

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



OFFICE OF
AIR AND RADIATION

**Summary of Rationale for Version 4.0 ENERGY STAR® Computer Monitor Specification
July 2004**

I. Introduction and Background

This memorandum provides a summary of the rationale and key changes that culminate in Version 4.0 of the Computer Monitor specification. It contains the following information:

- Summary of the Version 4.0 Specification and the key changes from the last specification
- Summary of key milestones in the development of the Version 4.0 Specification
- Summary of comments provided by stakeholders
- EPA's rationale for deciding on key elements of the final Version 4.0 Specification including the criteria EPA uses
- Detailed overview of the Version 4.0 Specification

II. Summary of Version 4.0 Specification

The Version 4.0 ENERGY STAR Specification for Computer Monitors is different from Version 3.0 in several key ways, as described below.

- To qualify as ENERGY STAR, a computer monitor must meet the specified energy-efficiency requirements in all three operating modes — On, Sleep, and Off. This is different from the Version 3.0 specification where a display only had to meet Sleep and Deep Sleep Mode requirements. (See Table 1 below for a comparison of the old Version 3.0 and the new Version 4.0 specification.) The Computer Monitor specification is the first under the office equipment category to incorporate On Mode levels.

Table 1: Comparison of Old Version 3.0 and New Version 4.0 Computer Monitor Specification

Operating Mode	Old Spec	New Spec: Tier 1	New Spec: Tier 2
On Mode	N/A	$Y = 38X + 30$	If $X < 1$ megapixel, then $Y = 23$; if $X \geq 1$ megapixel, then $Y = 28X$
Sleep Mode	≤ 15 Watts	≤ 4 Watts	≤ 2 Watts
Deep Sleep Mode	≤ 8 Watts	N/A	N/A
Off Mode	N/A	≤ 2 Watts	≤ 1 Watt

Note: The new specification is explained in greater detail in Section VI. Y = Watts; X = Megapixels in decimal form.

- The new specification requires computer monitor models to use less energy while in Sleep Mode than allowed in the last specification. The required improvements are staged in two tiers effective January 1, 2005 and January 1, 2006.
 - In Tier 1, the Sleep Mode energy-efficiency criterion is ≤ 4 watts.
 - In Tier 2, the Sleep Mode energy-efficiency criterion is ≤ 2 watts.
- The Tier 2 Off Mode level of ≤ 1 watt aligns with the Federal Energy Management Program's (FEMP) standby recommendations for computer monitors.
- The new specification includes a detailed test methodology to measure power consumption in On, Sleep, and Off Modes. EPA developed this methodology with significant input from industry and an independent testing laboratory.
- Grandfathering is no longer allowed. That is, EPA now requires product models to meet the specification in effect on their manufacture date if they are to carry the ENERGY STAR mark.
- The Version 4.0 specification is accompanied by the ENERGY STAR Partnership Agreement, which supersedes the Memorandum of Understanding (MOU) format previously employed by EPA. This Agreement includes standard Partner Commitments language requiring manufacturers to: 1) qualify at least one ENERGY STAR qualified computer monitor model within six months of activating the computer monitor agreement; 2) provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying computer monitor models; 3) provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR; and 4) provide clear and consistent labeling of ENERGY STAR qualified computer monitors. For the fourth key partner commitment—product labeling—EPA has incorporated some flexibility into the ENERGY STAR labeling requirements for computer monitors given manufacturers' product design and cost concerns. Additional details on the labeling options and timeframe are provided in Section VI of this document.
- The Version 4.0 Computer Monitor Specification is the first specification to be developed and completed under the auspices of the European Commission/ENERGY STAR agreement.

III. Key Milestones of Specification Revision

In order to preserve the meaning of ENERGY STAR as a label identifying the most energy-efficient products in the market, EPA must periodically review and revise performance criteria. In setting an ENERGY STAR performance specification, EPA strives to strike the appropriate balance between identifying the better performers while ensuring adequate supply and selection of qualifying products. The Version 3.0 Computer Monitor Specification has been in effect for almost 5 years (since July 1, 1999), and market penetration of ENERGY STAR qualified computer monitors has been estimated at approximately 95 percent of total units shipped. This penetration level suggested that a review of ENERGY STAR performance specifications was warranted, as is outlined in the Memorandum of Understanding (MOU): "ENERGY STAR Partner and EPA will work together to revise the technical specifications as necessary. ENERGY

STAR Partner agrees that EPA can initiate a review of compliance guidelines at any time, if necessary.”

In addition, the following market factors influenced EPA’s decision to update the specification for computer monitors:

- Computer monitors have a reliably large and growing installed base. IDC predicts that total monitor shipments will reach 149 million units in 2007, with 118 million of these being LCDs;
 - Computer monitors have a significant presence in office environments and on retail shelves, which provides opportunities to differentiate ENERGY STAR qualifying models and increase awareness of ENERGY STAR; and
 - Many manufacturers, retailers, and consumers have expressed continued interest in ENERGY STAR for computer monitors.
- With this latest specification revision, EPA also decided to incorporate On Mode/Active Power into its energy-efficiency requirements for computer monitors. The key reasons behind this decision are noted below:
- There is limited additional energy savings potential in Sleep and Off Modes;
 - Savings in On Mode are not dependent upon the user enabling (or not disabling) the power management feature, which has been a concern for past Sleep Mode specifications; and
 - The On Mode specification allows a variety of technologies to qualify as ENERGY STAR. In fact, the specifications have been set such that some models on the market today already meet the ENERGY STAR criteria.
- The final Version 4.0 specification was developed over the course of more than two years, which included the following key milestones:
- Approximately nine months of development time (June 2002-February 2003) dedicated to the preparation of an integrated computer monitor test methodology to measure power consumption in On, Sleep, and Off Modes. During this time, EPA provided interested stakeholders with several opportunities to comment on draft versions of the test methodology both in writing and during conference calls.
 - Testing (both by EPA and manufacturers) and evaluation of 270 computer monitor models varying in terms of brand, size, resolution, and features.
 - Two formal stakeholder meetings hosted by EPA on April 29, 2002 in San Francisco, CA and July 22, 2003 in Washington, DC. EPA also attended European computer monitor stakeholders meeting in France in May 2002.
 - Several presentations and discussions with industry during international travel to Tokyo, Japan in February 2003 and Turin, Italy in October 2003.
 - Scores of meetings and conference calls with representatives from individual manufacturers, the Information Technology Industry Council (ITI), the European Commission, TCO Development, and other stakeholders.
 - Four draft specifications, four drafts of the test methodology, and separate EPA correspondence/proposals to address the new labeling requirement.

IV. Summary of Stakeholder Input

EPA received substantial stakeholder input in the development of the new specification. Key stakeholders that provided either written or oral comments were ITI, the European Commission, TCO Development, Japan's Ministry of Economy, Trade and Industry (METI), and various computer monitor manufacturers.

There were areas of clear agreement between EPA and ENERGY STAR stakeholders. These were:

- Development of a new integrated computer monitor test methodology to measure power consumption in On, Sleep, and Off Modes. All stakeholders agreed that an existing industry-accepted test methodology to measure monitor power consumption in On, Sleep, and Off Modes did not exist. As such, EPA invested its resources in preparing a new test methodology with significant input from the computer monitor industry, international stakeholders, and an independent testing laboratory. Where appropriate, the test methodology references published specifications from the Video Electronics Standards Association (VESA) Display Metrology Committee and the International Electrotechnical Committee (IEC).
- Incorporation of a two-tiered specification approach. In Draft 2, EPA introduced a two-tiered specification for On, Sleep, and Off Modes. Tier 2 was provided to serve as an "energy-efficiency roadmap" for manufacturers. While there was discussion about the specific Tier 2 levels, there was general acceptance by all parties of the two-tiered approach.
- Interest in accommodating larger screen sizes and widescreen models. When designing its specifications, EPA strives to recognize the most energy-efficient models across a spectrum of features and functionality. This approach is congruent with manufacturers' goals to offer the latest, most feature-rich (and often best selling) models with the ENERGY STAR mark. In both tiers, EPA ensured that the final specification accommodated larger screen sizes (20 inches and above). For widescreen models, EPA was not able to develop separate specifications due to a lack of data; however, widescreens are eligible to earn the ENERGY STAR under the general specifications and current test data indicates that some models will qualify in Tier 1. For Tier 2, EPA has agreed to consider revisions or clarifications for widescreen models when adequate energy consumption data is readily available.
- Interest in coordinating with other domestic and international standards and voluntary initiatives. All parties recognized the benefits of coordinating their efforts and implementing one cohesive set of energy-efficiency specifications for computer monitors.

There also were a number of concerns raised by stakeholders that EPA has sought to address. The following is a summary of five key concerns and their resolutions.

- Approaches to measuring On Mode/Active Power. A few stakeholders voiced concern about the appropriateness of the pixels per watt approach in determining On Mode/Active Power. EPA concurred that pixels per watt may not be the perfect approach and that resolution is not the only driver of power consumption. However, the vast majority of stakeholders supported pixels per watt as the best choice available. The following are the key benefits of this approach:

- It is technology neutral (i.e., it avoids the difference between viewable screen size versus total screen size);
- It emphasizes display quality over physical screen size; and
- It avoids the need to estimate a representative “duty cycle” for monitors, which would be difficult to do.

An alternative—screen area/size—was considered in the early stages and not pursued for two reasons: 1) it added a lot more complexity to the specification, and 2) initial testing showed that power variations tended to reflect differences in resolution. To further address concerns, EPA indicated that it might consider future revisions to the On Mode approach based on additional data collected as the specification is implemented in the United States and around the world.

- CRT monitors under the new specification. EPA designed the Computer Monitor specification to be a performance-based specification. This means that it strives to recognize the better performing monitors in terms of energy efficiency without differentiating based on technology. Most market research firms are predicting a significant decline in CRT sales over the next few years. In fact, according to NPD Techworld, LCD unit sales exceeded CRT unit sales for the first time in May 2003. However, as noted by some industry representatives, due to the current price differential between LCD and CRT monitors, CRTs continue to be preferred options for some consumers, even though on average they tend to consume more energy than a comparable LCD. As such, EPA chose its proposed energy efficiency levels in order to allow a modest percentage (17%) of CRTs to qualify under Tier 1. For Tier 2, which doesn’t take effect until 2006 and at which point LCDs are expected to dominate the market, CRTs will be eligible for the ENERGY STAR label, although testing in 2002 during specification development did not identify any current models that would qualify.
- Elimination of grandfathering. Industry was concerned about the removal of the grandfathering provisions included in the Version 3.0 specification. Under this provision, qualified products were allowed to remain qualified for the life of the product, despite a change in the specification. EPA believes it is important to remove grandfathering so that products meeting varying efficiency criteria are not labeled in the market at the same time. Consumers should be able to look for labeled products and be confident that those products labeled meet current program requirements. To respond to industry concerns, EPA provided about a one-year transition period between completing the specification (early 2004) and implementing Tier 1 (January 2005 effective date). Furthermore, since date of manufacture is being used as the basis for ENERGY STAR qualification, manufacturers are not being asked to retroactively remove the ENERGY STAR label from products that no longer qualify. The products may carry the ENERGY STAR label as they move through the distribution channel, even if they are no longer qualified, as long as their date of manufacture is prior to the effective date of the new specification.
- Introduction of new labeling requirements. Some stakeholders opposed the introduction of new labeling requirements for computer monitors through the Partnership Agreement. In order to reduce the burden on manufacturers, EPA took the following steps: 1) provided manufacturers with four options for labeling their products (while still requiring that the mark be displayed on product packaging, in product literature, and on manufacturers’ Internet sites), and 2) deferred all labeling requirements until January 2006. This date was

specifically selected to coincide with the Tier 2 effective date and the anticipated adoption of the new ENERGY STAR label by the European Commission.

- Number of units required for test. In its initial drafts of the test methodology, EPA required multiple data points per model, which proved burdensome to some companies. Based on an analysis of power variability between samples of models, EPA felt there was sufficient data consistency to establish a new procedure where the number of units required for test (i.e., one sample or three samples per model) depends on the test results for the first unit. This approach is based on European Norm 50301 and was originally presented to EPA by a manufacturer during the July 2003 stakeholder meeting.

“For the purposes of ENERGY STAR, if a tested computer monitor uses at least 15% less power (i.e., greater than or equal to 15%) than the ENERGY STAR specification in all three operating modes (On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power), then it only has to be tested once. However, if a tested computer monitor is within 15% (i.e., less than 15%) of the ENERGY STAR specification in any of the three operating modes, then two more units have to be tested. None of the test values may exceed the ENERGY STAR specification for the model to qualify as ENERGY STAR.”

EXAMPLE: For simplicity, assume the specification is **100 watts or less and only applies to one operational mode. 85 watts would represent the 15% threshold...**

- If the first unit is measured at **80 watts**, **no more testing** is needed and the model qualifies (80 watts is at least 15% more efficient than the specification and is “outside” the 15% threshold).
- If the first unit is measured at **85 watts**, **no more testing** is needed and the model qualifies (85 watts is exactly 15% more efficient than the specification).
- If the first unit is measured at **90 watts**, then **two more units** must be tested to determine qualification (90 watts is only 10% more efficient than the specification and is “within” the 15% threshold).
- If three units are tested at **90, 98, and 105 watts**, the model **does not qualify** as ENERGY STAR—even though the average is 98 watts—because one of the values (105) exceeds the ENERGY STAR specification.

- Local voltage/frequency conditions. Based on feedback from international stakeholders, EPA added language to the test methodology requiring manufacturers to test their computer monitors at the standard mains voltage and frequency conditions for the market in which the models will be sold. While EPA considered limiting testing to 115 volts at 60 Hz, various concerns were raised about the potential variations in tested values across markets.

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 and so that their purchases will deliver substantial environmental protection. 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.

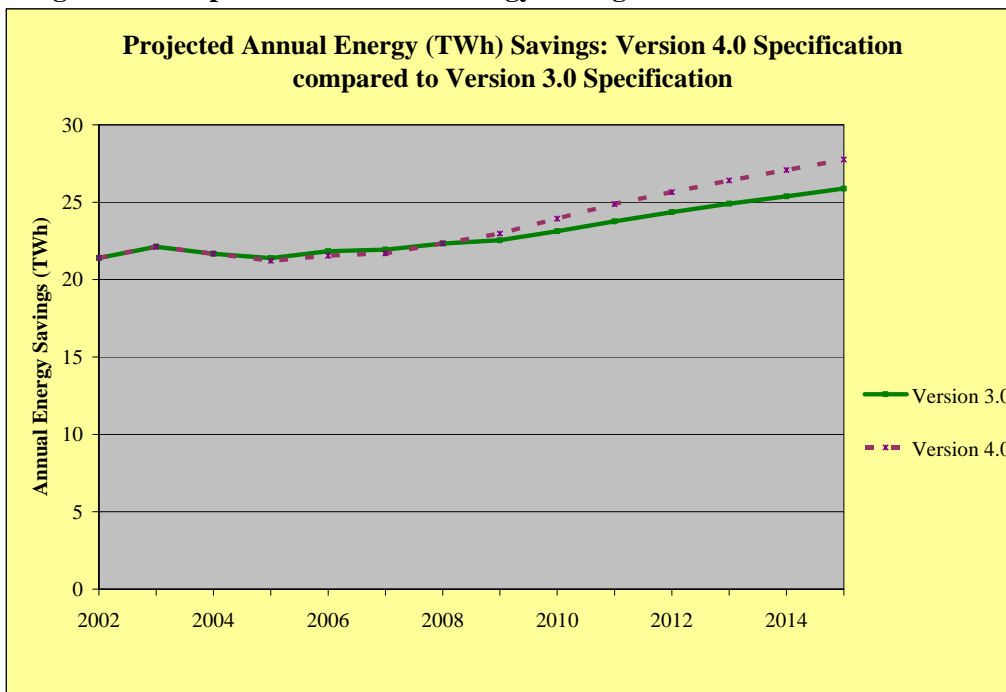
Below EPA addresses the Version 4.0 specification relative to each of these criteria.

- *Expected Energy Savings and Environmental Benefits.* EPA expects its Version 4.0 specification to yield increased energy savings and reductions in air pollution. EPA projects a potential US energy bill savings of almost \$590 million, electricity savings of 8 billion kWh, and 1.2 million metric tons of carbon (MMTC) avoided over the time period of 2005 to 2015 due to the new specification. A table outlining these results and the key assumptions is provided in Table 2. Figure 1 provides a comparison of the annual energy savings between Versions 3.0 and 4.0.

Table 2: Additional Computer Monitor Savings from the Version 4.0 Specification

Note: The figures below represent the net increase in cumulative savings (i.e., not total savings, which would be larger) attributed to the Version 4.0 Specification from 2005 through 2015.	
Additional energy bill savings	\$590 million
Additional energy savings	8 billion kWh
Additional carbon savings	1.2 MMtC
Key Assumptions	<ul style="list-style-type: none"> • Residential price of electricity ranges from 7.7 to 7.6 cents during 2005 to 2015. Commercial price of electricity ranges from 7 to 6.8 cents during the same period. • ENERGY STAR market penetration decreases in 2006 due to the introduction of Tier 2 of the specification, but then rises again. • Annual shipments of CRTs decrease until 2007, followed by modest growth. Annual shipments of LCDs increase over the 10-year period. • Annual energy savings for an ENERGY STAR qualified LCD ranges from 127 kWh/year to 177 kWh/year. Annual energy savings for an ENERGY STAR qualified CRT ranges from 213 kWh/year to 290 kWh/year.

Figure 1: Comparison of Annual Energy Savings Between Version 3.0 and 4.0



- *Technical Feasibility/Impact on Product Performance/Functionality.* EPA believes the energy use requirements across the two tiers of this specification to be technically feasible and to not adversely impact product performance for the following reasons:
 - The Tier 1 levels represent the top 17% of CRTs and the top 69% of LCDs from EPA’s data set, which includes 270 models varying in brand, size, resolution and features tested by EPA and monitor manufacturers. Further, the Tier 1 levels accommodate larger screen sizes (20 inches and above) and widescreen models, as suggested by manufacturers. With the introduction of On Mode requirements for the first time in computer monitors, this specification has been set so that it recognizes the best of current efficiencies and encourages increased efficiency in the future through a Tier 2 specification. Stakeholder feedback on Tier 1 generally indicated that the levels were “achievable.”
 - EPA believes based on its technical work and industry comment that the Tier 2 levels are feasible by 2006 for the top 25 percent of the computer monitor market. This finding is based on the following:
 - Early percentage of models qualifying -- The Tier 2 levels today represent the top 12% of computer monitors in EPA’s data set in All Modes. Given that significant lead time has been provided for Tier 2, EPA expects the percentage of qualifying computer monitors to be higher in 2006.
 - Performance-based specification -- Version 4.0 is designed to be a performance-based specification. This means that it strives to recognize the better performing models in terms of energy efficiency without differentiating based on technology. While the current test data set does not include any qualifying CRTs for Tier 2, EPA feels this fact is mitigated by the following: 1) manufacturers have two years to design more energy-efficient CRTs if they voluntarily choose to; and 2) market research firms and other industry sources are indicating the continued rapid decline in CRT sales, along with a corresponding increase in LCD sales.

- Adequate time allowed to transition to lower energy use levels -- EPA understands that product redesign takes time and cannot always be accomplished within one design/manufacturing cycle. Therefore, EPA has developed the new specification with two tiers of effective dates to incrementally phase in lower energy levels over time. This phase-in period will enable more manufacturers to commit to gradually lowering their products' energy consumption and should help ensure that the energy savings remain cost-effective to the consumer.
 - Industry comment – As an example, in a letter to EPA one manufacturer stated, “The on mode criteria for both Tier 1 and 2 are challenging, but appear achievable for most LCD flat panel monitors.”
 - Willing to consider future revisions for widescreen models – Under Tiers 1 and 2 of the final specification, widescreen models may qualify as ENERGY STAR if they meet the energy-efficiency requirements. Given the relatively recent introduction of widescreen models and the lack of significant energy consumption data available for them, EPA did not have the data to properly evaluate widescreen models relative to the Tier 2 specification. If needed, further evaluation of Tier 2 and widescreens may be conducted at a later date, if widescreen models garner additional market share as forecasted.
- *Cost-effectiveness to the Buyer.* EPA believes the Version 4.0 Specification can be achieved cost effectively based on evidence that manufacturers are already meeting the new energy-efficiency targets and providing these models to consumers at competitive prices.
- While prices of LCDs are falling, they are still generally more expensive than CRTs (e.g., average 15” LCD is about \$125 more than a comparable CRT, and average 20” LCD is about \$600 more than a comparable CRT). It is important to note, however, that the price differential between CRTs and LCDs is not directly linked to their energy efficiency, but rather reflects the lifecycle of the technology and other factors. In addition to lower power consumption, below are some non-energy benefits of purchasing an LCD computer monitor:
 - Smaller footprint, so less work space is needed for an LCD
 - Less heat generated by an LCD, leading to increased comfort and lower cooling costs
 - Less flicker in an LCD display, which is less likely to induce eyestrain
 - Useful life of an LCD is 5-7 years, whereas useful life of a CRT is 3-4 years under similar conditions
 - Installation of a an LCD is easier, due to its lighter weight and smaller size
 - Transportation of an LCD costs less, due to its lighter weight and smaller size
 - LCDs don’t contain lead, making waste disposal/recycling less complicated
 - As noted earlier in this document, a variety of CRTs on the market today are already meeting the Tier 1 levels. When Tier 2 takes effect, many analysts expect CRTs to be more of a niche market player with LCDs accounting for the majority of new sales.
 - EPA is providing significant lead-time with the phase-in of the new specification so that manufacturers can incorporate energy efficiency into their products during the regular design and manufacturing cycle. EPA understands that attempting to retrofit existing products that have high power demand can be expensive but such retrofitting should not be necessary.
- *Several Technology Options, including some with Non-proprietary Technology.* EPA believes that options exist for improving the energy performance of computer monitors. A few examples include:

- Using switch mode power supplies to reduce energy losses across the full range of load conditions;
 - Incorporating changes in circuit design, particularly for Sleep and Off Modes, such that circuits can be disengaged so energy isn't used unnecessarily;
 - Using energy-efficient displays (LCD displays require less power when compared to CRTs; other direct view technologies are in development with the potential to reduce energy consumption, such as Organic Light Emitting Diodes (OLEDs)).
- *Product Differentiation and Testing Procedure.* As was the case when EPA initially established ENERGY STAR efficiency criteria for computer monitors, product performance varies within a sufficient range to allow for meaningful differentiation to the consumer.
- **EXAMPLE:** Within EPA's test data set, On Mode/Active Power measurements for 15" monitors vary from 14.7 to 75 watts. For CRTs only, the range is 49.3 to 75 watts; for LCDs, the range is 14.7 to 58 watts.

It was clear early in specification development that a new test methodology for On Mode/Active Power was needed. The new methodology outlined in the Version 4.0 specification went through multiple rounds of stakeholder review and comment over a nine-month period and was successfully used to generate hundreds of test data points by an independent testing laboratory and a variety of manufacturers.

- A well-defined test procedure ensures that repeatable results can be generated, objective comparisons can be made between products, and loopholes can be avoided. The ENERGY STAR product testing methodology for computer monitors can be found at www.energystar.gov/productdevelopment.
- *Effectiveness of ENERGY STAR Labeling.* EPA believes an ENERGY STAR label for computer monitors serves an important role in the marketplace due to the absence of any other objective basis for buyers to identify and manufacturers to promote highly efficient computer monitors. ENERGY STAR offers the attributes of a strong ingredient brand for its partners, since it is an immediate point of differentiation, has added value (energy and financial savings), and has reduced effort and perceived risk for consumers.

VI. Noteworthy Aspects of the Specification

New Product Areas

- *Computer Monitors with Tuner/Receiver:* As product convergence continues, there are computer monitor products on the market with television capability. These products may qualify as ENERGY STAR under the Version 4.0 specification as long as they are marketed and sold to consumers as computer monitors or as dual function computer monitors and televisions. To date, televisions, including those with limited computer functionality, are addressed under the Version 2.0 TV/VCR specification. EPA intends to monitor the product convergence closely and make changes as necessary.
- *Widescreen Models:* Widescreen (e.g., 16:9, 15:9, etc.) models are eligible to earn the ENERGY STAR, provided that they meet EPA's energy-efficiency requirements. There are

no separate specifications for widescreen models. For Tier 2, future revisions or clarifications for widescreen models will be evaluated and considered, when adequate energy consumption data is readily available to EPA.

Tier 1 of the Version 4.0 Specification – effective January 1, 2005

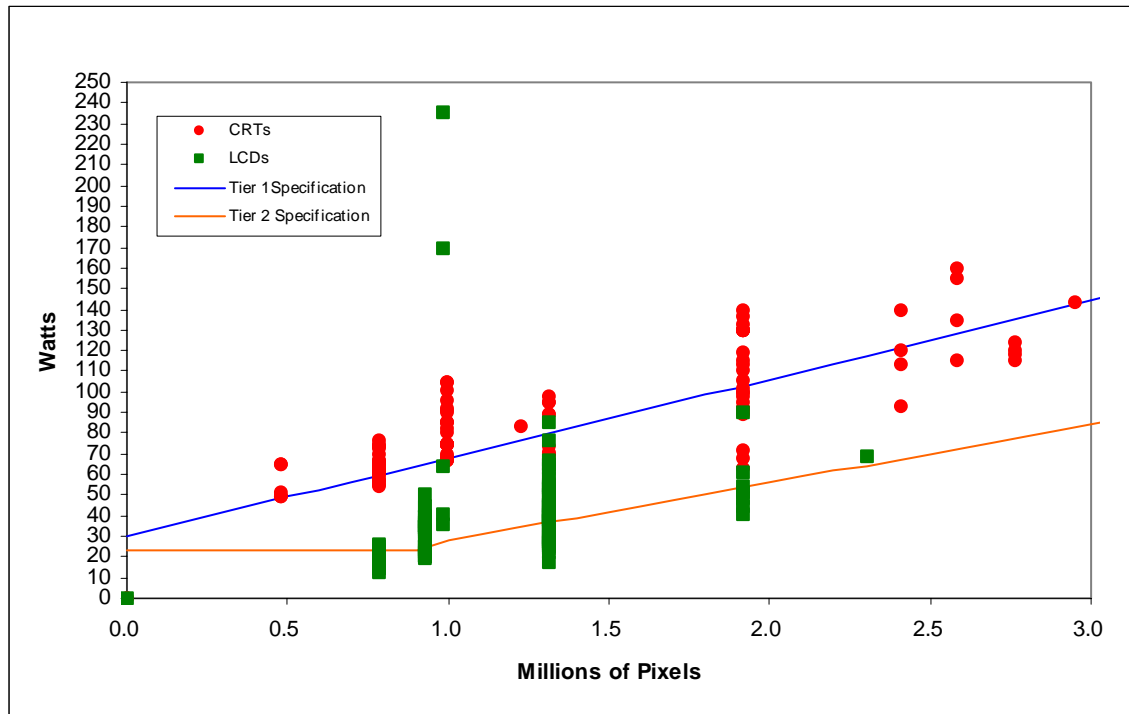
- To qualify as ENERGY STAR, computer monitors must meet the specified energy-efficiency requirements in the following three operating modes:
 - On Mode: $Y = 38X + 30$
 - Sleep Mode: ≤ 4 watts
 - Off Mode: ≤ 2 watts
- The On Mode equation provides the maximum allowed power consumption for a computer monitor. Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form (e.g., 1,920,000 pixels = 1.92 megapixels). For example, the maximum power consumption for a computer monitor with 1800 x 1440 resolution, or 2,592,000 pixels, would be: $38(2.592) + 30 = 128.49$ or 129 watts when rounded up.
- EPA recognizes that enabling and default times are driven by the computer, and as such, has outlined these requirements in the Computer Agreement. However, where feasible (e.g., where monitor manufacturer has a business relationship with specific computer manufacturers or where monitor manufacturer also sells its own computers or bundled products), monitor manufacturer should ensure that ENERGY STAR qualified computer monitors have their Sleep Modes enabled when shipped to the customer. Further, the computer shall activate the computer monitor's Sleep Mode within 30 minutes of user inactivity or as otherwise defined in future versions of the Computer Agreement (issued after current Version 3.0).

Tier 2 of the Version 4.0 Specification – effective January 1, 2006

- To qualify as ENERGY STAR, computer monitors must meet the specified energy-efficiency requirements in the following three operating modes:
 - On Mode: If $X < 1$ megapixel, then $Y = 23$; if $X \geq 1$ megapixel, then $Y = 28X$.
 - Sleep Mode: ≤ 2 watts
 - Off Mode: ≤ 1 watt
- The On Mode equation provides the maximum allowed power consumption for a computer monitor. Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form (e.g., 1,920,000 pixels = 1.92 megapixels). For example, the maximum power consumption for a computer monitor with 1024 x 768 resolution (or .78 megapixels) would be $Y = 23$ watts and for a computer monitor with 1600 x 1200 resolution would be $28(1.92) = 53.76$ or 54 watts when rounded up.
- The 1-watt Off Mode level is consistent with FEMP's standby recommendations and also follows the 1-watt path that many ENERGY STAR specifications are moving towards.

- Figure 2 below graphically presents EPA’s computer monitor test data and the Tier 1 and 2 On Mode specifications.

Figure 2: Computer Monitor Data and Tier 1 and 2 On Mode Specifications



Date of Manufacture and Elimination of Grandfathering Language

- The effective dates of both phases of the specification pertain to the date of manufacture of the unit, as preferred by manufacturers. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.
- Under Version 4.0, EPA has made a significant change with regard to product qualification and labeling during specification transitions. ENERGY STAR qualification will no longer last for the life of the product model as previously allowed under Version 3.0’s grandfathering language. To carry the ENERGY STAR mark, a product model must meet the ENERGY STAR specification in effect on the unit’s date of manufacture.
- Due to the elimination of grandfathering, EPA has delayed the introduction of the Version 4.0 specification by approximately one year, until January 1, 2005. This one-year lead-time is provided to allow manufacturers to make appropriate plans or other adjustments based on their products’ design and manufacturing cycles.
- ENERGY STAR has decided to discontinue grandfathering across all product categories for the following reasons:
 1. To deliver on expectations about ENERGY STAR by ensuring that the products perform at levels promised.

2. To ensure that ENERGY STAR's ability to differentiate more efficient products is not undermined by high percentages of labeled products qualifying at less stringent performance levels.

Partner Commitments

- *Submittal of Qualified Product Information:* As of January 1, 2005, partners will be required to provide updated information regarding qualifying models under the Version 4.0 specification on an annual basis and preferably on a monthly or quarterly basis as models are introduced or discontinued.
- *Submittal of Unit Shipment Data:* Annual unit shipment data will be collected from the computer monitor industry for the first time for the 2005 sales year in early 2006 (no later than March). Partners will be required to submit shipment data for their ENERGY STAR qualified products. Data may be provided directly from the partner or through a third party, such as an industry association. Submission of other information, including total shipment data, is also requested but is not required. The data will be used by EPA only for program evaluation purposes and will be closely controlled.
- *Product Labeling:* To accommodate manufacturer production cycles and other issues, EPA has deferred the labeling requirements under the Version 4.0 specification until January 1, 2006. This date was specifically selected to coincide with the Tier 2 effective date and the anticipated adoption of the new ENERGY STAR mark by the European Commission.
 - These labeling requirements include the clear display of the ENERGY STAR label on product packaging, in product literature, on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed, and on the product according to one of four options (i.e., permanent label, temporary label, electronic label, or labeling via advertising).
 - Computer monitors is the only ENERGY STAR product category with four EPA-approved product labeling options. These options were developed in response to design and cost concerns raised by industry.

Timeline

	June-Dec. 2004	Jan.-June 2005	June-Dec. 2005	Jan. 2006 & Beyond
Existing Partners Sign Agreement to Avoid Interruption in Partnership Status				
Partner Commitments in Effect, Except for Labeling				
Tier 1 in Effect				
Review of Tier 2 for Widescreen Models, if data available				
Tier 2 in Effect				
All Partner Commitments in Effect, including Labeling Requirements				