

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
AIR AND RADIATION

**Summary of Rationale for Version 3.0 ENERGY STAR® Television Specification
October 2009**

I. Introduction and Background

The Version 3.0 ENERGY STAR® program requirements for televisions (TVs) were finalized on February 4, 2008, and became effective on November 1, 2008.

This decision memorandum summarizes important details about the specification development process. The document is divided into the following sections:

- Summary of Key Specification Requirements
- Key Specification Development Milestones
- Summary of Stakeholder Input
- EPA's Rationale for Specification

II. Summary of Key Specification Requirements

The following section summarizes the key requirements found in the new Version 3.0 Eligibility Criteria.

Qualifying Products

- Qualifying products include TVs, TV monitors, component TVs, and TV combination products, e.g., a TV/DVD combination unit.
 - “Television monitor” products are covered by the Version 3.0 TV specification, not the Version 5.0 ENERGY STAR Displays specification.
- Product categories ineligible for ENERGY STAR qualification include:
 - Monitors with computer capability that are marketed and sold as monitors or dual-function television and computer monitors;
 - Televisions that do not have a power state that meets the definition of Standby (e.g., those TVs that are Public Alert™ CEA2009-certified and offer 24/7/365 active features);
 - Stand-alone VCRs; and
 - Combination VCR/DVD products. Combination VCR/DVD products are, however, still eligible to earn the ENERGY STAR under the ENERGY STAR Audio/DVD specification.

Energy Efficiency Criteria

- The Version 3.0 specification is technology-neutral, i.e., all products, regardless of underlying technology, must meet the same requirements in order to qualify.
- EPA will publish On and Standby mode power consumption data for qualifying products on the ENERGY STAR Web site. EPA will also publish the estimated annual energy consumption (kWh/year) for each product, given a typical duty cycle of 5 hours per day in On mode and 19 hours per day in Standby mode.
- Products must meet both On mode and Standby mode power consumption requirements in order to earn the ENERGY STAR under the Version 3.0 requirements.
 - *On mode:* Power consumption limits are based on both viewable screen area and resolution. A larger, high-definition (high resolution) TV is allowed a higher maximum On mode power consumption allowance than a smaller, standard-definition TV.
 - *Standby mode:* Power consumption is limited to 1 Watt. This lowest-power Standby mode must be enabled by default when products are shipped to consumers.
- Credit is given for products that offer an Automatic Brightness Control (ABC) feature and ship with ABC enabled by default. For these products, On mode power consumption is averaged over both low and average ambient light conditions, assuming low ambient light conditions 45% of the time, and average ambient light conditions 55% of the time.
- Products that are sold with an external power supply (EPS) are required to use either (i) an ENERGY STAR qualified EPS, or (ii) an EPS that meets the ENERGY STAR no-load and active efficiency requirements in effect at the time that the TV is manufactured.
- Manufacturers must qualify their products for ENERGY STAR with picture settings (brightness, contrast, etc.) set as shipped from the factory. Manufacturers who wish to offer high-brightness settings for use in a retail display environment must offer a “Forced Menu” to consumers upon initial start-up. The forced menu shall offer a choice of either “home” or “retail” modes, and an additional prompt shall be offered to users that select “retail” mode in order to confirm their selection.

Table 1: On Mode Power Level Requirements for TV Products

Screen Area	Tier 1: Effective November 1, 2008		Tier 2: Effective September 1, 2010	
	Maximum On Mode Power Consumption (A expressed in inches ²)	Maximum On Mode Power Consumption (A expressed in cm ²)	Maximum On Mode Power Consumption (A expressed in inches ²)	Maximum On Mode Power Consumption (A expressed in cm ²)
Non-High Definition TVs (i.e. ≤ 480 Native Vertical Resolution)				
All Screen Areas	$P_{Max} = 0.120 \cdot A + 25$	$P_{Max} = 0.01860 \cdot A + 25$	TBD	TBD
High Definition and Full High Definition TVs (i.e. > 480 Native Vertical Resolution)				
$A < 680 \text{ inch}^2 (< 4,387 \text{ cm}^2)$	$P_{Max} = 0.200 \cdot A + 32$	$P_{Max} = 0.03100 \cdot A + 32$	TBD	TBD
$680 \text{ inch}^2 \leq A < 1045 \text{ inch}^2$ ($4,387 \text{ cm}^2 \leq A < 6,742 \text{ cm}^2$)	$P_{Max} = 0.240 \cdot A + 27$	$P_{Max} = 0.03720 \cdot A + 27$	TBD	TBD
$A \geq 1045 \text{ inch}^2$ ($\geq 6,742 \text{ cm}^2$)	$P_{Max} = 0.156 \cdot A + 151$	$P_{Max} = 0.02418 \cdot A + 151$	TBD	TBD

P_{Max} = maximum On Mode power consumption, expressed in watts and rounded to the nearest whole number.

A = viewable screen area of the product, found by multiplying the display width by the display height.

Test Procedures

- The following test procedures are required for determining ENERGY STAR qualification:
 - On mode power consumption should be measured using Section 11 of IEC 62087, Ed. 2.0: *Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment*, accompanied by clarifications provided in the Test Methodology section of the Version 3.0 ENERGY STAR TV specification.
 - Standby mode power consumption should be measured using IEC 62301, Ed. 1.0: *Household Electrical Appliances – Measurement of Standby Power*, accompanied by clarifications provided in the Test Methodology section of the Version 3.0 ENERGY STAR TV specification.

Labeling & Documentation Requirements

- Manufacturers must include the ENERGY STAR mark on the top/front of the product, or on the TV's menu-screen for pre-set picture settings via use of an electronic label. The ENERGY STAR label must also be used in product literature, on product packaging, and on the manufacturer Web site where information about ENERGY STAR qualified products is displayed.
- Manufacturers are required to include consumer education materials on the product Web site and in the user manual, or on a box insert, to inform consumers that the television qualifies for ENERGY STAR only in "home" mode. These materials must also describe the benefits of keeping the TV in the as-shipped default setting.

III. Key Specification Development Milestones

EPA officially announced its intention to revise the Version 2.2 TV/VCR specification with a memorandum and accompanying FAQ document on September 21, 2005. At the time of the announcement, there was no technology-neutral test method available for measuring the On mode power consumption of televisions. Per industry request, EPA and IEC worked together with industry stakeholders over a three-year period to develop an internationally accepted and accredited test procedure. A working draft of this test procedure, IEC 62087, Ed. 2.0, was made available to EPA and ENERGY STAR stakeholders in April 2007. This test procedure was eventually used to inform On mode performance levels in Draft 1, and subsequent draft versions, of the specification.

The development of the Version 3.0 ENERGY STAR program requirements for televisions took slightly over two years and included the following key events:

- September 21, 2005: A memorandum and accompanying FAQ document was distributed to all stakeholders, officially launching the Version 3.0 specification development process.
- January 6, 2006: A preliminary TV market and industry research report was shared with stakeholders during the International Consumer Electronics Show (CES) in Las Vegas, NV.
- March 15, 2006: IEC voted to begin development of a new, technology-neutral On mode TV test procedure.
- June 19, 2006: A test procedure workshop was held at the 2006 Energy Efficiency in Domestic Appliances Conference in London, UK.
- July 18 & 19, 2006: ENERGY STAR representatives attended a meeting of the IEC TC100 US Technical Advisory Group to further development of IEC 62087, Ed. 2.0 in Washington, DC.
- July 20, 2006: ENERGY STAR hosted a TV stakeholder meeting in Washington, DC to discuss IEC 62087 and provide an update the Version 3.0 TV specification

- January 3, 2007: EPA distributed a document to update stakeholders on the development of the Version 3.0 ENERGY STAR TV specification and to solicit feedback on related topics.
- January 8 – 11, 2007: ENERGY STAR representatives met with stakeholders at the 2007 CES in Las Vegas, NV.
- January 11, 2007: ENERGY STAR representatives attended a meeting of the IEC TC100 US Technical Advisory Group to further development of IEC 62087, Ed. 2.0 in Las Vegas, NV.
- April 2, 2007: EPA released a working draft of IEC 62087, Ed. 2.0 and a first request for On mode test data.
- June 29, 2007: EPA released the Draft 1 Version 3.0 ENERGY STAR TV specification and accompanying files. Updates included: revised definitions for televisions and television monitors; proposed requirements for On, Standby, and Download Acquisition Mode (DAM); and a user information requirement.
- July 19, 2007: EPA hosted a stakeholder meeting to discuss the Draft 1 specification in Washington, DC.
- July 26, 2007: Per an industry request to augment the TV test data set, EPA distributed a second request for test data, specifically for (i) top-selling models by both screen-type and screen-size, and (ii) information on product features & functions and their effect on power consumption.
- September 24, 2007: EPA released the Draft 2 Version 3.0 ENERGY STAR TV specification and accompanying files. Updates included: modified product definitions for TV monitors and TV combination units; revised On mode power consumption requirements based on both TV screen area and resolution; revised DAM requirements; an equation to calculate power consumption of TVs with ABC; instructions on testing products with ABC; clarification of “Picture Level Adjustments” to reference IEC 62087, Ed. 2.0; and, introduction of the “Forced Menu” concept. Draft 2 also included preliminary Tier 2 qualification levels.
- October 18, 2007: EPA hosted a stakeholder meeting in conjunction with the CEA Technology and Standards (T&S) Forum in San Diego, CA.
- November 2, 2007: EPA distributed discussion guides for the following topics that were identified for further discussion at the October 18 stakeholder meeting: DAM, TVs with Public Alert, Wide Color Gamut, and TV monitors.
- November 6, 2007: EPA hosted a conference call to discuss the four topics mentioned above and solicited further feedback on the Forced Menu option presented in the Draft 2 Version 3.0 TV specification.
- November 16, 2007: EPA distributed revised proposals on DAM, Forced Menu option, ABC, and TV monitors. EPA also released a summary of key assumptions behind its projected savings numbers in the Draft 2 specification.
- November 26, 2007: EPA distributed revised On mode qualification requirements based on the augmented TV data set, which, coupled with the 1W Standby mode requirement, resulted in an overall qualification rate of 30% for TV models in the EPA data set.
- November 28, 2007: EPA hosted a conference call to discuss the revised proposals.
- December 4, 2007: EPA released projected savings numbers associated with the proposed revisions to On mode power consumption limits.
- December 17, 2007: EPA released the Final Draft Version 3.0 ENERGY STAR TV specification and accompanying files. The Final Draft document included: a modified definition for TV monitors; delayed implementation of DAM requirements until Tier 2; clarification that products without a Standby mode are ineligible for ENERGY STAR; revised On mode requirements; a modified equation for products with ABC; clarification of the forced-menu option; and a delay in the effective date for Tier 1 requirements.
- January 8 & 9, 2008: ENERGY STAR representatives met with stakeholders at the 2008 CES in Las Vegas, NV.

- February 4, 2008: EPA distributed the final Version 3.0 ENERGY STAR TV specification. The final document modified the On mode requirements for large-screen TVs to apply to all products with screen area $\geq 1045 \text{ in}^2$ to ensure that all TVs sold with an advertised viewable diagonal screen size of 50” would be subject to the same requirements.

Note that the above list only includes references to stakeholder meetings and major communications attended and organized by EPA. Several additional one-on-one meetings were held with manufacturers, trade associations, and other stakeholders during the test procedure and specification development processes.

IV. Summary of Stakeholder Input

EPA received substantial feedback from stakeholders during the development of the new Version 3.0 specification. Written stakeholder comments were posted to the ENERGY STAR Web site, provided the submitter provided EPA permission to do so, throughout the specification development process. Provided below is a summary of key stakeholder comments and EPA responses. More detailed comments and responses are provided in note boxes included within the draft specifications available in the ENERGY STAR Product Development Archives located at: www.energystar.gov/productdevelopment.

Definitions

- Comment: Several stakeholders proposed clarifications to product and power mode definitions.

EPA Response: Where available, EPA used product and power mode definitions developed by the IEC, and provided additional clarification as needed. However, IEC does not provide definitions for TV monitors or DAM. EPA worked closely with manufacturers to identify product characteristics to clearly differentiate TV monitors from computer monitors, in order to define whether a particular product should qualify under the Version 3.0 TV specification or the Version 4.1 Monitor specification. EPA also worked closely with industry to refine a definition for DAM to cover all anticipated DAM functionality without being too restrictive.

- Comment: Several stakeholders asked for additional TV combination products, e.g., TV with integrated hard disk drives (HDDs), to be added to the list of products eligible to earn the ENERGY STAR.

EPA Response: In order to provide additional flexibility for manufacturers, EPA combined all TV/VCR, TV/HDD, and other combination products under one “TV Combination Unit” definition. This structure allows future TV combination products to qualify for ENERGY STAR if they meet the definition and energy efficiency criteria.

- Comment: Per stakeholder request, EPA clarified what it considers to be a TV monitor and therefore eligible for qualification under the Version 3.0 TV specification by aligning its definition with the FCC’s requirements for this product-type. However, several stakeholders did not agree with linking the definition of a TV monitor to FCC requirements, stating concerns that e-waste laws might be affected.

EPA Response: EPA attempted to align its definition for a TV monitor with the FCC's requirements in response to stakeholder request and based on the fact that these requirements offered the most standardized, non-company specific delineation between TV monitors and

computer monitors. EPA also shares concerns about e-waste laws but found that based on subsequent stakeholder feedback few, if any, TV monitors will be sold in the U.S. in the near future.

Energy Efficiency Criteria

- **Comment:** Several stakeholders asked to maintain technology neutrality in the Version 3.0 specification. These stakeholders noted that with plasma and LCD technologies, in particular, there is relative parity in overall energy efficiency performance. As such, having separate power requirements would be unnecessarily complicated.
- **Comment:** Several stakeholders requested separate On mode power consumption limits for products with various screen resolutions and TV combination units. These stakeholders claimed that different television technologies serve different purposes, are bought for different reasons (i.e. to hang against the wall or to sit in the family room on a stand), and, consequently, should be subject to different requirements. Stakeholders noted that ENERGY STAR precedent already exists for separate equations based on technology differentiation, citing the ENERGY STAR refrigerator specification, as an example. One stakeholder further claimed that the Draft 1 specification was "technology biased," and would force consumers to choose between high performance and lower energy use. This could result in the consumer ignoring the ENERGY STAR mark in favor of TVs that delivered higher quality pictures and performance.

EPA Response: EPA developed On mode requirements tied to both screen area and resolution, based on stakeholder feedback. TVs serve the same fundamental purpose (i.e., to project visual media) and therefore should be compared to one another in a technology neutral manner. This technology-neutral approach provides flexibility for manufacturers who wish to qualify TVs that utilize new screen technologies, such as OLED. Furthermore, the EPA data set used to set the performance requirements included data points for LCDs, Plasmas, CRTs, and rear projection-based units, many of which were new, feature-rich TV models submitted by manufacturers.

- **Comment:** One stakeholder claimed that the EPA data set was biased in favor of "outmoded" or older technologies, such as CRT and rear projection-based products.

EPA Response: The data set used to develop the performance requirements was roughly in line with CEA's 2007 and 2008 US TV shipment projections. EPA believes that the data set serves as a fair representation of the TV market. For example, based on CEA's shipment projections for 2008, 6.2% of the total US TV market was estimated to be CRTs, while 6.3% of EPA's data set was comprised of CRTs. CEA estimated 5.3% of the total US TV market to be rear projection-based in 2008, so 5.7% of EPA's final data set was rear projection-based. Furthermore, in response to stakeholder feedback, EPA collected additional performance data to raise the total number of data points used to set the final Version 3.0 requirements to 175.

- **Comment:** A stakeholder commented that since rear projection display energy consumption remains static as screen size varies, it is inappropriate to include this technology in a data set that makes power proportional to screen size. Data from projection TV's change the slope of the qualification criteria line and make it more difficult for plasma displays to qualify.

EPA Response: Rear projection TVs deliver the same content as all other TV types and are a viable and energy-efficient option for consumers wishing to purchase a larger HDTV. Therefore, EPA chose to continue to include rear projection TVs in its evaluation of overall qualification

rates. However, EPA did omit the rear projection-based TVs with the highest and lowest On mode power consumption from its data set to make the total percentage consistent with CEA's 2008 market share projections for these product types.

- Comment: One stakeholder expressed concern with "stand alone" TVs and combination TVs being required to meet the same performance levels. The stakeholder further suggested that TV combination units should not exceed the combined ENERGY STAR power usage requirements for the separate component devices, in both On mode and Standby mode. It was suggested that for those devices without a "stand alone" ENERGY STAR equivalent in the market, a manufacturer could qualify the TV combination unit by demonstrating that the TV itself meets ENERGY STAR criteria with the combination device removed or disabled.

EPA Response: The Version 2.2 ENERGY STAR TV specification limited Standby mode power consumption to 1 watt for all TV combination units as of July 1, 2005. The Version 3.0 specification is consistent with these pre-existing program requirements for Standby mode. In addition, IEC 62087, Ed. 2.0 does not require measurement of the On mode energy use of integrated VCRs, DVD players, etc. in combination units. The additional On mode power consumption of the auxiliary device is minimal compared to the power consumption of the TV display itself. EPA thus chose to simplify the specification and align with IEC 62087, Ed. 2.0 by not requiring testing of any sub-components within a TV combination unit. If the TV portion of the product qualifies for ENERGY STAR with the subcomponent(s) turned off, the entire system qualifies for ENERGY STAR.

- Comment: A stakeholder noted that picture quality improvements (i.e., Wide Color Gamut (WCG), motion blur improvement, full-HD 1920x1080) can add to a TV's base power consumption. As such, EPA should grant allowances or "adders" for these additional features/functions.

EPA Response: EPA reviewed the information provided by stakeholders on the estimated power draw of these features and conducted research to determine how prevalent they are in the marketplace. Based on information from DisplaySearch, EPA found that WCG is projected to be in over 40% of TVs with a screen size of greater than 30" by 2008, when the Version 3.0 TV specification was scheduled to take effect. Given the quick uptake of this feature, EPA did not believe WCG to be a 'premium' feature that would warrant an additional power consumption allowance. Information from stakeholders also indicates that motion blur improvement has a minimal effect on power consumption, especially when compared with a TV's overall power budget.

- Comment: Several stakeholders expressed concern that EPA made the final Tier 1 specification less stringent than in earlier drafts, particularly for products with larger screen sizes.

EPA Response: EPA made the final Tier 1 requirements for large screen TVs less stringent to ensure that consumers would be able to find a range of ENERGY STAR qualified TVs in popular screen sizes of 42" and above for all screen-types, once the specification takes effect November 1, 2008. However, EPA intends to work closely with stakeholders to develop far more stringent Tier 2 criteria, particularly for large screen models, to take effect on September 1, 2010.

- Comment: Stakeholders said that consumers would not understand that TVs of similar screen area (e.g., one measuring exactly 1045 sq-inches and another slightly above 1045 sq-inches), would have to meet very different requirements to earn the ENERGY STAR.

EPA Response: EPA intends to provide consumers with an estimate of the annual energy consumption of qualified TVs on the ENERGY STAR Web site. This annual energy consumption estimate will be based on a daily usage pattern of 5 hours in On mode and 19 hours in Standby mode. In providing this information to consumers, EPA intends to highlight the fact that TVs with larger screen sizes typically consume more power than smaller models.

- Comment: One stakeholder commented that the Tier 2 specification should make an effort to reduce the On mode consumption requirements for increasingly popular large screen sizes.

EPA Response: Recognizing that both products and market conditions will evolve in the coming years, EPA intends to work closely with stakeholders to develop more stringent Tier 2 requirements for TVs, particularly for large screen models.

- Comment: One stakeholder commented that there was no benefit to including Off mode power consumption requirements, since the requirement for Standby is less than 1 watt and networking features require that products never truly be in Off mode.

EPA Response: EPA decided not to include Off mode requirements in the Version 3.0 specification since minimal additional energy savings would result from Off mode requirements.

- Comment: One stakeholder commented that DAM criteria may exclude televisions based on features they offer and not solely on their energy efficiency. The stakeholder went on to propose that the specification add a "Networked Standby" mode with an average power consumption allowance of 4 watts, averaged over a 24 hour period. Furthermore, it was proposed that this limit apply only to features that are active in factory default settings and not those activated by the consumer. Additionally, a stakeholder noted that there are many uses for televisions in which they have to remain connected to a network device 24/7, such as in retail stores and hotels. The current definition of DAM would exclude ENERGY STAR televisions from these uses.

EPA Response: After carefully reviewing the comments received on DAM, including concerns raised by stakeholders that development of a separate test procedure to accurately measure power consumption in DAM might delay finalization of the Version 3.0 specification, EPA decided to defer development and implementation of DAM requirements until Tier 2.

- Comment: One stakeholder noted that Automatic Brightness Control (ABC) functionality should be encouraged by the EPA due to its energy savings potential.

EPA Response: EPA included an additional equation under the Version 3.0 specification specifically for TVs that ship with ABC enabled by default. EPA recognizes that TVs are used during low ambient light conditions for a portion of a typical day, so TVs with ABC will automatically reduce brightness and consume less power.

Test Methodology

- Comment: One stakeholder requested that EPA retain sections of IEC 62087, Ed. 2.0 that pertain to "Special functions," "Picture level adjustments," and "Power saving functions" in the specification. The stakeholder requested that all normative parts of the test procedure should be adopted "as is" to ensure the continued integrity of the document.

EPA Response: EPA endorses and supports the test methodology described in Section 11 of IEC 62087, Ed. 2.0 as the most complete international test standard for measuring the average On mode power consumption of a television. Any clarifications made in the Version 3.0 specification were intended not to deviate from that test procedure but to reiterate normative language already stated by IEC and clarify that broadcast, not static, signals should be used in all active mode measurements for the purposes of ENERGY STAR testing.

- Comment: Several stakeholders expressed concern about a Forced Menu at initial start-up in which a user would have to "confirm" the choice of retail mode every time the TV is powered on. These stakeholders commented that this would be an undue burden on retailers as well as on consumers who might select the retail mode.

EPA Response: EPA agreed with this concern. The Final specification makes it clear that should a user select "retail" at start-up, he/she will need to be prompted only once to confirm this choice. Additionally, manufacturers may replace the second prompt with information at start-up that clearly relays that the product qualifies for ENERGY STAR in the "home" setting.

Effective Date

- Comment: Due to manufacturer production schedules, several stakeholders stated that the proposed November effective date did not align with typical manufacturer production cycles. Several alternate dates were proposed, including January 2009, February 18, 2009 (to tie in with the digital transition), and April 1, 2009. These stakeholders also requested that Tier 2 target effective dates should be two years after the dates proposed for Tier 1.

EPA Response: Revisions to ENERGY STAR specifications typically become effective nine months after being finalized to allow manufacturers adequate time to prepare for the new requirements. EPA proposed the November 1, 2008 effective date to allow consumers the opportunity to purchase ENERGY STAR qualified TVs that meet the new active mode requirements during the 2008 holiday season. It is estimated that 40% of annual TV sales typically occur during the holiday season and several retailers and utility companies expressed interest in promoting the newly qualified models during this time.

- Comment: Several stakeholders suggested that allowing grandfathering under the new specification could be a more equitable, industry-wide solution to the debate over the effective date. Further, two stakeholders stated that not allowing grandfathering would alter production plans mid-cycle, involving the alteration of boxes, instruction manuals, and other materials printed with the ENERGY STAR mark and resulting in a large amount of wasted materials.

EPA Response: EPA eliminated grandfathering for TVs under the Version 2.0 TV products specification. Subsequently, grandfathering has been eliminated across all other ENERGY STAR product categories to maintain the integrity of the label and deliver on consumer expectations of product performance and related energy savings. Given that manufacturers will have known about the new specification an estimated 14 months prior to the effective date, EPA hopes that proper planning can result in a minimum of wasted material. Additionally, EPA recognizes that it takes time for products and their associated collateral material to work their way through distribution channels. EPA will not require manufacturers to de-label any products, packaging, or materials that are manufactured and labeled as ENERGY STAR qualified under the Version 2.2 requirements prior to November 1, 2008. However, any TV models manufactured as of

November 1, 2008 must meet the new Version 3.0 requirements in order to be labeled as ENERGY STAR.

V. EPA Rationale for Specification

EPA uses a consistent set of criteria in the development and revision of specifications for ENERGY STAR qualified products. These criteria guide EPA in its decision making and help EPA ensure that the ENERGY STAR mark will continue to be a trustworthy symbol for consumers to rely upon as they purchase products for the home or business. These criteria include:

- Significant energy savings and environmental protection potential on a national basis;
- Efficiency level is technically feasible while product performance is maintained or enhanced;
- Labeled products will be cost-effective to the buyer;
- Efficiency can be achieved with several technology options, at least one of which is non-proprietary (i.e., not exclusive to proprietary technology);
- Product differentiation and testing are feasible; and,
- Labeling would be effective and recognizable in the market.

Below EPA addresses the Version 3.0 TV specification relative to each of these criteria:

Expected Energy Savings and Environmental Benefits: For the first time in product history, the Version 3.0 ENERGY STAR specification for televisions addresses On mode power consumption. The consumer can now realize energy savings in all modes of operation. ENERGY STAR qualified models are up to 30% more efficient than non-qualifying models. In its first year of implementation, the Version 3.0 ENERGY STAR specification for televisions is projected to save over 8.4 billion kilowatt-hours of energy and 1.6 million tons of carbon.

- Product Performance Measured and Verified with Testing: EPA participated in the development of Section 11 of IEC 62087, Ed. 2.0: *Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment*; and IEC 62301, Ed. 1.0: *Household Electrical Appliances – Measurement of Standby Power*. These industry-accepted test procedures were adopted by EPA for purposes of measuring ENERGY STAR On mode and Standby mode power consumption. Both procedures were developed under the strict guidelines of the IEC and subject to multiple rounds of international stakeholder review, comment, and vote prior to finalization.
- Technical Feasibility/Impact on Product Performance/Functionality: Based on feedback from product manufacturers and other industry stakeholders, EPA believes that the Version 3.0 ENERGY STAR requirements for televisions are technically achievable and will not adversely impact product performance. 27% of the models in the EPA data set were able to meet the Tier 1 requirements at the time that the Version 3.0 specification was finalized. These models covered the full range of available screen sizes and display technologies, i.e., CRTs, LCDs, plasmas, and rear projection-based models. Maximum allowable power consumption for a given product is, however, defined as a factor of both screen size and resolution, so televisions of all types and sizes are eligible to earn the ENERGY STAR.

- Cost-Effectiveness: Based on pricing information collected from the Web on two 32-inch LCD televisions (an average TV size indicated in a 2009 CEA market report), an ENERGY STAR 32-inch television (Sharp LCC3234U) costs \$20 more than a comparable non-ENERGY STAR television (Sharp LC-32GP1U) by the same manufacturer. Using the price of electricity of \$0.111/kWh and an annual unit energy savings of 76 kWh¹ between these units, the payback period would be less than three years. However, as of the writing of this document, a majority of televisions on the market meet the Version 3.0 requirements. Therefore, it can be concluded that there is little to no extra cost associated with the production of energy-efficient products.
- Several Technology Options, including some with Non-proprietary Technology: The Version 3.0 ENERGY STAR TV specification is intended to be performance-based and technology-neutral. The requirements are designed to identify the most energy-efficient products on the market without regard to the underlying display technology. At the time that the specification was finalized, there were CRT, LCD, plasma, and rear projection-based TVs included in the EPA data set that could meet the requirements in the Version 3.0 specification.
- Product Differentiation and Labeling: EPA believes that the ENERGY STAR label serves as an objective basis for consumers to identify the most energy efficient televisions on the market. Under the previous Version 2.2 requirements, market penetration of ENERGY STAR qualified televisions was over 60%. At the time of finalizing the Version 3.0 specification, market penetration was anticipated to be just 27%, based on available performance and CEA market data. Most major TV manufacturers were involved in the Version 3.0 specification revision process, and 71% of the manufacturers in the data set had at least one model that could qualify under the new requirements. Furthermore, several major electronics retailers and utilities have expressed interest in marketing and promoting products that qualify under the new Version 3.0 specification.

¹ ENERGY STAR Case: $((95W*5h)+(0.3W*19h))*365=175kWh/yr$; Reference Case: $(175/0.7) = 251kWh/yr$.