NATURAL RESOURCES DEFENSE COUNCIL

June 4, 2018

Mr. Ryan Fogle
United States Environmental Protection Agency
ENERGY STAR Program
1200 Pennsylvania Ave NW
Washington, DC 20460

Subject: NRDC comments regarding Draft 3 Version 3.0 Specification for Computer Servers

Dear Mr. Fogle,

On behalf of the Natural Resources Defense Council (NRDC), we respectfully submit the following comments in regard to the ENERGY STAR Draft 3 Version 3.0 specification for computer servers issued May 3, 2018.

NRDC strongly supports the ENERGY STAR program for servers: it is an important tool to enable businesses of all sizes, as well as local, state and federal government agencies, to reduce their energy use through sustainable procurement policies for their data center equipment; it also enables electric utilities to implement efficiency incentive programs that reduce energy use in their service territories, and that help transform the market toward more efficient equipment.

NRDC directionally supports EPA's Draft 3 proposal and in particular the change from Draft 2 to using only the SERT metric for efficiency requirements.

However, we urge EPA to implement the following recommendations in order to ensure Version 3.0 achieves its objectives of differentiating the most efficient products and enabling customers to purchase the most efficient servers.

1. **Tighten efficiency requirements to target an average pass-rate of 25 percent at effective date**
2. **Revise power supply efficiency requirements at 10 and 20 percent load**

Here are our detailed comments:

1. NRDC setting efficiency requirement based solely on the SERT "active" metric

In our Draft 2 comments, NRDC supported keeping separate efficiency requirements for both active and idle, based on the fact that typical servers spend a lot of time in both modes and that it is important for ENERGY STAR to set requirements for the mode servers are typically operated in.

Since then, further discussions with ENERGY STAR and industry stakeholders have brought new information to bear. Industry's presentation at the March 12, 2018 webinar,[1] has provided evidence that the SERT benchmark includes significant periods of idle state. For example, the AMD chart shows that the 50% load level includes roughly 45% "core C6" state, which is the power saving state characteristic of idle state on AMD processors. Intel and IBM data shows similar situations.

The SERT weighting of idle vs. active may not be entirely representative of utilization patterns in the average data center, but we believe it is good enough as a first step based on the SERT vs. idle compliance analysis provided by industry stakeholders.

The alternative option of keeping both the idle and active metrics separately has challenges too: the idle metric as currently defined is too coarse and makes it difficult to set stringent levels without unduly penalizing some configurations. This is because it relies on adders (allowances for specific functions that go above the base configuration), and adders as currently defined, particularly memory adders, are inappropriate as demonstrated in our Draft 2 comments. Using the idle metric would require either revising the memory adders, which has been discussed extensively in recent ENERGY STAR meetings and is a complex endeavor, or to set idle levels high enough that they do not yield significant energy savings.

As a result, NRDC supports the use of the SERT metric in Version 3.0 of ENERGY STAR for servers, provided that levels are set to be stringent enough, and we recommend that EPA, in collaboration with stakeholders, evolves the SERT benchmark to better represent typical operating conditions in data centers.

[1] https://www.energystar.gov/sites/default/files/ITI_Servers_Presentation.pdf

2. **Tighten efficiency requirements to target an average pass-rate of 25 percent at effective date**

   ENERGY STAR guidelines indicate that specifications should aim to set levels such that that pass rates are around 25 percent at effective date, i.e. when the spec goes into effect, 9 months after the final spec is released.

   According to data presented by EPA at the May 17, 2018 webinar, pass rates for proposed levels are **38 percent across categories on average** for the 2014-2017 specification development dataset, much higher than the target 25%. And pass rates at effective date will likely be even higher for 2 reasons:

   a. These pass rates are based on models introduced during the years 2014 to 2017. If only 2017 data were used, to better represent the latest technology in the market, it is very likely that pass-rates would be significantly higher.
   b. The spec is expected to go into effect mid-2019. By then server efficiency will have continued to increase, as suggested by efficiency trends in historical SERT data.

   As a result, we expect that pass rates will be higher than 40 percent at effective date, perhaps as high as 50 percent, and given the trend of efficiency progress in computer servers, the pass rate may exceed 75 percent with 1 or 2 years of the specification going into effect.

   This would fail to adequately differentiate the most efficient products on the market, and would make it difficult for utilities to justify incentive programs.

   In addition, NRDC's support for the use of SERT is based on the SERT metric better supporting stringent levels than the existing idle metric. If levels are not stringent, this invalidates much of the rationale for using SERT.

   We urge EPA to set levels that target 25% at effective date, by analyzing the correlation of server efficiency with date of market introduction, and by using this correlation to determine the efficiency levels that will correspond to a 25 percent pass rate at effective date.

3. **Power supply efficiency: Per our Draft 1 comments, we recommend tightening low-load efficiency requirements.**

   We support the intent of EPA's proposal to strengthen power supply unit (PSU) efficiency requirements to reflect the fact that 63 percent of configurations tested in v2 achieve Platinum level.

However, we recommend that EPA considers alternative requirements that would encourage energy efficiency at load points that save the most energy in real-world operation. Industry data presented at the February stakeholder meeting shows that the average load of typical servers is between 10 and 20 percent of the power-supply maximum rated power.

It would therefore make sense for PSU requirements to reflect this situation by setting more stringent requirements for 10% and 20% load than for 50% and 100%, which are rarely if ever used in real-world operation.

However, 80-PLUS Platinum criteria are more stringent at the 50% and 100% load points than at the 10% and 20% load points. Table 1 compares the mean of all the Platinum units in the 80-PLUS database as of Summer 2017 (530 units) with the 80-PLUS Platinum requirements, and shows that 80-PLUS certified power supplies exceed requirement by 5 points at 5% load, 2.7% at 20% load, but only 0.38% at 50% load:

Load:	**10%**	**20%**	**50%**	**100%**
Platinum req. (single-output)	83.00	90.00	94.00	91.00
Min	78.80	90.19	94.00	91.00
Max	94.41	95.50	96.24	95.79
Mean	88.26	92.71	94.38	92.78
Difference mean/Platinum	5.26	2.71	0.38	1.78

Table 1: Efficiency of 80-PLUS Platinum PSUs vs. 80-PLUS Requirements

This clearly shows that the stringency of 80-PLUS Platinum is misaligned with the operating conditions of servers in typical data centers.

We propose alternate requirements, based on the 80-PLUS data, in the table 2 below.

Efficiency

Load point	**Rated Output power**	**10%**	**20%**	**50%**	**100%**
Ac-Dc Multi-output	All output ratings	**86%**	90%	92%	89%
Ac-Dc Single-output	All output ratings	**88%**	**92%**	94%	91%

Table 2: NRDC Recommended Efficiency Levels for ENERGY STAR Version 3.0 (Updates in bold)

We realize that it is easier for ENERGY STAR to align with 80-PLUS, and that it is easier for 80-PLUS to evolve its specification if ENERGY STAR sets consistent requirements. This is a chicken-and-egg situation, and we encourage ENERGY STAR to coordinate with 80-PLUS to co-evolve power supply efficiency levels to better reflect the low-load efficiency of modern power supplies.

Thank you for the opportunity to participate in this specification development process and for your consideration of our comments.

Sincerely,

Pierre Delforge
Director, High Tech Sector Energy Efficiency
Natural Resources Defense Council