

ENERGY STAR Computers Version 7 Draft 2 Specification Comment Response Document				
Ref. #	Topic	Subtopic	Comment Summary	EPA Response
1	Adders	Enhanced Performance Displays	One stakeholder commented on Enhanced Performance Displays, noting that the data they have analyzed on the topic indicate EPA adders for EPS may be high. This stakeholder requests additional data and information on this adder.	EPA has retained the enhanced performance display adder value from Version 6.1 as there was no data provided to EPA to support changing this adder in Version 7.0.
2	Adders	Ethernet Ports	One stakeholder commented on the need for a potential Ethernet Adder, as many notebooks have removed these ports, except for business models. The ENERGY STAR test method requires connecting these cards to a network during the testing, which generally accounts for 1 W of additional power consumption (or 3.5 kWh), based on lab measurements. Alternately, this could be addressed by requiring only WLAN usage for the test method.	EPA did not receive data that supports the suggested 3.5 kWh adder for 1Gb/s Ethernet ports. The limited data received shows a minimal difference across like product examples where one configuration has an Ethernet port and the other does not. EPA is not proposing to change the network connection priority during test as it would deharmonize with the guidance provided in IEC 62623, which the test method heavily leverages.
3	Adders	Integrated Display	One stakeholder commented on the Integrated Display adder, noting that the footnote defining the variables A-area and r-resolution, were dropped off the draft report. This stakeholder requested this note is re-added for clarity.	The footnote referenced in this comment remain present, but on the following page of the document as the table expanded to the next page in Draft 2. EPA will ensure all footnotes are present in the Final Draft.
4	Adders	Memory	One stakeholder commented that the memory adder equations in the draft 2 specification are less ambitious than other existing specifications, such as the CEC rulemaking and NRDC server memory report, with a slope of 2.6x and 10x steeper, respectively.  This stakeholder recommended increasing the stringency of the memory adder substantially to ensure 25% pass rates are achieved on the effective date. This stakeholder also noted that issues with lower end configurations could be addressed by including an offset term or an inflection point in the memory adder equation.	EPA received stakeholder feedback in response to the memo published on the ENERGY STAR website on November 14, 2017 supporting the revision of the memory adder which recognizes more low-end configurations with 4GB of memory which are not reported as representative models in the QPL, as well as scaling down the adder beyond 16GB as it was perceived as too generous for high-end systems. As a result, this memory adder change is being proposed in the Final Draft specification.
5	Adders	Storage Adder	One stakeholder commented that the storage adder should be allowed to be applied to additional drives, due in part to the strict base levels, and the likely difficulty in qualifying a 2 drive device.	EPA has not received any data to support extending the storage adder to additional drives in Version 7.0.
6	Adders	Network Card Adder	One stakeholder commented that the low base levels for notebooks will require an Ethernet adder to notebooks which have a card with 10 Gb/s or greater, to allow products supporting this technology to qualify. This stakeholder recommended this adder be set to 12.5 kWh/card.	EPA has not received any data to support such an adder for network cards that provide 10Gb/s or greater capability in notebooks.
7	Definition	Additional Internal Storage	One stakeholder believes the latest iteration of the additional internal storage definition seems not to cover hybrids, which they believe it should. The first part of the definition may be: "Additional internal, non-removable storage..."	EPA believes that the current definition sufficiently covers hybrid HDDs (an HDD with flash component) as that implementation would fall within the "any and all internal hard disk drive (HDD)" description at the beginning of the definition.
8	Definition	Discrete Graphics	Two stakeholders commented on the change in definition to remove the requirement that the discrete graphics must be separate from the CPU. One of these stakeholders noted that they did not have data suggesting that system on chip (SOC) graphics would draw a similar level of power to separate discrete (PCIe) graphics cards, and recommended avoiding this change without supporting data. The other stakeholder commented that the physical separation allows manufacturers to use designs that provide more GPU power with higher cooling requirements (Thermal Design Power). A third stakeholder commented in agreement that EPA should revert to the V7D1 definition.  Another stakeholder commented in support of the change in definition, noting that it is the inclusion of a local memory controller interface and local graphics specific memory that differentiates discrete from integrated graphics, and the previous definition which required physical separation from the CPU was arbitrary.  Two stakeholders commented that packaged graphics (SOC) should be able to use the energy savings features of integrated graphics, including switching and panel self-refresh, therefore this type of product should not be given the full discrete graphics allowance. This stakeholder recommended that this packaged graphics category could receive the 0.5 * G1 adder allowed for desktop switchable graphics.	As stated in Draft 2, EPA received stakeholder feedback indicating that the proposed change to the dGfx definition in Draft 1 could adversely impact future GPU packaging implementations which may allow additional efficiency improvements. As a result, EPA proposed reverting to the previous version of the definition in Draft 2, but clarified that in order to be considered dGfx, the GPU cannot share memory resources with the CPU. EPA has not received any additional information or data that supports further changes to the discrete graphics definition in the Final Draft.  EPA is not aware of any technology that would utilize packaged graphics and therefore has not given an adder for this. However, a packaged graphics adder could be considered again as part of the Version 8.0 specification development process if there is data that may be analyzed related to this feature.

Computers Version 7.0 Draft 2 Specification Comment Response Document

Ref. #	Topic	Subtopic	Comment Summary	EPA Response
9	Definition	Portable All in One	One stakeholder commented in support of changes to the Portable All in One definition, noting agreement with the intent to adjust the definition to include products that have longer battery lifetimes, while including the products which would be classified by limited portability.	EPA thanks the stakeholder for their support of this change.
10	Definition	System Memory Bandwidth	One stakeholder commented with a definition for System Memory Bandwidth: "the rate at which data can be read from or stored into computer system's memory, expressed in gigabytes per second(GB/s)"	EPA will consider this definition for inclusion in the Version 7.1 dot revision to include Mobile Workstations as a separate product category.
11	Definition	Workstation: Desktop	<p>Multiple stakeholders recommended that an independent software vendor (ISV) certification would be beneficial to ensure that workstations are properly differentiated from non-workstations.</p> <p>Three stakeholders recommended that the Workstation definition include: 4 or more PCIe slots where each lane has a bandwidth of 8 Gb/s or more. One of these stakeholders recommended including the additional requirement that these PCIe slots are 16 lane.</p> <p>Two stakeholders recommended the definition be updated to the include the requirements that the products are marketed as a workstation, do not allow the altering of frequency or voltage beyond as shipped CPU and GPU specifications, supports error correcting code (ECC), and meets two or more of the following: Supports one or more discrete GPU or discrete compute accelerators, supports 4 or more PCIe slots with individual bandwidth of 8 Gb/s, provides multiprocessor support for 2 or more physically separate CPUs, and/or has qualified or under review by 2 or more independent software vendors (ISVs).</p>	<p>After reviewing the feedback on this topic, EPA agrees that the term "lanes" may be too generic and that the term "slots" (used in Version 6.1) more clearly defines the interfaces intended to identify the differences between a workstation and desktop computer. EPA is proposing to include this revision in the Final Draft as the Agency is concerned that the term "lanes" may unintentionally include small form factor ports such as Thunderbolt 3 which are not the target of this criteria.</p> <p>Beyond this change, EPA will maintain the definition proposed in Draft 2 that closely aligns with the spirit of the CEC workstation definition, while maintaining aspects important to the ENERGY STAR program.</p>
12	Definition	Workstation: Mobile	One stakeholder commented in support of the inclusion of Mobile Workstations. This stakeholder noted that the CEC Mobile Workstation definition includes a reference to the CEC term "system memory bandwidth", therefore, EPA should incorporate this definition in the specification.	EPA will consider the inclusion of Mobile Workstations into scope as an independent product type in a Version 7.1 dot revision if sufficient data is provided to support TEC levels for this product type. Until that time, mobile workstations that meet the definition of a notebook will be eligible to certify as notebooks under Version 7.0. As noted in Comment 10, EPA will consider the system memory bandwidth definition as part of this dot revision process.
13	Desktops	Data Collection for Desktops	One stakeholder commented that EPA should begin data collection efforts in Version 7 for expandability data in desktops, which would benefit the Version 8 development process (desktop revision). In addition, this stakeholder also recommended EPA issue a call for data on desktops (expandability data) concurrently with Version 7 development.	EPA intends to collect this information to benefit end-users by helping them make better purchasing decisions, as well as to better inform potential desktop categorization changes in Version 8.0.
14	Desktops		One stakeholder commented that EPA should revise desktop levels down to 25% pass rates in the Version 7 specification.	As stated in previous drafts, Version 7.0 changes are directed at notebooks and thin client computers, while the following Version 8.0 revision will focus primarily on desktops and workstations.
15	International Market Certification	Testing	One stakeholder commented that the international market certification section should be amended to: "Products, and all applicable components, shall be tested for certification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR", to avoid the issue that some components were only tested according to US requirements.	EPA has proposed this change in the Final Draft.
16	IPS	80PLUS	<p>Two stakeholders commented in support of the 80PLUS Gold Standard for power supplies rated over 500W and 80PLUS bronze for IPS rated below 500W.</p> <p>One stakeholder commented that IPS over 500W should have an 80PLUS Silver Requirement.</p> <p>Another stakeholder commented against the 80PLUS Bronze for power supplies below 500W rating, noting that the cost justification which drove this requirement for Bronze over Gold would be eliminated by economy of scale if this power supply class was required for products. This stakeholder noted a similar occurrence in ENERGY STAR Servers.</p> <p>One stakeholder commented that the IPS requirements were not written in a manner with accurately translated to non-US voltage/frequency. This stakeholder recommended adding a line item on the IPS efficiency table corresponding to efficiency requirements under 230V/50 Hz, or directly referencing the 80PLUS Gold standard, which has these values alongside US requirements.</p>	EPA will maintain the IPS approach proposed in Draft 2. The Agency continues to believe that the data collected shows that products with 80PLUS Gold Standard equivalents are cost effective. An additional column in Table 1 and Table 2 has been added to address minimum efficiency requirements for IPS tested at 230V.

Ref. #	Topic	Subtopic	Comment Summary	EPA Response
17	IPS	Low Load Efficiency	<p>Two stakeholders commented that most computers spend their time at low loads, indicating a need for low load IPS requirements. One of these stakeholders recommended a data collection effort at low load to set levels in Version 8, whereas the other stakeholder recommended there was enough data to set a Version 7 requirement at 10% load, which could be done via typical 80PLUS Gold power supply efficiency levels.</p> <p>Another stakeholder also commented in support of Version 7 low load data collection efforts, noting that low load efficiency, especially below 10% load, is often characterized by large losses in efficiency. In some cases, over half the power needed by the PSU at low load was not performing useful work (losses).</p> <p>A stakeholder commented via a low load efficiency research report, with the following findings: large efficiency losses can occur at load points at or below 10% load, ranging from 91-28% efficiency in the 1-10% load test points, 80PLUS level was not a good indicator of IPS performance at or below 5% loads, and at 0-5% loading, considerable energy savings (by percent) is available by turning down the cooling fan at these operating levels. This report was from collected data from an earlier report and tested data from 21 unique power supplies, constructing a combined dataset with 33 unique power supplies in total, spanning several 80PLUS categories.</p>	<p>EPA does not have sufficient data to support a 10% load requirement in Version 7.0, but will be working with stakeholders in the development of Version 8.0 to determine if low load points are feasible for testing in lieu of higher load requirements, and if so what exactly those load points should be.</p> <p>EPA welcomes any additional feedback and supporting data from stakeholders on this topic to help inform potential revisions to the IPS requirements in Version 8.0.</p>
18	IPS	Power Factor	<p>One stakeholder commented that not all tested power supplies supplied a power factor above 0.8 when brought down to and below 10% load. Additionally, 80PLUS level was not an effective predictor of power factor performance below 10% load.</p> <p>Another stakeholder commented that power factor measurements at extremely low load points (e.g. 1.2%) may be challenging due to the level of distortion present in the measurement. Sophisticated equipment may be needed, and requirement tolerances may need to be larger than typical values at other more traditional load points. Some power factor correction circuitry in the tested power supplies began to stop working or go into burst mode operation near 3% load.</p>	<p>EPA has maintained the 20%, 50%, and 100% loading IPS loading points in the Final Draft, but welcomes additional discussion about power factor at low loads (<math>\leq 10\%</math>) as part of the Version 8.0 revision.</p>
19	IPS	Requirements	<p>One stakeholder recommended removing IPS requirements, instead recommending the specification focus on total system energy consumption (TEC), and allow manufacturers to make the cost benefit analysis of which power supply to incorporate in their systems, so long as they met the minimum power requirements. This stakeholder noted that there are several desktops on the market that would meet ENERGY STAR TEC requirements but are not eligible due to the 80PLUS Bronze requirement. Additionally, CEC has adopted this approach in the upcoming California rule.</p> <p>This stakeholder also recommended if IPS requirements are maintained, the following changes should be made: Load Rating for Power Factor Correction (PFC) at 0.9 should be at 50% load, not 100% load, to align with the 80PLUS specification and the CEC. Additionally, the IPS requirements table should be updated to align with 80PLUS requirements in efficiency at 100% load.</p>	<p>EPA will maintain the previously proposed IPS requirements in the Final Draft specification, but has revised the power factor requirement from 100% load to 50% load in Table 1 and Table 2, and adjusted the 100% requirements in Table 6 to harmonize with the 80Plus platinum and titanium requirements.</p>
20	Mobile Workstation Criteria		<p>One stakeholder commented on Mobile Workstations, recommended that they are included in scope for the Version 7 Specification. This stakeholder recommended that: EPA adopt CEC's criteria to qualify mobile workstation under ENERGY STAR, as outlined in CEC's Computers and Displays standard ((Chapter 8)(1605.3)(60). The criteria requires use of external power supply that meets federally regulated level VI efficiency criteria, incorporates energy-efficiency Ethernet functionality (Note: IEEE 802.3az is specific to a physical port – not wireless connection), and power management to transition connected display and system in to sleep mode or alternative sleep mode with a maximum power demand (per Table V-6).</p> <p>Additionally, this stakeholder commented that EPA should include a reporting requirement for TEC of Mobile Workstations, to lay the groundwork for setting a requirement for this product type in Version 8.</p>	<p>As noted above, EPA is removing the Mobile Workstation definition in the Final Draft specification. EPA will consider including Mobile Workstations into scope as an independent product type in a Version 7.1 dot revision if sufficient data is provided to support TEC levels for this product type. Until that time, mobile workstations that meet the definition of notebook will be eligible to certify as notebooks under Version 7.0.</p>

Ref. #	Topic	Subtopic	Comment Summary	EPA Response
21	Mode Weightings + Network Connectivity		<p>One stakeholder commented that their research and associated industry research was demonstrating that ECMA 383 may not be representative of real world computer usage, in many cases dramatically underestimating the influence of active mode and a more realistic idle mode power. This stakeholder recommended EPA revisit the test procedure and conduct additional research/analysis to include light active mode and real world idle in Version 8.0.</p> <p>The other stakeholder commented that the Draft 2 specification language on mode weightings was unclear. This stakeholder sought to clarify that EPA intent was to provide two options to stakeholders for mode weightings: Option 1 contains computers with full proxy support, which could enter a low power state and intelligently wake when needed for processing power, and Option 2 does not have intelligent sleep requirements, only a 2 W maximum power usage requirement which would require a more general low power state (with flexible implementation). This stakeholder requests that this section is restructured and edited for clarity to match the new specification intent.</p> <p>The final stakeholder commented that the changes to the mode weighting definitions section would categorize products which use 2 or less W would be categorized in the Network Proxy- Full Capability definition. This stakeholder notes that EPA intent may have been to set these products in a different category, which would require a new power mode definition.</p>	EPA has reworked Section 3.5.1 to offer two clear options for applying the full network connectivity mode weighting. EPA believes this change removes any confusion about applicability of the full network connectivity mode weighting using alternative low power modes with constant network connectivity, but welcomes stakeholder feedback if any additional clarification is needed.
22	Notebooks	230 V Pass Rates	<p>One stakeholder commented that the pass rates for notebooks under EU power (230V/50 Hz) obtain high pass rates, nearing 47% for 2017 products. This stakeholder recommended that these levels are tightened.</p>	<p>As part of its analysis EPA considered notebooks that were manufactured from 2015 to the present to reflect the current market of products, which would include those products that are not ENERGY STAR certified (which ENERGY STAR has no information on). EPA believes that this approach is consistent with the approach taken for previous specifications and offers a reasonable cross section of the market.</p> <p>EPA also did include 230V and 115V data in the dataset and only considered a product as meeting the criteria if it met for both measurements.</p> <p>EPA also notes that it does not have data on product family members that are less energy consuming than the parent model. Following information received regarding these products, EPA amended the memory adder to more accurately reflect the energy consumption of these products. Based on the data received, EPA believes that the final draft proposal differentiates the market while allowing a variety of different product types to meet the specification. EPA will continue to monitor the market in advance of Version 8.0.</p>
23	Notebooks	Base Levels	<p>One stakeholder commented that the Draft 2 notebook levels are too low, as they are not accounting for high end non-ENERGY STAR notebooks, which this stakeholder estimates at approximately 20% of the market. This stakeholder notes that an analysis including these products will result in a higher requirement base level for NB2 products.</p> <p>This stakeholder also commented that the most logical cut point for P-score between NB1 and NB2 is 8.0, and recommends that EPA recategorize to these levels.</p>	EPA received additional non-certified notebook data which led to the proposed revisions to the memory adder and base allowance for category 2 in the memo distributed on November 14, 2017, which have since been adopted in the Final Draft. EPA is also proposing to shift the cutoff between category 1 and 2, so that category 1 will include notebooks with a p-score of 8.
24	Power Management		<p>One stakeholder commented on the power management requirements in the Draft 2 specification, noting that there are instances where the power management features in a computer do not function as intended especially due to conflicts with installed software. This stakeholder recommended that EPA develop a database listing where software products with known issues interacting with power management are catalogued, to provide an incentive for these developers to repair these issues.</p>	The scope of the ENERGY STAR computer program does not apply to software installed after shipment, nor the effect that software may have on the behavior of the product. However, EPA is interested in working with stakeholders to determine ways to encourage more efficient software practices, outside of the Version 7.0 specification revision.
25	Test Method	Display Brightness	<p>One stakeholder commented on the display brightness requirements in the Test Method, noting that calibrating the display brightness to 200 nits misses the additional energy savings or energy consumption of units which are shipped at high/low display brightness. Additionally, the display power usage is a large component of the energy use of All-in-one computers.</p> <p>This stakeholder recommends that EPA update the test procedure to test with display brightness as shipped, or make it a requirement that manufacturers must ship ENERGY STAR computers with display brightness set as tested.</p>	EPA has clarified in Section 4.2.1 that all models shipped as ENERGY STAR within a product family must maintain the same power management settings and default display brightness settings used when testing the Representative Model of that family for certification.

Computers Version 7.0 Draft 2 Specification Comment Response Document

Ref. #	Topic	Subtopic	Comment Summary	EPA Response
26	Thin Clients	TEC Base	<p>One stakeholder commented that the Thin Client requirements does not include the memory adder in the Thin Client TEC equation, and the power management requirement that reduces the speed of 1 Gb/s or faster Ethernet network links does not address fiber networks.</p> <p>Due to these factors, this stakeholder recommends increasing the Thin Client base requirement to 35 kWh, and including an adder for Fiber Optic NICs, at 20 kWh.</p>	<p>EPA did not receive any data to support the claims in this comment, and continues to believe that the thin client requirements proposed in Draft 2 provide a healthy selection of efficient lower end and higher end thin client products.</p>
27	Timeline		<p>One stakeholder commented that the effective date of the Version 7 specification should be on October 1, 2018, or later, after the close of the fiscal year.</p>	<p>EPA is targeting an effective date of November 16, 2018.</p>