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CEC Draft Display Standards (Docket #14-AAER-2)

ITI/TechNet Comments on CEC Staff Report -- Displays

Authors.

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1. Executive Summary.

ITI and Technet have the privilege of representing the most innovative and productive companies in the world. This includes their incredible work on energy productivity. As the American Council for an Energy-Efficient Economy (ACEEE) wrote back in 2008, "Information and communication technologies have transformed our economy and our lives, but they also have revolutionized the relationship between economic production and energy consumption."

Companies within our industry vigorously compete to offer customers products that meet performance needs and do so with the highest levels of energy efficiency. We are proud of our 20+ year partnership with the EPA on ENERGY STAR (with our strong support, computers and computer monitors were some of the original ENERGY STAR products), and our work with governments worldwide in improving energy efficiency. We are not newcomers to this policy area, and we are accustomed to constructive partnership and collaboration with governments and other stakeholders.

As was made clear at the April 15th Workshop, ITI and Technet see the initial staff draft proposals as raising very serious concerns. If promulgated, they would be detrimental to California's interests, posing a significant threat to the productivity and other capabilities that California end users demand from our products, especially those that rely on high end products to run their businesses.

Fortunately, we are not at the point of promulgation, but rather still in pre-rulemaking, and so while ITI and Technet believe the staff draft proposals err on a number of fronts, we remain committed to working with the CEC and other stakeholders on getting this rulemaking right.

A great deal of the gulf between us seems to be the underlying data and data analysis, much of which we haven't seen. While we appreciate the additional information that has been made available since the Workshop (see the Dave Ashuckian letter of May 6th), fundamental gaps and difficulties remain and require significant near-term attention and dialogue.

At the Workshop, ITI and Technet offered to host a "deep-dive" technical meeting to ensure that such a dialogue can indeed occur, and occur on a timely basis. We appreciate the willingness of the CEC and other key stakeholders to participate in the meeting now being planned for June 9 and 10 in Folsom.

In our detailed comments, ITI and Technet also provide other important criticisms of the staff draft proposals. That said, our comments are not just about criticisms. We are looking for ways forward. As regards displays, we are making three primary recommendations:

- There are a multiple display products that are typically designed / intended for specialized use, low unit shipment volume, and relatively high-cost that should be clearly identified as not in scope of California's appliance energy efficiency regulations. Specialized displays that should be exempted from CEC's energy efficiency regulations include "Enhanced Performance Displays, Signage Displays (for outdoor use), Professional Broadcast Displays, Production Monitors, Displays classified by the FDA for Human Use, and Monitors with keyboard, video, mouse (KVM) and/or Keyboard Monitor Mouse (KMM). As technology evolves, there will likely be other types of products with electronic displays that should not inadvertently be in scope of CEC's computer and

signage display regulations. Language in the regulations should strive to limit the applicability to "mainstream" computer and signage displays, and include provisions for excluding new display products that are designed for specialized uses, etc. If CEC would like, we will make recommendations on regulatory language to achieve these goals.

- The energy efficiency limits that CEC has proposed for Computer Displays On Mode are more restrictive than the exclusive ENERGY STAR label and would eliminate approximately 90% of the displays on the market. CEC's energy efficiency limits should be set at appropriate levels such that all types of display users can still purchase displays offering the performance these customers need. CEC's corrected On Mode power consumption limits typically require a 20 to 45% reduction in power consumption, and far exceed what CEC has stated in the first draft. The magnitude of reductions the CEC proposes are certainly beyond anything that could be achieved in the time frame currently proposed. Industry can assist CEC with setting appropriate energy efficiency limits for Computer Displays that accomplish reduction in energy use, while also continuing to provide the broad range of customers purchasing displays, the performance and value they require.

- The energy efficiency limit that CEC has proposed for Computer and Signage Displays Sleep Mode does not include tolerance for additional features and functionality. The final regulations should either exempt these additional features and functionality from the scope of the appliance regulation, or provide additional tolerance for these and other yet to be defined value-added features and functionality that consume some power in the low power Sleep Mode. If CEC would like, we will make recommendations on regulatory language to achieve these goals.

As regards next steps, fully consistent with the opportunities for dialogue contemplated by the "Appliance Energy Efficiency Rulemaking Process" at this stage of the pre-rulemaking, we expect and request that: (1) meaningful dialogue continue between CEC and stakeholders following the June 9-10 meeting; (2) the CEC issue a 2nd staff draft report based on this dialogue and the corrected factual underpinnings on technical feasibility and cost effectiveness; (3) the CEC then host a 2nd stakeholders workshop, and (4) that this process continue until there is sufficient agreed basis for moving forward into the formal regulatory process.

Also, there would seem to be further research and new educational activities that could be pursued, building on the research already conducted in association with CalPlug, regarding consumer and enterprise power management settings and practices. This is non-regulatory activity on which we should be collaborating.

Finally, and again as was mentioned at the Workshop, ITI and Technet believe that non-regulatory partnership opportunities exist for very significant energy savings and clean energy productivity in California. We do not cite these opportunities as potential replacements for CEC regulatory action on computers and displays, but rather as very important supplements to be pursued in support of Governor Brown's larger economic and environmental goals. Recent

ACEEE reports on intelligent efficiency are instructive in this regard, as is a recent Skip Laitner report commissioned by the Digital Energy and Sustainability Solutions Campaign (DESSC), which is available at http://www.digitalenergysolutions.org/dotAsset/06dcd855-1ba0-4dc5-b3f3-bb4a5d0ce0c8.pdf.

2 Detailed input on CEC's Staff Report with proposed Computer and Signage Display Regulations.

2.1 Industry needs the data and underlying assumptions CEC used in formulating the draft staff proposal.

We do not have access to all of the data and underlying assumptions CEC used in formulating their energy efficiency regulatory proposal for displays. Manufacturers need this information to understand and provide further input on the technical, economic, and customer impacts associated with staff draft proposal.

With what we have seen in the Staff Report and follow-up information CEC provided after the release of the report, we have a number of concerns related to the cost-effectiveness analysis, impacts to customers, and assumptions about technical feasibility and how industry might achieve compliance by the dates proposed.

Example: In response to industry's request for the basis for setting On Mode limits for smaller sized Computer Displays (15" – 21.5" inches diagonally), we found that CEC had evaluated several USB powered portable displays that are not of suitable image quality/resolution to be used as primary desktop computer displays. We evaluated two HP branded USB powered portable displays that were identified in a list of displays CEC used as the basis for proposing On mode limits for smaller Computer Displays. We confirmed that these two portable USB powered displays should not have been used as a basis for setting energy efficiency regulation limits for Computers for the following reasons:

A. The HP USB powered displays are non-standard products (e.g. Used as a secondary display in a retail sales transaction for purchaser to view order details).

B. USB power displays are limited to 15.6" maximum size.

C. These USB powered displays do not provide the performance required for a primary display (They use notebook panels). See comparison data in APPENDIX – 1 Comparison of a USB power display (U160) versus a standard Computer Monitor.

D. Customers will not use these small sized, low resolution displays for primary or secondary desktop computer display use.

Industry has requested and needs the balance of data and information CEC used in proposing all of the energy efficiency limits for Computer Displays and Signage Displays.

2.2 Computer and Signage Displays serve a broad range of consumer and commercial customers in California.
The range of displays offered to the market is segregated according to customer use and market segments. Displays are often segmented according to broad use categories such as "Home Users", "Business Users", and "Professionals Users" and the market is further segmented according to customer use locations such as "Mobile Display Users", "Mainstream Home / Office", "Professional Users" (Enhanced Performance), and "Commercial Users" (Signage Displays). The design, performance, cost and power consumption among displays serving the broad range of customers varies substantially.

Regulations that seek to limit the power consumption of these display products must include provisions for this wide range of performance, through specifying an appropriate scope, reasonable energy efficiency limits, and provisions (exemption or tolerances) for additional features and functionality beyond displaying images/video content. More detail and recommendations are provided later in this response.

2.3 The scope of energy efficiency regulations should target only "mainstream computer displays" and should explicitly exempt a number of specialized, low shipment volume products with display capabilities listed below.

Enhanced Performance Displays: Refer to APPENDIX – 3 for the definition of this product type.

Signage Displays that are designed for outdoor use: Refer to APPENDIX – 4 for the definition of this product type.

Professional Broadcast Display or Production Monitor: Refer to APPENDIX – 5 for the definitions of these product types.

Displays Classified by FDA for Human Use: Refer to APPENDIX – 6 for the definition of these product types.

Keyboard / Video / Mouse (KVM) or Keyboard / Monitor Mouse (KMM) display products: Refer to APPENDIX – 7 for the definition of this product type.

2.4 Impact CECs Proposed Display Energy Efficiency Regulations on Computer Displays.
Regulatory energy efficiency limits should be set at reasonable levels that remove the least energy efficient display models from the market (~ 25% least efficient models on the market). Regulatory energy efficiency limits should not adversely impact consumer and commercial customers who depend upon computer and signage displays to perform very real, productive work. Refer to ITI / TechNet presentation on April 15, 2015 "Displays – Customer/Product Impact" for more details on the types of activities and work customers use Computer and Signage Displays to perform.

2.5 CEC's proposed Computer Display On Mode energy efficiency regulatory limits (with the sign error in formula corrected) impacts a minimum of 90% of the displays on the market (all sizes included – ENERGY STAR and non-ENERGY STAR qualified models). A manufacturer of professional displays concluded that 100% of their products would not meet the proposed regulations. CEC confirmed that there was an error in the On mode formula for display in the 23" </= D < 25" and 25" </= D < 61" size ranges, that should show a minus sign.

Impacts of CEC's proposed On Mode limits are not proportional across range of display sizes. The percentages of displays that do not comply with CEC's proposed On Mode limits is shown in the On Mode Compliance Assessment Summary Table below. The On Mode limits proposed for Computer Displays is unrealistic from both a technology and cost perspective with the current state of display technology and design. CEC should evaluate all of the Computer and Signage Displays on the market when determining what are appropriate and cost effective limits for Computer and Signage Display On Mode limits.

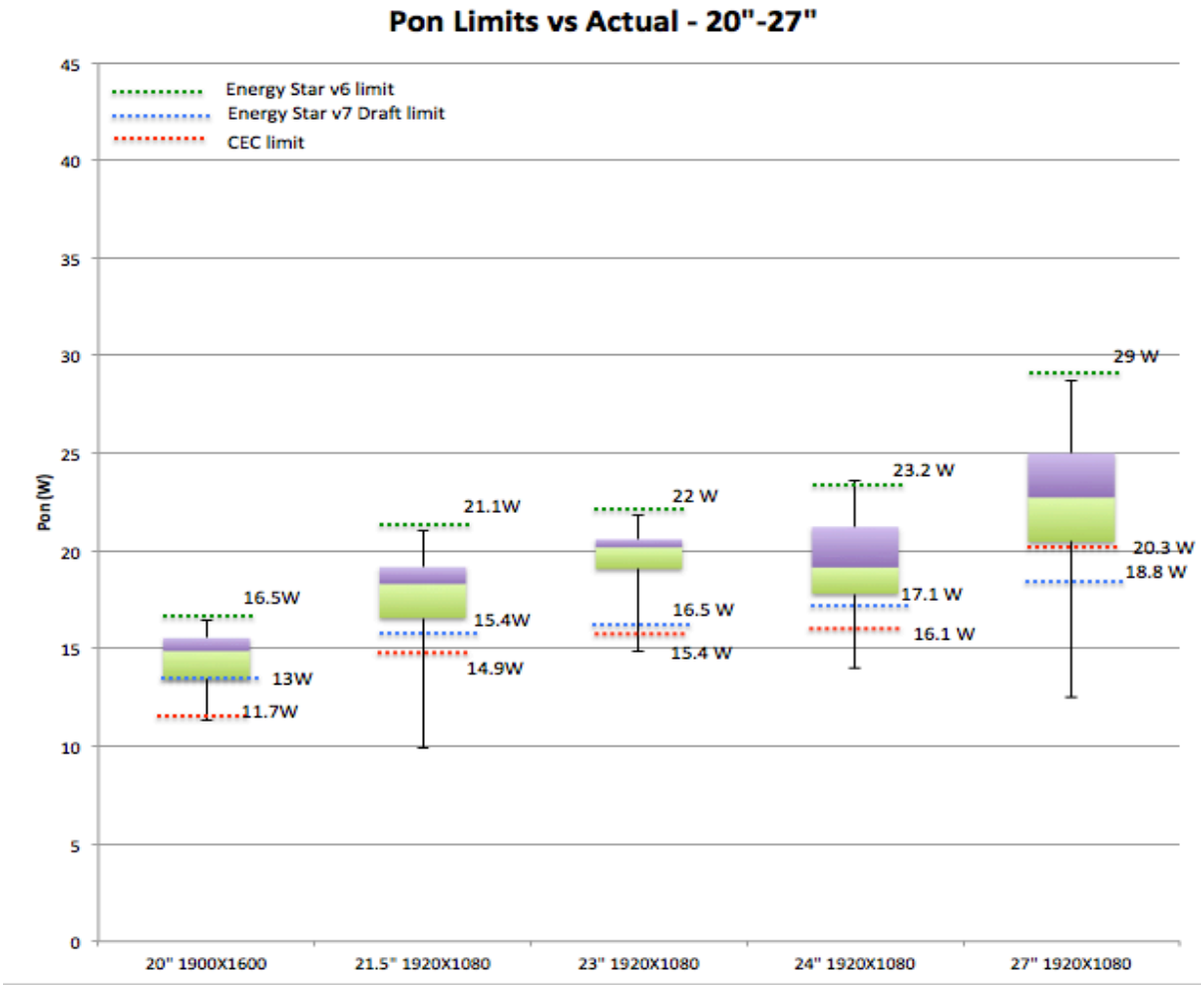
On Mode Compliance Assessment Summary

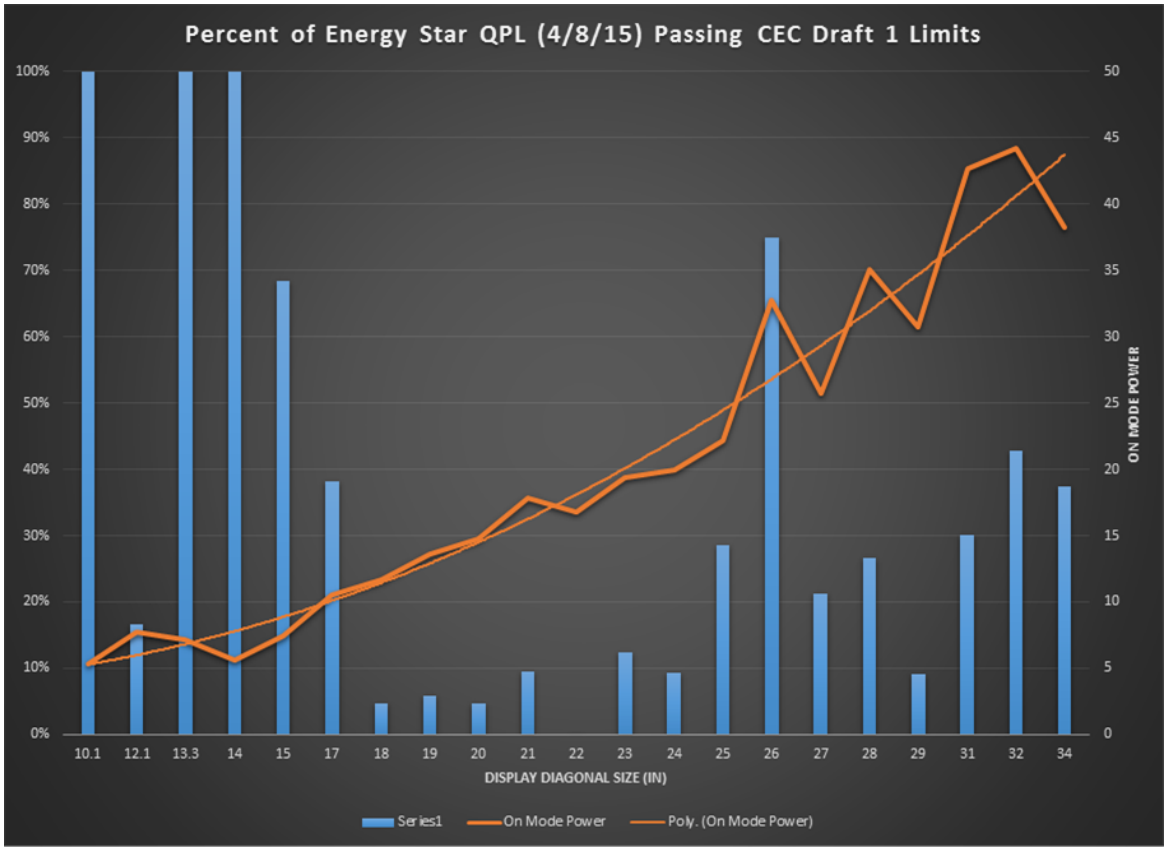
Display Size	Changed 23 and up plus signs to minus signs	Number of Products Shipping	% Compliant
<12	(4.2*r) + (0.04*A) +1.8	5	80%
12<=D<17	(4.2*r) + (0.01*A) +3.5	4	25%
17<=D23	(4.2*r) + (0.02*A) +2.2	105	5.7%
23<=D<25	(4.2*r) + (0.04*A) -2.4	41	12.2%
25<=D<61	(4.2*r) + (0.07*A) -10.2	33	48%

2.6 CEC's proposed Computer Display Sleep Mode energy efficiency regulatory limit of 1.0 Watts may impact displays configured with added features and functionality. The draft Computer and Signage Display energy efficiency requirements limiting power consumption to 1.0 Watts in Sleep Mode does not indicate whether or not added features / functionality provided with these products is in or out of scope. Many displays that are configured with added features / functionality such as touch, pen stylus, USB 3.0 HUB, and USB power pass-through products are unlikely to comply with the 1.0 W Sleep Mode limit CEC proposed. The CEC should provide additional tolerance, identify as not in scope, or, allow testing Displays in the Sleep Mode without these features enabled (where possible) for these added features / performance. Given the very rapid evolution of these types of products including providing customers with features and functionality that goes beyond display of video content, CEC should consider stating that any added features or

functionality provided with computer display and signage display products, is not in scope of this regulation.

2.7 Analysis of On Mode Limits and ENERGY STAR® qualified Computer Displays. The ENERGY STAR® program is an exclusive and worldwide recognized eco label that seeks to promote sales of the most efficient products on the market (~ top 25% most efficient products on market). Analysis of California Energy Commission's final Staff Report revealed that the regulatory limits for Displays in the On Mode are more restrictive than the Ver. 6.0 and DRAFT 7.0 On mode requirements. The box plot diagram provided below shows the range of On mode power of mainstream Energy Star v6 qualified displays of 20"-27" with typical screen resolution. CEC's limits would render 85% of the Displays in this range as not meeting the requirements. If we consider the other non Energy Star qualified displays in the market the percentage of displays not meeting the CEC's limit will be much higher.

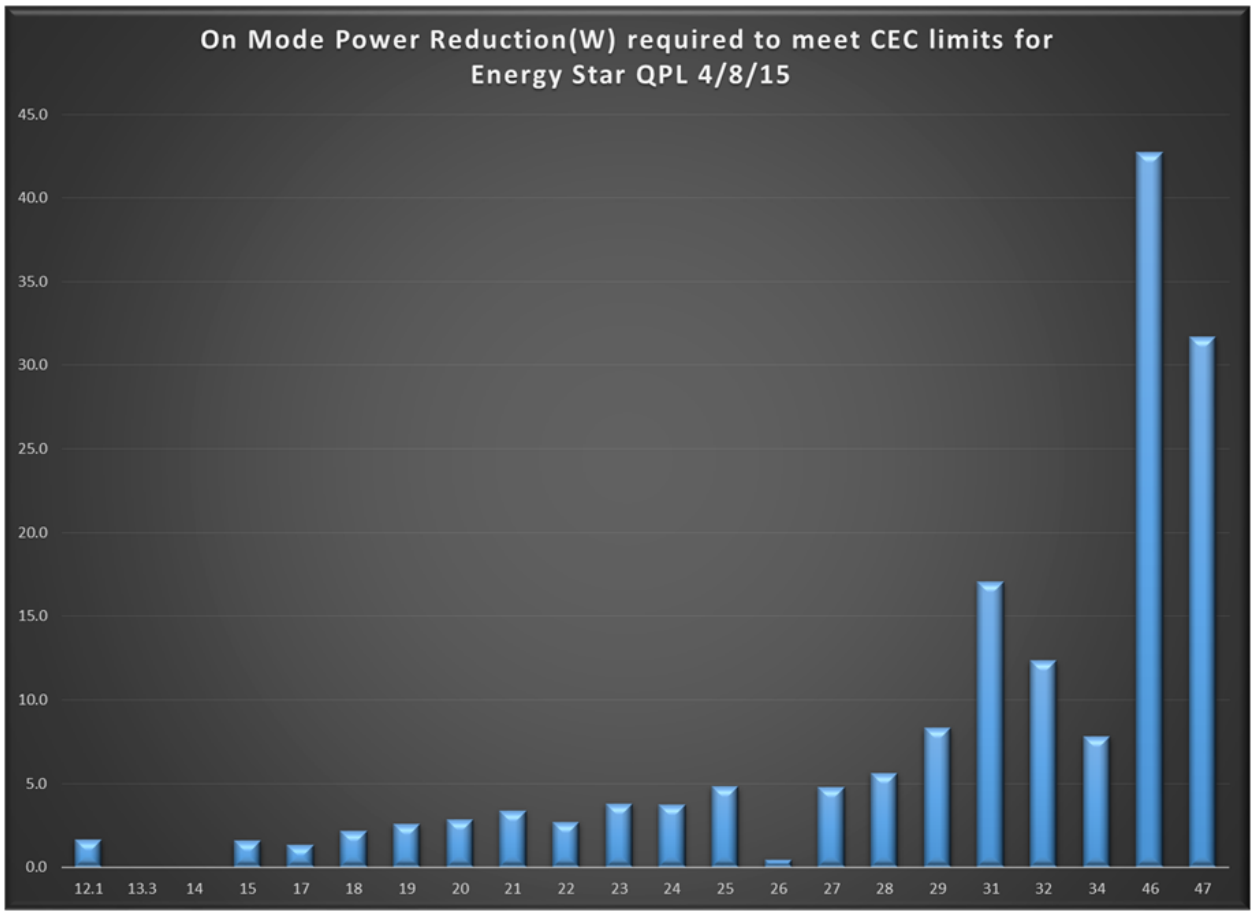




Refer to the graphs above for details on the impact of CEC's On Mode regulatory proposal for ENERGY STAR qualified Displays (that represent the most efficiency displays on the market).

2.8 Displays Cost Effectiveness / Technical Barriers.
In CEC's Staff Report they note that manufacturers do not need to improve the power consumption of displays substantially to comply with the On Mode limits they proposed. CEC states in the Staff Report that '…*only about 14% of current models meet the staff's proposed standards. However, monitors would only need to reduce their power consumption by 3 to5 watts to comply'.*

Power Consumption data that manufacturers have indicates that the On mode power consumption reduction required to meet the limits CEC proposed, are substantially greater as shown in the table below. This graph shows the average on mode power reduction required to bring the failing displays in the current Energy Star Display data base into compliance with the CEC proposal. Depending on the size, the On mode power consumption reduction required to meet the On mode limits CEC proposed ranges from 5 to ~ 45 Watts for displays 25 in. diagonal and above.



In both the CEC draft report and the IOU's report to the CEC, the actual detailed analysis of the development of the display on mode power tables and how these values are determined to be technologically feasible and cost effective is not provided. The CEC draft report provides only the final results/conclusions and references the Investor Owned Utility (IOU) data.

CEC's analysis of annual and lifetime energy consumption appears to be based upon erroneous modeling. CEC states that they used the case study usage modeling for commercial and residential monitor usage. However we believe that CEC did not copy the correct values and likely interchanged residential and commercial weightings in its analysis. This error invalidates CEC's analysis of both energy consumption and energy savings.

From Staff report final draft:

Table 10: Annual Hours in Power Mode for Computer Monitors by Sector

	On (hrs/yr)	Sleep (hrs/yr)	Off (hrs/yr)
Residential	1,533	4,453	2,774
Commercial	2,483	5,043	1,234
Shipment-Weighted Averages	2, 232	4,887	1,640

Source: IOUs Case Study 2013 CASE study: "Analysis of Standards Proposal for Electronic Displays"

CEC states that the table shown above (used in CEC's analysis of current energy consumption and estimated savings) was provided in the 2013 case study "Analysis of Standards Proposal for Electronic Displays". However the actual table in the referenced document is much different and is included below.

Table 4.6 Annual Hours in Power Mode for Computer Monitors by Sector

	On (hrs/yr)	**Sleep (hrs/yr)**	**Off (hrs/yr)**
Residential	2,519	3,541	2,701
Commercial	1,632	2,688	4,440
Shipment-Weighted Averages	**1,915**	**2,961**	**3,884**

Source: CASE Team analysis

As previously noted, CEC seems to have interchanged the commercial and residential line entries, and not copied entries correctly. This caused shipment weighted time in operating modes to significantly overweight the higher power modes, than the actual source data CEC referenced. This impacts errors involving monitor energy modeling, overestimates annual and lifetime energy consumption, as well as overstating potential savings of proposed new regulations.

CEC states use of higher Efficiency LED's will allow Displays to meet the more stringent requirements in the allotted time frame. However, cost and volume data is not provided, nor are any references to studies provided, to validate the assumption that more efficient LED's would achieve the desired limits (either from a power or cost effectiveness perspective). There are several other practical considerations that must be considered in order to determine feasibility of the changes CEC recommends.

Use of higher efficiency LED's assumes ability to use fewer LED's in a backlight assembly and this point ignores a key driver of LED count which relates to the physics of spreading the light evenly across the display to achieve uniform brightness over the screen area. Any cost analysis that assumes LED count can be reduced is invalid without consideration for minimum LED count.

We believe that CEC did not consider the manufacturing and supply capabilities for the most efficient LED's, and market effects of transitioning all monitors/displays to the most efficient LEDs on the market. This cost analysis is neither complete nor valid because it assumes there is an unlimited supply of higher efficiency LEDs and there will be no cost increase. New technology/components with advanced performance capabilities come at a cost premium to existing parts and have limited production capabilities which must be considered in any cost analysis that assumes a complete transition to the most efficient LEDs.

CEC's proposal and the Investor Owned Utilities (IOU) analysis do not consider two key end-user performance criteria that are significant drivers of display power consumption. Viewing angle of the display and color gamut are not considered in the IOU panel comparisons between what are characterized as "efficient" and "baseline systems". CEC also did not adequately address these key performance indicators in its proposal on mode limits. Any comparison of displays that does not factor in these key performance indicators is invalid, as it disregards two fundamental primary drivers of display power consumption.

Automatic Brightness Control (ABC) cost analysis of $0.50 is not applicable to all products since it disregards key implementation requirements:

- Need clear window in plastics to get light to the sensor and or a light pipe
- Must have circuit board in the appropriate area for the sensor or need new PCB and cabling
- Users much less likely to operate PC in low light environment than watch TV in low light environment. Brighter ambient conditions means energy savings analysis based on assuming lower display brightness, is highly suspect.
- CEC fails to provide validated usage model to show how energy savings will result from inclusion of ABC in monitor systems or how this contributes to the on mode power limits the CEC proposes.

3. Summary / Industry Recommendations.

3.1 Industry does not have the data and underlying assumptions CEC used as a basis for the proposed energy efficiency regulations targeting Displays. Note: We evaluated partial information CEC provided for the On Mode limits CEC proposed for smaller displays, and concluded that portable low resolution USB powered displays / technology should not be used as a basis for setting On mode energy efficiency limits for "mainstream" Computer Displays. The information industry needs to be able to assess CEC's regulatory proposal has been identified, requested, and is pending receipt. Please provide industry with all of

the data and underlying assumptions CEC used as the basis for proposing display energy efficiency regulatory limits.

3.2 There are a multiple display products that are typically designed / intended for specialized use, low unit shipment volume, and relatively high-cost that should be clearly identified as not in scope of California's appliance energy efficiency regulations. Specialized displays that should be exempted from CEC's energy efficiency regulations include "Enhanced Performance Displays, Signage Displays (for outdoor use), Professional Broadcast Displays, Production Monitors, Displays classified by the FDA for Human Use, and Monitors with keyboard, video, mouse (KVM) and/or Keyboard Monitor Mouse (KMM). As technology evolves, there will likely be other types of products with electronic displays that should not inadvertently be in scope of CEC's computer and signage display regulations. Language in the regulations should strive to limit the applicability to "mainstream" computer and signage displays, and include provisions for excluding new display products that are designed for specialized uses, etc. If CEC would like, we will make recommendations on regulatory language to achieve these goals.

3.3 The energy efficiency limits that CEC has proposed for Computer Displays On Mode are more restrictive than the exclusive ENERGY STAR label and would eliminate approximately 90% of the displays on the market. CEC's energy efficiency limits should be set at appropriate levels such that all types of display users can still purchase displays offering the performance these customers need. CEC's corrected On Mode power consumption limits typically require a 20 to 45% reduction in power consumption, and far exceed what CEC has stated in the first draft. The magnitude of reductions the CEC proposes are certainly beyond anything that could be achieved in the time frame currently proposed. Industry can assist CEC with setting appropriate energy efficiency limits for Computer Displays that accomplish reduction in energy use, while also continuing to provide the broad range of customers purchasing displays, the performance and value they require.

3.4 The energy efficiency limit that CEC has proposed for Computer and Signage Displays Sleep Mode does not include tolerance for additional features and functionality. The final regulations should either exempt these additional features and functionality from the scope of the appliance regulation, or provide additional tolerance for these and other yet to be defined value-added features and functionality that consume some power in the low power Sleep Mode. If CEC would like, we will make recommendations on regulatory language to achieve these goals.

3.5 We request that CEC continue working with industry to achieve display energy efficiency regulations that are technically and economically feasible, and ensure that consumer and commercial customers located in California are able to purchase displays that provide the performance and value needed.

APPENDIX – 1 Comparison of a USB power display (U160) versus a standard (low end) Computer Monitor.

Parameter	**USB Power**	**Standard Display (low performance)**
Size limitation	15.6” max	no limit
Luminance	180 nits	250 nits
Contrast Ratio	500:1	1000:1
Viewing angle H/ V	90 /60	170 / 160
Color Gamut	60%	72%
Response time	12 ms	8ms
Power Source	USB Cable	AC Power

APPENDIX – 2 Characteristics of Enhanced Performance Displays

Enhanced performance displays are defined as

"A computer monitor that has all of the following features and functionalities:

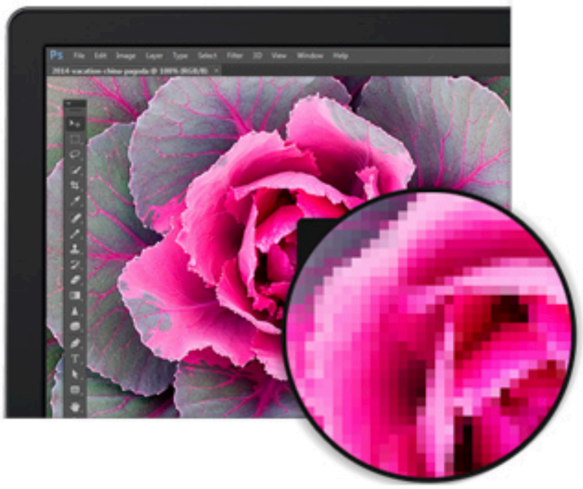
- A contrast ratio of at least 60:1 measured at a horizontal viewing angle of at least 85˚, with or without a screen cover glass

- A native resolution greater than or equal to 2.3 megapixels (MP)

- A color gamut size of at least sRGB as defined by IEC 61966 2-1. Shifts in color space are allowable as long as 99 percent or more of defined sRGB colors are supported

Example of a high resolution enhanced performance display compared to a mainstream display. A 4K Ultra HD Display has 8.85 million pixels which is more than 4 times more resolution than a Full HD (2.1million pixels).

2K Full HD
1920x1080



4K Ultra HD
3840x2160

APPENDIX – 3 Definition of Enhanced Performance Displays (From ENERGY STAR® Ver. 6.1 Program Requirements for Computes)

Enhanced Performance Displays (EPD) are specialized products featuring high resolution, wider viewing angles, enhanced / more accurate color rendition that are sold in limited quantities to professional users requiring enhanced display capabilities. Sales of Enhanced Performance Displays (EPD) are a small percentage of the display market (representing < 3% of the displays listed on the ENERGY STAR® Qualified Product List). Customers who require Enhanced Performance Displays use these products in a number of technical fields including graphic arts, animation and digital film making / special effects, medical, engineering, science, etc. Enhanced Performance Displays consume more power than "Mainstream" Computer Displays as a result of their enhanced performance. The exclusive ENERGY STAR Program requirements for Displays (Ver. 6.0) recognize that EPDs consume more power and have provided additional tolerance for these displays. Given the relatively higher cost, low shipment volume, and additional utility provided to users who require the performance EPDs provide, Industry recommends excluding Enhanced Performance Displays from the California Appliance regulations. This is aligned to the approach in both European Commissions Energy Related Product for Displays Lot 5 and Australia/New Zealand AS/NZS 5815.1:2012 Refer to APPENDIX - 2 *Enhanced Performance Displays* for more details about these specialized displays.

APPENDIX – 4 Definition of Signage Displays:

Signage Displays are sophisticated units designed for three basic segments; indoor use, semi-open, and outdoor use. Indoor use signage displays contain design characteristics similar to those found in consumer televisions or in mainstream computer displays. Indoor use signage displays may have additional input ports and brighter luminance default settings. These products may benefit from energy reducing features like automatic brightness controls to adjust the brightness depending on ambient light conditions. Signage displays for semi-open or fully open areas differ greatly from indoor use displays. Outdoor specific displays require brightness levels exceeding 1000 cd/m². To achieve the high brightness found in outdoor displays without compromising picture quality and viewing angles, technologies not commonly found on mainstream computer displays or in indoor use displays are required. RGB LED systems can perform and deliver the desired picture quality at high ambient light levels. Driving each Red, Green, and Blue LED to high levels in order to achieve the luminance customers demand for their applications require additional power resulting in higher energy consumption of the end product. In addition, certain types of outdoor signage displays are systems composed of several small individual RGB LED panels with low resolutions tiled together to create screens bigger than 110 inches measured diagonally. These systems require separate data controllers and several power supplies to feed each tile or a combination of tiles at the same time. Communication protocols and input connections differ substantially from those typically found in indoor use signage displays. While data is transmitted through RJ45 connectors (not TCP/IP protocol), it is processed by the external controller to display the desired images. Automatic brightness control (ABC) features are not adequate for these products since constant brightness is required for these applications. Examples of outdoor signage displays are those used in stadiums, airports, and exhibition rooms. Signage displays for outdoor use are considered professional products and must not be subject to the same standards as indoor displays. Signage displays for outdoor use or intended to operate at luminance values exceeding 1000 cd/sq² should be exempted from the proposed regulations.

APPENDIX – 5 Definition of Professional Broadcast Display or Production Monitor:

A professional broadcast display or production monitor is a display intended to be used for technical evaluation of video signals or media content intended for entertainment purposes. These types of displays include tools and functions for measuring and analyzing video content. They are not intended or designed for use in any home or business application such as what is seen with mainstream computer displays. These displays are found TV stations, post production facilities and on set locations where entertainment content is manufactured. Other applications include industrial design, simulation, museums, air traffic control, convention centers, and others. The price of one of these displays is many times that of a mainstream computer display and usually exceeds $30,000 in cost. They are not used outside of the intended applications. The population of these types of monitors is in the 100's, not in the millions. Professional products should be exempted from the proposed regulations.

APPENDIX – 6 Definition of Displays Classified by FDA for Human Use

Displays that are classified as devices for human use under the Federal Food, Drug and Cosmetic Act, require U.S. Food and Drug Administration listing, and approval as a medical device should be excluded from scope. Displays that are designed for exclusively industrial or professional use should also be out of scope.

APPENDIX – 7 Definition of Keyboard / Video / Mouse or Keyboard / Monitor Mouse Display Products:

Monitors with keyboard, video, mouse (KVM) and/or Keyboard Monitor Mouse (KMM) should also be excluded from scope. KVM/KMM does not include a stand mechanism to use on a desk surface or in an office environment. KVM/KMM are only used in a server rack located inside the data center with restricted access. Although KVM/KMM are available for purchase by consumers, costs range from $800.00 to $6,000.00 depending on the number of ports provided by the switch.

The usage model for a KVM/KMM is unknown but assumed to be minimal. To access and activate the KVM/KMM, an individual must have security access to the data center. The server rack must be opened, and the trays extended for the KVM/KMM to exit sleep mode. After work is performed, the display is folded down and stowed back into the rack where the display reenters sleep mode. The usage model would not be aligned due to the low number of hours the device is actually being used. The benefits provided by KVM/KMM include saving space by allowing a single console to manage multiple servers. KVM/KMM save power by reducing the number of keyboards, monitors, and mice needed to administer servers and save time by allowing access to multiple servers from a single console. Industry recommends removing KVM/KMM from the scope of CEC. Link: http://accessories.us.dell.com/sna/products/productdetail.aspx?c=us&l=en&s=bsd&cs=04&sku=A7546778

APPENDIX - 8 DETAILED COMMENTS ON CEC STAFF REPORT

Description	Page	CEC Comments/Proposal	Industry Comments
Draft Proposal Chapter 9: Part B: Displays	31	Staff's analysis shows that the proposed computer monitor and signage display standards are technically feasible and cost-effective. Proposed standards would save significant amounts of energy. Specifically, computer monitors and signage displays will save roughly 585 GWh/year statewide after the complete stock turnover.	CEC mentions their analysis but never actually provides the analysis used to determine wither technical feasibility or cost effectiveness.
CHAPTER 12: Technical Feasibility	38	Improved Options: USB-powered monitor: video and power over one single USB 3.0 cable Notes: High-efficiency LCD panel required Cost increase for the LCD panel but likely cost-neutral for the monitor set	CEC fails to consider that USB powered monitors are lower in power level by moving AC-DC power conversion into another device (PC etc). CEC never establishes any real overall system savings with USB powered displays since they fail to take into consideration the rest of the system. It is impossible to draw any conclusions on AC powered displays by looking at the energy consumption of a USB powered display.
		Manufacturers can improve the efficiency of monitors by implementing high-efficacy LEDs that are available at a comparable price as low-efficacy LEDs. There are also efficient power supplies and LED drivers that are available at a low incremental cost, but computer monitor manufacturers continue to produce and sell inefficient monitors.	CEC never establishes any analysis to show that it is technically feasible and cost effective in production to implement high efficiency LED's, efficient power supplies and LED drivers. IOU study referenced these points but fails to establish that most of these features are available in high volume manufacturing or that the transition to these higher efficiency options will not change the relative cost used in the analysis.
	40	Automatic brightness control (ABC) is a function in which a computer monitor automatically adjusts the brightness of the screen based on ambient light conditions. ABC saves	No validated energy reductions as a result of ABC implementation are ever provided as the only analysis is arbitrary and un-validated. The Cost model used in the IOU presentation was also

		unnecessary energy consumption in low-light conditions. Furthermore, a dimmer screen in a dark environment provides less eye strain than a brighter screen in a dark environment, providing consumer satisfaction. With ABC installed, monitors can see a 10 percent increase in energy efficiency.58	shown to be flawed as it ignores necessary design elements. CEC fails to consider that implementation of ABC has created as many if not more end user complaints as it has satisfaction. The 10% improvement statement is unfounded in fact.
Incremental Cost	47	Incorporating higher efficiency LEDs, enhanced reflective films, and global dimming presented a compliance pathway at a cost of approximately $5.68 This incremental cost estimate is based a detailed cost analysis for two sizes of computer monitors using a Display Search component cost survey that is commonly used by the industry.	CEC fails to provide details on how these numbers are achieved. Simply stating that an analysis was done is insufficient in meeting regulatory burden placed on the CEC to prove cost effectiveness. CEC should make entire cost analysis modeling public and available for evaluation by all stakeholders.
		The proposed standard will save about 28 kWh a year per unit, and at a cost of $0.16 per kWh,69 it will generate $4.40 in electricity savings per unit per year. Total energy saving over the entire life of the product will be about $26.54. Subtracting the incremental cost of $10.26 per unit from the total energy savings of $26.54 per unit over the life cycle of the product provides savings of $16.28 to the consumer. Using the IOUs incremental cost estimates, the payback period for the improvement is less than 2½ years. Therefore, the proposed standard is cost-effective.	CEC again states a list of summary calculations that are the result of calculations hidden from public review. Providing a summary of unverifiable unkown analysis does not meet the CEC's obligation for proving cost effectiveness.
	48	For illustration, Energy Commission staff has conducted a market survey to evaluate the price differences between ENERGY STAR-compliant and non-ENERGY STAR monitors. Many LED computer monitors that are sold in the market are ENERGY STAR-compliant, but a large number of LED monitor	CEC fails to establish that the passing and failing monitors are in any way similar for comparison. It is not appropriate to draw any conclusions from the comparison made by the CEC. CEC's conclusions cannot be derived from the information provided. More factors other than diagonal screen size and ENERGY STAR

		models in the market are not ENERGY STAR-compliant and are inefficient. Staff has conducted a current market price-versus-size survey of ENERGY STAR and non-ENERGY STAR computer monitors. Survey results are plotted in a graph shown in Figure 6 below. The survey shows the ENERGY STAR-compliant monitors sell at the same or lower prices than non-ENERGY STAR compliant monitors.	compliance must be considered, in order to make technically sound comparisons of monitor costs. The table also shows many cases where ENERGY STAR compliant monitors are more expensive than non-compliant monitors so the result converse of the CEC conclusion is equally valid.
	49	Total Energy Savings	All of the analysis in this section is based upon unsound / un-validated modeling and analysis. It is therefore not possible to evaluate further.