

ENERGY STAR® Computer Program Discussion Guide: Version 7.0 January 27, 2017

Overview:

The U.S. Environmental Protection Agency (EPA), in collaboration with the European Commission (EC), is sharing this ENERGY STAR Computer Program Discussion Guide: Version 7.0 to invite your input on the proposed specification development process, possible approaches for the included products, key questions regarding the forthcoming Version 7.0 specification, and a rough timeline for the specification development process. **EPA will host a webinar on February 13, 2017 from 12-2 PM Eastern Time** to engage with stakeholders on the content included in this discussion guide. Stakeholders are also asked to share written feedback with EPA by February 27, 2017. As always, stakeholder engagement is a vital ingredient in the success of the ENERGY STAR program, and EPA looks forward to working with all parties to develop the ENERGY STAR Version 7.0 Computers specification.

The topics that EPA feels are of particular importance for discussion prior to a Draft 1, Version 7.0 release are:

- The categorization system used to set leadership levels
- Duty cycle and mode weightings for full network connectivity
- Power management updates
- Scope of included products

1) Consider categorization system to set leadership levels

The ENERGY STAR Computers Specification Version 6.1, which took effect June 2014, currently has a market share exceeding 95% for laptop computers and reaching nearly 40% for desktop computers. Advancements in hardware and software technologies have driven energy efficiency gains that require new leadership levels to be set. EPA has been monitoring regulatory developments during the life of the ENERGY STAR Version 6.1 Computers Specification, including the U.S. Department of Energy (DOE) Rulemaking for Computer and Backup Battery Systems and the California Energy Commission (CEC) Appliance Efficiency Rulemaking for Computers, Computer Monitors, and Signage Displays. While DOE released a Framework Document in July 2014, CEC is in the late stages of its rulemaking, with efficiency standards expected to start taking effect in 2019 using a novel categorization system for desktop computers referred to as expandability score. Leveraging both CEC and ENERGY STAR data sets, EPA examined the benefits of the p-score and expandability score methodologies to determine the best fit with the ENERGY STAR objectives to set leadership levels in Version 7.0.

Background

What is p-score?

P-score is a category system developed and proposed to EPA by the Information Technology Industry Council (ITI) during the development of the ENERGY STAR Version 6.0 Computers specification development process. This category system was intended to separate products by the performance of their processors and graphics capability, seen as a reasonable proxy to overall system energy needs. Since this time, similar categorization concepts have been discussed and/or encouraged by industry in other areas including the upcoming Version 3.0 Computer Servers specification, a product category with some commonalities in design related to desktop computers. The p-score category can be applied to desktops, integrated desktops, notebooks, and slate/tablet products as well as their sub-product categories.

What is expandability score?

Expandability score is a category system proposed by the CEC during its rulemaking process that correlates with the power supply sizing necessary for a system to be able to power the core system plus potential expansions through externally and internally available ports and interfaces. CEC's category system applies to desktop and integrated desktop computers, as this methodology is not an adequate differentiator in notebooks and slate/tablet products.

Why does this matter?

When possible, ENERGY STAR may consider harmonization with other voluntary and regulatory programs acknowledging the benefits of a single approach for industry as well as consumers. EPA has closely followed the proceedings in California's rulemaking process. On a programmatic level, EPA's ENERGY STAR program often "bins" like products to ensure that similar products and configurations are compared in an apples to apples manner, taking into account the service or functionality they are providing the end-user. As a principle, EPA sets efficiency levels such that performance is not negatively impacted.

In preparing this discussion guide, EPA examined the advantages and disadvantages of adjusting ENERGY STAR's existing p-score to reflect the current market and CEC's proposed expandability score in the context of use in the Version 7.0 Computers specification.

Summary of 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).
- Design-neutral approach is independent of form factor and product type.
- Maintains global harmonization.

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.
- Chipset architecture differs across product types (e.g. desktops vs. notebooks vs. tablets/slates) that requires vigilance as new product subcategories and form factors emerge.
- Processor technology improvements necessitate periodic specification revision.

Summary of Observations for Expandability Score:

Advantages of Expandability Score:

- Introduces opportunity to simplify to a single desktop category, creating clear expectations for TEC.
- Consensus that expandability generally scales well with size of power supply used in desktop products.
- Provides longevity for efficiency requirements.

Disadvantages of Expandability Score:

- Introduces additional adders, and potential for increased energy use of products.
- Scope is limited to desktops and integrated desktops.
- Inability to differentiate across a range of configurations covered within an ENERGY STAR product family.

- 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.
- May introduce incentive to upsize power supplies in higher end products to reach exclusion category and meet easier workstation requirements instead.

EPA 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.
- Fine tuning the boundaries of the performance scores in different categories to capture remaining scalability in performance and energy of products.
- Significantly revising base allowance and functional adders.
- Investigating the continued validity of discrete graphics performance categories for notebooks. given the wide adoption of switchable graphics in that product type.

Discussion Questions:

- A. 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.
- B. 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?
- C. 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?

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.

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.

EPA Recommended Approach for Mode Weightings in V7.0:

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. 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. 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.

Discussion Questions:

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

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.

EPA Recommended Approach for Scope in V7.0:

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.

Discussion Questions:

- H. 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?
- I. 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?
- J. 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?

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

Please send any written feedback on this document to computers@energystar.gov no later than **February 27, 2017**. Registration for the Computer Program Discussion Guide: Version 7.0 webinar on **February 9, 2017**, is available [here](#). If you have any questions, please contact Ryan Fogle, EPA, at Fogle.Ryan@epa.gov or (202) 343-9153; or John Clinger, ICF, at John.Clinger@icf.com or (215) 967-9407.