Consumer Technology Association™

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Via E-Mail
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The Consumer Technology Association (CTA)™ appreciates the opportunity to submit comments to EPA on its Final Draft Version 8.0 ENERGY STAR Displays specification.

The Consumer Technology Association (CTA)™ is the trade association representing the $377 billion U.S. consumer technology industry, which supports more than 15 million U.S. jobs. More than 2,200 companies – 80 percent are small businesses and startups; others are among the world's best-known brands – enjoy the benefits of CTA membership including policy advocacy, market research, technical education, industry promotion, standards development and the fostering of business and strategic relationships. CTA also owns and produces CES® – the world's gathering place for all who thrive on the business of consumer technologies. Profits from CES are reinvested into CTA's industry services.

For many years, the technology sector has been a supporter of energy efficiency initiatives related to the consumer technology industry at the state, federal and international levels and has supported advanced energy efficiency as part of the industry's broader commitment to environmental sustainability. Our industry's involvement in the successful ENERGY STAR program is over 20 years old.

We appreciate your consideration of these comments and welcome the opportunity for further dialogue on these issues.

EPA Analysis
EPA's analysis has is generally based on an overall pass rate of 31%. Technical data analysis is lacking direct comparison of the different technologies available in today's displays. Each energy allowance must be analyzed individually, before a percent credit is given.

For version 8.0, EPA has reduced the baseline E_{TEC} Max level. All subsequent energy allowances are based on a percentage of ETEC Max. Once the baseline has been reduced, there is no need to further reduce the percentage for energy allowances. The initial reduction already considers increased efficiency for technologies that have been given an energy allowance due to the percentage calculation. Many of CTA's comments below regarding individual energy allowance stem from this issue as well as EPA's lack of direct comparison of the technologies itself.

Consumer Driven Products
This technology, in part, is driven by consumer demand. As a new generation floods the job market, there is increasing focus on delivering superior experiences to both employees and customers. Enabling the

workforce with better technology, including the right monitors is a way to heighten employees experience which in turn impacts customer experience[1]. The proliferation of data gives rise to a demand for better visualization tools. Research[2] shows that there is growing demand for larger screen size, better support for multitasking, higher resolution monitors and a clutter-free work area to enhance the visualization of data. As demographics change and millennials become professionals, visually appealing monitors that help in productivity will be key to attract and retain the best talents[3].

Enhanced Performance Displays

EPA based the Final Draft EPD allowance equation on balancing pass rates among models meeting the two performance levels. As mentioned in our previous comments, the color gamut does not reflect different optical power characteristic of sRGB & Adobe RGB models. To ensure an appropriate level of E_{EP} allocation, factors that affect the color gamut must be taken into consideration. Adobe RGB offers a larger color spectrum than sRGB and much deeper colors. In order to create those colors and meet the minimum performance levels, brighter LEDs levels are required to penetrate supplementary filters.

Based on the above, CTA proposes to use the following equations to determine the energy allowance for enhanced performance displays:

- E_{EP} for **sRGB = 0.1 x E_{TEC_MAX}**
- E_{EP} for **Adobe = 0.5 x E_{TEC_MAX}**

Power efficiency of sRGB is different from Adobe RGB models (See table 1). Coefficients of 0.1 and 0.5 should applied to cater for sRGB & Adobe RGB inherent power efficiency difference, respectively. This proposed E_{EP} equation has coefficients more stringent than version 7.1 (0.15 for sRGB and 0.65 for Adobe, respectively) and has considered the panel's transmittance and BLU efficiency.

EPA's analysis and pass rate of 31% for monitors does not produce a direct comparison of the technology itself. EPA's analysis needs to account for additional energy consumptive features that are present in the display. Not all displays with Adobe RGB may or may not include features such as USB Type C, HDR, etc. The addition or lack of these features do not offer a direct comparison of the technology.

Color Gamut	Panel Transmittance	LED Efficiency	Panel Power Efficiency
72% NTSC	100%	100%	100%
sRGB	97%	93%	**90%**
Adobe RGB	60%	84%	**50%**

Table 1: Optical Power Characteristics of sRGB & Adobe RGB Models

[1] Forrester TLP Research Paper: Elevate Employee Productivity by Choosing the Right Display Monitors, April 2018
[2] IDC Research Paper: The Future of Work and Reimagining Displays for the Industry 4.0 Era commissioned by Dell, August 2018
[3] Forrester Total Economic Impact™ Study: The Total Economic Impact™ Of Dell UltraSharp Monitors: Productivity Gains, Talent Retention, And Operational Efficiency Enabled by Dell Monitors, July 2018

Equation 8 – Curved Display Energy Allowance

EPA's reduction of curved display allowance is still too drastic at 15%. CTA recommends an allowance of 30% to provide consistency with CEC regulation. Different curvature of TFT and Color Filter layers causes a larger misalignment between the layers due to mechanical stresses; resulting in crosstalk between the sub pixel colors (See Figure 1). In order to prevent cross talk between sub pixels, the design of the TFT needs to be modified at the expense of lower transmittance efficiency. This would mean a 30% drop in panel transmittance efficiency for curved displays. The CTA proposed equation below more accurately reflects the optical efficiency of a curved display:

- $E_C = 0.30 \times E_{TEC\_Max}$

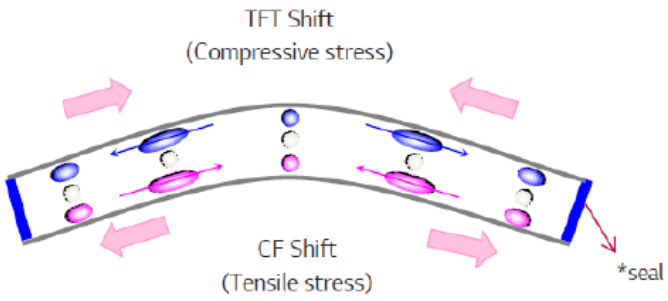

Figure 1: TFT and Color Filters Causing Misalignment

USB Type-C Connectivity

EPA's allowance of 0.7 kWh is not sufficient for models with USB type c compatibility. Displays with this capability offer the consumer additional utilities such as:

- The ability to power external devices and remove any associated losses in power
- Provide up to 90 watts over the interface
- Potential to power multiple devices including notebooks, tablets, cell phones, etc. without additional power adapters

CTA members have performed testing that shows a direct comparison of displays with and without USB type compatibility. Members will provide that data directly to EPA. In order to provide this consumer utility, additional energy is consumed in both On and Sleep modes. Between the three models, on average, 1.7 watts of additional energy is consumed by models with USB-C. Using equation 1, the adder calculates out to 6.05 kWh, exceptionally more than EPA's allowance of 0.7 kWh. CTA proposes that the allowance be corrected to 6 kWh.

Effective Date
EPA has proposed an effective date of January 28, 2020 for version 8.0. Give the proposed changes outlined in the Final Draft version, CTA agrees with EPA's proposed effective date.

CTA thanks EPA for the opportunity to provide further feedback on the specification for Displays.

Sincerely,

Rehan Ehsan
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CTA