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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460



## OFFICE OF AIR AND RADIATION

September 9, 2021

Dear ENERGY STAR® Televisions Brand Owner or Other Interested Party,

The U.S. Environmental Protection Agency (EPA) is revising the ENERGY STAR Televisions specification and most recently published the [Version 9.0 Draft 2 specification](#) for review and comment on April 22, 2021. In response to stakeholder feedback on the Draft 2 and subsequent further discussions with stakeholders, EPA is proposing changes to aspects of the On Mode criteria that relate to the High Contrast Ratio (HCR) capabilities of some display technologies. EPA is now releasing a limited topic proposal to provide stakeholders an opportunity to comment on the proposed changes before releasing a Version 9.0 Final Draft specification. **Comments on this limited topic proposal may be submitted no later than October 7, 2021.**

### Stakeholder Comments Regarding the Version 9.0 Draft 2 HCR Criteria

EPA received public comments from several stakeholders in response to the Version 9.0 Draft 2 specification. They can be found on the [ENERGY STAR Televisions Version 9.0 product development webpage](#). Comments regarding the proposed HCR criteria can be condensed into two main considerations:

1. EPA should more clearly specify the technical characteristics that a TV must possess to qualify for the HCR Adjustment Factor so that the risk of certification bodies incorrectly designating models is reduced.
2. EPA should monitor TV technology development to ensure that no new display technology makes the HCR Adjustment Factor unnecessary and reevaluate the current value of the HCR Adjustment Factor to confirm that it reflects an aspirational level.

EPA also received test data measured per a recent draft of *CTA-2037C*, the test procedure specified for use in the Version 9.0 specification, for an additional five OLED TV models from two stakeholders. *CTA-2037C* was near completion at the time of reference and no subsequent changes to the procedure affect the relevance of this data. Considering this feedback and the submitted data, EPA is proposing refinements to the definition of an HCR Display and the value of the HCR Adjustment Factor through this limited topic proposal.

### Proposed Definition Refinement

A TV must meet the definition of an HCR Display as outlined in the Version 9.0 specification to qualify for the HCR Adjustment Factor. The definition for an HCR Display was presented in the Draft 2 specification as follows:

*A display where pixels emit no light when displaying a pure black color, thus yielding a contrast ratio of infinity:1 when comparing these pixels against those that do emit light.*

According to several stakeholders, this assertion of an infinity-to-1 contrast ratio has been a heavily debated marketing claim. EPA thus proposes the following definition for an HCR Display to reduce the possibility of a Certification Body incorrectly designating whether the HCR Adjustment Factor should be applied:

*A display where pixels emit no light when displaying a pure black color.*

EPA believes that this simplified definition for an HCR Display eliminates the possibility of marketing materials influencing a Certification Body's decision to apply the HCR Adjustment factor. After brief research into the display technologies available today (e.g., LCD, OLED, etc.), EPA has been able to easily determine those that are able to disable individual pixels and thus project no light when displaying a pure black color on-screen.

### **Proposed Changes to the HCR Adjustment Factor**

The value of the HCR Adjustment Factor as presented in Draft 2 varies depending on the viewable screen area of the TV being evaluated. This relationship is defined by the following equation:

$$\text{HCR Adjustment Factor Value} = 0.4588 \times \text{Area}^{0.138}$$

The analysis leading to Draft 2 indicated that there was no available TV model meeting the definition of an HCR Display that could meet the On Mode criteria without some allowance. EPA then developed the HCR Adjustment Factor with the intention of providing HCR TVs with an On Mode efficiency target that encourages demonstrable efficiency improvements.

In response to the Draft 2 specification, EPA received On Mode testing data for an additional five OLED TVs, all of which would qualify for the HCR Adjustment Factor. These models all have a screen size (diagonal) of 65 inches. Analysis of this data confirms the idea that models meeting the definition of an HCR Display will not be able to meet requirements without some allowance but updates EPA's understanding of the size of the adder that would be needed to allow any OLED models to earn ENERGY STAR certification.

Per Draft 2, the proposed value of the HCR Adjustment factor with a 65 inch diagonal screen size is 1.29 or 29%. This means that an HCR TV of this size would be able to meet On Mode Power requirements while using 29% more On Mode Power on average than a non-HCR TV with the same diagonal screen size and measured dynamic luminance. However, the data from the five newly submitted TVs indicates that all five models were within 20% of the requirement. The performances of these five TVs with respect to the proposed On Mode Power requirements are outlined below:

Model (anonymous identifier)	O3	O4	O5	O6	O7
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% Over the Proposed On Mode Power Requirement	12%	15%	20%	16%	18%
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\*For example: O3 was measured to use 12% more W than allowed by the proposed On Mode Power requirement

This data demonstrates that the Adjustment Factor proposed in Draft 2 does not fulfill its intended purpose of recognizing the most efficient HCR models. Further investigation indicates that an explanation for this overestimation is likely the absence of information regarding High Dynamic Range (HDR) picture settings from the dataset that informed Draft 2 – TVs with individual pixel control are especially efficient in an HDR picture setting when compared to LCD TVs because they achieve a black color by turning off a pixel rather than using a filter. By using data for only Standard Dynamic Range (SDR) picture settings, the models in the Draft 2 dataset did not capture this benefit and the added energy need was skewed high. This review of the referenced dataset against the newly submitted data also suggests that the correlation between viewable screen area and needed allowance is not as strong as previously indicated.

As such, EPA proposes a universal HCR Adjustment Factor of 1.12 allowing the very top-performing HCR-capable TVs to qualify while encouraging significant efficiency improvements for most HCR TVs to meet these On Mode requirements. This requirement would be presented in the Version 9.0 Final Draft specification as:

**Table 2: Average Limit of On Mode Power,  $P_{OA\_Average\_Limit}$ , Adjustment Factors**

$P_{OA\_MAX}$ Adjustment Factor (AF)	Value
$AF_{HCR}$	1.12

- The  $AF_{HCR}$  adjustment factor applies to TVHTDs that are determined by the Certification Body, through evaluation of the TV's display technology, to meet the definition of an HCR Display.

### Comment Submission

Stakeholders are encouraged to provide written comments for EPA consideration to [Televisions@energystar.gov](mailto:Televisions@energystar.gov) by **October 7, 2021**. EPA also invites stakeholders to submit any data taken per CTA-2037C relevant to the Adjustment Factor value proposed by this document. All comments will be posted to the [ENERGY STAR Televisions product development website](#) unless the submitter requests otherwise.

Please contact me at (202) 564-8538 or [Kwon.James@epa.gov](mailto:Kwon.James@epa.gov), or Cody Niblett at (202) 862-1245 or [Cody.Niblett@icf.com](mailto:Cody.Niblett@icf.com), with questions or to share feedback for this effort.

Thank you for your continued support of ENERGY STAR.

Sincerely,



James Kwon, EPA Product Manager  
ENERGY STAR for Consumer Electronics

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