



August 11, 2017

To: Ryan Fogle, EPA Manager, ENERGY STAR for IT and Data Center Products;
John Clinger, ICF International

Re: ITI Comments on ENERGY STAR Version 7.0 Computers Draft 1 Specification

Thank you for the opportunity to comment on the ENERGY STAR Version 7.0 Computers Draft 1 Specification. As the global voice of the tech sector (“Industry”), ITI has been a long-standing partner in the ENERGY STAR process and has collaborated with governmental agencies on related regulatory efforts, like the recently adopted California Energy Commission (CEC) Energy Efficiency Standards for Computers and Computer Monitors (“CEC regulation”).

After reviewing the Draft 1 Specification and participating in the July 18th Webinar, our priority concerns include (1) harmonization with existing standards, (2) the product categorization approach, (3) limits/adders, (4) the power management and (5) the product definition/ scope. The comments below expound upon these concerns and provide detailed feedback to the EPA’s Draft 1 proposal.

Summary of key issues:

Desktop Workstation Definition

The Version 7.0 definition for Desktop Workstations does not incorporate industry recommendations to EPA and California Energy Commission. The proposed definition below was a result of months of collaboration effort between the industry, advocates and the Commission, while keeping EPA informed of significant updates. Industry recommends harmonization of the Desktop Workstations definition and proposes the following definition, as detailed in the California Energy Commission’s *2nd 15 Day Language*.

“Workstation” means a computer used for graphics, computer-aided design (CAD), software development, financial, or scientific applications, among other computation intensive tasks. A workstation covered by this specification must meet the following criteria:

- (1) Product as shipped does not support altering frequency or voltage beyond the computer processing unit and GPU manufacturers’ operating specifications;
- (2) Has system hardware that supports error-correcting code (ECC) that detects and corrects errors with dedicated circuitry on and across the CPU, interconnect, and system memory; and



- (3) Meets two or more of the following criteria:
 - (A) Supports one or more discrete GPU or discrete compute accelerators.
 - (B) Supports four or more lanes of PCI-express, other than discrete GPU, connected to accessory expansion slots or ports where each lane has a bandwidth of 8 gigabits per second (Gb/s) or more.
 - (C) Provides multi-processor support for two or more physically separate processor packages or sockets. This requirement cannot be met with support for a single multi-core processor.
 - (D) Has qualified or is currently being reviewed for qualification by two or more independent software vendor (ISV) product certifications.

Interactive Displays Definition

During the July 15th Webinar, the EPA noted that interactive displays would be covered under the ENERGY STAR Displays specification, but did not provide a definition in Draft 1 of the Version 7.0 Computer Program Requirements or in Version 7.0 Display Program Requirements. Industry needs more information about the products EPA believes would be classified as “Interactive Displays” to understand how they differ from Integrated Desktop Computers, Electronic Displays, and Monitors.

Industry recommends that EPA exclude Interactive Displays from scope of the Computers specification. ITI is open to collaborating with the EPA to develop potential coverage under the Displays specification, as long as the limits are reasonable as this market is still very new, and we are not sure how this will play out in the long run i.e. customer acceptance.

Mobile Workstations Definition

Industry proposes adoption of the CEC definition and qualification criteria for "Mobile Workstations":

Definition:

“Mobile workstation” means a high-performance, single-user computer primarily used for graphics, computer-aided design (CAD), software development, financial, or scientific applications, among other computation intensive tasks, excluding game play, and that is designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an external power source. Mobile workstations utilize an integrated display and are capable of operation on an integrated battery. A mobile workstation may use an external power supply and have an integrated keyboard and pointing device. In addition, a mobile workstation must meet all of the following criteria:

- (1) Has a mean time between failures (MTBF) of at least 13,000 hours;
- (2) Has qualified or is currently being reviewed for qualification by two or more independent software vendor (ISV) product certifications;
- (3) Supports either:



- (i) At least one integrated or discrete GPU graphics processing unit with frame buffer bandwidth of 96 gigabytes per second or greater; or
 - (ii) A total of 4 gigabytes or more of system memory with a bandwidth of 134 gigabytes per second or greater and an integrated GPU;
- (4) Supports the inclusion of three or more internal storage devices; and
- (5) Supports at least 32 gigabytes of system memory.

Mobile workstation criteria: ITI recommends EPA to adopt CEC’s criteria to qualify mobile workstation under ENERGY STAR, as outlined in CEC’s Computers and Displays standard {(Chaper 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). ITI believes there should be no TEC limits for mobile workstation. As it is, EPA’s current proposal on notebooks base TEC limits is intended for entry level, and mainstream notebooks. ITI welcomes further discussion on this, should EPA disagree with ITI’s proposal.

Discrete Graphics Definition

Industry requests deletion of this additional proposed text from the definition: “*Discrete GPUs are not packaged on the same die or substrate as the CPU.*”

Discrete graphics are distinguished from integrated graphics, by the inclusion of a local memory controller interface and local graphics specific memory. This is the agreed industry definition of discrete graphics, and it’s the definition that’s used in V6.1.

The added language creates an arbitrary distinction based on packaging design rather than whether discrete graphics are present. It would limit future choices for both manufacturers and consumers and reduce competition and innovation in the marketplace. Multi-chip and system on chip packages are widely used in other applications and this packaging option is associated with miniaturization of devices by providing greater functionality in smaller form factors. Innovative packaging designs are one of the tools that will help drive future energy efficiency ENERGY STAR should not limit packaging design options for computers, including any future multi-chip packaging designs that are based on the presence of a CPU and discrete GPU.

Mode Weightings and Network Connectivity

In response to EPA’s proposal to revise the definition of Full Network Connectivity to more closely align with very low power modes, Industry recommends that EPA retain the following mode weighting options:

1. Conventional Weighting, and Full Network Connectivity definition in line with ENERGY STAR v6.1. EPA’s proposal to replace $\leq 10W$ power demand with $\leq 2W$ for all computer form factors with alternative low power mode (LPM) is not realistic. Industry requests to either remove 2W LPM requirements as part of Full Network Connectivity definition or



adopt the following alternative sleep mode limits adopted by CEC in the CEC regulation¹, with an effective date of Jan 1, 2019. Industry is gearing up to align product design cycle to meet CEC's effective date and not before that.

Workstations, Mobile Workstations, High Expandability Computers, Small-Scale Servers:

$10 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 32 gigabytes. If C is less than zero, use zero for the value of C.

Desktop Computers, Thin Clients, Mobile Gaming Systems:

$5 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 32 gigabytes. If C is less than zero, use zero for the value of C.

Notebook Computers, Portable All-In-Ones (expand to include Slates/Tablets):

$2.5 + 0.03 * C$ where C is the system memory capacity in gigabytes minus 16 gigabytes. If C is less than zero, use zero for the value of C. If a discrete GPU is present in the system, the maximum power consumption limit shall be increased by an additional 2 watts.

Stakeholder feedback and confidential data referencing power levels below 2.0 W during the 7.0 revision is premature and not realistic based on form factor dependent power demand above. ITI members continue to work with every impacted component (hardware & software) in the eco-system that must support these alternative sleep or lower power power demand.

Internal Power Supply Requirement

The Load Rating for Power Factor Correction (PFC) at 0.9 should be at 50% Load not at 100% load, to harmonize with California Energy Commission and Ecova 80Plus Internal Power Supply efficiency requirements, as discussed during the EPA's July 18th webinar.

Regarding Internal Power Supplies (IPS), ITI would like to reiterate its long standing position that ENERGY STAR focus should be on the system level energy consumption (TEC), and not IPS efficiency levels. IPS selection is one of the tools the system makers use for system design consideration for a given market segment. To illustrate this issue, there are many consumer desktop systems in the market that meet the ENERGY STAR TEC requirements but could not be qualified for ENERGY STAR label, for lacking an 80Plus Bronze or higher IPS. The system maker decision not to design-in a more expensive higher grade IPS is based on energy efficiency and cost trade-offs for a given market segment. These systems are already highly energy efficient (meeting ENERGY STAR limits) and adding a higher grade IPS is not warranted as cost-effective energy efficient solution. CEC agreed with this approach and decided not to regulate IPS for mainstream desktop PC systems, leaving it up to the system makers to decide,

¹ Energy Efficiency Standards for Computers and Computer Monitors. Available here: http://docketpublic.energy.ca.gov/PublicDocuments/16-AAER-02/TN217276_20170424T110142_Notice_of_Availability_of_Additional_15Day_Language.pdf



based on the system BOM to meet the TEC requirements. Should the EPA not agree with this approach, ITI requests the potential changes to the internal power supplies efficiency level should be addressed as part of the desktop requirements in the planned ENERGY STAR version 8 specifications. EPA has not provided data to justify its proposal to jump 2 levels from the current 80Plus Bronze to 80Plus Gold level. Industry believes this proposal is premature, and is better addressed at the time of desktop data collection, TEC limits discussion and understanding ROI of energy efficiency gains, by going from 80Plus Bronze to 80Plus Gold requirements.

TEC Base for Thin Clients

Industry supports a reduced TEC Requirement of 50 kWh for Thin Clients, as also proposed by CEC. However, lowering the TEC to 31 kWh as proposed in Draft 1 will limit Thin Clients to low performance machines only. Eliminating Thin Clients will also have the effect of rendering them ineligible for EPEAT, reducing the incentive to work towards a reduced environmental impact.

The following are recommended options for addressing industry concerns:

- Option #1 - Push out establishing TEC limits, adders and potentially Categories until Ver. 8.0 (same timing as Desktop PCs).
- Option #2 - Revise Base TEC and provide appropriate Adders for Thin Clients under Ver. 7.0. Base TEC Should be 50 kWh and Adder for Memory should be 0.8 (same as DT PC). Note: Adder for Graphics no longer available for Thin Clients with "System on a Chip".

TEC Limits for Notebooks

Proposal for Base TEC limits for Notebooks: ITI has analyzed the data used to set new Notebooks categories and TEC limits/adders, and has the following observations and recommendation:

1. **Categorization:** The scatter plot in Figure 1(P-score vs. Base TEC) reveals the following issues:
 - P-Score vs. Base TEC does not show a good correlation. This was pointed out by ITI in its earlier comments to EPA.
 - While category cut-off point is difficult to assess, the biggest gap between NB1 and NB2 occurs between P Score values of 7.3-8.0, This is shown with the orange arrow in Figure 1.
 - ITI recommends the following P-Score (P) values for the proposed 3 categories.
 - i. NB0: $P \leq 2$
 - ii. NB1: $2 < P < 8$
 - iii. NB2: $P \geq 8$

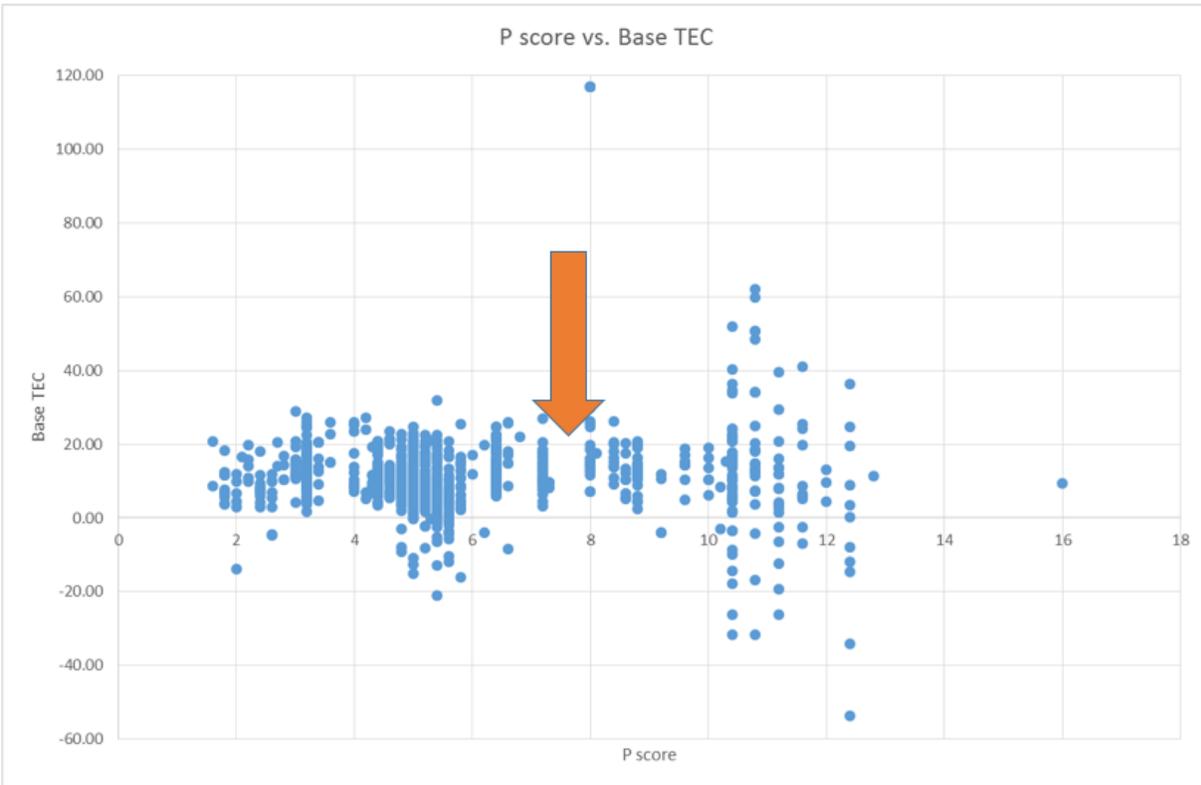


Figure 1

2. Base TEC limits assessment:

- Base TEC limits: ITI has performed independent analysis on the dataset EPA provided, and found errors. After further consultation with EPA, and comparing EPA’s own analysis with ITI analysis there was agreement that EPA’s analysis contained errors in memory adder and display adder formulas. ITI has run the analysis after correcting the formula errors in alignment with EPA’s proposal in draft 1. Table 1 below shows the summary of the analysis with side-by-side comparison.
- The Integrated Display Adder in Draft 1 for notebooks was very closely copied from the CEC Computer regulation. However there is one change in that equation that looks to be unintentional. The current equation shows “ $8.76 \times 0.30 \times (1+0.4 \times EP) \times (0.43 \times r + 0.0263 \times A)$ ”. The Enhanced Performance multiplier section of the equation has an extra “0.4” value. The Energy Star Computers Ver 7 Draft 1 shows that the Enhanced Performance multiplier is either 0.3 or 0.75. But in the CEC version of the equation the only option for the Enhanced Performance Multiplier is 0.4, which seems like that is the reason for the extra 0.4 value. ITI would like to see the equation be the same as what it is in the CEC Computer Regulation for Notebooks –



“ $8.76 \times 0.30 \times (1+EP) \times (0.43 \times r + 0.0263 \times A)$.”

Where the EP in the Energy Star Computers Ver 7 would stay as written as either 0.3 or 0.75 based on the display size.

- In order to determine the proposed base TEC limits within each category, ITI established the pass rate similar to EPA’s pass rate both at the category level and overall pass rate. Further, all other adders in draft 1 were kept the same. This allowed ITI analysis to narrowly focused on memory and display adder fixes, while keeping all other parameters the same.
- **Recommendation:** ITI recommends EPA to adopt the corrected base TEC limits below.

	Draft 1 limits (with errors)	Recommended limits (Errors fixed)
Mem Adder	2.5+(0.4*GB) (error)	0.4*GB (error fixed)
Display adder	ES V7 D1 (error)	ES V7 D1 (error fixed)
NB0 TEC Base Limit	4 kWh	6.5 kWh
NB1 TEC Base Limit	7 kWh	8.5 kWh
NB2 TEC Base Limit	11 kWh	12 kWh

Table 1

3. Base TEC/Adders Discussion:

EPA’s proposal even after correcting for errors calls for significantly reducing the Notebooks base TEC limits from ENERGY STAR v6.1 to ENERGY STAR v7.0. This will put additional constraint on rest of the notebook system to ensure the capability adders are properly sized.

- **Ethernet cards:** Most consumer notebooks removed Ethernet cards and rely on WLAN only for connectivity. However commercial notebooks still require both WLAN and Ethernet card support for connectivity customers require. The ENERGY STAR test methods require connecting an Ethernet card to a live network. Therefore it will be appropriate if EPA eliminates the Ethernet connection requirement and only require use



of WLAN in ENERGY STAR test procedure. As an alternative, EPA would propose a GbE adder for notebooks that support Ethernet cards.

- **Hybrid graphics:** Since hybrid graphics is a default setting for Notebooks configured with dGPUs, there is some power overhead required in dGPU designs even when hybrid graphics is enabled. Furthermore, for Notebooks configured with higher end dGPUs, the notebook overhead power demand is the same as the power demand in desktop computers. This situation necessitates a TEC adder for Notebooks configured with dGPUs even when in hybrid graphics mode. And particularly for Notebooks configured with dGPUs with G5, G6, and G7 class of dGPUs. Without an appropriate adder, no high end Notebooks configured with dGPUs could meet the Draft 1 Ver. 7.0 ENERGY STAR requirements.
- **In summary,** while the basic category definition is CPU P score dependent, while there are many other features like dGPU option, display, storage, memory, connectivity, etc. that define the configuration. Since not all platforms pick all features, reducing base TEC may be appropriate only if there are appropriate allowances for additional features on the platform, given that none of the features have zero power consumption. For example, high end dGPU with hybrid graphics needs additional power to achieve higher performance, LOM (Ethernet on the motherboard) requires additional power allowance. Because of customer needs involving cost and hard drive capacity, we still need to provide many customers with computers configured with HDDs. If we cut the base TEC too much without providing additional adders, this will inhibit innovation by precluding such features on the system.

We appreciate your consideration of our comments.

Sincerely,

A handwritten signature in grey ink, appearing to read "AMcBride", is positioned below the word "Sincerely,".

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