



NRDC Input on ENERGY STAR Version 9.0 Draft 1 TV Specification

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On behalf of the Natural Resources Defense Council (NRDC) and its more than 3 million members and on-line activists, we respectfully submit our feedback on ENERGY STAR's Version 9.0 Draft 1 specification for televisions.

I. NRDC fully supports ENERGY STAR's decision to establish a new blended metric focused on how efficiently a TV delivers light, and to include three power tests (standard dynamic range (SDR) -default preset picture setting, SDR -brightest preset picture setting, and high dynamic range (HDR) and default picture setting).

One of the main determinants of a TV's energy use is screen brightness and how efficiently a TV produces and delivers that light. The current on-mode power use metric used by ENERGY STAR can drive manufacturers to producing dimmer TVs as a means to perform well during laboratory testing in its default conditions and potential gaming by manufacturers. For example a TV that ships with a somewhat dim picture or poorly implemented automatic brightness control software in order to qualify for ENERGY STAR may likely result in unsatisfied consumers who then seek out a brighter picture through a different preset picture setting or manually increasing the brightness. (Note, some manufacturers automatically disable key energy saving features like ABC when the user picks a preset picture setting other than the default.)

The new approach is superior in many ways and we look forward to working with ENERGY STAR and other stakeholders to effectively implement it.

ENERGY STAR has added two new tests, power measured when playing a SDR test clip at the brightest preset picture setting and a HDR test clip at the default

preset picture setting. We think these additions are justified as recent surveys show that many users elect to change the picture setting from the default and because many of today's TVs turn off all energy saving features when in HDR mode. EPA's approach will ensure that manufacturers design their TVs to be energy efficient not only in the default as shipped setting and playing SDR content, but also when other pre set picture settings are selected and/or when HDR content is being played.

While these additions add some additional testing burden, these two tests are done with automatic brightness control disabled, negating the need to perform testing at four different room lighting levels.

II. Wait until the test method is finalized and testing data is available before determining the efficiency levels and power limits.

The TV manufacturers and technical experts are working hard to finalize the details around the laboratory procedure for measuring screen luminance. This new method uses a dynamic video clip and measures luminance over the whole screen vs the current method which uses a static image of 3 test bars and measurement at single point. The new approach has the potential to deliver significantly more accurate screen luminance test results.

As we understand it, additional work needs to be done before language can be locked down regarding the camera photometer – the aperture to be used and how far the camera should be from the TV during the measurement. We are hopeful this work can be finalized in the next few weeks and that some robin testing will be done to validate the reproducibility of the test.

The next step is to test a representative cross section of TVs per the new test method, both in active and standby modes and for that data to be reported to ENERGY STAR to inform their spec setting process. The leading TV makers have already committed publicly to actively engage in the processes to update the test method and to perform such testing. (See recent [agreement](#) signed by the leading TV manufacturers as well as NRDC.)

Assuming the test method can be finalized and the testing completed within the next few months, we urge EPA to hold off on further decisions regarding the shape and slope of the lines under consideration for Version 9. It's in everyone's best interest to avoid issuance of a specification that is based on old data collected per an older version of the test method that yields different luminance and power results.

III. More careful consideration is needed regarding the specification lines and setting allowances for TVs with differing resolutions

The proposed specification appears to be insufficiently stringent for small to mid-sized TVs. Per EPA’s analysis shown below, the pass rates for TVs <52.5 inches, which likely represents about half of all TV sales, is between 45 and 50%. This is way too high for an ENERGY STAR specification.

Metric	Pass		Pass Rate by Screen Diagonal					
	count	Rate		47.5"<x	52.5"<x	59.5"<x	69.5"<x	80"<x<
	All	All	<=47.5"	<=52.5"	<=59.5"	<=69.5"	<=80"	=90"
Standby-active low	90	84%	90%	91%	79%	84%	84%	82%
On-mode	30	28%	50%	45%	17%	31%	21%	18%
Total	27	25%	50%	45%	17%	28%	16%	9%

Assumes all TVs pass smart speaker test

When developing the next draft, we recommend EPA:

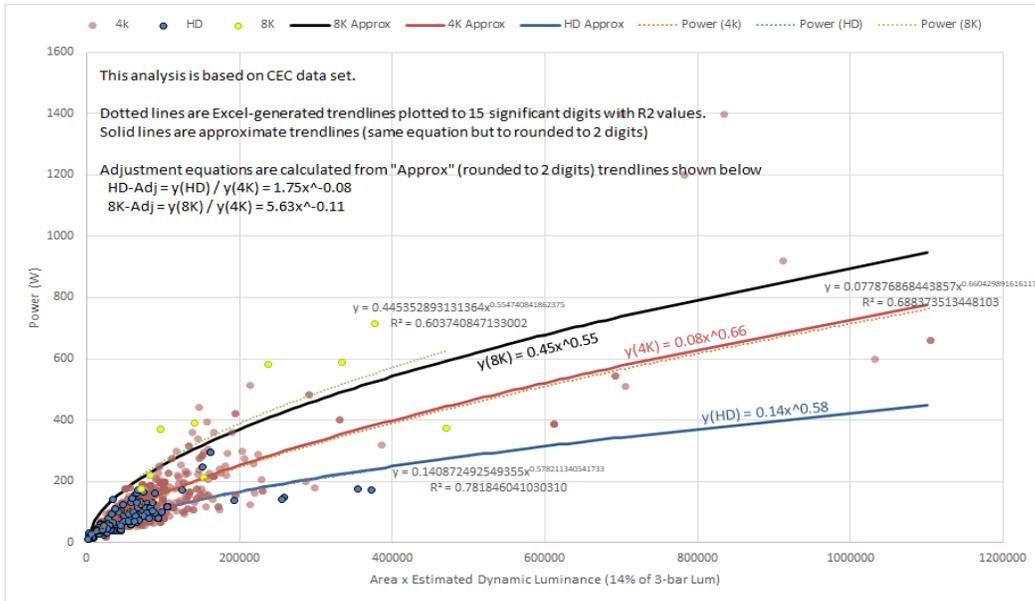
- a) Find a way to set the pass rate for each screen size bin to 25% or lower
- b) Provide a breakout by screen resolution to determine what % of HD, 4K and 8K TVs pass. The current adders seem overly generous.
- c) Provide supporting data that shows the annual energy use of the tested TVs compared to the proposed specification levels.

IV. Delay setting levels for 8K models until sufficient additional testing data is available

TVs that offer 8K resolution are in the very early stages of their market launch, with unit sales well under 10% of the total market. In addition, there is currently a scarcity of native 8K content for viewers to watch.

As is common with the launch of many new products, the initial models have not yet been optimized for energy use. We expect the energy use of model year 2021 and 2022 8K TVs to be significantly lower than those on the market today. As there is likely to be very limited data on the energy use of today’s 8K TVs per the new test method, we think its premature to set a level for them at this time.

Per its current proposal, it appears that ENERGY STAR qualified 8K TVs would be able to use almost 3 times more power than a similar sized ENERGY STAR qualified HD TV. This seems extremely excessive and warrants much closer study.



For the above reasons we recommend EPA put a placeholder in its Version 9.0 specification for future 8K TV requirements and to wait till it has sufficient test data for model year 2021 TVs before including them in the program. EPA could at that point update its specification and 8K TVs could then be eligible for ENERGY STAR under a Version 9.1.

V. Further discussion on the need for and magnitude of a high contrast ratio allowance for TVs is needed.

ENERGY STAR is proposing inclusion of a 25% power adder for TVs defined as having a high contrast ratio -- greater than 1 million to one ratio between the luminance of the brightest white and the darkest black that a TV can produce. Today it appears that only OLED (organic light emitting diode) TVs can achieve this level, in part due to their ability to deliver almost completely black images due to the nature of their design.

As ENERGY STAR points out a new technology able to achieve very high contrast ratios called Quantum Dot Conversion is due to soon enter the market and it may well consume less energy than OLEDs and even conventional LED TVs.

At this time, NRDC recommends:

- a) ENERGY STAR waits until it has in hand the on mode power testing results of both OLED and LED TVs before making a decision whether or not to include a HCR adder and how large it should be.
- b) In almost all cases, its better policy to use a technology neutral and

performance-based approach to setting energy limits, such as those contained in other ENERGY STAR specifications. It's unclear to us why an OLED TV that uses 25% more power than a same sized LED TV should receive the ENERGY STAR label. Such an approach does not seem warranted for a voluntary, consumer facing program designed to help consumers identify and select the energy saving models.

- c) Should ENERGY STAR decide to include a high contrast ratio adder for OLED TVs in Version 9.0, we encourage EPA to include language indicating the potential sunset of this adder pending additional developments such as the introduction of TVs like those that utilize Quantum Dot Conversion and offer high contrast ratios, without the added power.

VI. While we support ENERGY STAR's efforts to update its testing approach and requirements for measuring standby power levels in order to better reflect the levels consumers are likely to experience for their internet connected TVs, additional refinements to the test method and specification are needed.

The vast majority of TVs sold today are connected to the internet, typically through Wi-Fi. The current DOE test method for measuring standby-active low and standby-active high is flawed as the TV is not connected to a live internet signal during testing. (The only requirement is to connect the TV to a router but not for the router to be connected to a live internet connection.)

Recent testing by NRDC and others has shown that some TV models continuously consume between 10 and 15 Watts of standby power when connected to Wi-Fi and if: a) the TV is connected to a wireless speaker like an Amazon Echo (also commonly known as Alexa) with wake by voice feature enabled and/or b) the TV's "wake by cast" feature is enabled. (We also want to point out that preliminary testing performed by NRDC found that the latest Samsung TVs, which have the highest market share in the US, are able to support wake on voice and wake on cast for under 1 Watt with quick resume times.)

This additional standby power is extremely consequential as most TVs are in standby mode for 17 or more hours per day and annual standby energy consumption could be 50 to just under 100 kWh/yr. This amount of wasted energy can essentially offset and exceed ALL of the energy savings EPA has estimated for TVs that would qualify for ENERGY STAR Version 9, as shown below.

Screen Diagonal Size Bin	Average annual energy savings of non-compliant units (kWh/yr)
<=47.5"	57
47.5"<x<=52.5"	61
52.5"<x<=59.5"	25
59.5"<x<=69.5"	57
69.5"<x<=80"	42
80"<x<=90"	73

Assumptions: (1) Savings are calculated as

TVs with wake on cast selected allow the user who is watching content on their phone or tablet to hit the cast button and the TV will then quickly wake up and



cast screen icon

display the content.

This extremely smooth hand off between devices is likely to become increasingly popular as consumers become more aware of this feature.

NRDC recommends ENERGY STAR continue to work with its advisors and the TV manufacturers to further improve the testing set up conditions for measuring standby-active low power levels by:

- *Setting requirements that TVs with wake on cast or wake on voice for smart speakers be tested with those features enabled, even if these features are not shipped enabled. Its essential that this extra amount of potential energy use be captured during the test and prevented by ENERGY STAR. This will prevent the situation whereby TVs can earn the ENERGY STAR label even though they are capable of wasting 50 to just under 100 kWh/yr when they are NOT in use and the user believes they are turned off.*
- *Ensuring there is traffic on the network the TV is connected to and multicast DNS requests are occurring during the test. Through thoughtful*

test method language development and the use of packet generators, a network traffic test environment can be created that simulates real world environments while yielding reproducible testing results.

- *Providing guidance on the minimum period of time for the standby-active low test to be performed and when to start and stop the testing.* Note, earlier test methods waited till the power levels stabilized which could result in not capturing a large amount of a unit's standby power use. Some TVs for example draw elevated and varying standby power levels for four hours after last used before going down to a steady <1 Watt standby power level.
- *Considering lowering the proposed standby-active low power limit from 2 Watts down to 1 Watt if the data supports it.* Given the millions of TVs installed and the 5000 plus hours of time TVs spend in standby every year, this extra standby power can really add up. Depending upon the effective date EPA selects, EPA could stagger the effective dates for these requirements, setting an initial 2 W limit at first and x months later bringing it down to 1 W.

We greatly appreciate the opportunity to provide this input to EPA's specification revision process and are available to discuss any questions you might have.