



July 18, 2013

Mr. Robert Meyers
United States Environmental Protection Agency
Office of Air and Radiation
1200 Pennsylvania Ave NW
Washington, DC 20460

Subject: Comments regarding Version 6.0 Final Draft Computer Specification

Dear Mr. Meyers,

The Natural Resources Defense Council (NRDC) respectfully submits the following comments in regards to the ENERGY STAR Version 6.0 Final Draft Computer Specification issued July 2, 2013. Our comments supplement those we submitted in January 2013 on Draft 3 and others we submitted throughout this specification setting process.

Desktop and notebook computers represent one of the largest electricity use by electronic products. They consume over 70 TWh annually in the U.S., the equivalent output of 25 medium-size 500 MW power plants. This represents approximately 2% of US electricity use, and is equivalent to the energy consumption of all data centers and server rooms in the country. In the context of continued growth of the computer market in the US and globally, capturing energy saving opportunities in computers is critical to reducing air and climate pollutants from power generation.

NRDC has a long standing interest in reducing the energy consumed by computers and has been very active performing research and analysis on computer energy use and savings opportunities.

NRDC commends EPA for the improvements made in the final draft specification, particularly the changes in graphics adds that reflect more recent market data and technology. The specification includes substantial improvements from draft 3 and NRDC believes that with the two adjustments we propose in these comments, EPA can finalize its Version 6.0 specification by its proposed August timeline.

Summary

EPA's version 6.0 draft 3 proposes a much improved computer specification framework over version 5, including a simplified and updated categorization system, the inclusion of display energy for computers with integrated displays, more granular graphics adders, an updated duty cycle and premium efficiency power supplies. NRDC strongly supports these improvements which enable a more effective ENERGY STAR program for computers.

Our comments focus on two topics:

1. **Switchable graphics** – While NRDC strongly supports the principle of an incentive to encourage the adoption of switchable graphics in desktop computers, we are concerned that EPA's proposed implementation may not be as effective as expected for desktops and could even backfire for notebooks. We propose an adjusted approach which we believe will increase the effectiveness of the incentive for desktops and reduce the risk of negative impacts for notebooks.
2. **Internal Power supply efficiency incentive** - We recommend EPA adjust the 10% load requirement for the first level incentive for better alignment with the average of the current market, and consistency with requirements at other load levels.

Detailed Comments

1. Switchable Graphics

Switchable graphics refers to the functionality that allows both integrated and discrete graphics to be used at different times depending on the graphics rendering needs of the user. This functionality allows lower power and lower capability integrated GPUs to render the display while on battery or when the output graphics are not overly complex while then allowing the more power consumptive but more capable discrete GPU to provide rendering capability when the user requires it.

This capability has the potential to save substantial energy consumption given that most computers spend the majority of their active time performing low capability graphics such as idle mode, internet browsing and office document processing. Many notebook computers now feature this capability in battery mode in order to maximize battery life, some also do it when plugged in (AC mode). Desktops typically do not implement this functionality, which represents a key energy savings opportunity.

EPA proposes to provide an incentive for manufacturers to enable this capability by default in AC mode on desktops. NRDC strongly supports the intent of this incentive, but is concerned that EPA's proposed implementation may present a perverse incentive for notebooks **not to** provide this functionality in AC mode and may therefore backfire.

EPA justifiably does not allow manufacturers to claim discrete graphics adders if switchable graphics is enabled during testing. Instead, desktops can claim a switchable graphics incentive of 18 kWh (no incentive is provided for notebooks given the natural battery life incentive). However, the risk with this approach is that by disabling switchable graphics on notebooks in AC mode, manufacturers can claim a full discrete graphics adder instead. Given that graphics adders are very substantial (up to 130 kWh for desktops and 60 kWh for notebooks), and that many GPUs on the market already consume much lower levels of energy than these graphics adder levels today, the difference between the adder and actual GPU energy use may significantly exceed the switchable graphics

incentive.

For example, NRDC-CLASP and PG&E testing of eight 2012 G7 GPUs showed that they consumed as low as 45 kWh/yr and on average 70 kWh/yr. This represents an incentive of between 60 and 75 kWh/yr to disable graphics switching in AC mode, much higher than the 18 kWh/yr switchable graphics incentive. The same holds true for notebooks with the difference that the specification provides no switchable graphics incentive, making the incentive to disable switchable graphics in AC mode even stronger.

NRDC proposes the following adjustment to EPA's proposal:

We propose a differentiated approach for notebooks and desktops given that most notebooks already feature switchable graphics capabilities for battery life reasons, whereas almost no desktop currently offers the same capability.

For notebooks, we need to avoid potential backsliding on switchable graphics due to graphics adders. Given that most notebooks already implement graphics switching, we propose that EPA adjusts its proposal to **not allow notebooks capable of switchable graphics to claim a discrete graphics adder**. Put simply, this means that notebooks capable of switchable graphics, should have it enabled by default in idle mode to qualify for ENERGY STAR. This would remove the perverse incentive of enabling switchable graphics only in battery mode.

For desktops, the same approach could discourage the implementation of switchable graphics given the lack of natural incentive for this functionality. Instead we propose to increase the incentive to a full G1 adder, but leave desktop the flexibility to make enable by default or not. This would reduce the potential difference the graphics adder margin and the switchable graphics incentive, without discouraging its implementation. We believe that potential savings from the deployment of switchable graphics on desktops far outweigh the loss of savings through the increased incentive.

Discussions on the July 9 webinar raised a couple of points regarding this issue and proposal:

1. **Graphics switching are triggered by graphics intensity determined by the operating system rather than AC/DC mode** – The triggers for graphics switching need to be verified, but even if current triggers do not include AC/DC status, it may be possible for manufacturers to configure future products so that they switch based on AC/DC status as well as graphics intensity. The specification would certainly encourage them to do so, constituting a potential loophole, even if no one is taking advantage of it today.
2. **Forcing notebooks to switch to integrated graphics during testing could remove the ability to account for discrete graphics energy use in measurements and therefore to encourage low-power discrete graphics** – this is a valid concern, although GPU energy use would still be accounted for in those computers that do not implement switchable graphics. Also the savings potential from ensuring that switchable graphics remain enabled in AC mode probably outweighs incremental discrete graphics efficiency. And a future ENERGY STAR specification could require testing with the discrete GPU switched on and off.

In conclusion, we caution EPA that its proposed implementation of the switchable graphics incentive may not be as effective as expected for desktops and could be counter-effective for notebooks. We encourage EPA to consider our proposed adjustments which we believe would increase its effectiveness for desktops and reduce the risk of negative impacts for notebooks.

2. Internal Power Supply Efficiency Incentive

The final draft specification proposes an incentive for computers equipped with internal power supplies that are more efficient than the minimum requirement equivalent to 80 PLUS BRONZE. These higher efficiency levels correspond to 80 PLUS SILVER and GOLD, with additional efficiency requirements at 10% load. 10% load corresponds closely to the typical operating point of modern computers in idle mode.

We applaud EPA for including this NRDC proposal in the draft specification, it will help create demand for more efficient internal power supplies in real-world usage conditions.

However, we recommend EPA adjust the 10% load requirement for the first level incentive (equivalent to 80 PLUS SILVER). We analyzed the latest data for 10%-load efficiencies from the 80 PLUS website¹ as of July 1, 2013. It shows that the market has evolved and the average efficiency of SILVER power supplies at 10% load has now moved from 81% to close to 82%.

80 PLUS Badge	Avg 10% Data	Proposed 10% Level	20% Level
BRONZE	79.0	-	82.0
SILVER	81.9	81.0 82.0	85.0
GOLD	84.0	84.0	87.0

Updating the SILVER 10%-load requirement to 82% would align both the SILVER and GOLD 10% levels with the average of the current market, and would represent consistent deltas between BRONZE, SILVER and GOLD at the 10% and 20% levels.

By setting this SILVER 10% requirement at the appropriate level, EPA will set a global industry-wide specification for SILVER power supplies, yielding much greater savings than just those derived from the Energy Star qualified computers that will take advantage of this incentive.

This simple change requires the following update to table 5 of the final draft specification:

Table 5: Power Supply Efficiency Allowance

Power Supply Type	Computer Type	Minimum Efficiency at Specified Proportion of Rated Output Current ^{iv}				Minimum Average Efficiency ^v	Allowance _{EPSU}
		10%	20%	50%	100%		
IPS	Desktop	0.81 0.82	0.85	0.88	0.85	-	0.015
		0.84	0.87	0.90	0.87	-	0.03
	Integrated Desktop	0.81 0.82	0.85	0.88	0.85	-	0.015
		0.84	0.87	0.90	0.87	-	0.04
EPS	Notebook	0.83	-	-	-	0.88	0.075
		0.84	-	-	-	0.89	0.015
	Integrated Desktop	0.83	-	-	-	0.88	0.075
		0.84	-	-	-	0.89	0.015

¹ <http://www.plugloadsolutions.com/80PlusPowerSuppliesDetail.aspx?id=0&type=2>

Thank you for considering our comments.

A handwritten signature in blue ink, consisting of a large capital 'D' followed by a stylized lowercase 'f'.

Pierre Delforge

Natural Resources Defense Council

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