Climate Savers Computing Initiative Feedback on Draft 3 Server Energy Star® Specification

Background

This document outlines the Climate Savers Computing Initiative (CSCI) feedback on the proposed requirements defined in the Draft 3 Server Energy Star® specification. The feedback is from the following companies in the CSCI AC/DC workgroup; Acer, AMD, Dell, Delta, Google, HP, Hitachi, Intel, LiteOn, Microsoft, Sun, and Supermicro. All feedback in this document was voted on and approved unanimously by the AC/DC workgroup.

This feedback is divided into six areas;

1. **Base Configurations**
2. **Operating Systems**
3. **Idle Requirements**
4. **AC Power Monitoring**
5. **Utilization Measurements**
6. **1000W threshold as delineation between low- and high-power PSU.**

1. **Base Configurations**: CSCI has concerns that in order for a server to be considered Energy Star compliant, it must be measured in the "as-shipped" configuration. Server manufacturers may have up to 20 base server products, but each of these products may have up to 200 configurations. Testing each of these configurations for Energy-Star compliancy is burdensome and costly for manufacturers. CSCI recommends testing one standard configuration for each system model. From these testing results, all configurations with that system model will be certified for Energy Star compliance. Following this recommendation will allow Energy Star to discard Table 4 addressing Additional Power Allowances for Extra Components.

2. **Operating Systems**: CSCI asks for further clarification surrounding systems shipped without an operating system that are configured by the customer with an OS and additional devices after shipping. Specifically CSCI would like further clarification on how can these systems be qualified under Energy Star.

3. **Idle Requirements**: In general, Climates Savers does not support idle power consumption to be an effective metric to judge a system's energy efficiency. Idle power is simply a consumption metric, not an energy efficiency metric and CSCI therefore recommends that Energy Star abandon idle power as a criteria for Energy Star consideration. Once an industry-supported energy efficiency metric can be established, CSCI supports using that metric for determining server efficiency, hopefully by the Tier 2 server specification.

   However, if Energy Star continues to support idle power as a criteria for Energy Star labeling, CSCI encourages Energy Star to reconsider the baseline idle

requirements for all server system types. CSCI considers the base idle power requirements listed in Table 3 of the Energy Star Server Specification to be too low for all product server types. CSCI anticipates that server manufacturers will be submitting further data to support this consideration. After detailed analysis of the new data, CSCI expects that Energy Star will increase the idle power requirements for all server types.

In addition, the idle requirements in Energy Star Draft 3 make allowances for additional memory and hard drive configurations which CSCI supports. However, the specifications do not make allowances for additional configurations that are critical to high performance servers. These configurations include I/O devices such as Ethernet cards, RAID drives, fiber channels, interface or management cards, and Infiniband links to name just a few. Each of these devices can consume 5-30 Watts of power at Idle. For those IT managers that must strictly adhere to Energy Star purchasing requirements, low performance servers with energy savings will be favored over high performance systems that do not meet Energy Star idle requirements yet perform tasks more efficiently. The potential end result is for IT managers to purchase a larger number of lightly configured low end servers as opposed to fewer high performance servers to meet IT computing needs, thus consuming more energy during server operation. This approach addresses consumption only, and does not consider a performance requirement which is the mission of enterprise data centers. CSCI recommends that the Energy Star server specification make additional allowances for I/O devices that grants up to 20W for each I/O device.

4. **AC Power Monitoring:** CSCI recommends that Energy Star relax the accuracy measurements for AC power monitoring. The accuracy requirements were only recently added. Products in flight cannot be changed in time to meet Energy Star requirements. From CSCI data, the most reasonable accuracy requirement would be +/-10% accuracy over an individual power supply unit load range of 50-100%. Server manufacturers have not concentrated on accuracy at system idle conditions. Standard power supply accuracy requirement are based on PSU loading conditions, not system operating conditions. For the Tier 2 server specification, CSCI supports improving power monitoring accuracy.

   In addition, CSCI recommends removing the AC power monitoring requirement for server systems falling into the standard availability category and the single processor socket categories. Few systems in these categories that are shipped will have AC power monitoring capability within the next year. These systems will likely be used for small business applications where console applications are not used for AC power monitoring. Requiring AC power monitoring for systems that do not make use of the feature consumes unnecessary energy.

5. **Utilization Measurements**: CSCI supports CPU utilization measurements that have +/-5% accuracy for CPU utilization less than 90%.

6. **1000W threshold as delineation between low- and high-power PSU**: CSCI supports the PSU efficiency requirements and power factor for high power PSU, >1000W. However, CSCI does not believe that the 1000W barrier represents a natural delineation between low- and high-power PSUs. The 1200W rated output power represents a more natural delineation to separate efficiency requirements between low-and high-power PSU.

   CSCI recommends the following:
   1. Move the power requirements threshold from 1000W to 1200W. 1200W is a more natural delineation point in part because the industry standard C13 and C14 connectors are applicable up to 1200W. In addition, there are few power supplies between 1200 and 1500W, whereas there are many power supplies just above the 1000W threshold that would require the higher efficiency requirements without a discernable technical reason.
   2. Set the requirements at the draft 3≤1000W levels across any power supply rating for the tier 1 specification, then project the tier 2 specifications will target gold efficiency levels. Refer to the section below on data set analysis to see why we think this may be an option and still come close to meeting the EPA requirements of top 25% of systems passing Energy Star requirements.

EPA Data Set Analysis: CSCI had a chance to analyze the EPA data set on single output power supplies. Below is a table summarizing the data sets we considered, requirements, and associated passing percentages. We considered the affect of adding a passing margin of 1% efficiency and 0.05 PF. Since the data set is base on a single tested power supply we assume a nominal PSU was tested. Manufacturers will need to have margin above requirements to allow for manufacturability. CSCI data has shown a margin of 0.8% to 2% efficiency will be needed when comparing a typical PSU to the requirement to make sure all manufactured power supplies meet Energy Star requirements. No analysis has been done on power factor, so we propose using a margin of 0.05 PF for analysis purposes at this point.

For the above reason stated in #1; we considered changing the threshold to 1200W. CSCI members questioned whether some of the power supplies are valid to base requirements on. There are 4 power supplies with higher than 94% efficiency at 50% load, and two of these have higher than 92% efficiency at 20% load. Can EPA verify these PSUs are production ready, will be used in high volume production, will they be used in a systems that meet the industry cost points (i.e. will customer buy the system), and does the manufacturer think they can meet these efficiency requirements on a manufacturing line? Another request; can EPA get a sample (or samples) of these power supplies to verify their efficiency levels? For analysis; CSCI removed these 4 PSUs from the data set to see the effects.

Data set	Requirements	# of PSUs	% Passing	% Passing w/ margin

Full data set	Draft 2	61	20%	11%
Full data set	≤ 1000W across any PSU	61	43%	31%
Full data set	≤ 1200W threshold	61	30%	18%
Removed 4 PSUs, manufacturer H	Draft 2	57	18%	11%
Removed 4 PSUs, manufacturer H	≤ 1000W across any PSU	57	42%	30%
Removed 4 PSUs, manufacturer H	≤ 1200W threshold	57	28%	16%

Using the full data set and the proposed draft 2 requirement; 20% of the power supplies pass. If we apply the 1% efficiency and 0.05 PF margin then only 11% of the PSUs will pass. Both are less than the target of top 25%. If we change the requirements threshold to 1200W, 18% of the power supplies passed with enough margins for manufacturability. This seems that EPA could consider changing the threshold to 1200W and still meet their top 25% rule.

Using the ≤ 1000W requirements across all power supply rating; 31% of the power supplies pass with enough margin for manufacturability. Using these criteria; we think EPA could consider using the ≤ 1000W efficiency and PF requirements for all rated power supplies. This eliminates the loop hole and complexity issues associated with the threshold. If this is done, CSCI also recommends including guidance for the tier 2 Energy Star specification to the CSCI Gold level. This will motivate the industry to plan for these higher efficiency requirements in future products.

After removing the 4 power supplies from manufacturer H where we question the validity of this data; we see that the passing percentages are close to allowing EPA to consider the ≤ 1000W requirements across any PSU rating since 30% of power supplies pass with enough margin for manufacturability.