely the definition of *Enhanced-performance Display* and adder. EPA welcomes feedback on this proposal as detailed in definition 1.C).3).a), 3.5.2.ii, and Equation 3.

Presence of Multiple Discrete Graphics Cards (dGfx): EPA received a recommendation and proposal to set the adder for dGfx present in a system in excess of the first to 73% of the baseline adders. EPA is in the process of evaluating this and other potential approaches and welcomes further stakeholder feedback on this topic.

3.6 Requirements for Workstations

3.6.1 Weighted power consumption (P_{TEC}) as calculated per Equation 4 shall be less than or equal to the maximum weighted power consumption requirement (P_{TEC_MAX}) as calculated per Equation 5.

Equation 4: 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 5: 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)*

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 has maintained the Active State testing requirement for Workstations from Draft 1. DOE is in the process of validating the SPECworkstation benchmark and any necessary test method changes that may result from its use.

3.7 Requirements for Small-scale Servers

Note: EPA received limited feedback on the Small-scale Server proposal but has heard stakeholder interest in providing feedback. EPA has retained the Draft 1 proposal here and welcomes further input.

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 6, 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 6: 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 7.

Equation 7: 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)**	**$P_{IDLE\ HDD}$ (watts)**
1.0	0.4	24.0	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 8, 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 8: 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 9, 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 9: 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

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)**
A	All Thin Clients that do not support Sleep Mode.	0.5	0.4	n/a	n/a	12.0
B	All Thin Clients shipped with a Sleep Mode enabled by default.	0.5	0.4	2.0	0.4	15.0

Note: For Thin Clients, EPA received stakeholder comments on the topics of power management; Off and Idle power levels; and dGfx.

Power Management: One stakeholder stated the belief that power management in the category is not appropriate given the presence of an active network link. Another stated that Thin Clients were transitioning to power managed operating systems, but that demand remained for non-power-managed Thin Clients. EPA maintains the belief that the Draft 1 proposal, which does not preclude non-power-managed Thin Clients from qualification, remains an appropriate approach for this product category based on inclusiveness and assessment of ENERGY STAR qualified products.

Off Mode: EPA did not receive feedback on this proposal in response to Draft 1 but understands that stakeholders may have an interest in offering such feedback. As such, EPA has retained its Draft 1 proposal and welcomes further input.

Idle Mode: Stakeholders suggested that a 12 Watt Idle power requirement was inadequate for products not power-managed and recommended that a 15 Watt power limit be applied for all Thin Clients employing internal graphics. EPA has not received market data that supports this recommendation to date and welcomes market data to support this request. EPA proposes maintaining the proposed Idle Power limits set in Draft 1 until such information is received.

dGfx: A stakeholder suggested demand for thin clients with higher-powered dGfx. Data was not provided to support the stated market demand. As above, EPA welcomes such supporting information, but has not proposed an adder for dGfx in the Thin Client category.

3.9 Requirements for Consumer Benefits

3.9.1 For products intended for sale in the US market, please see ENERGY STAR® Program Requirements for Computers, Partner Commitments, for applicable toxicity and recyclability requirements.

Note: To ensure that product designers are aware of Partner Commitments specific to toxicity and recyclability, EPA has inserted the above note.

EPA remains committed to including attributes 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. By including additional attributes, the ENERGY STAR program seeks to avoid associating the label with models of poor quality or models with features that are not compatible with broadly held consumer or societal interests, thereby preserving the influence of the label in the market In response to significant stakeholder concern that placement of toxicity and recyclability requirements in the product eligibility criteria would hinder international harmonization, EPA is proposing that these criteria reside instead in the ENERGY STAR Computer Partner Commitment document, which is unique to the US market. As such, EPA has removed section 3.9, Toxicity and Recyclability requirements from the computer eligibility criteria. Further, in response to feedback, EPA notes in the Partner Commitment document that it is the Agency's intention to harmonize with EU RoHS and that the toxicity and recyclability requirements are not subject to third-party certification.

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

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

Note: Out-year tiers have been removed from the specification (listed as Version 7.0 in the Effective Date table). EPA maintains the intent of working with stakeholders to conduct "roadmapping" exercises over the summer to plan for future program requirements.

7 CONSIDERATIONS FOR FUTURE REVISIONS

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.