



ENERGY STAR® Program Requirements for Televisions

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR qualified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for Televisions. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for Televisions. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform Televisions testing. A list of EPA-recognized laboratories and certification bodies can be found at www.energystar.gov/testingandverification.
3. **Ensure that any model associated with the ENERGY STAR name or mark** meets the following standards:
 - 3.1. Product material requirements as defined in restriction of hazardous substances (RoHS) regulations, as generally accepted. This includes exemptions in force at the date of product manufacture, where the maximum concentration values tolerated by weight in homogeneous materials are: lead (0.1%), mercury (0.1%), cadmium (0.01%), hexavalent chromium (0.1%), polybrominated biphenyls (PBB) (0.1%), or polybrominated diphenyl ethers (PBDE) (0.1%). Batteries are exempt.
 - 3.2. The generally accepted attributes of a recyclable product at the date of product manufacture: where products shall be designed for ease of disassembly and recyclability where external enclosures, sub-enclosures, chassis and electronic subassemblies are easily removable with commonly available tools, by hand, or by a recycler's automated processes.

Notes:

- The explicit intention is to harmonize with EU RoHS.
- For purposes of ENERGY STAR third-party certification, these requirements shall not be reviewed when products are initially qualified nor during subsequent verification testing. Rather, EPA reserves the right to request supporting documentation at any time.

Using the ENERGY STAR Name and Marks

4. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
5. Use the ENERGY STAR name and marks only in association with qualified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is qualified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
6. Provide clear and consistent labeling of ENERGY STAR qualified Televisions.
 - 6.1. The ENERGY STAR mark must be clearly displayed on product packaging, in product literature (i.e., user manuals, spec sheets, etc.), and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed.

6.2. ENERGY STAR qualified TVs must also be labeled according to one of the following three options:

6.2.1. Permanent label on the top/front of the TV;

6.2.2. Temporary label on the top/front of the TV; or

6.2.3. Use of an electronic label so that the ENERGY STAR certification mark appears on the TV's menu-screen for pre-set picture settings.

Verifying Ongoing Product Qualification

7. Participate in third-party verification testing through a Certification Body recognized by EPA for Televisions, providing full cooperation and timely responses, EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

8. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

8.1. Partner must submit the total number of ENERGY STAR qualified Televisions shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).

8.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.

8.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.

9. Report to EPA any attempts by recognized laboratories or Certification Bodies (CBs) to influence testing or certification results or to engage in discriminatory practices.

10. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR qualified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR qualified product information to employees for use when purchasing products for their homes.

- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR qualified Televisions and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR qualified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.
- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.



ENERGY STAR® Program Requirements for Televisions

Eligibility Criteria Version 8.0

Following is the Version 8.0 ENERGY STAR Product Specification for Televisions. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS¹

A) Product Types:

- 1) Television (TV)²: A product designed to produce dynamic video, contains an internal TV tuner encased within the product housing, and that is capable of receiving dynamic visual content from wired or wireless sources including but not limited to:
 - a) Broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analog and/or digital signals; and/or
 - b) Display-specific data connections, such as HDMI, Component video, S-video, Composite video; and/or
 - c) Media storage devices such as a USB flash drive, a memory card, or a DVD; and/or
 - d) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.
- 2) Home Theater Display (HTD): A product with diagonal viewable screen size greater than 25 inches, that is designed to produce dynamic video, that does not contain an internal TV tuner encased within the product housing, that is primarily marketed for use in home theater applications, and that is capable of receiving dynamic visual content from wired or wireless sources including but not limited to:
 - a) Display-specific data connections, such as HDMI, Component video, S-video, Composite video; and/or
 - b) Media storage devices such as a USB flash drive, a memory card, or a DVD; and/or
 - c) Network connections, usually using Internet Protocol, typically carried over Ethernet or Wi-Fi.

Home Theater Display does not include Computer Monitors or Signage Displays (defined in the ENERGY STAR Product Specification for Displays).
- 3) Hospitality Television/Home Theater Display: A TV or HTD product which includes the following features:
 - a) A control port for bi-directional communication (DB-9, RJ11, RJ12, RJ45, coaxial cable, or HDMI-CEC); and

¹ Where applicable, these definitions are based on definitions in 10 CFR 430. When in conflict, the definitions in the Federal Test Procedure in 10 CFR 430 take precedence, including any future updates to the test procedure.

² 10 CFR 430.2

b) Activated hospitality protocol software (e.g., SmartPort, Meeting Professionals International (MPI), Multiple Television Interface (MTI), Serial Protocol) to provide direct access to Video-On-Demand (VOD) systems, non-video hotel services or a digital media player designed for hospitality-specific applications.

4) Projector: A product that is a mains-powered, optical device, for processing analog or digital video image information, in any, broadcasting, storage or networking format to modulate a light source and project the resulting image onto an external screen³.

B) Operational Modes:

1) On Mode⁴: The mode of operation in which the TV/HTD is connected to mains power, and is capable of producing dynamic video.

2) Standby-Passive Mode⁵: The mode of operation in which the TV/HTD is connected to mains power, produces neither sound nor picture, and can be switched into another mode with only the remote control unit or an internal signal.

3) Standby-Active, Low Mode⁶: The mode of operation in which the TV/HTD is connected to mains power, produces neither sound nor picture, can be switched into another mode with the remote control unit or an internal signal, and can additionally be switched into another mode with an external signal.

4) Standby-Active, High Mode⁷: The mode of operation in which the TV/HTD is connected to mains power, produces neither sound nor picture, is exchanging/receiving data with/from an external source, and can be switched into another mode with the remote control unit, an internal signal, or an external signal.

a) Download Acquisition Mode: The power mode in which the product is connected to a mains power source, produces neither sound nor picture, and is actively downloading data. Data downloads may include channel listing information for use by an Electronic Program Guide, TV/HTD setup data, channel map updates, firmware updates, monitoring for emergency messaging/communications or other network communications.

5) Off Mode⁸: The mode of operation in which the TV/HTD is connected to mains power, produces neither sound nor picture, and cannot be switched into any other mode of operation with the remote control unit, an internal signal, or external signal.

C) Additional Functions⁹: Functions that are not required for the basic operation of the device.

Note: Additional functions include, but are not limited to, a VCR unit, a DVD unit, an HDD unit, a FM-radio unit, a memory card-reader unit, or an ambient lighting unit.

1) Thin Client Capability: The ability of the TV/HTD to receive, decrypt, and display encrypted content provided by a Multichannel Video Programming Distributor (MVPD) over the Local Area Network via a server device co-located on the customer premises without the need for a client device at the TV/HTD.

3 AEA, Building on the Eco-design Directive, EuP Group Analysis: ENTR Lot 3 Sound and Imaging Equipment Task 1-7 Report, <http://ec.europa.eu/DocsRoom/documents/10198/attachments/1/translations/en/renditions/pdf>.

4 10 CFR 430, Subpart B, Appendix H, Section 2.14

5 10 CFR 430, Subpart B, Appendix H, Section 2.18

6 10 CFR 430, Subpart B, Appendix H, Section 2.20

7 10 CFR 430, Subpart B, Appendix H, Section 2.19,

8 10 CFR 430, Subpart B, Appendix H, Section 2.13

9 10 CFR 430, Subpart B, Appendix H, Section 2.1, which references International Electrotechnical Commission (IEC) Standard 62087 Ed. 3.

- 2) Full Network Connectivity: The ability of the TV/HTD to maintain network presence while in Standby-Active, Low mode. Presence of the TV/HTD, its network services, and its applications, is maintained even if some components of the TV/HTD are powered down. The TV/HTD can elect to change power states based on receipt of network data from remote network devices, but should otherwise stay in Standby-Active, Low mode absent a demand for services from a remote network device. Full network connectivity is not limited to a specific set of protocols. Also referred to as “network proxy” functionality and described in the Ecma-393 standard.

D) Special Functions¹⁰: Functions that are related to, but not required for, the basic operation of the device.

Note: Special functions include, but are not limited to, special sound processing, power saving functions (e.g., Automatic Brightness Control).

- 1) Automatic Brightness Control (ABC): The self-acting mechanism that controls the brightness of a display as a function of ambient light.
- 2) Gesture Recognition: Ability to recognize non-verbal communication through a movement of the body, head, or limbs to express or emphasize an idea, sentiment, or command.
- 3) Voice Recognition: Ability to recognize spoken words or phrases and to convert said communication into text or commands to which meaning has been assigned.

E) TV/HTD Settings and Menus:

- 1) Preset Picture Setting¹¹: A preprogrammed factory setting obtained from the TV/HTD menu with pre-determined picture parameters such as brightness, contrast, color, sharpness, etc. Preset Picture Settings can be selected within the Home or Retail Configurations.
- 2) Default Picture Setting: The Preset Picture Setting that the TV/HTD enters into immediately after making a selection from the Forced Menu. If the TV/HTD does not have a Forced Menu, this is the as-shipped Preset Picture Setting.
- 3) Brightest Selectable Preset Picture Setting: The Preset Picture Setting in which the TV/HTD produces the highest screen luminance within either the Home or Retail Configuration.
- 4) Home Configuration: The TV/HTD configuration selected from the Forced Menu which is designed for typical consumer viewing and is recommended by the manufacturer for home environments.
- 5) Retail Configuration¹²: The TV/HTD configuration selected from the Forced Menu which is designed to highlight the TV/HTD's features in a retail environment. This configuration may display demos, disable configurable settings, or increase screen brightness in a manner which is not desirable for typical consumer viewing.
- 6) High Dynamic Range (HDR) Upscaling: A user-selectable Special Function that extends the luminance of the brightest scene elements and apparent saturation of colors of standard-dynamic range content in a manner similar to those provided by HDR 10 or Dolby Vision encoding.

10 10 CFR 430, Subpart B, Appendix H, Section 2.17, which references IEC 62087 Ed. 3.

11 10 CFR 430, Subpart B, Appendix H, Section 2.15, with the exception of “Home or Retail Configurations”; Section 2.15 uses “home or retail mode” instead.

12 10 CFR 430, Subpart B, Appendix H, Section 2.16

- 7) **Forced Menu**¹³: A series of menus which require the selection of initial settings before allowing the user to utilize primary functions. Within these menus contains an option to choose the viewing environment between Retail and Home Configurations.
- 8) **Electronic Program Guide (EPG)**: An interactive on-screen menu of TV/HTD program information downloaded from an external source or embedded interstitially in broadcast video streams (e.g., program time, date, and descriptions).

Figure 1: Illustration of Picture Settings for TV/HTDs with a Forced Menu ¹⁴

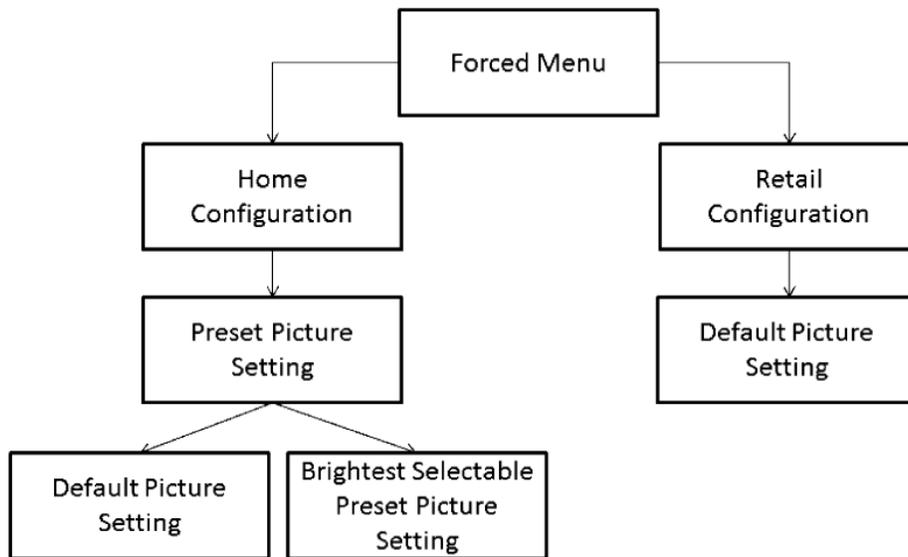
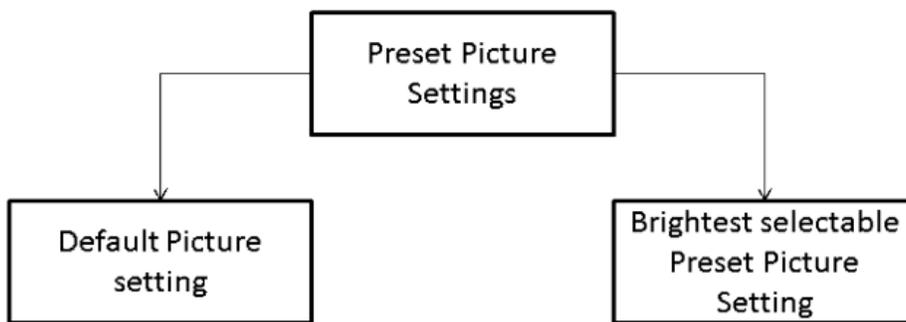


Figure 2: Illustration of Picture Settings for TV/HTDs without a Forced Menu ¹⁵



¹³ 10 CFR 430, Subpart B, Appendix H, Section 2.5

¹⁴ U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63828.

¹⁵ U.S. Department of Energy, Energy Conservation Program: Test Procedures for Television Sets; Final rule, *Federal Register*, October 25, 2013, 78 FR 63829.

F) Power Devices:

- 1) External Power Supply (EPS)¹⁶: Also referred to as External Power Adapter. An external power supply circuit that is used to convert household electric current into dc current or lower-voltage ac current to operate a consumer product.
- 2) Main Battery¹⁷: A battery capable of powering the TV/HTD to produce dynamic video without the support of mains power.

G) Product Characteristics:

- 1) Luminance¹⁸: The photometric measure of the luminous intensity per unit area of light traveling in a given direction, expressed in units of candelas per square meter (cd/m²).
- 2) Screen Area: The viewable screen area of the product, calculated by multiplying the viewable image width by the viewable image height. For curved screens, the measurements shall be made along the curvature on the face of the screen rather than along a straight line/chord.
- 3) Native Vertical Resolution: The number of visible physical lines along the vertical axis of the TV/HTD (e.g., a TV/HTD with a screen resolution of 1920 x 1080 (horizontal x vertical) would have a Native Vertical Resolution of 1080).

H) Basic Model¹⁹: All units of a given type of product (or class thereof) manufactured by one manufacturer, having the same primary energy source, and which have essentially identical electrical, physical, and functional characteristics that affect energy consumption and energy efficiency.

I) Multichannel Video Programming Distributor (MVPD)²⁰: A person such as, but not limited to, a cable operator, a multichannel multipoint distribution service, a direct broadcast satellite service, or a television receive-only satellite program distributor, who makes available for purchase, by subscribers or customers, multiple channels of video programming.

J) Unit Under Test (UUT): The unit currently undergoing testing.

K) Federal Test Procedure: The Department of Energy's "Uniform Test Method for Measuring the Energy Consumption of Television Sets" incorporated in Appendix H to Subpart B of 10 CFR Part 430.

2 SCOPE

2.1 Included Products

2.1.1 Products that are: (1) marketed to the consumer as a TV/HTD (i.e., TV/HTD is the primary function); (2) capable of being powered from a wall outlet or with an external power supply; and (3) meet one of the following product type definitions, are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.2:

- i. TVs
- ii. Hospitality TV/HTDs
- iii. Home Theater Displays

¹⁶ 10 CFR 430.2

¹⁷ 10 CFR 430, Subpart B, Appendix H, Section 2.12

¹⁸ 10 CFR 430, Subpart B, Appendix H, Section 2.11

¹⁹ 10 CFR 430.2, with references to water consumption and other specific covered products removed.

²⁰ As defined in 47 USC § 522(13)

2.2 Excluded Products

- 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for certification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/specifications.
- 2.2.2 Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR certification under this specification:
- i. Projectors.
 - ii. TV/HTDs with a Main Battery that enables operation without connected mains power.
 - iii. Products with a computer input port (e.g., VGA), that are marketed and sold primarily as computer monitors or other displays, and that do not contain an integrated TV tuner encased within the product housing.

3 CERTIFICATION CRITERIA

3.1 Significant Digits and Rounding

- 3.1.1 All calculations shall be carried out with directly measured (unrounded) values. Only the final result of a calculation shall be rounded.
- 3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using exact values without any benefit from rounding.
- 3.1.3 Annual Energy Consumption (AEC) values less than 100 kWh shall be rounded to the nearest tenth of a kWh; otherwise, they shall be rounded to the nearest kWh, as specified in Section 8.2 *Rounding* of the Federal Test Procedure, for reporting on the ENERGY STAR website.
- 3.1.4 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 General Requirements

- 3.2.1 External Power Supplies (EPSs): Single- and Multiple-voltage EPSs shall meet the Level VI or higher performance requirements under the International Efficiency Marking Protocol when tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to Subpart B of 10 CFR Part 430.
- i. Single- and Multiple-voltage EPSs shall include the Level VI or higher marking.
 - ii. Additional information on the Marking Protocol is available at <http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218>.
- 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 TV/HTD 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.

- 3.2.3 Energy Saving Features: A TV/HTD may not be certified with any detectable or undetectable energy saving features (e.g., Motion Detection Dimming) that are enabled when tested according to the Federal Test Procedure unless that feature provides comparable energy savings during typical viewing experiences (i.e., the duration of a variety of popular programming). This prohibition applies irrespective of whether the function's primary or intended purpose is energy savings.
- 3.2.4 Forced Menu: Any product that includes a Forced Menu upon initial start-up shall:
- i. Provide users with a choice of Home Configuration or Retail Configuration. Partners may use alternative terminology if approved by the U.S. Environmental Protection Agency (EPA).
 - ii. Upon selection of Retail Configuration at initial start-up, either (1) display a second prompt requiring the user to confirm the choice of Retail Configuration, or (2) display information on the start-up menu that the Home Configuration is the setting in which the product qualifies for ENERGY STAR. If option (2) is selected, additional detail about ENERGY STAR certification and energy consumption expectations shall be included in printed product literature and on the product information page on the Partner's website.
- 3.2.5 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 the 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 picture setting or display a message each time any setting other than the Default Picture Setting is selected.
 - ii. For each Preset Picture Setting with energy saving feature(s) (e.g., ABC) enabled by default, the energy saving feature(s) shall default back to being enabled whenever the user selects that Preset Picture Setting.
 - iii. The TV shall not contain favorable subjective language to name or describe a Preset Picture Setting other than the Picture Setting under which the product qualifies for the ENERGY STAR (e.g., optimal or preferred).
- 3.2.6 Manual Adjustments to TV Parameters: For products that qualify for ENERGY STAR with an energy saving feature (e.g., ABC) enabled in the Picture Setting under which the product qualifies for the ENERGY STAR, the feature's functionality must remain enabled during manual adjustments to any of the TV's picture parameters, such as screen brightness, backlight, and contrast ratio. Further, manual adjustments to one Preset Picture Setting shall not disable energy saving features from other Preset Picture Settings.
- 3.2.6.a. On the effective date of a revision to the Federal Test Procedure that addresses the persistence of energy saving features, Section 3.2.6 is superseded by the provisions of the Federal Test Procedure.
- 3.2.7 Special Functions: The TV/HTD shall alert the user anytime the activation of any Special Function disables an energy saving feature.
- 3.2.8 Standby-Passive Mode and Standby-Active, Low Mode Settings: If users can select and enable Standby-Passive Mode or Standby-Active, Low 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 consumption from the Picture Setting under 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 TV/HTD 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.

3.2.9 Thin Client Capability and MVPD-ready Information: Products that have Thin Client Capability as-shipped or are otherwise MVPD-ready shall:

- i. Report the presence of Thin Client Capability and supporting information including, but not limited to, interoperability protocols, decryption, and decoding functions for display on the ENERGY STAR certified products list; and
- ii. Inform the consumer in the user manual and/or on-screen prompt that the TV/HTD may be capable of operating without a set-top box from an MVPD.

3.2.10 Standby-Active, High Mode Capability: TV/HTDs with Standby-Active, High Mode shall automatically return to the as-tested Standby-Active, Low Mode or Standby-Passive Mode following a manufacturer firmware update or other maintenance operation in Standby Active, High Mode within a period less than or equal to 15 minutes from the completion of said update/maintenance operation.

3.3 On Mode Requirements

3.3.1 For all TV/HTDs, On Mode power, as determined per Section 7.1.2 *On Mode Test for TVs without ABC Enabled by Default* or Section 7.1.3.2 *On Mode Power Calculation* (for TVs with ABC Enabled by Default) in the Federal Test Procedure shall be less than or equal to the Maximum On Mode Power Requirement (P_{ON_MAX}) and high resolution allowance, as shown in Equation 1, subject to the following requirement:

- i. For TVs with ABC or any other energy saving feature enabled during testing: TVs with up to four Preset Picture Settings shall have one or fewer Preset Picture Settings without ABC and any other energy saving feature enabled by default, and TVs with more than four Preset Picture Settings shall have two or fewer Preset Pictures Settings without ABC and any other energy saving feature enabled by default. If the TV does not meet these requirements, it is not eligible for certification with the energy saving feature enabled during testing. In TVs that offer both Home and Retail configurations, only the total number of Preset Picture Settings available under the Home configuration under test conditions shall be considered.
- i.a. On the effective date of a revision to the Federal Test Procedure that addresses the persistence of energy saving features, Section 3.3.1.i is superseded by the provisions of the Test Procedure.

Equation 1: On Mode Power Requirement for All TV/HTDs

$$P_{ON} \leq P_{ON_MAX} + P_{HR}$$

Where:

- P_{ON} is On Mode Power in watts;
- P_{ON_MAX} is the Maximum On Mode Power requirement in watts, calculated in Equation 2; and
- P_{HR} is a high resolution allowance in watts, as applicable, calculated in Equation 3.

3.3.2 The Maximum On Mode Power Requirement (P_{ON_MAX}) in watts shall be calculated per Equation 2.

Equation 2: Maximum On Mode Power Requirement for All TV/HTDs

$$P_{ON_MAX} = 78.5 \times \tanh[0.0005 \times (A - 140) + 0.038] + 14$$

Where:

- P_{ON_MAX} is the maximum allowable On Mode Power consumption in watts;
- A is the viewable Screen Area of the product in square inches; and

- *tanh* is the hyperbolic tangent function.

3.3.3 TV/HTDs with Native Vertical Resolution greater than or equal to 2160 lines are eligible for a high resolution On Mode Power Allowance (P_{HR}) as calculated per Equation 3.

Equation 3: Calculation of On Mode Power Allowance for TV/HTDs with Native Vertical Resolution Greater than or Equal to 2160 lines

$$P_{HR} = 0.5 \times P_{ON_MAX}$$

Where:

- P_{HR} is the high resolution On Mode Power Allowance in watts; and
- P_{ON_MAX} is the maximum allowable On Mode Power consumption in watts, calculated in Equation 2.

3.3.4 All TV/HTDs shall continue to meet the On Mode requirements in this section following the installation of software updates, as demonstrated per testing in Section 4.5.2 of this specification.

3.4 Standby-Passive Mode Requirements

3.4.1 Standby-Passive Mode power ($P_{STANDBY-PASSIVE}$), as measured per Section 7.3.2 *Standby-Passive Mode* of the Federal Test Procedure, shall be less than or equal to 0.5 W.

3.5 Standby-Active, Low Mode Requirements

3.5.1 Standby-Active, Low Mode power ($P_{STANDBY-ACTIVE-LOW}$), as measured per Section 7.3.3 *Standby-Active, Low Mode* of the Federal Test Procedure, shall be less than or equal to 3.0 W.

3.5.2 All TV/HTDs shall continue to meet the Standby-Active, Low Mode requirements in this section following the installation of software updates, as demonstrated per testing in Section 4.5.2 of this specification.

3.6 Luminance Requirements

3.6.1 For products with a luminance in the Brightest Selectable Preset Picture Setting (the greater value of $L_{DEFAULT_RETAIL}$ or $L_{BRIGHTEST_HOME}$) less than 350 cd/m², luminance in the Picture Setting under which the product qualifies for the ENERGY STAR shall be greater than or equal to 65% of the luminance in the Brightest Selectable Preset Picture Setting, as per the Federal Test Procedure.

3.6.2 For products with a luminance in the Brightest Selectable Preset Picture Setting greater than or equal to 350 cd/m², luminance in the Picture Setting under which the product qualifies for the ENERGY STAR shall be greater than or equal to 228 cd/m², as per the Federal Test Procedure.

3.6.3 For products that certify to the On Mode requirements with ABC enabled during testing, the average luminance in the Picture Setting under which the product qualifies for the ENERGY STAR at the illuminance conditions of 3, 12, 35, and 100 lux with ABC enabled shall be greater than or equal to 50% of the TV's luminance in the Brightest Selectable Preset Picture Setting, as measured per Section 4.4 *Luminance Test for TVs with ABC Enabled during Testing*. For products that certify to the On Mode requirements with ABC enabled during testing and have a luminance in the Brightest Selectable Preset Picture Setting greater than or equal to 300 cd/m², the average luminance at the illuminance conditions of 3, 12, 35, and 100 lux with ABC enabled shall be greater than or equal to 150 cd/m².

3.6.4 For products that certify to the On Mode requirements with ABC enabled during testing, the luminance at 3 lux in the Picture Setting under which the product qualifies for the ENERGY STAR, with ABC enabled, shall be greater than or equal to 100 cd/m², as measured per Section 4.4 *Luminance Test for TVs with ABC Enabled during Testing*.

3.7 Download Acquisition Mode (DAM) Requirements for Hospitality TV/HTDs

- 3.7.1 A product may automatically exit Standby-Passive Mode or Standby-Active, Low Mode and enter Download Acquisition Mode according to a predefined schedule, in order to:
- i. Download channel listing information for use by an electronic programming guide,
 - ii. Monitor for emergency messaging/communications, or
 - iii. Communicate via a network protocol.
- 3.7.2 DAM energy consumption for all DAM states (E_{DAM}), as measured per the CEA Procedure for DAM Testing, shall be less than or equal to 40 watt-hours per day (0.04 kWh/day).

Note: Products intended for sale in the US market are subject to minimum toxicity and recyclability requirements. Please see ENERGY STAR Program Requirements for Televisions: Partner Commitments for details.

4 TESTING

4.1 Test Methods

4.1.1 Test methods identified in Table 1 shall be used for certification.

Table 1: Test Methods for ENERGY STAR Certification

Product Type	Test Method
All Ac Mains-powered TV/HTDs	Uniform Test Method for Measuring the Energy Consumption of Television Sets incorporated in Appendix H to Subpart B of 10 CFR Part 430

4.2 Average Power Consumption Test for TV/HTDs with HDR Upscaling

- 4.2.1 For products with HDR Upscaling, where the HDR Upscaling is not enabled for testing, one of the following additional tests is required for ENERGY STAR certification:
- i. For products with HDR Upscaling as a Special Function selectable from within the Picture Setting under which the product qualifies for the ENERGY STAR, enable the most consumptive version of this feature that is available and record the average power consumption value over a 10-minute period following the guidance in Section 7.1.2 *On Mode Test for TVs without ABC Enabled by Default* of the Federal Test Procedure and record the luminance following Sections 7.2.1.2 *ABC Configuration* through 7.2.3 *Three Vertical Bar Signal Measurement* of the Federal Test Procedure; or
 - ii. For products with a separate Preset Picture Setting with built-in HDR Upscaling that is not the Picture Setting under which the product qualifies for the ENERGY STAR or the Brightest Selectable Preset Picture Setting, choose that Preset Picture Setting and record the average power consumption over a 10-minute period following the guidance in Section 7.1.2 *On Mode Test for TVs without ABC Enabled by Default* of the Federal Test Procedure and record the luminance following Sections 7.2.1.2 *ABC Configuration* through 7.2.3 *Three Vertical Bar Signal Measurement* of the Federal Test Procedure.

4.3 DAM Test for Hospitality TV/HTDs

- 4.3.1 DAM energy consumption of Hospitality TV/HTDs shall be measured using the following method in Table 3:

Table 3: Method for Hospitality TV/HTDs

Product Type	Method
Hospitality TV/HTDs	CEA Procedure for DAM Testing: For TVs, Rev. 0.3, Sept. 2010

4.4 Luminance Test for TVs with ABC Enabled During Testing

4.4.1 The test method outlined below shall be used for luminance testing of products with ABC enabled during the On Mode test:

- i. The TV shall be in the Picture Setting under which the product qualifies for the ENERGY STAR within the home configuration, with the ABC sensor enabled.
- ii. Set-up the luminance test per Sections 7.2.1.3 *Stabilization* through 7.2.2 *Luminance Meter Set-up* of the Federal Test Procedure.
- iii. Direct 100 lx (± 5 lx) lux into the ABC sensor.
- iv. Display the International Electrotechnical Commission (IEC) 62087 Ed. 3.0 three vertical bar signal found in Section 11.5.5 of IEC 62087 Ed. 3.0 for no more than 5 seconds and take the luminance measurement.
- v. Repeat the above measurement at 35 lx (± 2 lx), 12 lx (± 1 lx), and 3 lux (± 1 lx).

4.5 Full Network Connectivity Test for TV/HTDs with Standby-Active, Low Mode

4.5.1 The following method in Table 4 shall be used for TV/HTDs with a Standby-Active, Low mode:

Table 4: Methods for TV/HTDs with Standby-Active, Low

Product Type	Method
TV/HTDs with Standby-Active, Low Mode	CEA-2037-A, Determination of Television Set Power Consumption

- i. If the TV/HTD is network-enabled and tested in Standby-Active, Low per the Federal Test Procedure, the presence of Full Network Connectivity shall be tested using the following method: Perform all procedures specified in the *Standby-active, Low* of CEA-2037-A with the additional preconditions:
 - 1) Place the UUT in On Mode as tested per Section 7.1.1 *On Mode Test* of the Federal Test Procedure and momentarily press the power button on the remote control; and
 - 2) Wait 5 minutes after pressing the power button before beginning the procedures in CEA-2037-A.
- ii. TV/HTDs for which availability can be confirmed with one of the methods in the *Availability* section of CEA-2037-A shall be reported as having Full Network Connectivity.

4.5.2 Following all other tests conducted, TV/HTDs with Standby-Active, Low Mode shall use the following method to demonstrate that they continue to meet the ENERGY STAR requirements after software updates:

Connect TV/HTD to the wide-area network (i.e., the Internet).

- i. Download and install any available software updates either by acknowledging a prompt or by requesting an update through a menu selection.
- ii. Wait until all software updates have been installed.
- iii. Conduct the On Mode Test per Section 7.1 *On Mode Test* of the Federal Test Procedure.

- iv. Conduct the Standby-Active, Low Mode Test per Section 7.3.3 *Standby-Active, Low Mode* of the Federal Test Procedure.
- v. Conduct the Additional Required Test for TV/HTDs with HDR Upscaling per Section 4.2 of this specification.

4.5.2.a. On the effective date of the Federal Test Procedure that addresses the persistence of energy saving features, Section 4.5.2 is superseded by the provisions of the Test Procedure.

4.6 Number of Units Required for Testing

4.6.1 One of the following sampling plans shall be used to test for ENERGY STAR certification:

- i. A single representative unit shall be selected for testing the Basic Model;
- ii. Units shall be selected for testing per the sampling requirements defined in 10 CFR 429.25, which references 10 CFR 429.11.

4.7 International Market Certification

4.7.1 Products shall be tested for certification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

5 USER INTERFACE

5.1.1 Partners are encouraged to design products in accordance with the user interface standard IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see <http://eetd.LBL.gov/Controls>.

6 EFFECTIVE DATE

6.1.1 Effective Date: The Version 8.0 ENERGY STAR Televisions specification shall take effect on **March 1, 2019**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.

7 CONSIDERATIONS FOR FUTURE REVISIONS

7.1.1 Standby-Active, High Mode: EPA and DOE are interested in learning more about Standby-Active, High Mode. EPA anticipates exploring this issue and potential power limits and duty cycle requirements in the next specification revision.

7.1.2 Trends and Improvements in Energy Efficiency: EPA anticipates continued gains in energy efficiency to be achieved in the next few years with advances in technology such as LED efficacy, the addition of reflective polarizing film, power supply improvements, lower screen reflectance, improved backplanes (Low Temperature Polysilicon and Indium Gallium Zinc Oxide), quantum dot technology, and next generation Organic Light Emitting Diodes (OLED). As such, EPA anticipates an opportunity for proposing further limits on power consumption in future revisions.

- 7.1.3 ABC Performance Across All Preset Picture Settings: EPA is interested in better understanding how ABC performs across all Preset Picture Settings and any future opportunities to simplify ABC testing. EPA anticipates exploring this issue once ABC is implemented in and persistent across more Preset Picture Settings.
- 7.1.4 UHD Allowance: EPA anticipates modifying the UHD allowance in the next revision to account for UHD gains in efficiency.
- 7.1.5 HDR: EPA will monitor the market to assess the extent to which opportunities exist to improve the energy efficiency of the HDR Upscaling feature
- 7.1.6 Revisions to Test Content: As TV technologies continue to evolve, DOE and EPA support external stakeholder efforts to revise test content (i.e. test clips) to better account for how products perform under more realistic consumer viewing conditions, especially with regard to the following.
- i. UHD (4K) Content
 - ii. Native HDR Content
 - iii. Luminance measurements using dynamic color content instead of a static, black and white test image.