



# **ENERGY STAR® Version 8.0 Draft 2 Displays Stakeholder Webinar**

**September 5, 2018**

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ENERGY STAR Products Labeling Program



## Webinar Details

- Webinar slides and related materials will be available on the Displays Web page:
  - [www.energystar.gov/revisedspecs](http://www.energystar.gov/revisedspecs)
  - *Follow link to "Version 8.0 is in Development" under "Displays"*
- Audio provided via teleconference:
  - Call in:** +1 (877) 423-6338 (U.S.)  
+1 (571) 281-2578 (International)
  - Code:** 198-920 #
  - Phone lines will remain open during discussion
  - Please mute line unless speaking
  - Press \*6 to mute and \*6 to un-mute your line



# Webinar Agenda

Time	Topic
12:00 – 12:10	Introductions
12:10 – 12:30	Draft 2 Definitions, Scope, General Requirements
12:30 – 1:10	Draft 2 Monitor Requirements
1:10 – 1:30	Draft 2 Signage Displays Requirements
1:30 – 1:45	Draft 2 Test Method
1:45 – 2:00	Open Discussion, Next Steps



## Introductions

### **James Kwon**

U.S. Environmental Protection Agency

### **Jeremy Dommu**

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### **Amit Khare**

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### **Allen Tsao**

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### **Rachel Unger**

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### **Matt Malinowski**

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## Definitions – Product Types

- In Draft 1 Stakeholders commented that there are several larger format models marketed as computer monitors that meet the definition of Signage Display.
- To better differentiate between displays and signage, EPA proposes to require that Signage Displays meet **three instead of two of the listed criterion.**
- EPA has additionally added a **fifth criterion** related to remote management.
- EPA welcomes any additional stakeholder feedback on how to distinguish Computer Monitors from Signage Displays



## Draft 1

- b) Signage Display: An Electronic Display intended for multiple people to view in non-desk based environments, such as retail or department stores, restaurants, museums, hotels, outdoor venues, airports, conference rooms or classrooms. For the purposes of this specification, a Display shall be classified as a Signage Display if it meets two or more criteria listed below:
- (1) Diagonal screen size is greater than 30 inches;
  - (2) Maximum Reported 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.



## Draft 2

- b) Signage Display: An Electronic Display intended for multiple people to view in non-desk based environments, such as retail or department stores, restaurants, museums, hotels, outdoor venues, airports, conference rooms or classrooms. For the purposes of this specification, a Display shall be classified as a Signage Display if it meets three or more criterion listed below:
- (1) Diagonal screen size is greater than 30 inches;
  - (2) ~~Maximum Reported Luminance is greater than 400 candelas per square meter;~~
  - (3) Pixel density is less than or equal to 5,000 pixels per square inch;
  - (4) Ships without a mounting stand designed to support the display on a desktop; or
  - (5) Designed to be operated by an external data controller or remote management system.



## Definitions – Tiled Display

- In Draft 1, EPA received feedback to create a specific product subcategory for tiled displays with On Mode power requirements similar to comparably sized single panel signage displays.
- In Draft 2, EPA is proposing the definition of Tiled Display System and Maximum Tiled Configuration.
- EPA welcome stakeholder feedback on this proposal.

- c) Tiled Display System: An array of individual Displays or panels tiled together contiguously and supported by single external controller and single external power supply to produce a single larger image.
- d) Maximum Tiled Configuration: At Tiled Display System with the maximum number of panels supported by the power supply and controller.

Note: Typical Maximum Tiled Configurations include a 2 x 2 configuration (four display panels). In this example, the minimum configuration would include a single panel operating with the power supply and controller rated for a total of four panels. For the purposes of the ENERGY STAR test, only the Maximum Tiled Configuration is considered.

Draft 2



## Displays Settings and Menus

- Similar to the ENERGY STAR televisions specification, EPA is proposing definitions for Preset Picture Setting and Default Picture Settings.
- The existing ENERGY STAR test method specifies procedures for testing models with a Forced Menu.
- EPA is including a formal definition of Forced Menu adopting language from the Version 8 ENERGY STAR Televisions specification and televisions Federal test procedure *10 CFR 430, Subpart B, Appendix H, Section 2.5*.
- There are currently 31 displays in the ENERGY STAR dataset that report the presence of a forced menu.



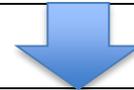
## Visual Characteristics – Total Native Resolution

- In Draft 2, EPA is replacing the definition for Vertical Resolution with a definition for Total Native Resolution.
- This definition is used to calculate the resolution that is applied to energy requirements in this specification.

Draft 1

5) Native Vertical Resolution: The number of physical lines along the vertical axis of the Display within the visible area of the Display.

Note: A Display with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a Native Vertical Resolution of 1080.



Draft 2

5) Total Native Resolution: Resolution expressed as total pixel count in megapixels calculated as the product of physical lines along the vertical and horizontal axes of the Display within the visible area of the Display.

Note: A Display with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a Total Native Resolution of 2.07 megapixels (MP).



## Plug-in Module and Embedded Module

- In Draft 1, stakeholders commented that Signage Displays with plug-in modules offer computing functions and could overlap with the Computers specification scope.
- Stakeholder further noted that instead of a plug-in, removable module, displays could contain an embedded processor that provides computing functions.
- EPA views these processors and modules as similar to Smart TVs that have replaced Set-top Boxes.
- EPA does not believe these types of displays meet the definition of a Computer



## Plug-in Module and Embedded Module (Continue)

- In Draft 2, EPA is proposing a revised definition for Plug-In Module
- EPA has also included a new definition for embedded computing function that is intended to cover internal processors for niche, display-oriented applications.

Draft 2

5) Plug-in Module: A modular plugin device that provides one or more of the following functions without the explicit purpose of providing general computing function intended for a broad range of home and office applications:

- a) Display images, mirror remote content streamed to it, or otherwise render content on the screen from local or remote sources; or
- b) Process touch signals.

Note: Modules providing any other additional input options are not considered Plug-in Modules for the purposes of this specification. Modules typically meet the Open Pluggable Specification (OPS).

6) Embedded Module: A non-modular processor or computing system embedded in the Display that provides one or more of the following functions without the explicit purpose of providing general computing function intended for a broad range of home and office applications:

- a) Display images, mirror remote content streaming to it, or otherwise render content on the screen from local or remote sources; or
- b) Process touch signals.



## Scope – Included Products

- In Draft 2, EPA has proposed language that explicitly includes Displays with Embedded Modules in the scope of this specification.

Draft 2

- Monitors;
- Signage Displays;
- Signage Displays and Monitors with Plug-in Modules; and
- Signage Displays and Monitors with Embedded Modules.



## Certification Criteria

- In Draft 2, EPA is proposing general user information requirements that have been present for some time in related ENERGY STAR specifications such as televisions and computers.
- For products that includes a Forced Menu upon initial start-up, similar to the requirement in the ENERGY STAR televisions specification, EPA is proposing that the model indicate which mode meets ENERGY STAR requirements.

Draft 2

- 3.2.2 General User Information: The product shall ship with consumer informational materials located in either (1) the hard copy or electronic user manual, or (2) a package or box insert. These materials shall include:
- i. Information about the ENERGY STAR program,
  - ii. Information on the energy consumption implications of changes to default as-shipped displays configuration and settings, and
  - iii. Notification that enabling certain optional features and functionalities (e.g., instant-on), may increase energy consumption beyond the limits required for ENERGY STAR certification, as applicable.



## Preset Picture Settings Menu

- EPA is proposing requirements in Section 3.2.4 for Preset Picture Settings Menu.
- In response to stakeholder comments, EPA is not requiring energy savings features to persist across all preset picture modes.
- EPA intends for these requirements to better inform consumers about which mode meets ENERGY STAR requirements and for users to easily return to the ENERGY STAR tested mode by selecting Default Picture Setting.

- 3.2.4 Preset Picture Setting Menu: For any product where consumers have the option of selecting different picture settings from a preset menu at any time:
- i. The product shall identify on-screen Default Picture Setting under which the product qualifies for the ENERGY STAR, if available. For example, the product may display an electronic ENERGY STAR mark alongside the name or description of that Default Picture Setting or display a message each time any setting other than the Default Picture Setting is selected.
  - ii. The as-tested default mode should return to its original preset picture Settings whenever the user selects the Default Picture Setting.



## Sleep Mode Settings

- Based on discussion with stakeholders, EPA learned that there is pressure on signage manufacturers to produce low latency sleep modes that enable quick start for certain types of displays.
- These products can have significantly more consumptive sleep modes.
- Therefore, in Section 3.2.5, EPA is proposing use of prompts or the ENERGY STAR mark to indicate when default settings are changed.

- 3.2.5 Sleep Mode Settings: If users can select and enable Sleep Mode functions from a display prompt in On Mode or a settings menu other than a Forced Menu, and if these functions may alter power draw (i.e. quick on) from the default as-shipped Sleep Mode in which the product qualifies for the ENERGY STAR:
- i. The product shall display on-screen information identifying the settings under which the product qualifies for the ENERGY STAR. For example, such information may be indicated by including an electronic ENERGY STAR mark alongside the name or description of the default as-shipped settings or in the form of a message displayed each time any setting other than a default as-shipped setting is selected.
  - ii. Products with a physical ENERGY STAR mark affixed to the front or top of the Display may alternatively display on-screen information that enabling settings other than those under which the product qualifies for the ENERGY STAR may change the energy consumption of the product.



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## Model Data Included in the EPA Analysis

- EPA analyzed models from the ENERGY STAR Certified Products List as of May 2018
- EPA did not received additional non-ENERGY STAR certified model data tested to the ENERGY STAR test method and submitted via the data assembly form
- 886 unique tested models were considered in the Draft 2 analysis

	Total Models Listed On Certified	Unique Tested Model Numbers*
Monitors	953	886

\*EPA identified unique Tested Model Numbers (Column G in dataset) for the data analysis. Accounts for multiple brands and product family representation.



## Total Energy Consumption Calculations

- In Draft 1, stakeholders suggested EPA to revisit resolution allowance, area coefficients, and intercept value in the TEC calculation.
- In response to stakeholder comments, EPA has made a slight revision to the coefficients and intercept values for the Maximum TEC equation in Draft 2.
- EPA has applied a continuous line to provide more balanced requirements across size bins and avoid issues with models that straddle bins.
- EPA welcomes feedback on this proposal.



# V8 Draft 2 Total Energy Consumption Base Limit

Draft 1

3.2 The Maximum TEC ( $E_{TEC\_MAX}$ ) in kWh for Monitors shall be calculated per Table 1.

**Table 1: Calculation of Maximum TEC ( $E_{TEC\_MAX}$ ) for Monitors in kWh**

Area (in <sup>2</sup> )	$E_{TEC\_MAX}$ (kWh)
	Where: A = Viewable screen area in in <sup>2</sup> r = Screen resolution in megapixels The result shall be rounded to the nearest tenth of a kWh for reporting
A < 171	$(3.99 \times r) + (0.123 \times A) + 8.78$
$171 \leq A < 226$	$(3.99 \times r) + (0.123 \times A) + 10.01$
$226 \leq A < 385$	$(3.99 \times r) + (0.123 \times A) + 8.48$
A ≥ 385	$(3.99 \times r) + (0.123 \times A) + 15.53$



Draft 2

Equation 2: Calculation of Maximum TEC ( $E_{TEC\_MAX}$ ) for Monitors in kWh

$$E_{TEC\_MAX} = (4.20 * R) + (0.122 * A) + 8.00$$

Where:

- R is the Total Native Resolution in megapixels
- A is the Screen Area in inches squared

# Total Energy Consumption Limit with Allowances and Adjustment for dc

## Equation 3: Total Energy Consumption Requirement for Monitors

$$E_{TEC} \leq (E_{TEC\_MAX} + E_{EP} + E_{ABC} + E_N + E_T + E_C) \times eff_{AC\_DC}$$

Where:

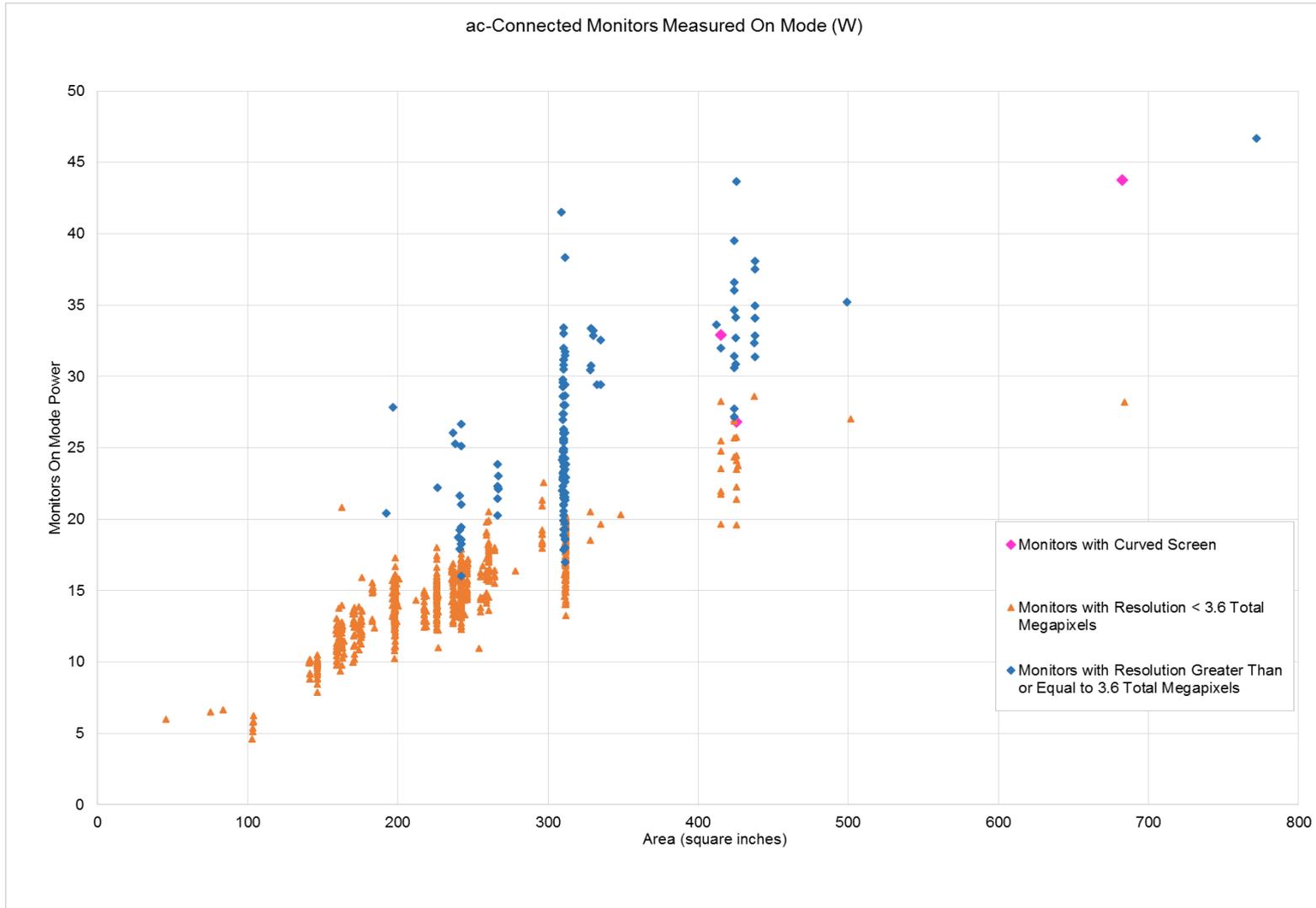
- $E_{TEC}$  is TEC in kWh calculated per Equation 1;
- $E_{TEC\_MAX}$  is the Maximum TEC requirement in kWh calculated per Equation 2;
- $E_{EP}$  is the enhanced performance display allowance in kWh per Section 3.3.4;
- $E_{ABC}$  is the Automatic Brightness Control allowance in kWh per Equation 6;
- $E_N$  is the Full Network Connectivity allowance in kWh per Table 1;
- $E_T$  is the Touch Technology allowance in kWh per Equation 7;
- $E_C$  is the curved Display allowance in kWh per Equation 8; and
- $eff_{AC\_DC}$  is the standard adjustment for ac-dc power conversion losses that occur at the device powering the Display, and is 1.0 for Ac-powered Displays and 0.85 for Displays with Standard dc.



## Factors Considered in the TEC Equation Analysis

- EPA considered the following factors in developing the Draft 2 Total Energy Consumption maximum equation:
  - The relationship between screen area and resolution variables in on mode
  - The Sleep Mode power of the top quartile of energy-efficient models
  - The lack of complete and consistent data for Enhanced Performance Displays and color gamut data
  - The relative pass rate in each size bin once the allowances (ABC, EPD, Touch, Curved) and Total Energy Consumption maximum equation were applied
  - The spread of data and difference between measured Total Energy Consumption and the Draft 2 proposal
  - The overall market penetration of ENERGY STAR Version 7 since its launch
  - The consistency and straightforwardness of the criteria

# Estimating On Mode, Area, and Resolution Relationship





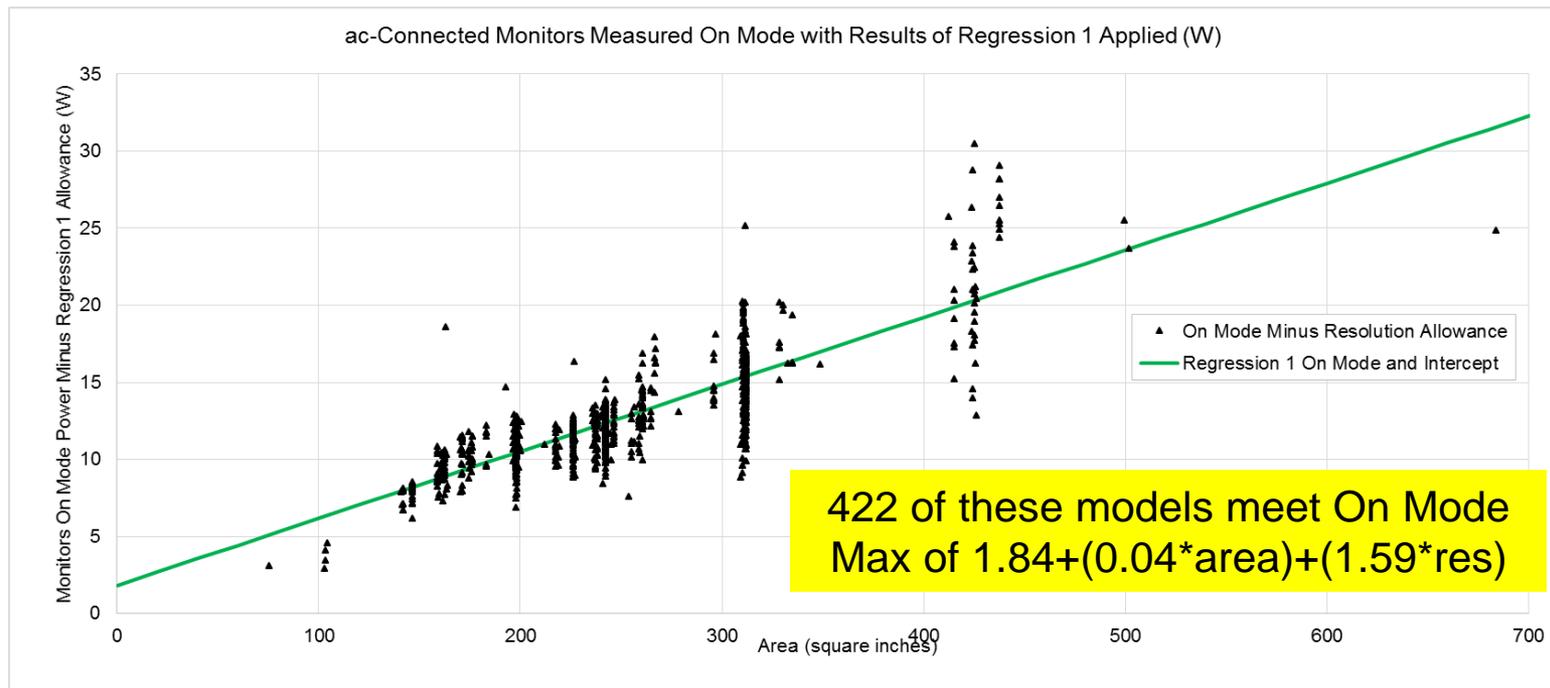
## Estimating On Mode, Area, and Resolution Relationship

- To initially estimate the relationship between On Mode power demand and the major variables, Screen Area and Total Resolution, EPA used regression analysis
- EPA removed models powered by USB, curved screens, models with Touch Functionality enabled in On Mode, and models categorized as EPD II because:
  - Data indicates that these features that affect power
  - There was enough robust data to include these variables in the regression analysis
- In total, there were 838 models included in the regression analysis

# Estimating On Mode, Area, and Resolution Relationship

- STEP 1: Regression on the 838 selected models:

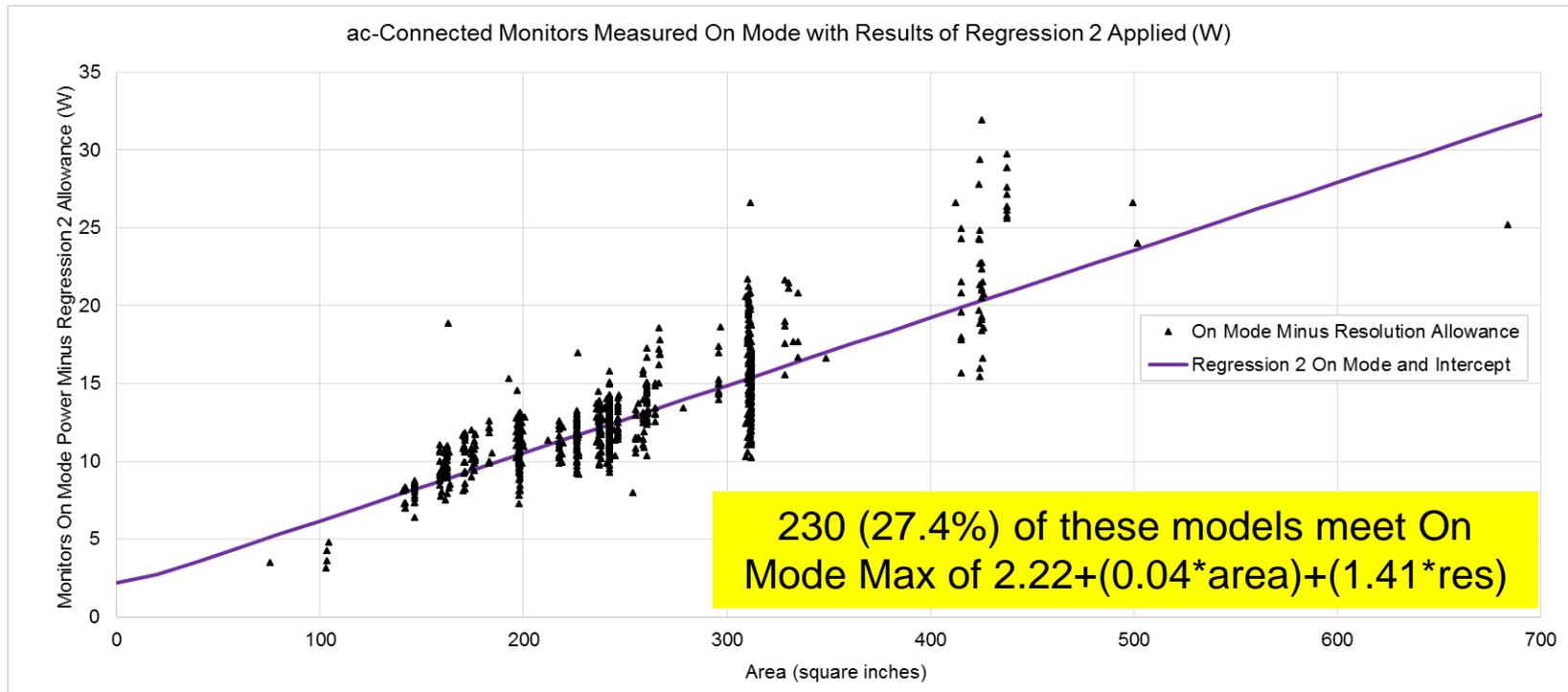
	Value	P-value
Intercept	1.84	4.E-12
Area Coefficient	0.04	5.E-186
Resolution Coefficient	1.59	2.E-202



# Estimating On Mode, Area, and Resolution Relationship

- STEP 2: Regression on the 422 models meeting regression 1:

	Value	P-value
Intercept	2.22	6.E-23
Area Coefficient	0.04	7.E-153
Resolution Coefficient	1.41	3.E-183



## Estimating On Mode, Area, and Resolution Relationship

- STEP 3: Translate the On Mode (W) values onto Total Energy Consumption equivalent (kWh)
  - 365 days/year x 24 hours/day \* ((0.35 x On Mode(W))+(0.65 x Sleep Mode (W))

### Equation 1: Total Energy Consumption Calculation

$$E_{TEC} = 8.76 \times (0.35 \times P_{ON} + 0.65 \times P_{SLEEP})$$



	On Mode Value	TEC Value *8.76*0.35
Intercept	2.22	6.82
Area Coefficient	0.04	0.12
Resolution Coefficient	1.41	4.33



## Sleep Mode Analysis

- STEP 4: Incorporating Sleep Mode (W)
  - Below is a statistical summary of the Sleep Mode (W) data for ac-powered Monitors:

	Sleep Mode (W)
25th Percentile	0.19
50th Percentile	0.24
75th Percentile	0.31
Maximum	1.70
Average	0.27



## Sleep Mode Analysis

- STEP 5: Incorporating Sleep Mode (W)
  - Translating Sleep Mode (W) to Total Energy Consumption
  - $8.76 * (0.65 * 0.19 \text{ W}) = 1.08 \text{ kWh}$
- STEP 6: Combining Sleep Mode TEC value with On Mode TEC intercept value
  - $0.12 * \text{Area} + 4.33 * \text{Resolution} + 6.82 + 1.08$
  - $0.12 * \text{Area} + 4.33 * \text{Resolution} + 7.9$
- STEP 7: Compare the above TEC equation with the dataset once the enhanced performance display and curved monitor allowances are applied



## Enhanced Performance Display (EPD) Allowances

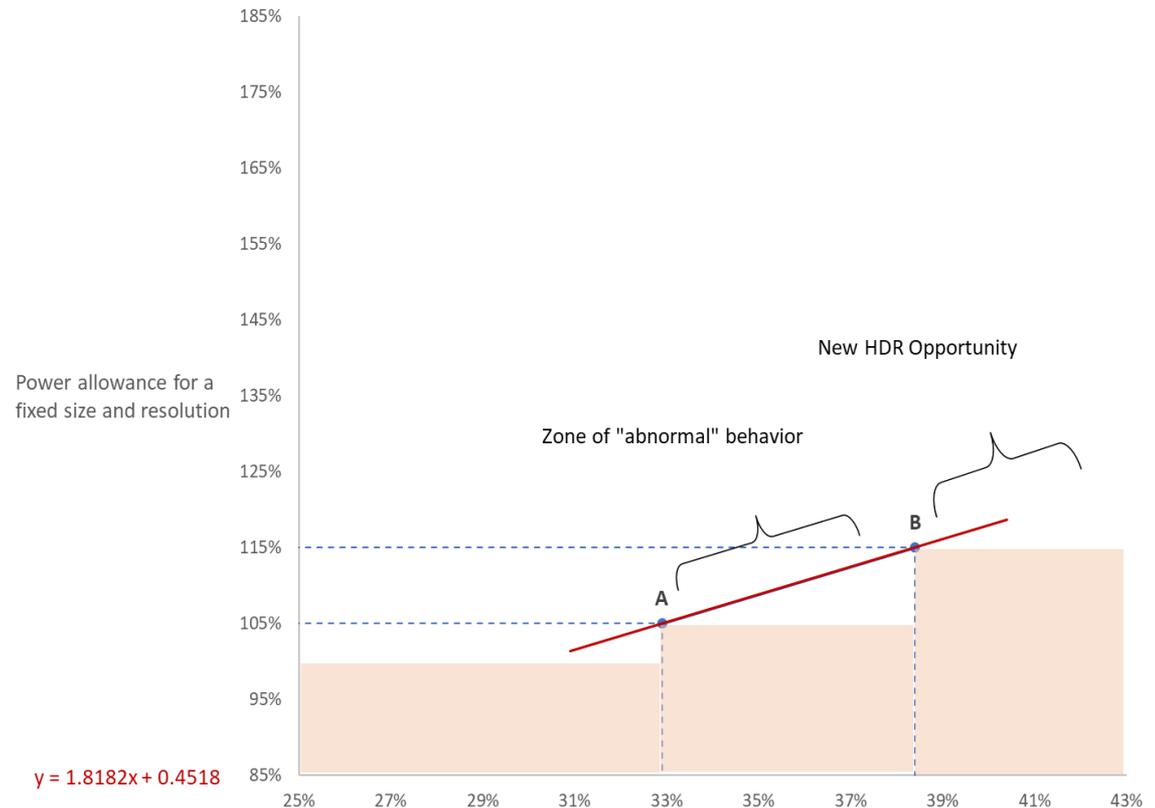
- In response to Draft 1, stakeholders suggested EPA develop a continuous function to apply to an energy allowance for the variable Color Gamut instead of applying two separate discrete allowances.
- EPA reviewed the dataset and analyzed a select group of models with the percentage Color Gamut reported correctly.
- EPA found no significant relationship between Color Gamut and power for models with Total Native Resolution below 3.6 megapixels.
- Further a substantial amount of models below 3.6 megapixels are able to meet the Draft 2 proposed energy requirements without an additional allowance.



# Enhanced Performance Display Allowance Stakeholder Feedback

Stakeholders commented that two discrete allowances for EPD 1 (lower color coverage) and EPD 2 (higher color coverage) did not account for monitors that were in the middle of the color coverage (33-39% of CIE) or above 39%

Requested EPA propose a continuous allowance based on color gamut





## Color Gamut Data Analysis Summary

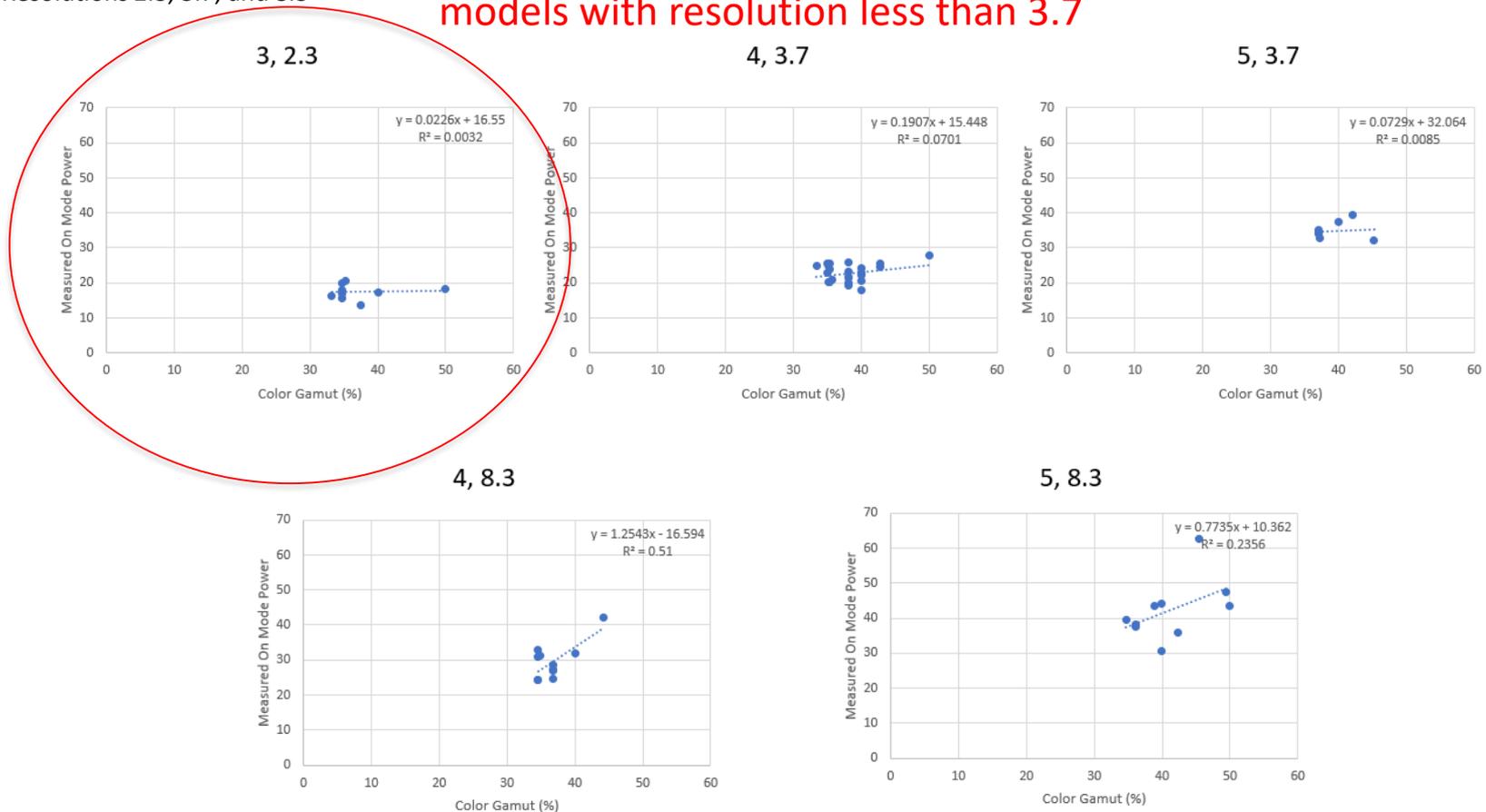
- In the Version 7 specification QPX, EPA required CBs to report color gamut as a percentage (%) of CIE space
  - The data was inconsistently reports as decimals and percentages and to apparently different gamuts and/or space (i.e. 80% sRGB instead of 31% CIE)
  - Data was reviewed and scrubbed leaving only a subset of models (132 unique tested monitors) available for analysis where data were relatively reliable
  - EPA categorized models by resolution and size bins to see if there was a positive trend for color gamut and On Mode Power (W)



- Size categories:
  - A<171 Category 1
  - A<226 Category 2
  - A<266 Category 3
  - A<385 Category 4
  - A>385 Category 5
- Resolutions 2.3, 3.7, and 8.3

## Size and Resolution Bins (size, resolution)

No strong relationship between power and color gamut for models with resolution less than 3.7





## Color Gamut Proposal

3.3.4 For Monitors meeting the enhanced performance display (EPD) requirements below, the energy allowance in Equation 4 shall be applied to the Total Energy Consumption requirement in Equation 3:

- i. Contrast ratio of at least 60:1 measured at a horizontal viewing angle of at least 85° from the perpendicular on a flat screen and at least 83° from the perpendicular on a curved screen, with or without a screen cover glass;
- ii. A native resolution greater than or equal to 3.6 megapixels (MP); and
- iii. Color Gamut greater than or equal to 32.9% of CIE LUV.

Increased resolution minimum from 2.6 to 3.6 MP

### Equation 4: Calculation of Energy Allowance for Enhanced Performance Displays

$$E_{EP} = 0.14 \times G$$

Linear continuous equation to capture ~27% of higher color models

Where:

- $E_{EP}$  is the enhanced performance display energy allowance in kWh
- $G$  is Color Gamut expressed as a percentage of CIE LUV

Note: A model supporting greater than 99% of the sRGB color space translates to 32.9% of CIE LUV and a model supporting greater than 99% of Adobe RGB translates to 38.4% of CIE LUV.



## Gaming Monitors

- In Draft 1, EPA requested feedback and data on monitors marketed as a 'gaming monitor.'
- EPA received no feedback on how to define gaming monitors or any model specific data tested to ENERGY STAR indicating the monitors marketed for gaming functions demand more power in On Mode.
- One stakeholder did comment that gaming monitors use "double the logic power" and "reduce transmittance," however, no model-level data was provided to support adopting an allowance.
- Through a web search of a subset of models, EPA did identify seven models with significant marketing for gaming application, three of these models meet Draft 2



- EPA has not proposed any allowance for 'gaming monitors' in the Draft 2 specification.

## HDR Functionality

- EPA received stakeholder comments regarding HDR functionality.
- The existing ENERGY STAR displays test method does not have procedure in place to assess displaying native or upscaled HDR content and would require a substantial revision and review process.
- To date, EPA has received no specific model data for Monitors indicating that HDR capability leads to more power demand under the ENERGY STAR test procedures.
- Through a web search of a subset of models, EPA identified eight models with HDR capability and three of these models meet Draft 2.



- EPA, therefore, does not propose an HDR allowance and has identified HDR testing in Section 7: Considerations for Future Revisions.
- In the meantime, EPA continues to welcome market data that indicates how prevalent HDR content viewing is among monitors in the field.



## Curved Monitors

- Several stakeholders suggested EPA include an energy allowance for curved monitors because of the decreased transmittance compared to flat monitor.
- Without an allowance, none of the four curved monitors in the dataset meet the proposed Draft 2 criteria.



- EPA is proposing a 5% of TEC\_MAX allowance for curved monitors.
- One of the four curved monitors in the dataset meets Draft 2 with this allowance.



## Other Allowances for Monitors

### Occupancy Sensor Allowance

- In Draft 2, EPA is proposing to remove the Occupancy Sensor allowance for Computer Monitors.
- There is no data indicating models have this feature or that the presence of such feature will draw significantly more power.

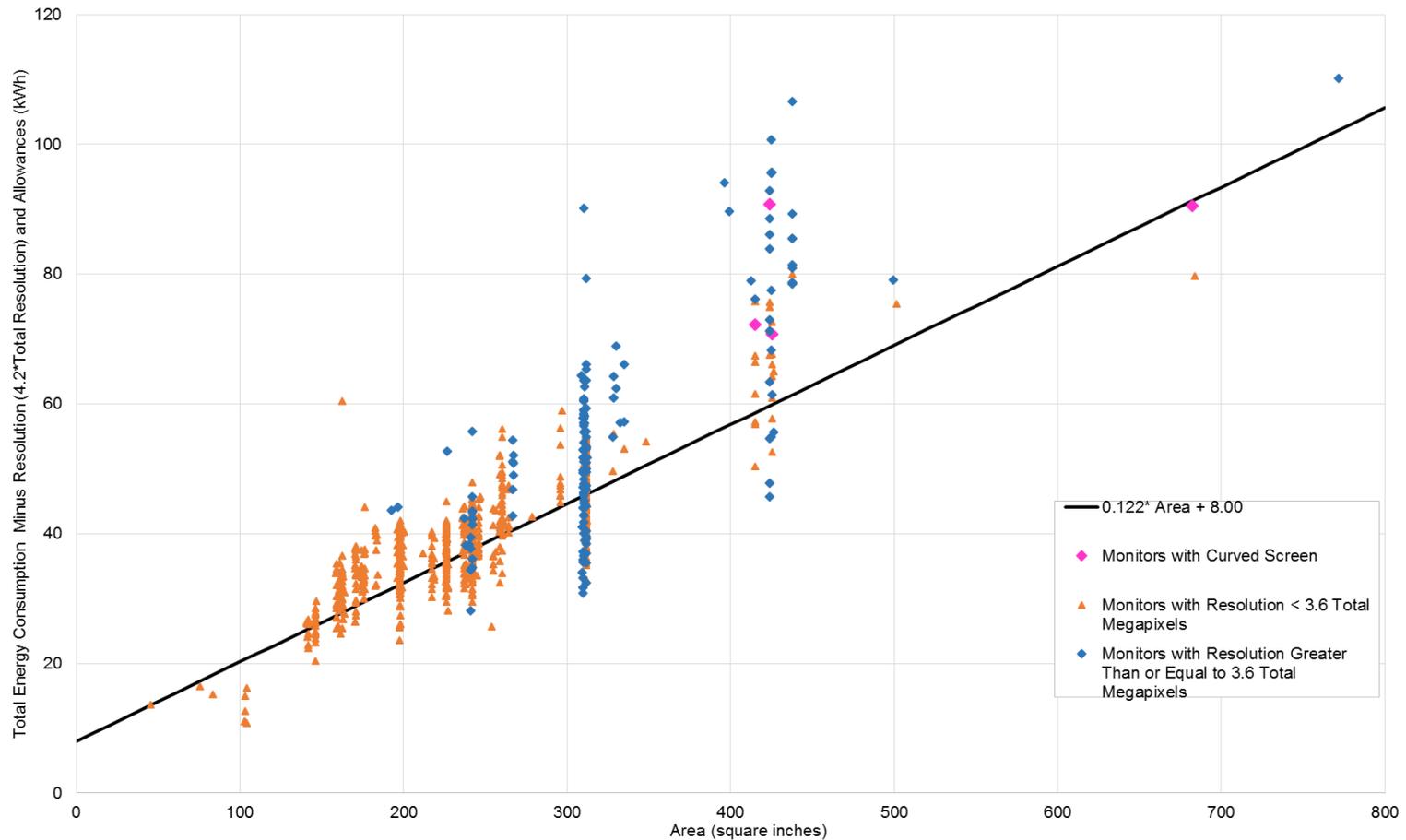
### Energy Allowance for Touch Technology ( $E_T$ )

- In Draft 2, EPA proposes a revision to the energy allowance for monitors with touch technology from 20% in Draft 1 to 15% percent of  $E_{TEC\_MAX}$ .
- A 15% allowance allows 22% of the models (versus 44% of the models) with touch enabled by default to meet the energy requirements with another several models within 2% of the requirements.



# Draft 2 Monitor TEC Graphical Representation

Draft 2 Version 8 Total Energy Consumption Requirements for AC-Powered Monitors



## Draft 2 Monitor Pass Rates

### Occupancy Sensor Allowance

- Below are the pass rates among size bins
- 2017 ENERGY STAR Market Penetration\* for monitors was 94%
  - Approximate market penetration of V8 Draft 2 is 26%

All Models	Diagonal Screen Size (in)	Total Models in Dataset	# Meeting V8 Draft 2	% Meeting V8 Draft 2
$A < 171$	$d < 20$	102	30	29.4%
$171 \leq A < 226$	$20 \leq d < 23$	200	36	18.0%
$226 \leq A < 267$	$23 \leq d < 25$	312	94	30.1%
$267 \leq A < 385$	$25 \leq d < 30$	212	72	34.0%
$A \geq 385$	$30 \leq d$	60	12	20.0%
	<b>ALL</b>	<b>886</b>	<b>244</b>	<b>27.5%</b>

\*Source: [www.energystar.gov/usd](http://www.energystar.gov/usd)



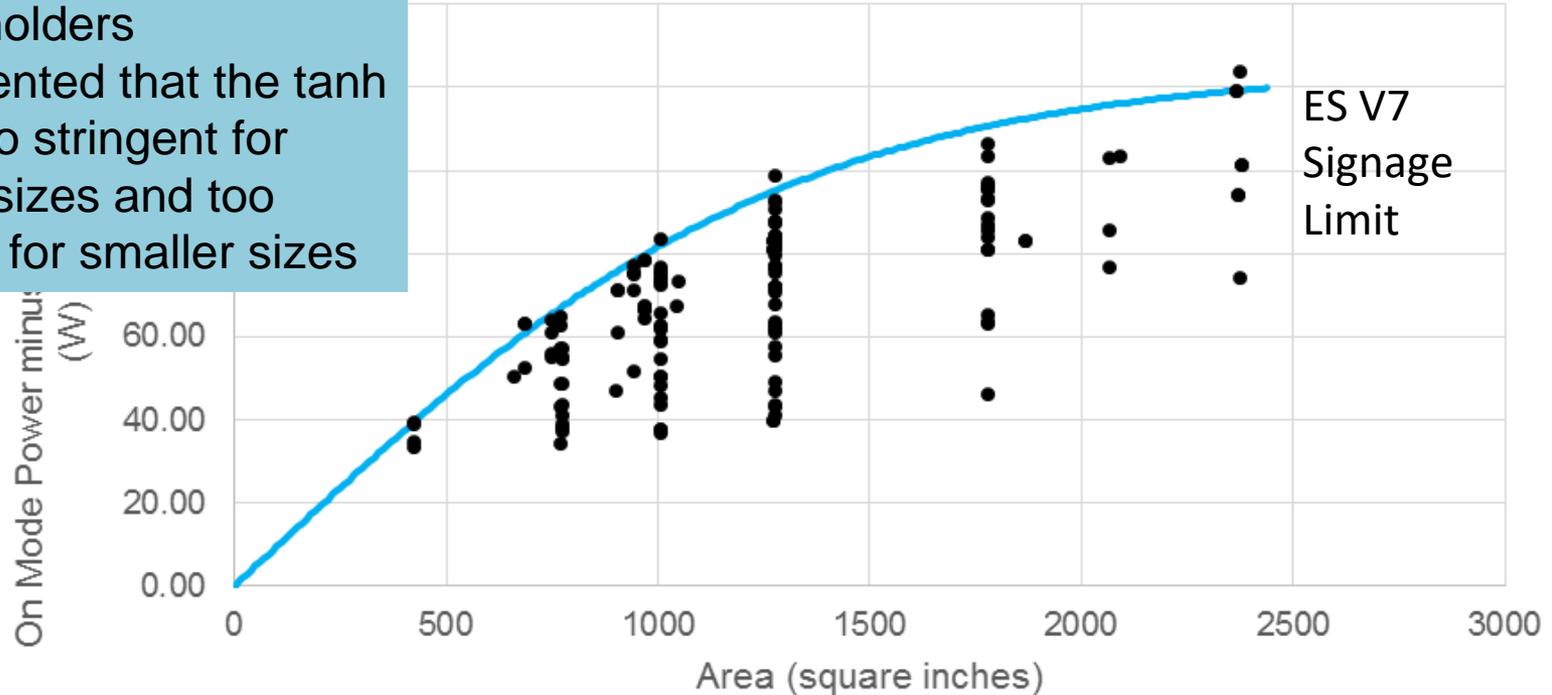
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# Signage Displays Current Dataset

Signage Displays On Mode Power Minus Lum Allowance

Stakeholders commented that the tanh was too stringent for larger sizes and too lenient for smaller sizes





## Draft 2 Signage Display On Mode Requirements

- In Draft 2, EPA has revised the limit to recognize top models across varying sizes, luminance, and resolution.
- The revised hyperbolic tangent equation has an asymptote of 135 W compared to 125 W in Draft 1 for On Mode Power minus the luminance allowance.
- EPA welcomes stakeholder feedback on this proposal.

### Equation 9: Calculation of Maximum On Mode Power ( $P_{ON\_MAX}$ ) in Watts for Signage Displays

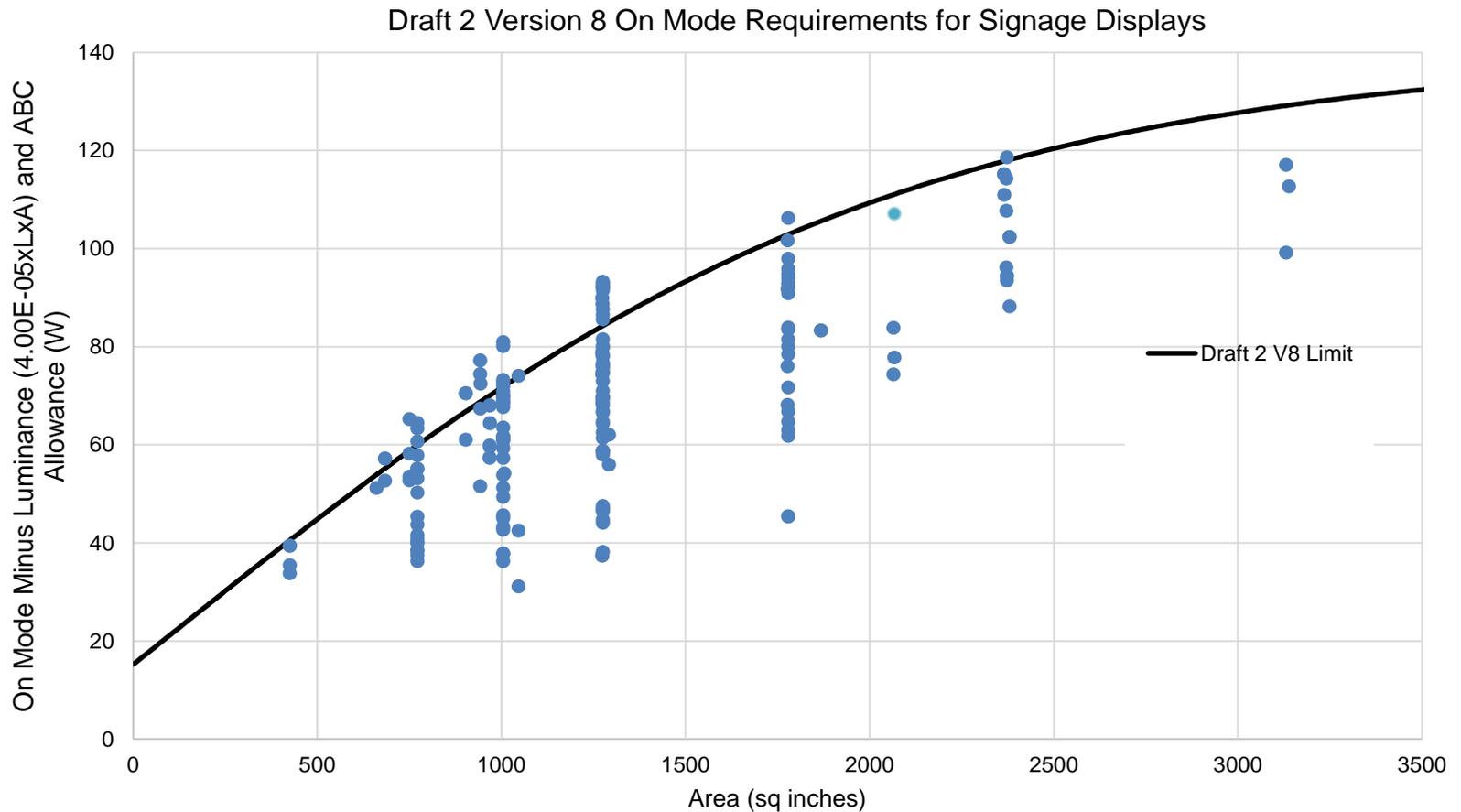
$$P_{ON\_MAX} = (4.0 \times 10^{-5} \times \ell \times A) + 120 \times \tanh(0.0005 \times (A - 140.0) + 0.03) + 20$$

Where:

- $P_{ON\_MAX}$  is the Maximum on Mode Power, in watts;
- $A$  is the Screen Area in square inches;
- $\ell$  is the Maximum Measured Luminance of the Display in candelas per square meter, as measured in Section 6.2 of the test method; and
- The result shall be rounded to the nearest tenth of a watt for reporting.



## Graphical Representation of Draft 2 V8 On Mode Requirements for Signage Displays



## Draft 2 Signage Pass Rate

- 2017 ENERGY STAR Market Penetration for Signage Displays was 29%
- Approximate V8 Draft 2 market penetration is 25%

Diagonal (in)	Total	% of Total Dataset	# Meeting Draft 2	% Meeting Draft 2
<48	39	23%	30	77%
48>=d<52	34	20%	28	82%
52>=d<56	53	31%	43	81%
>=56	44	26%	42	95%
<b>ALL</b>	<b>170</b>		<b>145</b>	<b>85%</b>



## Tiled Display System

- In Draft 2, EPA is proposing to assess the total combined screen area of a Tiled Display System as it is primarily intended to display images equivalent to the total area.
- EPA welcomes feedback on this proposal and any additional data for these systems in both On Mode and Sleep Mode.

### 3.4 Tiled Display Systems

- 3.4.1 Tiled Display Systems shall meet the Signage Display On Mode criteria for the total screen area of the Maximum Tiled Configuration.

Note: The total Screen Area of 4 x 4 Tiled Displays System of individual 42-inch diagonal screen size (height 23.3 inches and length 41.5 inches) displays is calculated as  $(2 \times 23.3'') \times (2 \times 41.5'')$  equal to 3867.8 square inches. The Tiled Display System shall meet the On Mode criteria for a 3,867.8 square inch Signage Display.



## Signage Display Plug-in and Embedded Computing

- EPA does not have model level data indicating that Signage Displays with plug-in modules or embedded modules demand more power
- The ENERGY STAR test method does not directly test computing functionality
- These models appear to provide similar functions to Smart TVs which do not require an additional allowance under the V8 specification for televisions



- Therefore, EPA is not proposing an allowance for computing functionality at this time.



# Webinar Agenda

Time	Topic
12:00 – 12:10	Introductions
12:10 – 12:30	Draft 2 Definitions, Scope, General Requirements
12:30 – 1:10	Draft 2 Monitor Requirements
1:10 – 1:30	Draft 2 Signage Displays Requirements
1:30 – 1:45	Draft 2 Test Method
1:45 – 2:00	Open Discussion, Next Steps



## Definitions

- In response feedback received on Draft 1, EPA and DOE are proposing the definition of Tiled Display System and Maximum Tiled Configuration.
- EPA and DOE welcome stakeholder feedback on this proposal.

- B) Tiled Display System: An array of individual Displays or panels tiled together contiguously and supported by single external controller and single external power supply to produce a single larger image.
- C) Maximum Tiled Configuration: At Tiled Display System with the maximum number of panels supported by the power supply and controller.

Note: Typical Maximum Tiled Configurations include a 2 x 2 configuration (four display panels). In this example, the minimum configuration would include a single panel operating with the power supply and controller rated for a total of four panels. For the purposes of the ENERGY STAR test, only the Maximum Tiled Configuration is considered.



## Test Conduct

- In Draft 2, EPA and DOE are proposing new guidelines shown below for testing the maximum configurations of tiled displays that are being considered in the Draft 2 Version 8.0 ENERGY STAR specification.
- EPA and DOE welcomes stakeholder feedback.

E) Tiled Display Systems: Products that meet the definition of Tiled Displays Systems shall be tested in the Maximum Tiled Configuration which is considered the UUT. The power meter shall be placed between the power source and external power supply supporting the maximum number of panels.



## Signal Interface

- EPA and DOE are proposing to add USB-C to the signal interface order of testing preference list above.
- This is because of the increasing prevalence of Monitors and computers with USB-C.
- Stakeholder comments on the proposal are welcome.



## Host Machine

- In response to stakeholder comment on prior draft test method, EPA and DOE are proposing the procedure below to ensure that any host machine does not have a battery, or, if a host machine with a battery is required to operate the UUT, the battery is fully charged. The host machine must be connected to an ac source prior to the test.

### H) Host Machine and Video Input Signal:

- 1) The Host Machine shall generate the video input signal in the native resolution of the Display such that the active area of the video fills the entire screen. This may require the playback software to adjust the aspect ratio of the video.
- 2) The frame rate of the video input signal should match the frame rate most commonly used in the region in which the product is sold (e.g., For the US and Japan a 60 Hz frame rate is used; for Europe and Australia a 50 Hz frame rate is used).
- 3) The audio settings on the Host Machine shall be disabled so that no sound is produced alongside the video input signal.
- 4) The Host Machine shall not have a battery and must operate on its own ac power source (e.g. desktop computer, Blu-ray player, etc.). If a UUT must be used with a Host Machine that requires a battery, ensure that the battery is fully charged and the Host Machine is connected to an ac power source prior to connecting to the UUT.



# Questions?



# Webinar Agenda

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## Open Discussion

- DOE and EPA would now like to open up the line for any general comments from stakeholders.



## Written Comments

- In addition to making verbal comments during today's call, stakeholders are encouraged to submit written comments to [displays@energystar.gov](mailto:displays@energystar.gov).

### Comment Deadline

Wednesday, September 26, 2018



## Specification Development Timeline

- EPA is proposing the following Version 8.0 specification development timeline:

Event	Date
September 26	Draft 2 Comments Due
November 7	Final Draft Published
December 19	Final Specification Published
	Version 8.0 Effective



## Contact Information

Please send any additional comments to [displays@energystar.gov](mailto:displays@energystar.gov) or contact:

For questions regarding the specification, you may contact James Kwon at [Kwon.James@epa.gov](mailto:Kwon.James@epa.gov) or (202) 564-8538.

For questions regarding the test procedures, you may contact Jeremy Dommu at [Jeremy.Dommu@ee.doe.gov](mailto:Jeremy.Dommu@ee.doe.gov) or (202) 586-9870.

Thank you for participating!

