



March 6, 2017

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

Re: ITI Comments on ENERGY STAR Computer Program Discussion Guide: Version 7.0

Thank you for the opportunity to comment on the ENERGY STAR Computers Specification Version 7.0 Discussion Guide. 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) Computers and Displays regulation (“CEC regulation”).

After reviewing the Discussion Guide and participating on the February 13th Launch Webinar, our priority concerns include (1) the accelerated specification timeline, (2) the product categorization approach, (3) the mode weightings, (4) the power management and (5) the expanded scope. The comments below expound upon these concerns and provide detailed feedback to the EPA’s Discussion Guide questions. ITI would like to request a meeting, prior to the issuance of the next draft, to review these comments in greater detail.

Summary of key issues:

1. ENERGY STAR Computers version 7.0 timeline

EPA’s proposed timeline to finalize specification by Q3, 2017 appears very aggressive given the major changes EPA outlined. The ENERGY STAR framework remains a global harmonization point due its past rigor in specification development processes. Any major revision undertaken in a hurry, without much diligence could impact its credibility, at the time when several computer regulations are up for revisions in Europe, China, and Japan.

ITI recommends a measured approach for Version 7.0 specification development, like in the past, to adequately reflect changes in product scope, product form factors and the future innovation trends. The timeline will also have a significant bearing on the new product categorization plans and leadership levels (Limits/Adders).

2. Product categorization approach (including limits, and adders)

ITI has outlined the advantages and disadvantages of both the P-score and Expandability Score (ES) approaches for Desktop and Integrated Desktop PC systems.



While the P-Score approach lacks scalability, the CEC's ES approach is new and untested. EPA's timeline for implementation with new leadership levels, ahead of CEC, remains a key concern for industry. While industry is gearing up to comply with CEC TEC limits for computers starting January 2019, EPA's schedule and limits proposal could become a challenge for industry to comply and for customers to procure ENERGY STAR compliant products. Industry's goal is to build products that can meet both ENERGY STAR and CEC requirements within the timeline established by CEC regulation. It will be very challenging for Industry to design products under a tighter deadline than CEC and/or with more aggressive levels, employing either P-score or ES categorization approach. Industry is open to reviewing EPA's Notebook computers categorization proposal. Industry looks forward further discussion on EPA's approach.

3. Mode Weightings

ITI agrees that the mode weightings need to be updated to reflect computers' real world usage. This requires a large study over several months with a statistically significant sample size within enterprise and consumer segments, which is not feasible within the Version 7.0 development horizon as proposed by EPA. Industry is opposed to setting new mode weightings (duty cycles) based on limited empirical data. Industry also believes such an effort is better addressed under the auspices of existing IEC 62623 standard work for broader legitimacy and global adoption. Regarding full network connectivity mode weighting, ITI proposes that EPA aligns with CEC's computers regulation.

4. Power Management

All ITI member company PC systems are shipped with power management enabled by default (factory settings). There is no strong evidence that the end-user disables power management. There is some evidence based on studies that in the enterprise environment, the power management is subject to changes based on IT department policy, and in some cases making them more stringent than the default factory settings. There should be no change in the ENERGY STAR computers specification regarding power management policy. Any attempt to make power management policy more stringent will likely have an unintended consequence of users disabling power management on their computers, leading to higher energy consumption. ITI will support any EPA campaign to increase awareness of power management and its benefits to reduce energy consumption.

5. Scope/Definition Revisions

ITI is of the view that Tablets and Slates should be excluded from the ENERGY STAR computers scope since these products are already very energy efficient, driven by usages, battery life and market forces. These products typically run wirelessly all day, on a single battery charge and are only connected to AC power outlet for battery charging.



Industry is open to consider other federal regulations already in place governing the energy efficiency of external power supplies and battery charger systems as a means for Tablets and Slates to qualify for ENERGY STAR certification.

ITI proposes that EPA update the workstation definition in ENERGY STAR Version 7.0 to align with the workstation definition in the CEC regulation.

ITI proposes that EPA defines high expandability/high-end desktop system and keep these systems out of scope of Version 7.0.

ITI proposes that EPA change computer 'Sleep Mode' definition to align with CEC, to include alternative to ACPI S3 sleep modes.

Small-scale Servers are no longer a relevant product category and should be removed from scope of the ENERGY STAR program. The ability to store information in the cloud and ability to access data anytime and anywhere with today's mobile lifestyle has made the need for this type of computer obsolete.

Zero Clients & Ultra-thin Client definitions are the same for both product types and should remain out of scope in Version 7.0.

ITI proposes to keep interactive displays with processing capabilities out of the scope. These form factors are still evolving, with varying product design configurations and energy consumption. However, due to low volumes and low overall energy footprint these products should be out of scope of ENERGY STAR Version 7.0 specification.



Detailed Comments on Computer Program Discussion Guide: Version 7.0 (ITI Comments in blue)

ITI comments on summary of EPA's Observations for P-Score:

Advantages of an Updated P-Score:

- Adjusts to current generation hardware through the tuning of the performance boundaries in a given product type.
- Reliably scales within a product family when the family includes a range of performance configurations. (A higher p-score correlates with a higher performing product and typically greater energy consumption).
 - Industry could not demonstrate this scaling during CEC study based on ENERGY STAR Dec 2015 QPL data – it may work within finer granularity category approach. We just need to review new proposal.
- Design-neutral approach is independent of form factor and product type.
 - While it may be design-neutral, it may not be architecture-neutral (example – products with small cores vs. large cores or products with a mix of small and large cores with different performance and energy profiles). P-score calculations could be challenging and may favor a particular architecture and configuration over the other.
- Maintains global harmonization.
 - That is true, however CEC has already moved away from P-score approach.

Disadvantages of an Updated P-Score:

- Scalability in performance vs. energy may continue to decrease across p-values in some product categories due to improvement in newer CPU and GPU technologies, lending support to a reduction of p-score categories.
 - That's what was observed on DT and NB systems for CEC – making it harder to justify P-score methodology
- Chipset architecture differs across product types (e.g. desktops vs. notebooks vs. tablets/slates) that require vigilance as new product subcategories and form factors emerge.
 - Same performance score for mobility vs. DT computers may have a different power profile
- Processor technology improvements necessitate periodic specification revision.
 - The spec revision could be warranted, with or without P-score, since the energy efficiency improves and ENERGY STAR penetration rates go up over time
 - P-score, which is essentially a CPU characteristic, is not a good proxy for overall platform power consumption going forward.



ITI comments on summary of EPA's Observations for Expandability Score:

Advantages of Expandability Score:

- Introduces opportunity to simplify to a single desktop category, creating clear expectations for TEC.
 - While the CEC proposal started out as a single category approach, the approach changed over time. Industry worked with CEC to use the expandability score bands to create categories for DT/AIO. A single category approach with adders was not acceptable to CEC's stakeholders.
- Consensus that expandability generally scales well with size of power supply used in desktop products.
 - Yes, however power supply sizing was left out of expandability criteria and from the regulation, except for the systems that are exempt from TEC requirements.
- Provides longevity for efficiency requirements.
 - Probably true – but will have to exercise CEC framework to validate it over time

Disadvantages of Expandability Score:

- Introduces additional adders, and potential for increased energy use of products.
 - Additional adders were necessary for CEC MEPs program so as not to exclude products from the CA market. Those adders will be necessary for ENERGY STAR as well.
- Scope is limited to desktops and integrated desktops.
 - Industry did not fully explore expandability score (ES) for Notebooks due to lower priority to reduce Notebook TEC limits in the context of CEC's long term energy reduction goals. From ingredient perspective, high-end performance notebooks could have expandability similar to desktops, but expandability slots are often traded for motherboard mounted components. Investigating the right Notebooks categorization requires more work.
- Inability to differentiate across a range of configurations covered within an ENERGY STAR product family.
 - Not sure if this is a true. For DT/AIO, expandability score allows binning of like products (with similar expandability score) within categories. This scheme provides differentiation across configurations by placing unlike products in different ES categories, while comparing like products within the same ES category.
- Sensitive to number and type of IO ports and/or memory configuration in a product that may or may not be used. Such adders (i.e., ports with high expandability adders such as USB-C and Thunderbolt 3.0) may place products in energy categories not reflective of actual use.
 - CEC was sensitive to this concern. ES was based on port power consumption rating which impacts the power supply sizing.
- May introduce incentive to upsize power supplies in higher end products to reach exclusion category and meet easier workstation requirements instead.



- There are only 2 product types in the CEC regulation that includes a requirement for power supply size: 1) High Expandability Computers (Clause 2 & 3 only) and 2) Mobile Gaming Computers. While it might be possible to upsize power supplies, the hurdle to meet CEC High Expandability definition is set fairly high and includes a very high-end graphics solution. The Mobile Gaming Computer includes 3 other requirements which limit the market for these types of computers. Lastly there is significant BOM cost impact for upsizing the power supply, along with the graphics solution or other attributes to meet these definitions.
- Further the CEC workstation definition change was completed in alignment with EPA, and should be included in Version 7.0.

ITI comments on EPA's Recommended Approach for Efficiency Levels in Version 7.0:

Based on this initial review, EPA believes the best path forward for Version 7.0 is to update the current P-score category boundaries. Doing so provides EPA with the highest degree of flexibility in setting aggressive requirements for products in the near term, which lines up best with the development and implementation timeline of Version 7.0. EPA has identified a number of improvements the Agency sees as necessary for use of p-score. These are:

- Collapsing performance categories as product data allows.
 - ITI would like to review the EPA proposal to understand data granularity for TEC vs. performance score.
- Fine tuning the boundaries of the performance scores in different categories to capture remaining scalability in performance and energy of products.
 - ITI will review the EPA's proposal in detail to assess performance score boundaries and impact on scalability and energy consumption for current shipping products and any future product roadmap implications
- Significantly revising base allowance and functional adders.
 - ITI will review the EPA's proposal in detail to assess base TEC and functional adders. It will depend on the category framework (P-score vs. expandability score), thresholds for base TEC and adders, and the effective date.
- Investigating the continued validity of discrete graphics performance categories for notebooks, given the wide adoption of switchable graphics in that product type.
 - The CEC PC regulation includes performance categories and allowances for notebook discrete graphics. Some level of categorization is being discussed in Version 7.0 to accommodate the wide range of notebook configurations on the market. EPA should also take into account the need for power allowance with an 'alternate sleep' mode as it may require the discrete GPU's local memory to remain in a low power state. ITI will review the EPA's proposal on discrete graphics performance categories, and provide additional comments as warranted. .

ITI comments on EPA's discussion questions:



- Are stakeholders able to outline any advantages or disadvantages not listed above that EPA should take into consideration in regard to a categorization system for Computers V7.0? Data to support additional considerations is encouraged.
 - Please refer to the comments provided above. Industry will assess both categorization options in light of EPA's proposal on categories, limits/adders, and schedule. While performance score approach has scalability issues, the expandability approach if implemented ahead of CEC planned implementation, could pose significant compliance risk for ENERGY STAR Version 7.0 – depending on proposed base TEC limits and adders. Current EPA proposed schedule is very aggressive and poses risk with either categorization approach.
- If EPA adopted an alternate categorization system such as expandability score, what modifications would be necessary for brand owners to certify a range of configurations within a product family that is currently enjoyed?
 - For DT/AIO industry is already gearing up to comply with CEC standard. Unless ENERGY STAR Version 7.0 deviates significantly from the CEC's expandability approach the framework, impact should be manageable. However, the Industry still needs to review ENERGY STAR Version 7.0 proposed levels to fully assess the risk.
- If EPA were to move to an expandability score for desktops, individual product data is needed to set leadership levels that is reflective of current and top performing models. Will brand owners make this data available in Q1 2017?
 - Industry has already shared the CEC data for DT/AIO with EPA. There is not likely to be significantly more data collection in Q1 to share with EPA.
 - Note: The key objective is that system makers should be able to design products that meet both ENERGY STAR and CEC requirements, and not have to design products for two very different framework and requirements. Should EPA proposes to stay with performance score approach, Industry will have to assess how products within new EPA categories map with CEC categories, to ensure same product configuration could be qualified for both ENERGY STAR and CEC requirement (ensuring a single design within the product family).

2) Evaluate current duty cycle and mode weightings for full network connectivity

The current duty cycle was incorporated in the Computers Version 6.0 specification based on data from a 2008 Microsoft study that included a sample set of 75,000 computers. As brand owners introduce software and hardware upgrades in their products over time, ENERGY STAR understands that operational modes may shift, which introduces potential issues when relying on historical data. EPA is therefore interested in evaluating the current duty cycle against data from its stakeholders to determine whether any modifications are necessary.

- To set the record straight the duty cycles were updated for Version 6.0 based on Ecma 383 study – that included separating long and short mode weightings and assessing the impact of active power.

For quite some time EPA has been concerned about power management settings being disabled



on the enterprise level. Data from PG&E in 2010 found that desktop computers spent less than 1% of time in sleep mode during an average business day, indicating that default power management settings were not being retained. In response, the ENERGY STAR Computers specification includes incentives to promote the adoption of the ECMA 393 standard in the form of alternative mode weightings for full network connectivity. Given the relatively low uptake among product brand owners in claiming these full network connectivity mode weightings during certification, ENERGY STAR seeks input on the technologies that brand owners plan to implement during the lifetime of Computers Version 7.0, as well as those functionalities they strive to achieve, so ENERGY STAR can increase the use of power management settings in desktop computers.

- All ITI member company PC systems are shipped with power management enabled by default (factory settings). There is no strong evidence that the end-users disable power management. There is some evidence based on a limited UCI data and other studies that in the enterprise environment the power management policy was subject to changes based on corporate IT policy, and in some cases making the power management even more stringent than the default factory settings. There should be no change in the ENERGY STAR computers specification regarding power management policy.

ITI comments on EPA Recommended Approach for Mode Weightings in Version 7.0:

EPA believes there may be value in updating the program's duty cycle should acceptable data be readily available. New data should reflect current products on the market and include, at a minimum, these characteristics: product type (e.g., desktop, laptop), application (e.g., residential, commercial), and operating system.

- Agreed! However, the duty cycle study takes 6-9 months after the study is commissioned. This study is not feasible within Version 7.0 development horizon as laid out by EPA.

Absent readily available data that is reflective of current use patterns in Q1 2017, EPA will continue to rely on the robust data used by the program in recent years.

- Agreed.

In addition, EPA intends to retain incentives for network proxy capability and will continue to seek ways to ensure power management settings remain enabled in their as-shipped state and are delivering value to the enterprise environment.

- Agreed. Regarding full network connectivity mode weighting, ITI proposes that EPA aligns with the CEC computers regulation (simplifying from four to two network proxy mode weightings).

ITI comments on EPA's Discussion Questions:

- Can stakeholders provide empirical data as part of their written comments that allows ENERGY STAR to evaluate the integrity of the current mode weightings?



- Industry has not collected any new data. Industry is opposed to setting new mode weightings (duty cycles) based on a limited empirical data. As discussed during the webinar that while the industry agrees that an effort should be undertaken to update the computers energy mode weightings, industry believes such an effort is better addressed under the auspices of existing IEC 62623 standard work for broader legitimacy and global adoption. As stated above that this study could take 6-9 months after the study is commissioned. This study is not feasible within Version 7.0 development horizon as laid out by EPA.

- Do product brand owners have data to show the adoption rate of remote wake capability in their product lines, either as a percentage of total shipments, or an estimate of models with or without the remote wake capability enabled as-shipped?
 - Industry believes a significant percentage of products are shipped with remote wake capability. Industry is unable to provide any percentage data at this point.

- Given EPA's concern about power management being disabled in enterprise environments, EPA seeks solutions that may be written into Computers Version 7.0 that would negate this behavior?
 - Industry does not see this as an issue as discussed during the EPA webinar. Industry will be open to reviewing EPA proposal.

- EPA has been made aware of industry efforts to employ smartphone like power management behavior in notebooks and, ultimately, desktops. This new design allows products to achieve a very low base power and handle small tasks without waking up, significantly reducing non-active energy usage. How are stakeholders involved in hardware and operating system development tangibly moving towards this shift in design paradigm and what are the expected timelines for adoption in the most popular chipsets and/or operating systems for both notebooks and desktops?
 - Since ENERGY STAR is a leadership program Industry proposes that EPA include Modern Standby or similar low power modes in the Version 7.0 specification.

3) Evaluate ENERGY STAR Scope

Two product categories are of particular interest in terms of a revised scope for the Computers Version 7.0 specification: small scale servers and ultrathin clients. Small scale servers—broadly defined as storage servers typically built with desktop computer parts and of a tower or pedestal form factor—were introduced in Computers Version 5.0 where 62 models had certified by the end of that specification's lifetime. Since then, the number of certified products has fallen such that there are no actively certified ENERGY STAR small scale servers. Computer thin clients were introduced into the Computers Version 5.0 specification, exhibiting steady product shipments of



nearly one million products per year. Due to testing uncertainties, ultrathin clients were subsequently excluded in Version 6.0. EPA and stakeholders considered inclusion of this product type in Version 6.0 but were hindered by concern regarding what should be tested for purposes of certification (i.e., should data processing at the data center be considered for qualification?). Ultrathin clients, often marketed as “zero clients,” are an attractive solution for government and healthcare enterprise environments given their security and manageability attributes. Industry figures from Teradici cite over 3 million PCoIP zero client shipments to date.

EPA has received inquiries regarding the inclusion of interactive displays with processing capabilities within scope of the computers specification. Historically, interactive touch displays certify under the displays specification, but there is no adder for processing power. A new class of products is emerging (e.g., Microsoft Surface Hub) that may not fall into one of these product types, instead somewhere in between. Due to a large growth opportunity for business and education applications, EPA seeks input on how best to classify interactive touch displays with computer modules that are powered through AC mains, including how to clearly differentiate across product types in a manner that might remain relevant as the market for these products grows and evolves.

There are currently very few types of interactive displays on the market, and the few that are available differ significantly in capabilities making it hard to do head to head energy comparisons. The following list is not comprehensive, but it does cover a large portion of the products either currently available or to be released soon.

- [Microsoft Surface Hub](#) is the product with the most features. It incorporates a display, electronic whiteboard, screen sharing and video conferencing. It incorporates a computer, but the computer runs application-specific software and it cannot be easily used as a stand-alone device for word processing, spreadsheets or similar office applications unless paired with a dedicated computer. A primary use is as a conference room display allowing “one-touch” starting of meetings. It connects to the company scheduling system allowing users to click on a meeting on the screen to start a videoconference. This feature means it must be “always on” and makes a sleep mode more difficult to implement.
- [Google Jamboard](#) is not been released yet and there are not full specifications available. It appears to be a mid-range device offering functionality of a display and digital whiteboard without videoconferencing capabilities. It appears to be designed to be a more mobile device and not a dedicated conference room system. As such, there is no indication that it would support extensive meeting or conferencing capabilities.
- [Dell 70 Interactive Conference Room Monitor](#) is the closest to a display of these devices. It has display capabilities, but has no integrated computing ability. It depends on external connections for full functionality. It includes a stylus, but whiteboard features are controlled through an externally connected computer.
- The [Planar displays](#) are similar to the Dell product but has more of focus on signage displays. They achieve a large size by tiling smaller displays. There is only display and touch capabilities without built-in meeting functionality. Sharp and Samsung have large touch displays, but they function as displays only. These are similar to the Dell display.
- [InFocus BigTouch](#) is an all-in-one computer and is intended to be used as a stand-alone device. As such, it differs in capabilities with all of those listed above.



As mentioned earlier, it's a short list of products currently on the market. The product configurations and their capabilities vary significantly.

Due to the size and cost, these products will sell in very small numbers contributing little to the overall energy consumption (the sales of these products represent less than 1% of the sales of computers and displays overall). Industry is also concerned that adding ENERGY STAR requirements may stifle innovation. This is a new area and products are just starting to emerge, and it will take time for the product category to develop.

ITI comments on EPA's Recommended Approach for Scope in Version 7.0:

EPA proposes that small scale servers be eliminated from scope of Version 7.0 given lack of industry participation in the ENERGY STAR program, while ultrathin clients be reintroduced once a test method is devised.

ITI comments on EPA's Discussion Questions:

- Do stakeholders have additional data or insight into product performance or market trends in small scale servers that would influence a decision whether or not to keep this product in scope?
 - Manufacturers participating in the ITI Work Group do not sell Small Scale Servers, and therefore are not able to provide EPA with information on these products.
- How might the ultrathin definition be improved to properly segment products in this space? Are zero clients increasing in functionality that traditional boundaries should be reconsidered? What are the key requirements for a testing energy use of ultra thin clients? Is industry able to share energy data on zero clients to allow EPA to more clearly compare the energy usage of zero clients to other thin client types they share similar functionality with?
 - Zero Clients & Ultra-thin Client definitions are the same for both product types and should remain out of scope in Version 7.0.
- Can stakeholders identify any products on the market that are currently tested under the computers specification but are a better fit under the displays specification, or vice versa? Should ENERGY STAR be concerned with technological convergence between computers and displays during the lifetime of Computers Version 7.0, anticipated to be 2017-2019/2020? If so, what type of market presence are these converged products expected to grow to during the life of Version 7.0?
 - ITI suggests that the EPA refrains from making any changes at this point.

Timeline for Version 7.0 Specification Development:

With the launch letter and this document, EPA has officially begun development of Version 7.0. The anticipated timeline for future development is shown below.



- Q1 2017: Launch and webinar, Draft 1 specification and webinar
 - Q2 2017: Draft 2 specification and webinar, Draft 3 specification and webinar (if needed)
 - Q3 2017: Final draft specification, Final specification
 - Q2 2018: Version 7.0 effective
- The Industry views the above development timeline extremely aggressive and unprecedented in establishing the new ENERGY STAR program for computers within record 3 quarters. Industry advocates a measured approach and rigor for collecting data and establishing the leadership levels.

Sincerely,

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

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