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Additional submitted attachment is included below.

Electronic Displays

Codes and Standards Enhancement (CASE) Initiative
For PY 2016: Title 20 Standards Development

Response to Proposed Regulatory Language for
Computer Monitors and Signage Displays

Docket # 16-AAER-02

October 24, 2016

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1 Executive Summary

The Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), Southern California Gas (SCG), San Diego Gas & Electric (SDG&E) Codes and Standards Enhancement (CASE) Initiative Project seeks to address energy efficiency opportunities through development of new and updated Title 20 Standards. Individual reports document information and data helpful to the California Energy Commission (CEC) and other stakeholders in the development of these new and updated standards. This document provides recommendations and supporting analysis in response to the CEC's Staff Report.

Energy use in California from electronic displays – computer monitors and signage displays – is significant and has been growing in some sectors. Computer monitors are ubiquitous in homes, offices, and other commercial settings. They are increasingly used as second screens with notebooks and in extended desktop display setups in home and office environments. Additionally, higher resolutions models (4K and 5K) are being introduced on the market, which can consume as much as five times as much power as a similarly sized regular high-definition model. Monitors account for a significant portion of electricity consumed in computing use. Signage displays are a growing presence in commercial settings, such as retail, restaurant, transit, and hospitality. The California Investor Owned Utilities (CASE Team) generally support the energy efficiency standards for electronic displays proposed by the California Energy Commission (CEC) in the updated staff report and express terms.

There are several areas on the regulation where CEC should examine available performance and technical data provided to the CEC throughout the electronic displays dockets. The CASE Team has provided robust testing, market, and performance data analysis to support cost-effective levels originally proposed by CEC in the previous staff report. The CASE team encourages CEC to further examine some aspects of the power proposals now proposed in the Express Terms, especially in regards to adders and other areas where the proposals are less stringent. While we agree that some of the specialty monitors alone are relatively a small share of the overall market *currently*, given gaining popularity of higher resolution and featured equipment, by 2019 or 2021 these monitor types could become mainstream. In reviewing the regulatory language, the CASE Team recommends modifications with supporting analysis in order to optimize energy savings and ensure robust compliance. Addressing these elements will allow California to even further address some of the statewide policy objectives of Zero Net Energy California Long Term Energy Efficiency Strategic Plan and AB32 energy efficiency goals. We appreciate careful consideration of the following comments.

2 Definitions

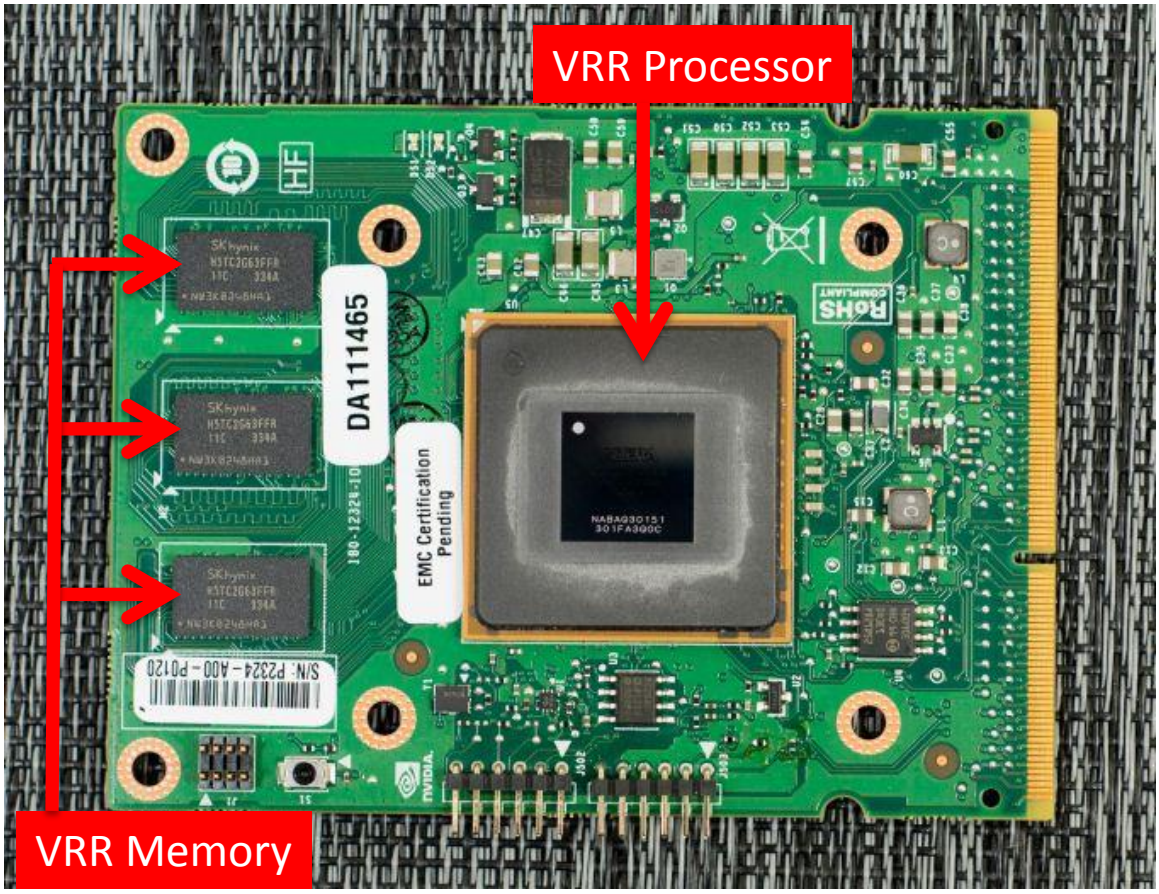
Although the CASE Team generally supports the definitions in section 1602(v), some clarifications are suggested to prevent confusion and open up loopholes in these standards. These definition clarifications are outlined in the section below.

2.1 Gaming Monitor

In this new definition, the phrase "an incremental hardware-based assistance" is used to distinguish a monitor with extra hardware dedicated to providing a variable refresh rate (VRR) from one that does not have additional. This phrase is ambiguous for a regulatory definition because it does not

specify exactly what additional hardware may count as VRR-specific. The hardware required in a monitor that uses this type of solution (e.g., an Nvidia G-Sync monitor) includes a dedicated processor that receives frames from the discrete graphics card in the attached gaming computer and dedicated memory that holds frames until they are to be displayed on the screen. Currently this solution is implemented on a dedicated circuit board, such as that shown in Figure 2.1.

Figure 2.1: Nvidia G-Sync circuit board, with key components (processor and memory) labeled.



Source: http://www.anandtech.com/show/7582/nvidia-gsync-review. Accessed September 29, 2016.

To clarify what is meant by "incremental hardware" the CASE Team suggests the following changes (strike-through indicates deletion of original language, bold italics indicates additional language throughout this document):

"Gaming monitor" means a computer monitor that is capable of adjusting the monitor refresh rate with the frame rate of the video content, and supports a continuously variable refresh rate ranging across a factor of at least 1.75 times the minimum supported (for example a variable refresh rate of at least 40 Hz to 70 Hz if the minimum supported refresh rate is 40 Hz~~); the monitor may include an incremental hardware-based assistance~~. ***Hardware-based implementations include a dedicated processor that receives frames from the discrete graphics card in the attached computer and dedicated memory that stores frames.***

2.2 Signage Display

By the proposed definition, a signage display is a display that is not marketed as a monitor or television. This definition presents a potential loophole because it depends only on how a product is marketed rather than on its specific attributes. In addition, the definition is very broad and could include, for example, a tablet or an information display in refrigerator. The CASE Team suggests a definition based on signage display attributes such as size, brightness, and pixel density, such as that used by ENERGY STAR:

"'Signage display' means an electronic display intended for multiple people to view in non-desk based environments, such as retail or department stores, museums, hotels, outdoor venues, airports, conference rooms, or classrooms, and meets two or more of the following criteria:

1. Diagonal screen size is greater than 30 inches;
2. Maximum luminance is greater than 400 candelas per square meter;
3. Pixel density is less than or equal to 5,000 pixels per square inch; or
4. Ships without a mounting stand."

The CASE Team understands that the exact wording of the definition may need to differ in the regulatory language, however that necessity should not preclude a specific definition based on product attributes.

2.3 KVM/KMM

The definition for keyboard, video, and mouse (KVM) or keyboard, mouse, and monitor (KMM) is oversimplified and therefore presents a loophole to any monitor used in a server rack. The distinguishing characteristic of this type of monitor is that it can operate with a KVM switch that allows the user to control more than one computer from one monitor and associated keyboard and mouse. The CASE Team suggests the following addition to clarify the definition and close the loophole:

"Keyboard, video, and mouse (KVM)" or "keyboard, mouse, and monitor (KMM)" means a computer monitor that ***can operate with a KVM switch and*** is designed to be used in a server rack for use solely in a data center.

2.4 DCI-P3

The definition for the DCI-P3 is needlessly vague as the industry has defined the DCI-P3 color space as 41.7% of CIELUV or greater. The CASE Team provides the following updates to reflect the industry standard definition:

"Digital Cinema Initiative (DCI)-P3" means a red-green-blue (RGB) color space that ***covers 41.7% of the CIELUV color space***~~features the widest color gamut of all the emulated color spaces and that is wider than standard RGB (sRGB).~~

2.5 Computer Monitor

The computer monitor definition limits its scope to those monitors between 17 and 61 inches. Although most people familiar with the industry understand that the monitor size is the diagonal measurement across the screen, not all who review the regulatory language may be familiar with the concept. To avoid ambiguity, the CASE Team suggests the following change:

"Computer monitor" means an analog or digital device of ***diagonal screen*** size greater than or equal to 17 inches and less than or equal to 61 inches,…

2.6 Very High Performance Monitors

The CASE Team recommends specifying that this distinction refers to the native resolution and updating the megapixel distinction to appropriately reflect 8.29 MPs (3840 pixels times 2160 pixels) by adding the following clarifying edits in the resolution criteria of the very high performance monitor definition:

(2) Has a ***native*** resolution equal to or greater than either 3840x2160 pixels or 8.2***9*** Megapixels; and …

3 Test Method

The CASE Team reviewed the test method language and found certain area where the guidance could be tighter to ensure accurate, repeatable, and reproducible results. Additionally, the CASE Team notes a few key omissions that are inconsistent with the standard's requirements.

3.1 Required Tests - Section 1604(v)(4)(B)

This section requires only On, Sleep, and Off Mode power to be measured. Section 1605.3(v)(4)(C), however, requires that monitors "be shipped with a screen luminance of less than or equal to 200 cd/m^2 ± 35 percent." The test method must provide instructions to measure the as-shipped screen luminance to confirm that monitors are meeting this requirement. In addition, the CASE Team suggests testing the monitor's maximum screen luminance, as required by ENERGY STAR. This data is valuable information for evaluating the capabilities and operating range of a monitor, and can be gathered for very little additional effort (on the order of one minute) once the monitor is set up for the as-shipped luminance measurement. We suggest the following updates to the language:

(B) A computer monitor shall be tested as required by the test procedure ~~only~~ for each of the following:

1. On mode power ~~consumption~~ ***draw***.
2. Sleep mode power ~~consumption~~ ***draw***.
3. Off mode power ~~consumption~~ ***draw***.
4. ***Screen luminance in default as-shipped setting***.
5. ***Screen luminance in maximum luminance setting***.

3.2 Turning features off – Section 1604(v)(4)(D)

The instruction to "turn off" any feature that is not related to displaying an image is confusing. Monitors generally do not have user options to turn off items like USB and network ports or even speakers. A more appropriate instruction is to ensure that these features are "not in use".

In addition, since an allowance for touch screen functions is provided in Section 1605.3(v)(4)(D), the regulatory language must state that the **touch screen function must be on during testing**.

Finally, the CASE Team has shown previously that network and hub connections with little or no data transfer can draw very small amounts of power and that most monitors can comply with sleep and off mode power requirements even with network and/or hub connections enabled (CA CASE Team 2016). **The CASE Team recommends the CEC require these connections to be enabled during the tests, as ENERGY STAR® requires**. Not only will this requirement better capture the actual usage conditions of the monitor, but it will also encourage manufacturers to utilize readily available power management techniques to minimize power draw of idling USB and network ports.

With the current language in the CEC Express Terms, there is no incentive for manufacturers to minimize the power draw for network connections. **The actual power draw of a monitor, out of the box, without any user modifications will almost certainly be greater than the reported value on the CEC appliance database**. This could lead to consumer confusion in the marketplace. Furthermore, since ENERGY STAR requires network and hub connections to be present during testing and have been requiring this testing for years, these **CEC requirements will significantly increase manufacturers' testing burden**. Additionally, two sets of reported power draw will exist for each ENERGY STAR monitor sold in California: one for CEC compliance and another for ENERGY STAR compliance.

The regulatory language in this section should be updated to:

(D) ~~Before starting the test procedure for measuring on mode power consumption, any f~~ ***Touch screen, network connection, and USB hub features shall be tested according to the ENERGY STAR test method. Other f***eatures unrelated to the display of images (for example ~~USB hubs,~~ webcams, speakers, ~~LAN connections,~~ and SD card readers) shall ***not be in use during the measurement of on mode power*** ~~be turned off~~.

3.3 IEC Test Procedure

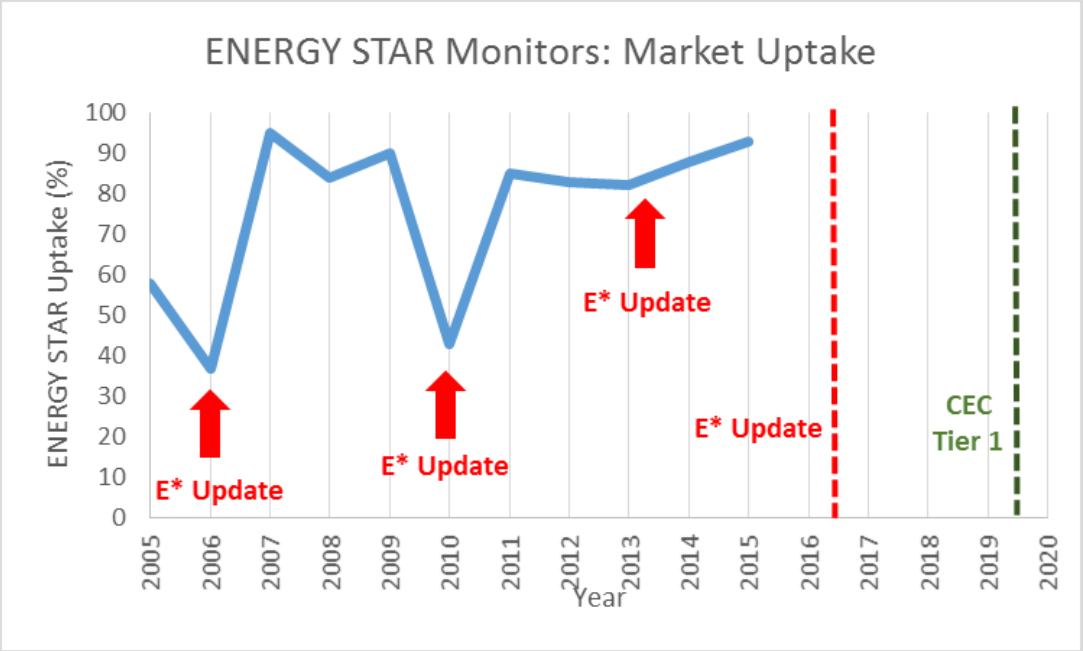
The CEC asked for comment on the implications of the replacement of the IEC test procedure 62087:2011 with the updated version 62087:2015. The ENERGY STAR test method uses IEC 62087:2011 methods and signals for on mode power measurements, as well as the test signals from 62087:2011 for luminance measurements. The CASE team has reviewed IEC 62087:2015 and found no significant changes in the on mode power measurement and the test signals.

4 Power Allowances

4.1 Market Adoption

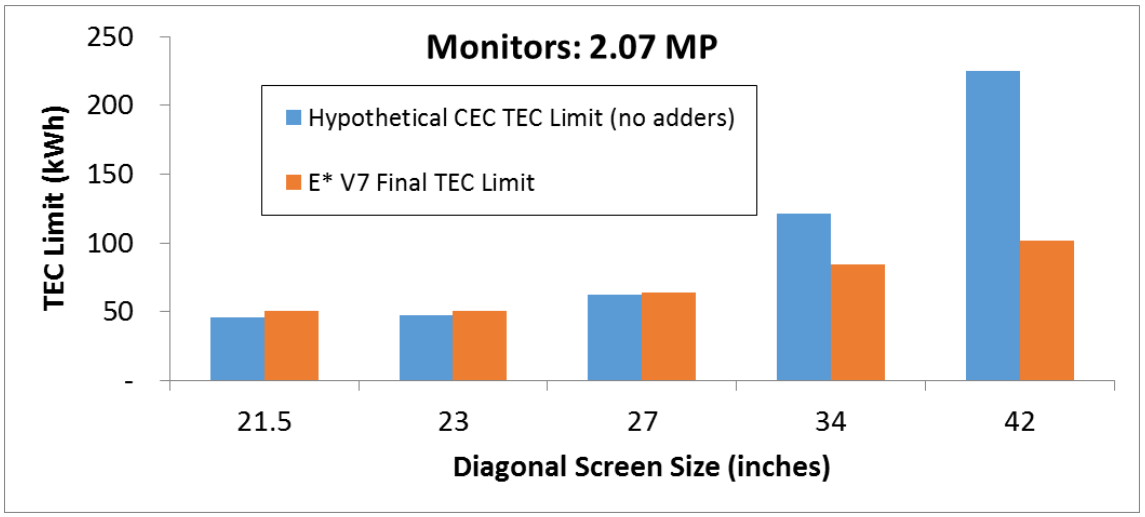
Figure 4.1 shows the historically rapid uptake of the ENERGY STAR monitor specification. In the three specification revisions since 2005, **over 80%** of the market has met the ENERGY STAR specification by Year 2. Assuming past trends continue, the CASE Team projects high market adoption of the Version 7 specification by July 2019, the proposed effective date of the Tier 1 standard. **CEC On Mode levels are similar or less stringent than the ENERGY STAR Version 7 specification *before* the application of any CEC proposed adders in almost every case**, as shown in Figure 4.2. Given past ENERGY STAR uptake rates and the On Mode allowances proposed by CEC, the CASE Team anticipates most of the market will already be meeting the CEC levels without any additional modifications by the effective date.

Figure 4.1 Uptake of ENERGY STAR: Historical



Source: CASE Team analysis

Figure 4.2 ENERGY STAR Version 7 and CEC Proposal (no adders) Comparison



Source: CASE Team analysis

4.2 Adders: General

At the October 10 hearing, stakeholders presented the need for multiple adders to apply to a given product. In the following section, the CASE Team outlines how the current adders are generous and more than sufficient for monitors with additional features and/or functions.

The CASE Team supports CEC's proposal to include gaming, OLED, and curved monitors in the scope of this rulemaking. We also agree that these monitors are currently a relatively small part of the market and there is limited power data available. However it is not clear to the CASE Team what the technical rationale is for newly proposed power allowances for OLED, gaming, and curved monitors.

It should be noted that the **ENERGY STAR Version 7 specification was updated with industry input within the past year, and there were no accommodations for extra power allowances for gaming, curved, or OLED features**. By July 1, 2019, a vast majority of monitors will meet the ENERGY STAR specification, given historical uptake rates and industry projections, **with no adders for these features**. These significant allowances in the CEC Express Terms could be used as potential loopholes to increase power consumption by up to 35% unnecessarily.

4.2.1 Enhanced Performance Display (EPD) Adders

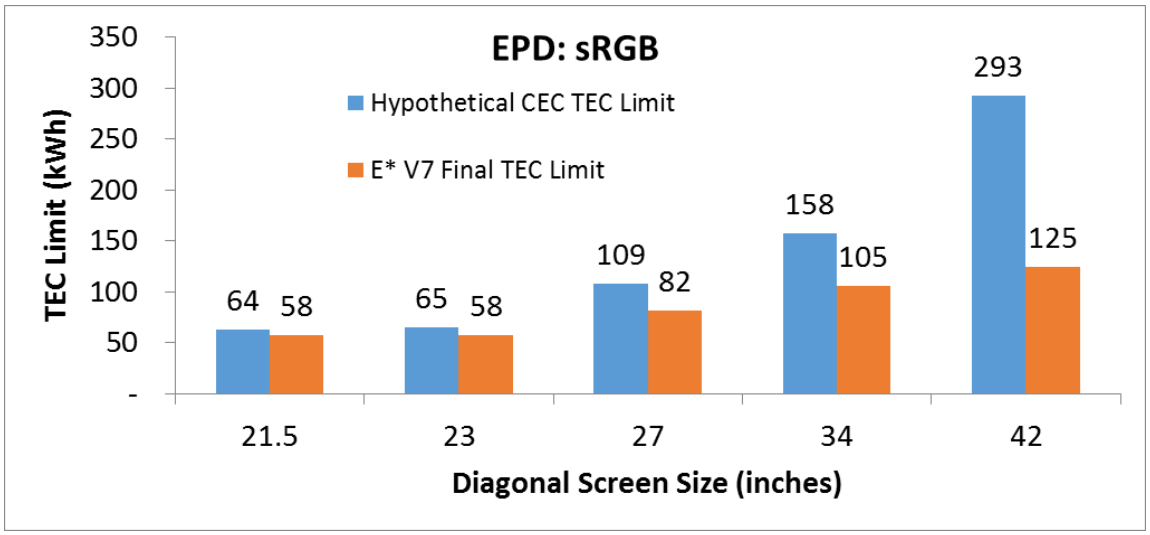
In the Express Terms, CEC increased the EPD adders proposed in the April 2016 Staff Report from 10% to 30% for sRGB monitors and from 50% to 75% for Adobe RGB in Tier 1. Table 4.1 and Figure 4.3 compare the updated CEC proposal for EPDs with the ENERGY STAR Version 7 specification that recently took effect in July 2016. In order to compare the ENERGY STAR specification, which uses a Typical Energy Consumption (TEC) value, with CEC's modal power approach, we used the same duty cycle assumptions as ENERGY STAR to calculate a hypothetical CEC TEC value. Please note that at the largest sizes, the CEC proposed On Mode allowances for EPDs is over double the allowance provided by ENERGY STAR. Given most of the monitor market will meet the ENERGY STAR Version 7 regulation by the July 1, 2019 effective date, **the CEC limit of applying a single adder is <u>more than</u> sufficient for EPDs to meet the proposed regulation.**

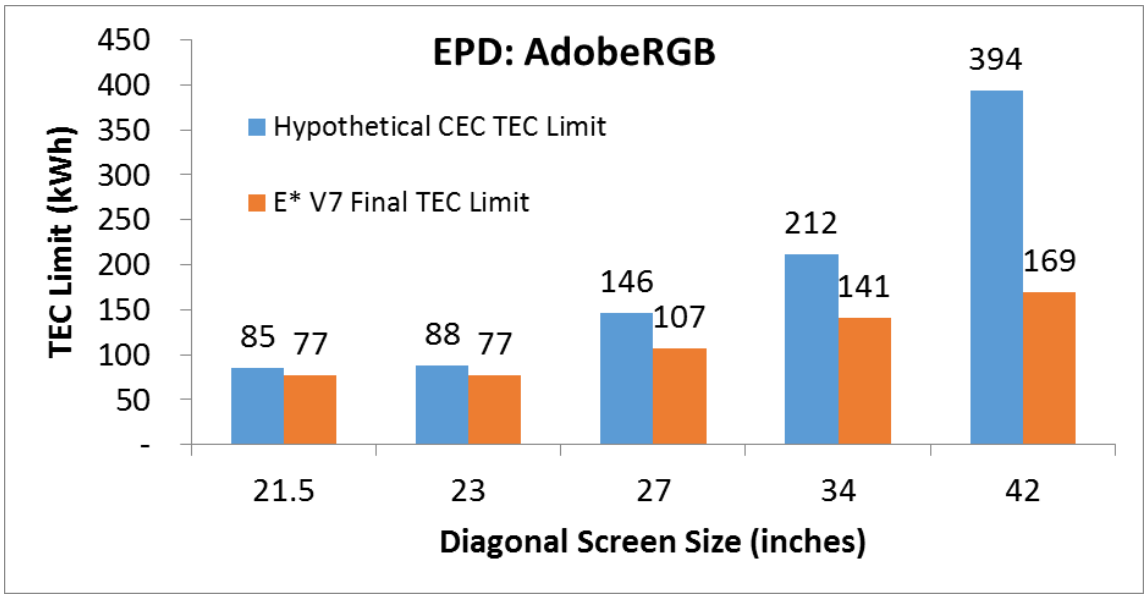
Table 4.1 EPDs: Comparison of ENERGY STAR Version 7 and CEC Tier 1 Levels

			sRGB Limit			AdobeRGB Limit		
Diagonal Screen Size (in)	Example EPD Resolution (MP)	Example Screen Area (in-sq)	ENERGY STAR V7 TEC (kWh)	CEC Proposal: Hypothetical TEC (kWh)	CEC Proposal: % Greater than V7	ENERGY STAR V7 TEC (kWh)	CEC Proposal: Hypothetical TEC (kWh)	CEC Proposal: % Greater than V7
21.5	2.3	198	57.68	63.51	10%	76.63	85.34	11%
23	2.3	226	57.93	65.42	13%	76.98	87.91	14%
27	3.7	312	81.73	108.62	33%	107.43	146.06	36%
34	3.7	415	105.42	157.58	49%	141.42	211.96	50%
42	3.7	754	124.97	292.69	134%	169.47	393.85	132%

Source: CASE Team analysis

Figure 4.3 EPDs: Comparisons of ENERGY STAR Versions 7 and CEC Tier 1 Levels





Source: CASE Team analysis

4.2.2 Gaming Monitor Adders

The CASE Team supports including gaming monitors within the scope of this rulemaking. These monitors are gaining in popularity as indicated by "Gaming Monitors" being a feature a consumer can use to filter models on popular retailer websites, such as Best Buy and Amazon. We agree with CEC that it is very likely that gaming monitors consume more power as operated in the home given the variable refresh rates and brighter backlight settings preferred for operating graphics-intensive video games. However, in the test procedure, based on the ENERGY STAR test method, On Mode power is measured at a calibrated brightness of 200 cd/m^2 and a calibrated refresh rate set at 60 Hertz (Hz). Since the higher brightness and the variable refresh rate features of gaming monitors would not be utilized by the test procedure, the intent of the 30% and 35% adders for this equipment as proposed in Table V-5 is not clear. These significant allowances could be used as

potential loopholes to increase power consumption by up to 35% unnecessarily for units that meet the definition of gaming monitors.

4.3 Multiple Adders

Since the currently proposed CEC adders are generous, there is no technical reason for multiple adders to apply to a given monitor. Table 4.2 shows actual examples of monitor models that could be eligible for more than one adder outlined in Table V-5 of the Express Terms and the calculated CEC On Mode Limits with and without adders. In these examples of a product available today, **these monitors would easily meet the CEC proposed limits without any adders applied**. These models would not have to make any additional updates in order to meet the On Mode proposals.

Table 4.2 Four Examples of Models with Multiple Potential Applicable Adders

Model 1	X34BMIPHZ
Relevant Features	Curved Screen and Gaming (hardware)
Diagonal Screen Size	34 inches
Screen Area	415 in-sq
Resolution	5.0 MP
Reported On Mode	42.9 Watts
CEC On Mode Limit (No Adder)	57.0 Watts
CEC On Mode Limit (+Largest Applicable Adder)	77.0 Watts
CEC On Mode Limit (+Multiple Adders)	127.1 Watts
Source	www.bestbuy.com/site/acer-x34-g-sync-34-ips-led-curved-uw-qhd-219-ultrawide-monitor-black/4777400.p?skuId=4777400

Model 2	34UC88-B
Relevant Features	Curved Screen and EPD (sRGB)
Diagonal Screen Size	34.1 inches
Screen Area	415 in-sq
Resolution	5.0 MP
Reported On Mode	43.7 Watts
CEC On Mode Limit (No Adder)	57.0 Watts
CEC On Mode Limit (+Largest Applicable Adder)	65.6 Watts
CEC On Mode Limit (+Multiple Adders)	74.6 Watts
Source	https://www.amazon.com/LG-34UC88-B-34-Inch-21-UltraWide/dp/B01B9IDL4I/ref=sr_1_2?s=pc&ie=UTF8&qid=1476824180&sr=1-2&refinements=p_n_feature_three_browse-bin%3A12659080011

Model 3	34UC98-W
Relevant Features	Curved Screen and EPD (sRGB)
Diagonal Screen Size	34.1 inches
Screen Area	415 in-sq
Resolution	5.0 MP
Reported On Mode	41.1 Watts
CEC On Mode Limit (No Adder)	57.0 Watts
CEC On Mode Limit (+Largest Applicable Adder)	65.6 Watts
CEC On Mode Limit (+Multiple Adders)	74.6 Watts
Source	https://www.amazon.com/LG-34UC98-W-34-Inch-UltraWide-Thunderbolt/dp/B019O78DPS/ref=sr_1_1?s=pc&ie=UTF8&qid=1476824180&sr=1-1&refinements=p_n_feature_three_browse-bin%3A12659080011

Model 4	XR3501
Relevant Features	Curved Screen and EPD (sRGB)
Diagonal Screen Size	35 inches
Screen Area	440 in-sq
Resolution	2.8 MP
Reported On Mode	33.4 Watts
CEC On Mode Limit (No Adder)	46.3 Watts
CEC On Mode Limit (+Largest Applicable Adder)	60.2 Watts
CEC On Mode Limit (+Multiple Adders)	74.1 Watts
Source	http://www.bestbuy.com/site/benq-xr-35-led-curved-hd-219-ultrawide-monitor-black/4235800.p?skuId=4235800

Source: Various

4.4 On Mode Power Allowance: Correction

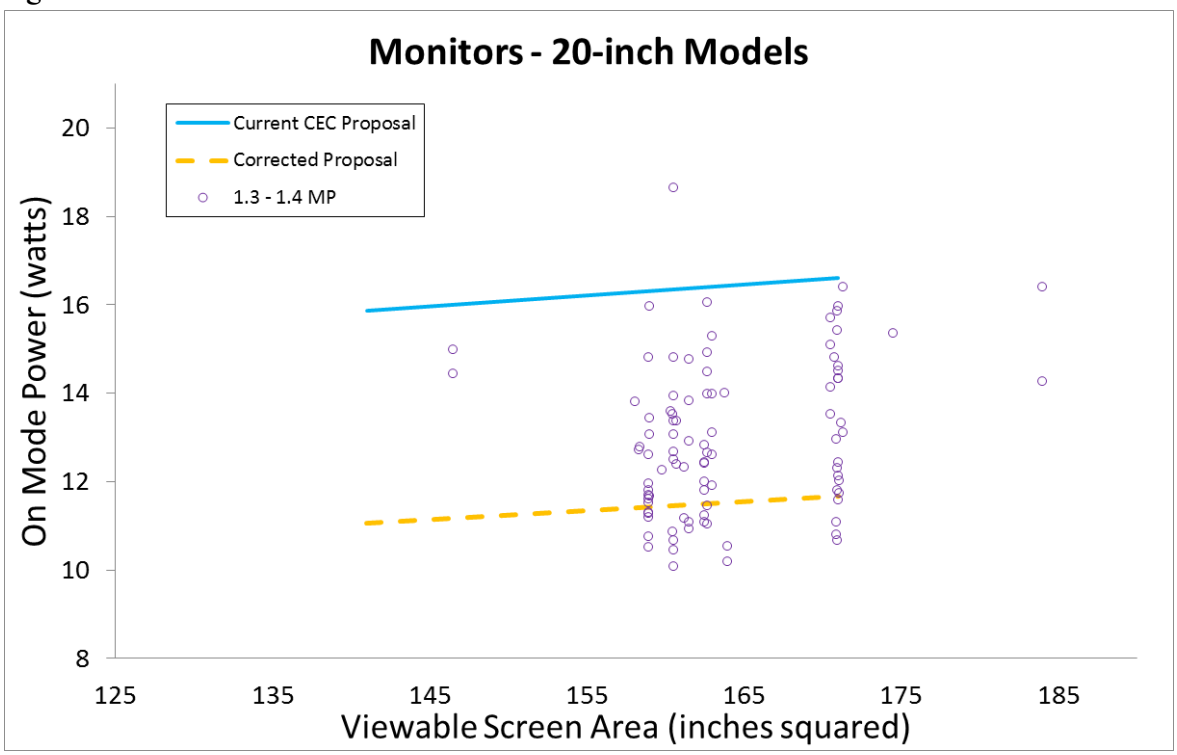
We believe CEC should make a correction in Table V-4. For consistency among the size bins, the following should be corrected in Table V-4 for both the regular resolution (≤ 5MP) sizes and the high resolution (> 5 MP) sizes as shown in Table 4.3. Currently, if 20-inch monitors are subject to the On Mode requirements in the lowest size bin, based from the ENERGY STAR Version 6 requirements, all 20-inch models that were manufactured since 2012 would be able to meet the level with no modifications necessary as shown in Figure 4.4. This would mean that there will be no savings for consumers associated with these models. Given that all 20-inch models would meet the current CEC proposal and given that there are cost effective strategies available today for these models to be more efficient, the CASE Team recommends CEC update current screen size bins according to Table 4.3.

Table 4.3 Screen Size Bin Correction

Current Screen Size Bins	Consistent Corrected Screen Size Bins
17" ≤ d ≤ 20"	17" ≤ d < 20"
20" < d < 23"	20" ≤ d < 23"
23" ≤ d < 25"	No change - Consistent
25" ≤ d < 30"	No change - Consistent
30" ≤ d ≤ 61"	30" ≤ d < 61"

Source: CASE Team analysis

Figure 4.4 On Mode Level for 20-in Monitors



Source: CASE Team analysis

4.5 On Mode Power Allowances: High Resolution Monitors

We believe there is another correction needed in Table V-4 in the Express Terms (and corresponding Table 15 of the Staff Report). For higher resolution monitors, in previous drafts, CEC proposed an equation that did not include resolution as a variable in the On Mode power allowances similar to the current proposal in Table V-4.[1] However, for these high resolution models, in previous drafts CEC proposed a constant 21 Watt (W) allowance in the equation regardless of resolution. We understand that the constant term was determined by multiplying 4.2 by 5.0 (the megapixel [MP] resolution that was the cutoff at the time). This way, there would be a

[1] Table 9, Final Draft Staff Report, March 2016

gradual increase in the resolution adder up to a certain resolution. In the Express Terms, CEC proposes the same resolution cutoff (i.e., 5.0 MP) but increased the constant allowance to 25 W. **Keeping the equation as-is would mean that models with a resolution between 5.0 MP to 6.0MP could get an additional allowance of up to 20%, which would be in effect another adder**. Refer to the examples outlined below in Table 4.4 and Figure 4.5.

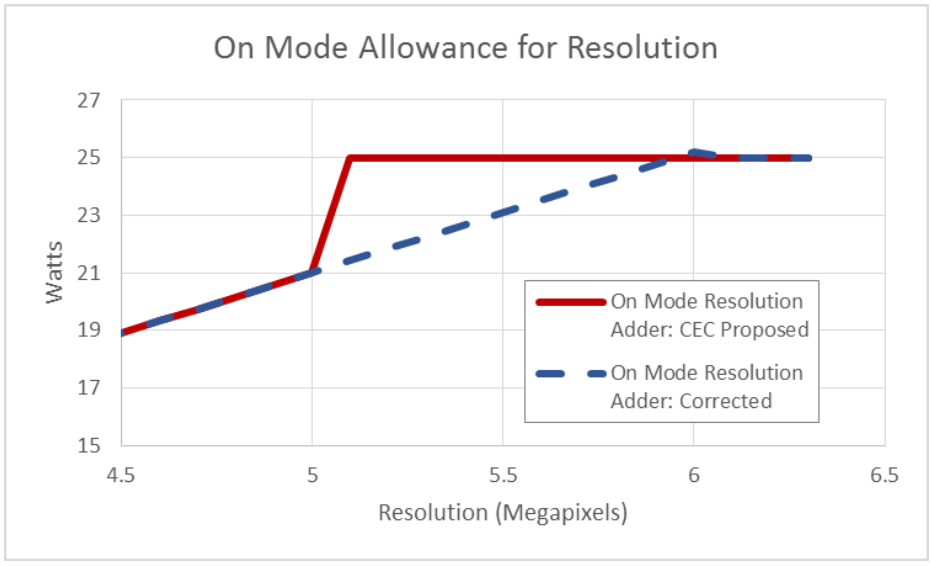
Table 4.4 Example of Resolution Part of On Mode Power Equation: Hypothetical 27-inch Monitor

Hypothetical Resolution (MP)	Current CEC Proposal (> 5MP)	Suggested Modification (> 6MP)
4.9	20.6 W	20.6 W
5.2	25 W	21.8 W
Incremental Power for 0.3 MP Increase in Resolution	**20%** (4.4 W)	**6%** (1.2 W)

Source: CASE Team analysis

In order to keep the same gradual increase in the resolution adder and prevent a step-wise jump, the CASE Team recommends the following solution to clear up this potential area for confusion. CEC should modify Table V-4 to read "Resolution ≤ **6.0** MP" and "Resolution > **6.0** MP". Incorporating this correction would mean monitors would get **gradual** increase in On Mode allowance by resolution instead of a significant jump in allowance. This would be consistent with the equations since 4.2 multiplied by 6.0 is 25, which is the new constant in the equations for higher resolution monitors. It is not clear is this was CEC's intention, but the CASE Team notes the resolution cap was raised to 6.0 MP for integrated displays.

Figure 4.5 On Mode Allowance for Resolution



Source: CASE Team analysis

5 Data Submittal Requirements

The Data Submittal Requirements in Table X must include all information required to determine the power requirements, adders, or exceptions for each monitor. The CASE Team notes the following additions, clarifications, and correction that need to made to provide complete information. We have also provided an updated Table X with these updates incorporated in Appendix A.

Technology Type: Two elements of the technology should be recorded: the display type and the backlight type (if present). The most common display type is the liquid crystal display (LCD). Organic light emitting diode (OLED) emissive and quantum dot (QD) emissive displays have been in development and may be prominent on the market when the standard is in place. To add to the confusion, however, OLEDs can potentially be used as the backlight in an LCD display[2], and QDs can be put on a film to increase color gamut (e.g., 3M's quantum dot film[3].). To provide unambiguous information, therefore, the CASE Team suggests breaking the "Technology Type" category into "Display Type" with permissible answers "LCD, OLED Emissive Display, Quantum Dot Emissive Display" and "Backlight Type" with permissible answers "CCFL, LED, OLED, None."

Monitor Type: The CASE Team recommends editing the permissible answers so that only one may apply to a given monitor, and that answer indicates what kind of adders or exclusions the product qualifies for. We recommend permissible answers of Computer Monitor, EPD, OLED, Gaming Monitor with Dedicated Hardware, Gaming Monitor without Dedicated Hardware, KVM/KMM, Medical Display, Very High Performance Display.

Screen Luminance: The CASE Team suggests measurements of both as-shipped and maximum luminance. Both should be captured in Table X.

Native Resolution: The CASE Team recommends reporting resolution in terms of horizontal and vertical pixel count, for example 1920 x 1080, to capture information on aspect ratio. Resolution in megapixels is easily calculated as the product of horizontal and vertical pixel count divided by one million.

Curved Monitor: Because the CEC has proposed an adder for curved monitors, the fact that a monitor is curved must be recorded.

[2] See for example: http://www.oled-info.com/lgs-8-gen-line-will-produce-oled-backlit-lcds-not-true-oled-tvs

[3] For a description see http://solutions.3m.com/3MContentRetrievalAPI/BlobServlet?lmd=1383547134000&locale=en_US&assetType=MMM_Image&assetId=1361748701374&blobAttribute=ImageFile

Appendix A Updated Table X

	Appliance	*Required Information*	*Permissible Answers*
V	Computer Monitors	~~Technology~~ ***Display*** Type	~~CCCFL, LED~~***LCD***, OLED ***Emissive Display***, Quantum Dot ***Emissive Display***
		Backlight Type	***CCFL, LED, OLED, None***
		Monitor Type	Computer Monitor, EPD ~~sRGB, EPD Adobe RGB~~, OLED, ~~Gaming Monitor w/ Incremental Hardware, Gaming Monitor w/o Incremental Hardware, "Keyboard, Video, Mouse," "Keyboard, Mouse, Monitor~~***KVM/KMM***," ***Medical Display***, Very High Performance
		Viewable Screen area (square inches)	
		Screen size (diagonal inches)	
		Automatic Brightness Control	True/False
		Automatic Brightness Control Enabled when Shipped	True/False
		Native Resolution (~~megapixels~~ ***h x v***)	
		Power Consumed in Computer Monitor On Mode (watts)	
		Power Consumed in Computer Monitor Sleep Mode (watts)	
		Power Consumed in Computer Monitor Off Mode (watts)	
		Screen Luminance, default as-shipped (cd/m^2)	
		Screen Luminance, maximum (cd/m^2)	
		Gaming Monitor	***With Dedicated Hardware/Without Dedicated Hardware/False***
		Curved Monitor	***True/False***
		Touch Screen	True/False

		Color Gamut	32.9% of CIELUV or greater, (99% or more of defined sRGB colors), 38.4% of CIELUV or greater (99% or more of defined Adobe RGB colors), ***41.7% of CIELUV or greater (99% or more of defined DCI-P3 colors),*** Less than 32.9 of CIELUV
		Networking Capability	***True/False***
		Features Unrelated to Display of Images Disabled for Test	***1.*** ***2.*** ***3.*** ***Etc..***