



ENERGY STAR® Program Requirements for Televisions

Partner Commitments Versions 4.0 and 5.0

DRAFT 2

Note: To simplify the specification nomenclature for this and future specifications, EPA is proposing to use the term “Version 4.0” instead of “Version 3.1 Tier 2.” All references to Version 3.1 Tier 2 in the previous Draft 1 document have been updated accordingly in this specification. Additionally, references to “Version 3.1 Tier 3” in this specification have been modified to “Version 5.0.”

Partner Commitments

The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified televisions (TVs). The ENERGY STAR Partner must adhere to the following program requirements:

- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on TVs. EPA may, 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 EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR name and mark may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- qualify at least one ENERGY STAR labeled TV model within six months of activating the TV portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Version 4.0 or Version 5.0) in effect at that time;
- provide clear and consistent labeling of ENERGY STAR qualified TVs. The ENERGY STAR label 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. In addition, ENERGY STAR qualified TVs must be labeled according to one of the following three options: 1) permanent label on the top/front of the TV; 2) temporary label on the top/front of the TV; or, 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.
- provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying TV models. Once the Partner submits its first list of ENERGY STAR labeled TVs, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;
- provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified TVs shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The 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; and

- notify EPA of a change in the designated responsible party or contacts for TVs within 30 days.

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:

- consider energy efficiency improvements in company facilities and pursue the ENERGY STAR label for buildings;
- 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;
- ensure the power management feature is enabled on all ENERGY STAR qualified monitors 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 product models;
- feature the ENERGY STAR mark(s) on Partner Web site and in other promotional materials. If information concerning ENERGY STAR is provided on the Partner Web site as specified by the ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section on the ENERGY STAR Web site at www.energystar.gov), EPA may provide links where appropriate to the Partner Web site;
- 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, communicate, and/or promote Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as simple as providing a list of planned activities or planned milestones that Partner would like EPA to be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR qualified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) provide information to users (via the Web site and user's manual) about energy-saving features and operating characteristics of ENERGY STAR qualified products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event;
- 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;
- join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. SmartWay Transport 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 Climate Leaders Partnership to inventory and reduce greenhouse gas emissions. Through participation, companies create a credible record of their accomplishments and receive EPA recognition as corporate environmental leaders. For more information on Climate Leaders, visit www.epa.gov/climateleaders; and

117 • join EPA's Green Power partnership. EPA's Green Power Partnership encourages organizations to
118 buy green power as a way to reduce the environmental impacts associated with traditional fossil
119 fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune
120 500 companies, small and medium businesses, government institutions as well as a growing
121 number of colleges and universities, visit www.epa.gov/grnpower/.



ENERGY STAR® Program Requirements for Televisions

Eligibility Criteria Versions 4.0 and 5.0

DRAFT 2

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Following is the **DRAFT 2** product specification for ENERGY STAR qualified televisions (Version 4.0). A product must meet all of the identified criteria to be labeled as ENERGY STAR.

1) **Definitions:**

- A. **Television (TV):** A commercially available electronic product designed primarily for the reception and display of audiovisual signals received from terrestrial, cable, satellite, Internet Protocol TV (IPTV), or other digital or analog signals. A TV consists of a tuner/receiver and a display encased in a single enclosure. The product usually relies upon a cathode-ray tube (CRT), liquid crystal display (LCD), plasma display, or other display device.

Televisions with computer capability (e.g., computer input port) may qualify for the ENERGY STAR under this specification as long as they (1) are marketed and sold to consumers primarily as televisions, and (2) incorporate Display Power Management Signaling (DPMS), a standard from the Video Electronics Standards Association (VESA) for managing the supply of power to a video monitor through a computer graphics card. Televisions are considered to have computer monitor capability under this specification if any input on the product is intended by the manufacturer to be used as a computer input, and, as such, the product complies with the FCC's Class B Computer Peripheral requirements and is authorized under the FCC's Declaration of Conformity program.

Note: EPA is proposing to exclude what was formerly called Television Monitors or equipment intended to display a video signal from an external tuner or other video source in this specification. Equipment with computer capability may still qualify under this specification as long as it meets the definitions above. Equipment with an integrated television tuner that is primarily marketed and sold to consumers as a display or as a dual-function display and television should qualify under the ENERGY STAR Version 5.0 Tier 1 Displays specification. However, please note, under the Version 5.0 Tier 2 Display specification (October 30, 2011 effective date), only displays without tuners may qualify, so equipment with an integrated television tuner that is primarily marketed and sold to consumers as a display would not be covered under any ENERGY STAR specification.

- B. **Rear-Projection TV:** A type of TV whose display device is a projector that focuses images onto a screen located inside the TV enclosure.
- C. **Direct-View TV:** A type of TV whose display device emits light either directly from the screen surface or transmits light from a source mounted directly behind the screen. Examples include CRT, LCD, and plasma display technologies.
- D. **TV Combination Unit:** A television system in which the TV and an additional device(s) (e.g., DVD player, Blu-ray Disc player, Hard Disk Drive [HDD], VCR, etc.) are combined into a single unit and which meets all of the following criteria: the additional device(s) is included in the television casing; it is not possible to measure the power requirements of the two (or more) components separately without removal of the television casing; and the system is connected to the wall outlet through a single power cable.
- E. **Component Television Unit:** A television system composed of two or more separate components (e.g., display device and tuner) marketed and sold as a television under one model or system designation. The system may have more than one power cord. The total power consumption of all components in the system is considered for purposes of ENERGY STAR qualification.

- 184 F. Analog: A television product which has an NTSC, PAL, or SECAM tuner, and may have analog
185 video inputs (e.g., composite video, component video, S-video, RGB).
186
- 187 G. Digital: A television product which has at least one digital tuner or at least one digital video input
188 (e.g., HDMI). Products with an analog tuner and both analog and digital inputs shall be considered
189 digital products under this specification.
190
- 191 H. Native Vertical Resolution: The physical pixel count for the vertical axis of the television. For
192 example, a television with a screen resolution of 1920 x 1080 would have a native vertical resolution
193 of 1080.
194
- 195 I. Electronic Program Guide (EPG): An interactive, onscreen menu of TV program information (e.g.,
196 time, date, description of TV programs, etc.) downloaded from an external source.
197
- 198 J. External Power Supply (EPS): A component contained in a separate physical enclosure external to
199 the television casing and designed to convert line voltage AC input from the mains to lower DC
200 voltage(s) for the purpose of powering the television. An external power supply must connect to the
201 television via a removable or hard-wired male/female electrical connection, cable, cord or other
202 wiring.
203
- 204 K. Point of Deployment (POD) Module: A conditional access module for digital cable signal reception.
205
- 206 L. Luminance: The photometric measure of the luminous intensity per unit area of light traveling in a
207 given direction. Luminance describes the amount of light that passes through or is emitted from a
208 particular area, and falls within a given solid angle. The standard unit for luminance is candela per
209 square meter (cd/m²).
210
- 211 M. ON Mode: Where the product is connected to a mains power source, has been activated and is
212 providing one or more of its principal functions. The common terms “active”, “in-use” and “normal
213 operation” also describe this mode. The power requirement in this mode is typically greater than the
214 power requirement in Sleep and Download Acquisition Modes.
215
- 216 N. Sleep Mode: The mode, also sometimes referred to commonly as “Standby,” where the product is
217 connected to a mains power source, is not providing a principal function, and offers one or more of
218 the following user oriented or protective functions which may persist for an indefinite time:
219 a. To facilitate the activation of other modes (including activation or deactivation of ON mode)
220 by remote switch (including remote control), internal sensor, timer;
221 b. Continuous function: information or status displays including clocks;
222 c. Continuous function: sensor-based functions.
223

224 For purposes of this specification, Sleep Mode is defined as the time when the product is connected
225 to a power source, produces neither sound nor picture, neither transmits nor receives program
226 information and/or data (excluding data transmitted to change the unit's condition from Sleep Mode
227 to ON Mode), and is waiting to be switched to ON Mode by a direct or indirect signal from the
228 consumer, e.g., with the remote control.
229

- 230 O. OFF Mode: Where the product is connected to a mains power source and is not providing any ON
231 mode or Sleep mode functions, and where the mode may persist for an indefinite time. An indicator
232 that only shows the user that the product is in the OFF position is included within the classification of
233 an OFF mode.
234

235 **Note:** The above definitions for power modes are consistent with the definitions provided in the
236 latest Committee Draft for IEC 62301 Ed 2.0. EPA is aware that IEC 62301 is under revision with a
237 forecasted publication date for Ed 2.0 of later this year. EPA will monitor developments and
238 incorporate changes to its draft specification as appropriate.
239

240 For harmonization with other ENERGY STAR consumer electronics specifications, EPA is
241 proposing to replace the term “Standby” with “Sleep.” The proposed definition of Sleep Mode is
242 consistent with the Standby Mode definition in IEC 62031.

P. Download Acquisition Mode (DAM): Where the product is connected to a mains power source, is not producing a sound or a picture, and is actively downloading channel listing information according to a defined schedule for use by the electronic programming guide, monitoring for emergency messaging/communications and/or otherwise communicating through a network protocol. The power use in this mode is typically greater than the power requirement in Sleep and less than that in ON Mode.

- 2) **Qualifying Products**: Any TV, TV Combination Unit, or Component Television Unit that is marketed to the consumer as such (i.e., focusing on television as the primary function), which meets the respective product type definition in Section 1, and is capable of being powered from either a wall outlet or a battery unit that is sold with an external power supply is eligible to earn the ENERGY STAR. This specification does not cover monitors with computer capability (e.g., a computer input port, such as VGA) that are marketed and sold as 1) computer monitors or 2) dual function television and computer monitors.

In addition, to qualify as ENERGY STAR, TVs must not exceed power consumption of 1 watt in Sleep Mode. TVs that do not have a power state meeting the definition of Sleep Mode (e.g., Public Alert CEA2009A certified models which offer 24/7/365 active features to alert users) are not able to qualify for ENERGY STAR. Additionally, this lowest power consuming Sleep state must be the default Sleep state for the TV as shipped to consumers.

- 3) **Energy-Efficiency Criteria**: Only those products listed in Section 2 that meet the following criteria may qualify as ENERGY STAR. The effective date for these Version 4.0 requirements is provided in Section 6 of this specification. To qualify TVs, TV Combination Units, or Component Television Units as ENERGY STAR, they must be tested according to the protocol outlined in Section 4, Test Methodology.

EPA will make ON Mode and Sleep Mode data available on the ENERGY STAR Web site for interested consumers. Additionally, EPA will publish an estimate of annual energy consumption (measured in kWh/year) for each ENERGY STAR qualified TV. This annual power consumption estimate will be based on a typical energy consumption (TEC) model which assumes a daily duty cycle of 5 hours in ON Mode and 19 hours in Sleep Mode.

A. ON Mode Power Consumption Criteria

1. To qualify as ENERGY STAR, a product must not exceed the maximum ON Mode power consumption (P_{Max}) limit determined from the equations in Table 1, for all screen areas and native vertical resolutions. The maximum ON Mode power consumption is expressed in watts and rounded to the nearest whole number.

In the following equations, “A” is the viewable screen area of the product, calculated by multiplying the viewable image width by the viewable image height. Example power consumption limits for TV products of various screen sizes are provided below in Table 2.

Table 1: ON Mode Power Level Requirements for TV Products

Version 4.0: Effective May 1, 2010		
Screen Area	Maximum ON Mode Power Consumption (A expressed in square inches)	Maximum ON Mode Power Consumption (A expressed in square centimeters)
All Screen Areas and Native Vertical Resolutions	$P_{Max} = 0.120 \cdot A + 25$	$P_{Max} = 0.019 \cdot A + 25$
Version 5.0: Effective May 1, 2012		
Screen Area	Maximum ON Mode Power Consumption (A expressed in square inches)	Maximum ON Mode Power Consumption (A expressed in square centimeters)
A < 1068 square inches (6890 square centimeters)	$P_{Max} = 0.084 \cdot A + 18$	$P_{Max} = 0.013 \cdot A + 18$
A ≥ 1068 square inches (6890 square centimeters)	$P_{Max} = 108$	

For example, under Version 4.0, the maximum power consumption allowance for a TV with a width of 36.6 inches and a height of 20.6 inches (screen area of 754 square inches) would be: $(0.120 \cdot 754) + 25 = 115.4$ watts, or 115 watts when rounded to the nearest whole number. Additional examples are provided in Table 2.

Table 2: Version 4.0 and 5.0 ON Mode Power Level Requirements for Example TV Screen Sizes

Viewable Diagonal Screen Size (Inches)	Aspect Ratio	Viewable Screen Size in Inches	Screen Area in Inches² (cm²)	Version 4.0 Maximum ON Mode Power in watts	Version 5.0 Maximum ON Mode Power in watts
20	16:9	17.4 x 9.8	170.5 (1,100)	45	32
32	16:9	27.9 x 15.7	438.0 (2,826)	78	55
42	16:9	36.6 x 20.6	754.0 (4,865)	115	81
50	16:9	43.6 x 24.5	1068.2 (6,892)	153	108
60	16:9	52.3 x 29.4	1537.6 (9,920)	210	108

Note: EPA's Version 4.0 proposed requirements remain unchanged from Draft 1. Based on current market data from more than 20 manufacturers and spanning all size categories, EPA believes the proposed requirements achieve the desired effect of recognizing leadership products when it comes to energy efficiency. EPA's assessment is based the nearly 700 models in the EPA dataset and other models being offered on the market now,

EPA has decided not to adopt a counterproposal provided by numerous stakeholders which increases the slope of the Version 4 line allowing greater qualification. EPA has not adopted this proposal because a range of currently available products meet EPA's proposed requirements, and the proposal would result in loss of savings associated with larger screen sizes and reduced relevance for the ENERGY STAR TV program.

Note (cont):

In comments shared with EPA, some stakeholders noted that the proposed Version 4.0 On Mode requirements are too stringent on mid- to large-sized units and would favor small, lower-performing, and less expensive products. Additionally, some stakeholder also noted that mid- and large-sized TVs do not have more room for proposed efficiency improvements and only more modest efficiency gains are achievable with existing technologies in the larger size models. Furthermore, one stakeholder commented that only sets which employ LED-backlighting will be able to meet the proposed On Mode requirements making qualified TVs prohibitively expensive.

EPA's market research contradicts these claims. Mid and large models from 32 to 55 inches on the market now, or forthcoming in the 2010 model year, will meet Version 4 as proposed. These products are bundled with a rich assortment of features such as 240Hz, Ethernet and USB jacks, 4 HDMI inputs, super slim speakers, touch sensor panels, are described as thin, light, bright and clear by tech reviewers and are being offered by multiple manufacturers at a range of price points.

Further, based on input directly from several TV manufacturers, manufacturer Web sites, and roadmaps for top panel manufacturers and top tier TV manufacturers, EPA expects many more mid- and large-sized energy efficient models will be available by May 2010 and into May 2012, the proposed Version 5.0 effective date. Roadmaps for the top four panel makers show LED backlight TVs in all 32 inch and above series going forward. Major manufacturers have targeted 40 - 100% LED backlight TVs in 2010. One major manufacturer has information on their Web site that it is reasonable to expect a 50% decrease in power for 2010 CCFL units as compared to 2008 CCFL units by increasing panel transmittance, using fewer lamps, adding new diffusion plates, and enhancing optical sheets.

Market reports indicate that the cost gap between more efficient backlight technology (e.g., LED) and CCFL will likely disappear for small screen sizes this year, will be significantly reduced for mid- and large-screen models by the end of this year, and will continue to trend down. As an example, according to a DisplaySearch blog posted on May 18, 2009, one major LCD TV panel maker has reduced the cost gap between CCFL and LED backlights for a 42" LCD TV to \$100. Another panel marker reported a 25% reduction in cost for their 42" LED backlight TV (over a CCFL unit) in less than one year. These figures reflect a trend toward marginal price differential between CCFL and LED backlight TVs in the coming years.

In addition, EPA is aware of many different design enhancements that have been made to increase the efficiencies in sets that can be price neutral or come at a small price premium, for instance the replacement of backlight bulbs with optical film to reduce power consumption with similar brightness.

EPA based its Version 5.0 proposed requirements on the rapid improvements in efficiency realized between Version 3.0 development and the present, expected additional efficiency projected for 2010 models, and trends toward efficiency projected by manufacturers and market research firms to continue into the Version 5.0 timeframe. Supporting such trends is significant consumer interest in energy efficient TVs and their willingness in many cases to pay more for such products.

Based on stakeholder input, under the proposed Version 5.0, TVs of all sizes will continue to be eligible to earn the ENERGY STAR. However, especially large TVs, which typically have a larger environmental impact, will be recognized as ENERGY STAR if they meet requirements consistent with those of a maximum 50-inch TV. Proposed requirements for products at or below 50" remain unchanged from Draft 1. This approach accommodates consumer choice across a wide spectrum of sizes, including large sizes, while recognizing that there is a limit to what ENERGY STAR can credibly classify as an energy efficient TV

2. TV Products with Automatic Brightness Control (ABC): To account for the power savings achieved through automatic brightness control, where the feature is activated by default when shipped to the end user, ON Mode power consumption should be determined as follows:

$$P_{a1_broadcast} = (0.55 * P_{o_broadcast}) + (0.45 * P_{abc_broadcast})$$

Where:

- $P_{a1_broadcast}$ is the average ON Mode power consumption in watts and rounded to the nearest whole number, taking into consideration that the TV will be in low ambient light level conditions 45% of the time;
- $P_{o_broadcast}$ is the average ON Mode power consumption in watts and rounded to the nearest whole number, and tested with a minimum ambient light level of 300 lux entering directly into the sensor; and
- $P_{abc_broadcast}$ is the average ON Mode power consumption in watts and rounded to the nearest whole number, with an ambient light level of zero (0) lux measured at the face of the sensor.

When determining ENERGY STAR qualification, products which ship with automatic brightness control enabled should compare their ON Mode power consumption ($P_{a1_broadcast}$), found using the equation above, to the maximum ON Mode power consumption allowed (P_{Max}), determined using the equations in Table 1, above. (See Section 4.E.2, below, for further information on how to test TVs with Automatic Brightness Control to determine ENERGY STAR qualification.)

Note: Based on stakeholders' input from the April 24 stakeholder meeting, EPA will not be modifying the above calculation for ON Mode power consumption of products with the Automatic Brightness Control (ABC) feature in the Version 4.0 specification. EPA will continue to track the use of this feature in the market, and possibly conduct a study, to assess the appropriateness of this treatment for products available in 2012 when the Version 5.0 requirements will go into effect.

3. TV Products Using an EPS: To qualify, the EPS must be ENERGY STAR qualified, or it must meet the no-load and active mode efficiency levels provided in the ENERGY STAR Program Requirements for Single Voltage AC-AC and AC-DC External Power Supplies. The ENERGY STAR specification and EPS qualified product list can be found at www.energystar.gov/powersupplies.
- B. Sleep Mode Power Consumption Criteria: To qualify as ENERGY STAR under both Version 4.0 and Version 5.0 of this specification, qualified products must not consume more than one (1.0) watt while in Sleep Mode. Additionally, this lowest power consuming Sleep Mode must be the default Sleep for the TV as shipped to consumers.
- C. User Information Requirements: In order to ensure that consumers are properly informed of the benefits of keeping their TVs in the default modes as shipped, particularly for those models that incorporate additional features and functionality that, if employed, would result in increased energy use beyond that intended by the ENERGY STAR requirements for ON Mode and Sleep Mode, the manufacturer will include with each TV one of the following:
- Information on ENERGY STAR and the benefits of keeping the TV at its factory default settings that meet ENERGY STAR criteria in either a hard copy or electronic copy of the user manual. Where necessary, manufacturers will also include language advising consumers that enabling certain features and functionality in their TV (e.g., instant-on) will increase its energy consumption, possibly beyond the limits required for ENERGY STAR qualification. This information should be near the front of the user manual; or,
 - A package or box insert on ENERGY STAR and the benefits of keeping the TV in its factory default modes. Where necessary, manufacturers will also include language advising consumers that enabling certain features and functionality in their TV (e.g., instant-on) will increase its energy consumption, possibly beyond the limits required for ENERGY STAR qualification.

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425 D. Luminance: To qualify as ENERGY STAR under this specification, the luminance of the product in
426 the “home” mode, or in the default mode as shipped, shall not be less than 65% of the luminance of
427 the “retail” mode, or the brightest selectable preset mode, of the product.

Note: Some commentors noted that there is little evidence from call centers suggesting that televisions are being shipped overly dim in order to meet the Version 3.0 On Mode requirements. It has been further noted by some stakeholders that EPA’s prior proposal too closely coupled the “home” and “retail” settings so that substantial savings would be lost in “home” mode as the sets would be too bright in the “home” mode in order maximize the brightness in “retail” mode. Alternatively, ENERGY STAR TVs may be too dim in the “retail” mode to compete with non-ENERGY STAR models if the “home” and “retail” modes are too tightly coupled. Some stakeholders noted that no luminance requirements should be set at this time until further studies have been conducted.

EPA has a significant interest in ensuring that products are tested and qualified as ENERGY STAR in the mode in which they will ultimately be viewed in the home. As the ENERGY STAR On Mode requirements increase in stringency, the potential for TVs to be shipped in an overly dim setting also increases. These concerns were noted to EPA by several stakeholders and in a CNET article published on October 10, 2008, which describes one TV that was shipped so dim in “home” mode that the reviewers considered it “unwatchable.” Therefore, EPA is interested in taking steps with this specification to help prevent unsatisfactory viewing experiences driving consumers to choose a more consumptive mode than that in which their television was qualified for ENERGY STAR.

While one stakeholder has proposed a requirement based on power, others suggested that this approach favored one technology type. Other stakeholders have commented that if EPA sets a luminance requirement, harmonization with international standards would be preferred. Also, it has been noted by other stakeholders that the currently proposed approach gives manufacturers some flexibility when setting luminance specifications for home and retail modes. Absent certainty on the most balanced and technically sound approach at this time, EPA has proposed an approach that is harmonized with international partners. EPA anticipates collecting luminance levels for both retail and home modes for ENERGY STAR qualification. EPA will review this data closely and adjust this approach prior to the effective date for Version 5.0, as needed.

Further, EPA is seeking feedback on a consensus test pattern and test method for luminance. EPA expects to work with interested stakeholders to finalize this test pattern and test method in the coming months. Absent consensus, EPA anticipates adopting test procedures from counterparts in other regions of the world.

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462 E. Download Acquisition Mode (DAM): Qualified products may automatically exit Sleep Mode
463 according to a predefined schedule to: download channel listing information for use by an electronic
464 programming guide, monitor for emergency messaging/communications, and/or otherwise
465 communicate through a network protocol. The additional maximum allowable level of a product
466 when in DAM is 0.02 kilowatt-hours (kWh), or 20 watt-hours, per 24-hour period.
467

Note: Some stakeholders have commented that adopting a DAM requirement based on a power budget in watt-hours, rather than limiting DAM time and/or maximum power, will allow manufacturers more flexibility to innovate to provide new data and service offerings without increasing overall power consumption in DAM mode. Stakeholders further suggested that a DAM requirement be set at 80 watt-hours per day.

EPA agrees with stakeholder comments that a DAM requirement based on total power consumption will allow manufacturers more flexibility to innovate their products. However, in order to highlight the truly efficient models, in this Draft 2 specification EPA proposes a DAM requirement for TVs of 0.02 kWh/day. This level was based on an expected power of 5 watts while in DAM for a duration of 4 hours. Manufacturers do not have to meet these power and duration levels, only the overall proposed 0.02 kWh/day requirement. This would give manufacturers a level that EPA understands is technologically feasible, while realizing real energy savings.

Stakeholders have also suggested that qualified TVs allow consumers to easily opt out of TV Guide updates. EPA is seeking joint proposals from TV manufacturers and guide suppliers on how to provide this feature to consumers.

Some stakeholders have asked for unique treatment of TVs destined for hospitality settings. EPA is considering paths forward for covering these products as requested. As such, EPA is seeking a means of clearly differentiating a hospitality TV from a consumer TV (i.e., a set of characteristics that are unique to hospitality TVs). EPA is also seeking data regarding the duty cycle for hospitality TVs and clarification on whether this duty cycles differs for hospitality bound TVs. Finally, if EPA is able to separate these products from consumer products with certainty, the Agency may propose a Typical Electricity Consumption (TEC) approach for hospitality TVs, giving manufacturers greater flexibility in meeting the ENERGY STAR kWh requirements. EPA has employed this approach with imaging equipment, computers, and set-top boxes. For further discussion of possible approaches for these products, EPA will host a conference call with interested stakeholders during the third week of June with details to accompany the distribution of this Draft,

- F. **User Interface (Voluntary Requirement):** Although not mandatory, manufacturers are strongly recommended to design products in accordance with the Power Control User Interface Standard — IEEE 1621 (formally known as “Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments”). Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard see <http://eetd.LBL.gov/Controls>.

- 4) **Test Methodology:** Manufacturers are required to perform tests and self-certify that products meet the ENERGY STAR guidelines.

- In performing these tests, partner agrees to use the test procedures outlined in Table 3, below, with the clarifications outlined in Section 4.E.
- The test results must be reported to EPA.

Additional testing and reporting requirements are provided below.

A. Test Conditions:

Supply Voltage:	North America/Taiwan:	115 (± 1%) Volts AC, 60 Hz (± 1%)
	Europe/Australia/New Zealand:	230 (± 1%) Volts AC, 50 Hz (± 1%)
	Japan:	100 (± 1%) Volts AC, 50 Hz (± 1%)/60 Hz (± 1%)
	<i>Note:</i> For products rated for > 1.5 kW maximum power, the voltage range is ± 4%	
Total Harmonic Distortion (THD) (Voltage):	< 2% THD (< 5% for products which are rated for > 1.5 kW maximum power)	
Ambient Temperature:	23°C ± 5°C	
Relative Humidity:	10 – 80 %	

(Reference IEC 62301 Ed 1.0: Household Electrical Appliances – Measurement of Standby Power, Sections 4.2, 4.3)

B. Models Capable of Operating at Multiple Voltage/Frequency Combinations: Manufacturers shall test their products based on the market(s) in which the models will be sold and promoted as ENERGY STAR qualified. For products that are sold as ENERGY STAR in several markets and rated for multiple input voltages, the manufacturer must test at and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that is shipping the same model to the United States and Europe must measure, meet the specification, and report test values at both 115 Volts/60 Hz and 230 Volts/50 Hz in order to qualify the model as ENERGY STAR in both markets. If a model qualifies as ENERGY STAR at only one voltage/frequency combination (e.g., 115 Volts/60 Hz), then it may only be qualified and promoted as ENERGY STAR in those regions that support the tested voltage/frequency combination (e.g., North America and Taiwan).

C. Approved Meter: Approved meters will include the following attributes¹:

- An available current crest factor of 3 or more at its rated range value; and
- Lower bound on the current range of 10mA or less.

The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W; and
- 1 W or better for power measurements of greater than 100 W.

The following attributes in addition to those above are suggested:

- Frequency response of at least 3 kHz; and
- Calibration with a standard that is traceable to the U.S. National Institute of Standards and Technology (NIST).

It is also desirable for measurement instruments to be able to average power accurately over any user selected time interval (this is usually done with an internal math calculation dividing accumulated energy by time within the meter, which is the most accurate approach). As an alternative, the measurement instrument would have to be capable of integrating energy over any user selected time interval with an energy resolution of less than or equal to 0.1 mWh and integrating time displayed with a resolution of 1 second or less.

¹ Characteristics of approved meters taken from IEC 62301 Ed 1.0: Household Electrical Appliances – Measurement of Standby Power

- 556
557 D. Accuracy: Measurements of power of 0.5 W or greater shall be made with an uncertainty of less
558 than or equal to 2% at the 95% confidence level. Measurements of power of less than 0.5 W shall
559 be made with an uncertainty of less than or equal to 0.01 W at the 95% confidence level.

560
561 All power figures should be in watts and rounded to the second decimal place. For loads greater
562 than or equal to 10 W, three significant figures shall be reported.

- 563
564 E. Test Procedures:

565
566 **Table 3: Test Procedures for Measuring Operational Modes**

Operational Mode	Test Protocol	Source
Sleep Mode	IEC 62301, Ed 1.0: Household Electrical Appliances – Measurement of Standby Power.	www.iec.ch
ON Mode	IEC 62087, Ed 2.0: Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment, Section 11, “Measuring conditions of television sets for ON (average) mode.”	www.iec.ch

- 567
568 1. Guidance on Implementation of IEC 62301: Below, EPA provides specific guidance on using
569 IEC 62301 for measuring TV Sleep Mode power. For purposes of determining ENERGY STAR
570 qualification of a product, the below clarifications apply:
571
572 a. All Sleep Mode measurements shall be conducted and reported to EPA first at factory
573 default conditions. Measurements are to be taken with the POD module, if available, not
574 installed.
575
576 b. Manufacturers must make additional measurements as necessary, in addition to the Sleep
577 Mode power consumption of the product at factory default settings, to report the highest
578 observed power consumption of the product in Sleep Mode.
579
580 2. Guidance on Implementation of IEC 62087: Below, EPA provides guidance on using IEC 62087,
581 Ed. 2.0 for measuring TV ON Mode power. For purposes of determining ENERGY STAR
582 qualification of a product, the below exceptions and clarifications apply.
583
584 a. Accuracy of Input Signal Levels: *Section 11.4.12, “Accuracy of input signal levels”* reminds
585 testers that video inputs used for testing should be within +/- 2% of reference white and
586 black levels. *Section B.2 of Annex B, “Considerations for ON (average) mode television set*
587 *power measurements”* describes the importance of input signal accuracy in further detail.
588 EPA would like to emphasize the importance of using accurate/calibrated video inputs
589 during ON Mode testing and encourages testers to use HDMI inputs wherever possible.
590
591 b. Use of Broadcast Test Materials for Testing: To measure average ON Mode power
592 consumption, manufacturers should measure ‘P_{o_broadcast}’ as described in *section 11.6.1, “On*
593 *Mode (average) testing with dynamic broadcast-content video signal.”*
594
595 c. True Power Factor: Due to increased awareness of the importance of power quality on the
596 part of EPA and electric utilities, manufacturers shall indicate the true power factor of their
597 sets during ON Mode measurement.
598
599 d. Testing at Factory Default Settings: In measuring the ON Mode power consumption of TVs,
600 EPA is interested in measuring the power consumption of products *as they are shipped*
601 *from the factory*. TV models that do not make use of a forced menu at initial start up, and
602 are shipped in a “retail” or equivalent mode, must be tested in that “retail” mode for
603 ENERGY STAR qualification. Picture level adjustments that need to be made prior to
604 testing ON Mode power consumption should be made per *section 11.4.8, “Picture level*
605 *adjustments,”* if applicable.
606

607 *Section 11.4.8 reads:* “The contrast and brightness of the television set and the backlight
608 level, if it exists, shall be set as originally adjusted by the manufacturer to the end user. In
609 the case that a setting mode must be chosen on initial activation, the “standard mode” or
610 equivalent shall be chosen. In the case that no “standard mode” or equivalent exists, the
611 first mode listed in the on-screen menus shall be selected. The mode used during the test
612 shall be described in the report. “Standard mode” is defined as “recommended by the
613 manufacturer for normal home use.””

614
615 For products shipped with a forced menu where the customer must select upon initial start
616 up the mode in which the product will operate, *section 11.4.8* states that testing must be
617 conducted in “standard mode.” To further consistent messaging to consumers about how to
618 set their TVs for home use, the forced menu option should provide two choices: “home” or
619 “retail.” EPA will consider alternative proposals regarding the words selected to describe
620 these two modes on a case-by-case basis. If the user selects the “retail” setting, he/she will
621 be prompted one additional time to confirm this choice. This additional prompt is only
622 required the first time that the user turns on the TV and selects “retail.” A manufacturer may
623 substitute the second prompt if “retail” is selected with information on the start-up menu
624 relaying that the “home” setting is the setting in which the product qualifies for ENERGY
625 STAR.

626
627 Information relaying that the product qualifies for ENERGY STAR in the “home” setting and
628 that this is the setting in which power savings will be achieved will be included with the
629 product in its packaging and posted on the partner’s Web site, where information about the
630 model is listed.

- 631
632 e. Testing of TVs with Automatic Brightness Control: If an automatic brightness control exists
633 and is enabled by default, the TV should initially be tested in a room with a minimum
634 ambient light level of 300 lux entering the sensor to obtain the ‘P_{o_broadcast}’ measurement, as
635 described in *section 11.4.7, “Power saving functions”* and in *section 11.6.1*. A second
636 measurement should subsequently be taken with the TV tested in a room with an ambient
637 light level of 0 lux entering the sensor to obtain the ‘P_{abc_broadcast}’ measurement, as described
638 in *section 11.4.7, “Power saving functions”* and in *section 11.6.2*. The average ON Mode
639 power consumption for the TV will subsequently be determined using both ‘P_{o_broadcast}’ and
640 ‘P_{abc_broadcast}’, as described in Section 3.A.2 of this document.

- 641
642 3. Testing of Products with Network Connection: No network connection should be active during
643 the testing and measurement of operational modes for products with network connection
644 capability (e.g., Ethernet, Wi-Fi).

645
646 **Note:** EPA understands that network connectivity for TVs will be a more common feature in
647 future models. The power implications of this feature are not well understood. In order to treat all
648 products equally and not penalize products with greater capability, EPA is proposing to require
649 units with network capability be disconnected from the network during testing.

650
651 To gain a better understanding of the power and functional implications of network connectivity,
652 EPA would encourage stakeholders to submit ON and Sleep Mode power measurements of
653 products with network capability with and without an active network connection.

- 654
655 F. Dark Room Conditions: All luminance testing shall be performed in dark room conditions.
656 Measurements should be taken perpendicular to the center of the display screen using a Light
657 Measuring Device (LMD) with the display in OFF Mode (Reference VESA FPDM Standard 2.0,
658 Section 301-2F).

660 G. Light Measurement Protocols:

661
662 **Note:** EPA is interested in working with stakeholders to develop a test procedure for measuring
663 luminance in order to accurately record luminance and prevent any potential gaming that
664 manufacturers have mentioned is possible with the luminance approach described in Section 3.D
665 above. Additionally, EPA would like to ensure that the procedure for measuring luminance does not
666 favor one type of display technology over another. EPA is seeking stakeholder feedback on how to
667 measure luminance of TVs accurately and fairly.

- 668
669 5) **Effective Date:** The date that manufacturers may begin to qualify products as ENERGY STAR will be
670 defined as the *effective date* of the agreement. Any previously executed agreement on the subject of
671 ENERGY STAR qualified TVs shall be terminated effective April 30, 2010.

672
673 A. Qualifying Products Under the Version 4.0 Specification: This Version 4.0 specification will
674 commence on **May 1, 2010**. All products, including models originally qualified under Version 3.0,
675 with a **date of manufacture** on or after **May 1, 2010** must meet the new Version 4.0 requirements in
676 order to qualify for ENERGY STAR. The **date of manufacture** is specific to each unit and is the
677 date (e.g., month and year) on which a unit is considered to be completely assembled.

678
679 B. Qualifying Products Under the Version 5.0 Specification: The second phase of this specification,
680 Version 5.0, will commence on **May 1, 2012**. All products, including models originally qualified under
681 Version 4.0, with a **date of manufacture** on or after **May 1, 2012**, must meet the Version 5.0
682 requirements in order to qualify for ENERGY STAR.

683
684 **Note:** EPA anticipates finalizing the Version 4.0 ENERGY STAR TV products specification by
685 August 2009. The proposed Version 4.0 effective date of May 1, 2010, would allow industry the
686 typical nine months transition time prior to the new specification taking effect. Additionally, EPA has
687 included a proposed effective date of May 2012 for Version 5.0 requirements under this Draft 2
688 specification.

689
690 C. Elimination of Grandfathering: EPA will not allow grandfathering under this Version 4.0 ENERGY
691 STAR specification. **ENERGY STAR qualification under previous versions is not automatically**
692 **granted for the life of the product model.** Therefore, any product sold, marketed, or identified by
693 the manufacturing partner as ENERGY STAR must meet the current specification in effect at the
694 time of manufacture of the product

- 695
696 6) **Future Specification Revisions:** EPA reserves the right to revise the specification should technological
697 and/or market changes affect its usefulness to consumers or industry or its impact on the environment.
698 In keeping with current policy, revisions to the specification will be discussed with stakeholders. In the
699 event of a specification revision, please note that ENERGY STAR qualification is not automatically
700 granted for the life of a product model. To qualify as ENERGY STAR, a product model must meet the
701 ENERGY STAR specification in effect on the model's date of manufacture.
702