UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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**OFFICE OF**
**AIR AND RADIATION**

**Summary of Rationale for Version 1.0 ENERGY STAR® Imaging Equipment Specification**
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## I. Introduction and Background

This memorandum provides a summary of the rationale and key changes that culminated in the Version 1.0 Imaging Equipment specification. It contains the following information:

- Summary of the Version 1.0 specification and the key changes from the last specifications;
- Summary of key milestones in the development of the Version 1.0 specification;
- Summary of key comments provided by stakeholders;
- EPA's rationale in support of key elements of the final Version 1.0 specification including the criteria EPA used;
- Noteworthy aspects of the Version 1.0 specification; and
- A reference list of acronyms used throughout this Summary Rationale.

## II. Summary of Version 1.0 Specification

The Version 1.0 ENERGY STAR specification for Imaging Equipment differs from previous specifications for imaging equipment in several key ways, as described below.

- To qualify as ENERGY STAR, an imaging equipment model must meet the specified energy-efficiency requirements designated through one of two different approaches – the Typical Electricity Consumption (TEC) approach or the Operational Mode (OM) approach – based upon the product type, size format, and marking technology employed by the product. While the OM approach considers the energy efficiency of a product in its low-power modes, such as in Sleep and Standby, the new TEC approach considers the energy efficiency of a product in all modes during a typical week. For products addressed by the TEC approach, it was determined that more energy savings were possible from considering the time spent in Active mode for these products, which spend less time in low-power modes during a typical week than products addressed by the OM approach. The previous specifications for imaging equipment solely considered the energy consumed by a product while in its low-power operational modes, addressing the following for each: Low-power and Sleep modes for multifunction devices (MFDs) and upgradeable digital copiers (UDCs); Low-power and Off modes for copiers; Low-power mode for scanners; and Sleep mode for printers, fax machines, printer/faxes, and mailing machines. A brief summary of the two Version 1.0 approaches, TEC and OM, are provided below:

- TEC Approach – A method of testing and comparing the energy performance of imaging equipment products, which focuses on the typical electricity consumed by a product while in normal operation during a representative period of time. The key criteria of the TEC approach for imaging equipment is a value for typical weekly electricity consumption, measured in kilowatt-hours (kWh). The Version 1.0 specification for imaging equipment is the first ENERGY STAR product specification that employs a TEC approach. Detailed information can be found in the "ENERGY STAR Qualified Imaging Equipment Typical Electricity Consumption Test Procedure" available at www.energystar.gov/products.

- OM Approach – A method of testing and comparing the energy performance of imaging equipment products, which focuses on energy consumption in various low-power modes. The key criteria used by the OM approach are values for low-power modes, measured in watts (W). Detailed information can be found in the "ENERGY STAR Qualified Imaging Equipment Operational Mode Test Procedure" available at www.energystar.gov/products.

— The Version 1.0 specification employs a new "functional adder" concept within the OM approach that considers the functionality of a product model and tailors the power requirements to individual products based upon this functionality. In past imaging equipment specifications, power requirements were based solely upon product speed, where a faster product had a higher power allowance than a slower product in the same category. However, a correlation between product speed and actual power used in Sleep was not evident in the OM dataset used when developing the Version 1.0 specification. Looking beyond a speed-based approach, EPA investigated other factors that affect power consumption in imaging equipment, such as functionality. The functional-adder approach evolved as a way to recognize that more feature-rich products may require more power in low-power modes than those with fewer features. The functional-adder approach allows the ENERGY STAR specification to better recognize the power needs of products while in Sleep, while neither being too lenient nor too strict for products across the full range of functionality.

— The functional-adder approach permits a manufacturer to apply up to three "primary" adders (i.e., functions that need to remain awake while the product is in Sleep), and multiple "secondary" adders (i.e., functions that are inactive while the imaging product is in Sleep) to a model. Each functional adder has a corresponding power allowance. The sum of the applicable adders and the product's base "marking engine" criterion serve as the product's total power limit to qualify as ENERGY STAR. The marking engine criteria are provided in seven tables within the OM section, based on product type, size format, and marking technology.

— The Standby level requirements for Standard and Small Format products addressed by the OM approach are based upon the Federal Energy Management Program's (FEMP) Standby recommendations for imaging equipment, and are categorized by the presence of fax capability. Levels for Large-format devices and mailing machines will be determined under Tier II.

— For imaging equipment shipped with an external power adapter, additional cordless handset, or digital front-end (DFE), the Version 1.0 specification requires that these accessories meet

the relevant ENERGY STAR specification for External Power Supplies (EPSs), Telephony, or Computers, respectively. These accessories must meet the relevant specification as of the date the imaging equipment product model is qualified as ENERGY STAR and must continue to meet the current requirements for these products in place at the time of manufacture.

- Standard-size copiers, MFDs, and printers that use Electrophotographic (EP), Solid Ink (SI), and heat-intensive Ink Jet (IJ) marking technologies addressed by the TEC approach must meet duplexing requirements specific to product speed.

- Products addressed by the OM approach must meet default-delay time requirements, which specify the maximum preset delay time a product model may stay in Ready before entering Sleep. Default-delay time requirements are categorized by product type and size format.

- While the Version 1.0 specification does not specify maximum recovery time for products, it does require that manufacturers submit product-literature excerpts that explain and support the default-delay times that manufacturers preset and why these settings should be maintained by the user. The intention of this requirement is to ensure that manufacturers test the product as it is optimally designed to be used in the field and prevent manufacturers from setting unusually short default-delay requirements to achieve a preferable test value, but which would result in the user or the vendor lengthening or disabling the settings.

- The new specification includes two detailed test procedures corresponding to the TEC and OM approaches, which measure a value of TEC for products addressed by the former approach, and values for Ready, Sleep, and Off for products addressed by the latter approach. EPA developed these procedures with significant input from industry.

- 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.

- Imaging products that are marketed as printer/fax combination units are now classified as MFDs in the Version 1.0 specification. In the Version 3.0 Memorandum of Understanding (MOU) for Printers, Faxes, Printer/Faxes, and Mailing Machines, these combination units were addressed as printers rather than MFDs, based on the definition for MFD, which required copying capability.

- For imaging products with a functionally-integrated DFE that relies on the imaging product for its power, manufacturers are directed to subtract the DFE's energy or power contribution from the product's total energy or power value before comparing the product's TEC or Sleep and Standby power values to the criteria limits provided.

- Partners commit to the Version 1.0 specification by signing the ENERGY STAR Partnership Agreement, which supersedes the MOU format previously employed by EPA. This Partnership Agreement includes standard Partner Commitments language requiring manufacturers to: 1) qualify at least one ENERGY STAR qualified imaging equipment model within six months of activating the imaging equipment portion of the agreement; 2) provide

to EPA, on an annual basis at a minimum, an updated list of ENERGY STAR qualifying imaging equipment 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 imaging equipment. For the fourth key partner commitment—product labeling—EPA has incorporated some flexibility into the ENERGY STAR labeling requirements for imaging equipment given manufacturers' product design and cost concerns. Additional details on the labeling options are provided in Section VI of this document.

## III. Key Milestones of Specification Revision

In order to preserve the meaning of ENERGY STAR as a mark 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 oldest existing imaging equipment specification has been in effect for nearly 10 years (since April 1, 1997), and market penetration of ENERGY STAR qualified imaging equipment under these existing specifications has been estimated at approximately 92 – 99 % of total units shipped at the time that the specification revision was initiated. These penetration levels suggested that a review of ENERGY STAR performance specifications was warranted, as is outlined in the MOUs: "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, revising the specifications would allow EPA to achieve additional energy savings while addressing the following:

- The anticipated increase in the large installed base of imaging equipment in the U.S., particularly as it relates to U.S. Executive Order 13123, which requires that the Federal government purchase energy-efficient products. This trend is also becoming more common in state and international government procurement regulations;
- The significant presence of imaging equipment in office environments and on retail shelves, which provides opportunities to differentiate ENERGY STAR qualifying models and increase awareness of ENERGY STAR;
- New technologies that have recently entered the marketplace or become more prominent (e.g., color, digital, and multifunction units) since the existing specifications were originally drafted;
- Increasing consumer interest in energy efficiency when selecting products for residential use;
- Consistency in terms of product and partner requirements, as well as terminology, across imaging equipment;
- Harmonization with other domestic and international organizations; and
- Streamlining of the product development process for manufacturers, who often tend to be involved in multiple imaging product categories.

— The final Version 1.0 specification was developed over the course of more than three years, which included the following key milestones:

- Approximately fourteen months of development time (May 2004-July 2005) dedicated to the preparation of a TEC test procedure to measure power consumption in Active, Ready,

Sleep, and Off Modes. During this time, EPA provided interested stakeholders with several opportunities to comment on draft versions of the test procedure both in writing, via conference call, and at stakeholder meetings scheduled during that period.

- TEC testing (both by EPA and manufacturers) and evaluation of 163 imaging equipment models varying in terms of product type, brand, size format, and features.
- Five draft specifications, six drafts of the TEC test procedure, three drafts of the OM test procedures, and several separate EPA correspondence to provide clarification and rationale in support of these materials.
- Five formal stakeholder meetings hosted by EPA in Washington, DC, on the following dates: April 16, 2003; July 14, 2004; October 14, 2005; March 16, 2005; and February 14, 2006.
- Several presentations and discussions with industry during international travel to Tokyo, Japan in February 2003, Frankfurt, Germany in April 2004, and Ispra, Italy in May 2005.
- Numerous meetings and conference calls with representatives from individual manufacturers, the Information Technology Industry Council (ITI), the European Commission, the Japan Business Machine and Information System Industries Association (JBMIA), and other stakeholders.

## 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 included ITI, the European Commission, various member States of the European Union, Natural Resources Canada (NRC), Japan's Ministry of Economy, Trade and Industry (METI), JBMIA, Japan Electronics & Information Technology Industries Association (JEITA), Communications and Information network Association of Japan (CIAJ), TCO Development, Group for Energy Efficient Appliances (GEEA), and numerous imaging equipment manufacturers.

There were areas of general agreement between EPA and most ENERGY STAR imaging equipment stakeholders. These included:

- 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 imaging equipment.

- Development of a new functional-adder approach to consider the energy-efficiency of OM products as an alternative to product speed. The majority of stakeholders agreed with EPA's proposal to consider the functionality of products addressed by the OM approach when designing the power requirements for these products, as opposed to basing these criteria solely on product speed. In past ENERGY STAR specifications, the power limits for imaging equipment products were linked to product speed, where a faster product had a higher power allowance than a slower product in the same category. However, a correlation between product speed and actual power used in Sleep was not evident in the OM dataset used when developing the Version 1.0 specification.

- Incorporation of second tier. In Draft 2, EPA introduced a two-tiered specification for products addressed by the TEC approach. This tiered concept was later expanded to address other aspects of the specification, such as Standby levels for Large-format OM products and mailing machines. In addition, the definitions, products addressed, the manner in which they

are addressed, and levels included for all products included in the Version 1.0 specification may be reconsidered. While there was not discussion about the specific Tier II levels and the items to be addressed under Tier II, there was general acceptance by all parties of the two-tiered approach.

- Testing to three regional voltage/frequency combinations where applicable. In initial drafts of the Test Conditions corresponding to the TEC and OM test procedures, EPA proposed four voltage/frequency combinations for product testing, based on the market where the product is sold. The product model was required to meet the ENERGY STAR requirements in all markets in order to qualify in any market. Because the TEC test procedure requires significant time to complete for each product model and the test must be completed for each applicable market, EPA worked with its international counterparts to make two key changes to this approach: (1) Rather than require testing at every regional voltage/frequency combination where the product is sold, manufacturers are required to test only at the voltage/frequency combinations for the markets where the manufacturer wishes to sell the product as ENERGY STAR. This means that manufacturers may choose not to apply the ENERGY STAR to a product in a specific region and still qualify the product in a different region; and (2) the voltage/frequency combinations were collapsed to three unique combinations as opposed to four, thus reducing the number of times the product needed to be tested. This was done because Taiwan agreed to accept the North American voltage/frequency combination and corresponding paper size and weight as a representation of Taiwanese test conditions.

- Interest in accommodating new types of imaging equipment. In the Version 1.0 specification, EPA considered products that had not been treated by ENERGY STAR in past specifications where it made sense. Among these products, EPA included digital duplicators, continuous-form products such as label printers and matrix printers, and Small-format products such as photo printers. In addition, low-voltage products, such as those that draw power through a data or network connection, were included in the terminology for each product type, thus encompassing USB-powered scanners and printers.

There were also a number of concerns raised by stakeholders that EPA has sought to address at various stages throughout the revision process. The following is a summary of the key concerns and their resolutions:

- Approaches to measuring and calculating TEC. A few stakeholders voiced concern about the appropriateness of various aspects of the TEC approach, ranging from the duration of the performance cycle considered (e.g., day, week, month), to whether the test should be performed in duplex, simplex, monochrome, or color, to the number of jobs required for the test. EPA attempted to address these concerns, and undertook the following key actions in response: (1) the performance cycle was lengthened from one day to one week, to account for time spent during weekends; (2) data was collected for a period of several months to affirm that duplex and color processing did not affect the ability to rank products by the TEC method; and (3) the job table was developed to consider the maximum claimed speed of the product, which stakeholders argued impacts the volume of jobs performed.

- Types of functional adders and the corresponding power allowances. During the development of the functional-adder approach for OM products, EPA worked closely with manufacturers to develop functional adders that reflected the way in which products are

designed and sold, and also to apply allowances for these functions that reflected their actual power requirements. Stakeholders provided EPA with a broad range of types of adders as well as suggested allowances. After careful consideration of the available data, EPA set the functional-adder values provided in the Final Version 1.0 specification. These values require significantly greater efficiency than what industry proposed to EPA.

**Table 1. Functional Adders and Allowances as Proposed by Industry in Watts**

| Type | Details | Manufacturer A | Manufacturer B | Manufacturer C | Industry Primary Value | Industry Secondary Value | Version 1.0 Primary Value | Version 1.0 Sec. Value |
|---|---|---|---|---|---|---|---|---|
| **Interfaces** | A. Wired < 20 MHz | 0.3 | – | – | 0.3 | 0.3 | **0.3** | **0.2** |
| | B. Wired ≥ 20 MHz and < 500 MHz | 0.9 | 1.0 | 5.0 | 1.0 | 1.0 | **0.5** | **0.2** |
| | C. Wired ≥ 500 MHz | 3.0 | – | 5.0 | 3.0 | 3.0 | **1.5** | **0.5** |
| | D. Wireless | 6.0 | 2.75 | 5.0 | 4.6 | 4.6 | **3.0** | **0.7** |
| | E. Wired card/camera/storage | 1.0 | – | 2.0 | – | 1.0 | **0.5** | **0.1** |
| | F. Fax | 0.4 | 1.0 | – | 0.7 | 0.7 | – | – |
| | G. Infrared | – | – | – | – | 0.25 | **0.2** | **0.2** |
| **Other** | Storage | 0.5 | 1.0 | – | – | 0.8 | – | **0.2** |
| | Paper Options | 0.5 | 0.25 | – | – | 0.4 | – | – |
| | Extra colors (each; beyond four) | – | 1.1 | – | – | 1.0 | – | – |
| | Scanners with CCFL lamps | – | 2.5 | – | – | 2.5 | – | **2.0** |
| | Scanners with non-CCFL lamps | 0.5 | – | 7.0 | – | 0.5 | – | **0.5** |
| | Enhanced Display/Control Panels (backlit, graphic, color LCD, etc.) | 1.0 | – | – | – | 1.0 | – | – |
| | PC-based system (cannot print/copy/scan without use of significant PC resources) | -0.5 | – | – | – | – | – | **-0.5** |
| | Cordless Handset | – | – | 1.5 | – | 1.5 | – | **0.8** |
| | Memory | – | 2.5 W per 256 MB | – | – | 2.5 W per 256 MB | – | **1.0 W per 1 GB** |
| | Status Monitor | – | – | 2.0 | – | 2.0 | – | – |
| | Ringtone Cancellation | – | – | 2.0 | – | 2.0 | – | – |

| Type | Details | Manufacturer A | Manufacturer B | Manufacturer C | Industry Primary Value | Industry Secondary Value | Version 1.0 Primary Value | Version 1.0 Sec. Value |
|---|---|---|---|---|---|---|---|---|
| | Power-supply (PS) size, based on PS output rating (OR) **[Note: this adder does not apply to scanners]** | – | – | – | – | 5% for all rated power above 10 W | – | **For PSOR > 10 W, 0.05x (PSOR – 10 W)** |

- Elimination of grandfathering. Industry was concerned about the removal of the grandfathering provisions included in the Version1.0 specification. Previously, qualified products were allowed to remain qualified for the life of the product, despite a change in the specification. To ensure clear, reliable messaging to consumers regarding efficiency, it is important to remove grandfathering so that only products that meet current ENERGY STAR criteria are labeled as ENERGY STAR. With this approach, a prospective buyer will know that the ENERGY STAR products available represent the most efficient products of their class. To respond to industry concerns, EPA provided approximately a one-year transition period between completing the specification (May 2006) and implementing Tier I (April 2007 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 mark from products that no longer qualify. The products may carry the ENERGY STAR mark 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 imaging equipment through the Partnership Agreement. In order to reduce the burden on manufacturers, EPA took the following steps: (1) provided manufacturers with an electronic labeling option (while still requiring that the mark be displayed on product packaging, in product literature, and on manufacturers' Internet sites); (2) provided manufacturers with an option to develop a separate box insert in place of including the ENERGY STAR mark in product literature; (3) permitted manufacturers to use temporary labels for physical product labeling; and (4) removed the requirement for manufacturers to label the product packaging in instances where the product is not sold at retail.

- Number of units required for test. In response to concerns that test results from the TEC test procedure may vary considerably between tests on the same model unit, EPA first introduced the following unit-accuracy requirement in Draft 2 for TEC and OM products:

  - For products tested to the TEC procedure, if the initial unit tested has TEC test results that meet the eligibility criteria but fall within 10% of the criteria level, one additional unit of the same model must also be tested. Manufacturers shall report values for both units. To qualify as ENERGY STAR, both units must meet the ENERGY STAR specification.
  - For products tested to the OM procedure, if the initial unit tested has OM test results that meet the eligibility criteria but fall within 15% of the criteria level in any of the specified

operating modes for that product type, then two more units shall be tested. To qualify as ENERGY STAR, all three units must meet the ENERGY STAR specification.

As referenced in the summary of changes for Draft 2, as well as at the October 14, 2005 stakeholder meeting, EPA decided to implement a unit-accuracy requirement in the Version 1.0 specification to ensure variability falls within a reasonable range of the specification requirements. This will also help prevent qualification disputes among manufacturers and other stakeholders who reference such results, such as governmental entities, utilities, retailers, and consumers.

- Product categorization. Throughout the specification revision process, some stakeholders expressed disagreement with how products were categorized in various drafts. These comments pertained to what products should be addressed by the TEC approach versus the OM approach, as well as to what products should be grouped for criteria setting purposes within each approach. A few of the key concerns that were brought to EPA's attention are described below:

  - **Printers addressed by the TEC approach** – In the Directional Draft, dated February 10, 2004, EPA proposed reserving the TEC approach solely for copiers and MFDs, since printers generally have higher power management enabling rates. Addressing printers under the OM approach would have also permitted EPA to revise the specifications more quickly, since the TEC approach had yet to be developed. However, in later drafts, based on data and on stakeholder feedback that heat-based printers consume power in the same manner as copiers, printers were moved to the TEC approach.
  - **Digital Duplicators** – Several stakeholders commented that digital duplicators should be given a separate TEC table within the TEC approach, since these products have operational and market dissimilarities with printers, copiers, and MFDs, and since they use significantly less power than heat-based marking technologies. EPA decided to categorize digital duplicators within TEC Tables 1 and 2 in the Final Version 1.0 specification based on their high productivity and functional similarities with copiers printers, and because lack of data for this previously-unqualified product did not permit separate criteria setting. The TEC data from digital duplicators was not included in the dataset when developing the energy levels, as doing so would have called for setting unreasonably aggressive levels for the larger group of products in this category.
  - **Large-format products** – Based on both a lack of data and operational similarities with scanners of different size formats, EPA categorized Large-format scanners with Small-format and Standard-size scanners within the OM approach in the Final Version 1.0 specification. In previous drafts, other types of Large-format devices were similarly grouped with non-Large-format versions of these devices until sufficient data was obtained for differentiation purposes. A few stakeholders disagreed with this classification for scanners, arguing that Large-format devices exhibit different operational characteristics, including variance in user patterns, and should be classified separately. EPA retained this classification, but may consider a separate table for Large-format scanners under Tier II.

- Recovery time and default settings. Some stakeholders supported a specific requirement for recovery time from low-power modes within the TEC approach, based on evidence that users disable power management settings if a product takes too long to recover from Sleep. It was feared that some manufacturers may set unusually short default-delay times during TEC testing to earn an unnaturally low TEC value. EPA appreciated this concern, and took

measures to prevent this type of activity from taking place, though no specific recovery time requirements were enacted. Because the concern was raised after the TEC test procedure had been finalized, revising the language in the TEC test procedure to require specific recovery times would invalidate TEC test data that had already been submitted to EPA. In addition, other stakeholders raised the concern that requiring a specific recovery time would promote proprietary technologies that make such recovery times possible. The TEC test procedure clearly directs manufacturers to test their products as they are shipped and recommended for use. To ensure that products are being tested as shipped and recommended, the specification requires that partners submit to EPA excerpts from product literature that explain these recommended default-delay settings to consumers. It is intended that these excerpts and additional recovery-time measurements within the TEC test procedure itself will help promote quick recovery time settings while not impacting the flexibility of product design afforded by the TEC approach.

- Remanufacturing. Some stakeholders suggested that "remanufactured" or "newly-manufactured" imaging equipment should be given special allowances within the Version 1.0 specification, since these products would not be able to compete with new-to-market products that employ updated technologies. Remanufacturing is defined as the reuse of previously used equipment components in new-to-market products. The percentage of reused component parts varies among products and manufacturers, depending on internal production processes. According to stakeholders who practice remanufacturing, this practice indirectly saves energy through the recycling of previously-used components; by reusing these components, these stakeholder argue that they are eliminating the energy that would have been consumed to manufacture and transport new components from raw materials, as well as preventing these older components from entering the waste stream. In response to this concern, in Draft 2 EPA introduced the concept of applying Tier II levels to higher-speed products addressed by the TEC approach to recognize product classes where remanufacturing is a common business practice. This was done to avoid creating a disincentive for this government-supported, environmentally-beneficial policy. When levels for Tier II are developed, EPA will consider remanufactured products carefully when setting the criteria for higher-speed products.

- Solid Ink. EPA decided to include products that employ SI technology within the TEC approach, since these products are typically marketed to the same customer base as other heat-based office products, such as those using EP. EPA initially did not include SI in the specification since products currently in the market employing this technology consume high levels of power; however, introducing these machines into the specification will provide an incentive to manufacturers to develop this technology further to achieve increased energy savings.

## 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.

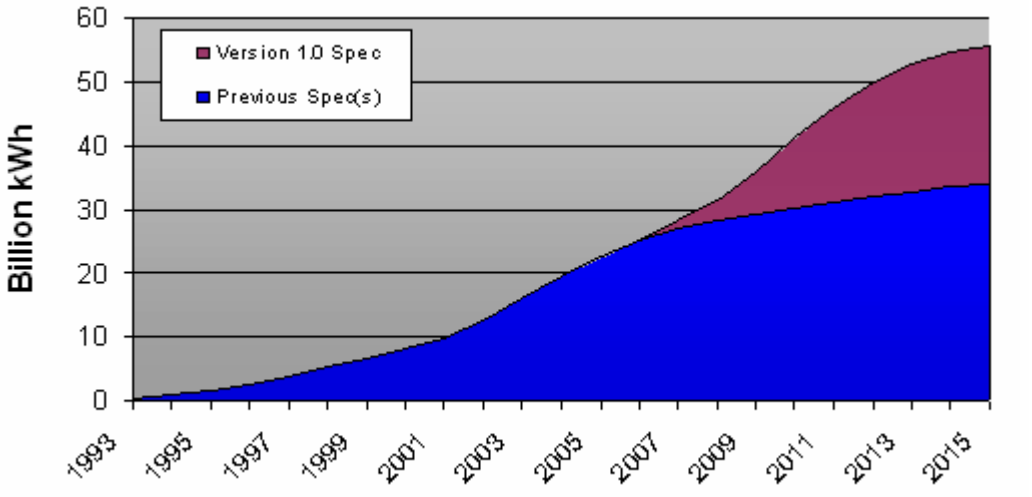
Below, EPA describes the Version 1.0 specification relative to each of these criteria.

- *Expected Energy Savings and Environmental Benefits.* EPA expects its Version 1.0 specification to yield increased energy savings and reductions in air pollution. EPA projects a potential U.S. energy bill savings of almost $3.8 billion, electricity savings of 37,000 million kWh, and 6.3 million metric tons carbon (MtC) avoided over the time period of 2007 to 2011 due to the new specification. These results and the key assumptions are provided in Table 2. Figure 1 illustrates the energy savings that will be achieved as a result of Version 1.0.

**Table 2: Additional Imaging Equipment Savings from the Version 1.0 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 1.0 Specification from 2007 through 2011. | |
|---|---|
| **Additional energy bill savings** | $3.8 billion |
| **Additional energy savings** | 37,000 million kWh |
| **Additional carbon savings** | 6.3 MtC |
| **Key Assumptions** | • The preceding figures are provided for US savings only.<br>• Residential price of electricity ranges from 7.8 to 8 cents per kWh during 2007 to 2011. Commercial price of electricity ranges from 6.8 to 7.1 cents during the same period.<br>• Any potential decrease in ENERGY STAR market penetration in 2009 due to the introduction of Tier II of the specification is not accounted for since these levels are uncertain. |

**Figure 1: Imaging Equipment Savings from 1993 to 2015**



— *Technical Feasibility/Impact on Product Performance/Functionality.* The energy use requirements of this specification are considered technically feasible and do not adversely impact product performance for the following reasons:

- The Tier I levels represent the top 34% of products addressed by the OM approach and the top 39% of products addressed by the TEC approach according to EPA's dataset for each, which are summarized below:
  - The full TEC test dataset is comprised of 163 models, submitted by 13 manufacturers, meant to represent the latest products currently available on the market.
  - The full OM dataset is comprised of 242 models, submitted by 10 manufacturers, representing both ENERGY STAR qualified models under the existing specifications as well as non-qualified models currently available on the market.

  Further, the Tier I levels accommodate more feature-rich models, as suggested by manufacturers. With the introduction of TEC requirements for the first time in imaging equipment, this specification has been set so that it recognizes the best of current efficiencies and encourages increased efficiency in the future through a Tier II specification. Stakeholder feedback on Tier I generally indicated that the levels were achievable by a portion of their product lines.

- 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. Additionally, manufacturers were given eleven months to prepare for the effective date of Tier I following the release of the specification on May 3, 2006. 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.

— *Cost-effectiveness to the Buyer.* The Version 1.0 Specification can be achieved cost effectively based on evidence that many manufacturers have models that meet the new energy-efficiency targets and are providing these models to consumers at competitive prices.

- While developing the Version 1.0 specification, EPA ensured that a variety of products on the market today could meet the Tier I levels. As noted earlier, the dataset reflected a mix of different manufacturers and brand names within each product type. By ensuring that proprietary technologies are not required to meet the Tier I levels, per the ENERGY STAR guiding principles, manufacturers should be able to achieve the criteria provided in Version 1.0 without extraordinary expense or raising the price of their products for consumers.
- 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.* Non-proprietary options exist for improving the energy performance of imaging equipment. A few examples include:

  - Employing new approaches to power management, including user "imprinting" software that learns user behavior and patterns and then shapes the power management based on this behavior. For instance, some devices currently employ software that directs the imaging equipment to enter low-power modes at certain times of the day, similar to how programmable thermostats operate. Employing this type of software could allow the manufacturer to reduce even further the power needs of the imaging device while in its low-power modes. Doing so would gain additional energy savings, since the recovery of the device is programmed to begin at pre-set times of the day and is less likely to cause inconvenience to the user.
  - Incorporating changes in circuit design, particularly for Standby, such that circuits can be disengaged so energy isn't used unnecessarily;
  - Using energy-efficient user panels and other components, such as internal power supplies. An internal power supply that is oversized for an imaging equipment product can reduce energy efficiency and raise the overall power consumption of the imaging product.

— *Product Differentiation and Testing Procedure.* As was the case when EPA initially established ENERGY STAR energy-efficiency criteria for imaging equipment, products in the market today exhibit enough variance in energy efficiency to ensure that the ENERGY STAR will be a meaningful differentiator to the consumer. The dataset that EPA considered when developing the Version 1.0 specification illustrates this variance.

**EXAMPLE**: Within EPA's TEC test dataset, TEC values for 35 ipm monochrome printers vary from 2.54 kWh/week to 7.10 kWh/week.

It was clear early in specification development that a new test methodology for total duty cycle or TEC was needed. The new TEC test procedure referenced in the Version 1.0 specification went through multiple rounds of stakeholder review and comment and was successfully used to generate numerous test data points by variety of manufacturers. The OM test procedure, while drawing on past test procedures used in the earlier specifications, was similarly updated.

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 TEC and OM test procedures for imaging equipment are available for review at www.energystar.gov/productdevelopment.

— *Effectiveness of ENERGY STAR Labeling*. The ENERGY STAR mark for imaging equipment 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 energy-efficient imaging equipment. 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

### International Harmonization

- The terminology for Standby has been harmonized with the internationally recognized 2005 IEC Standard 62301 – Household electrical appliances – Measurement of standby power. In past specifications for imaging equipment, Standby was equivalent to Ready mode, conflicting with other meanings of the term used in the industry and by other ENERGY STAR product specifications.

- The Version 1.0 specification was developed in close coordination with representatives from the European Commission. This specification held note as being the second such ENERGY STAR specification developed under the umbrella of the U.S. – European Union agreement on ENERGY STAR.

### New Product Areas

- *Digital Duplicators:* Digital duplicators were excluded from previous imaging equipment specifications due, in large part, to the recognition that these products operate so efficiently with regard to energy consumption that ENERGY STAR would not serve as a useful differentiator in this market. However, by not being included in the ENERGY STAR program, these energy-efficient products were actually disadvantaged in the market, due to procurement practices that use ENERGY STAR as a purchasing criterion. To recognize these products' energy efficiency, EPA has included digital duplicators in the Version 1.0 specification.

- *Products powered by non-AC sources:* Low-voltage products have not been addressed by ENERGY STAR in past imaging equipment specifications because these types of products were not very common in the market when these specifications were developed, and thus, ENERGY STAR would not have served as a market differentiator. However, in recent years, innovations in USB technology, among other forms of low-voltage connections, have spurred manufacturers to develop many more such products that are powered via a data or network connection, such as USB-powered scanners and printers. To recognize this growing segment of technology, EPA included these types of devices within the Version 1.0 specification.

- *Continuous Form products, including label printers:* Although the ENERGY STAR Version 3.0 specification for Printers, Faxes, Printer/Faxes, and Mailing Machines recognized continuous-form products within the scope of the specification, these types of products have never been defined within an ENERGY STAR specification or given a speed conversion method for comparison with like cut-sheet products. Version 1.0 introduced, through several iterations, a conversion method for comparing continuous-form product speed with cut-sheet product speed, allowing these products to be addressed by the same energy-efficiency requirements. This has allowed a greater variety of continuous-form products to be eligible for ENERGY STAR, including point-of-sale retail printers, label printers, and line-matrix printers.

**New Approaches to Considering Energy Efficiency of Imaging Equipment**

Tier I of the Version 1.0 Specification – effective April 1, 2007

- To qualify as ENERGY STAR, imaging equipment must meet specified energy-efficiency requirements through either the TEC or OM approach, based on the product type, size format, and marking technology. Standard-sized, heat-based copiers, fax machines, MFDs, and printers using Direct Thermal (DT), Dye Sublimation (DS), EP, SI, or Thermal Transfer (TT) technologies, as well as digital duplicators using Stencil technology, are addressed in one of four TEC criteria tables provided in Section 3 of the specification. All other products defined by the specification, including Large-format and Small-format machines, Standard-sized IJ products, and scanners are addressed in one of eight OM criteria tables.

- Version 1.0 incorporates Standby requirements for products addressed by the OM approach, which are based on FEMP. Standby levels have not been specified for imaging equipment in past ENERGY STAR specifications.

- Accessories that are shipped with imaging equipment must meet the relevant ENERGY STAR specifications in order for the imaging equipment product to earn the ENERGY STAR. Accessories that must meet such specifications include EPSs, additional cordless handsets, and DFEs.

- If a product model is offered in the market in multiple configurations as a product "family" or series, the partner may test and report the highest configuration available in the family, rather than each and every individual model. When submitting model families, manufacturers continue to be held accountable for any efficiency claims made about their imaging products, including those not tested or for which data was not reported.

Tier II of the Version 1.0 Specification – effective April 1, 2009

- Tier II will apply to the maximum TEC levels for all TEC products, as well as Standby levels for Large-format OM products and mailing machines. In particular, this Tier II will allow EPA to more closely consider the performance of high-speed products, which are more prone to the practice of remanufacturing. In addition, the definitions, products addressed, the manner in which they are addressed, and levels included for all products under the Version 1.0 specification may be reconsidered. Requirements for this second tier will be finalized by April 2008.

**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. 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 1.0, EPA has made a significant change with regard to imaging equipment product qualification and labeling during specification transitions. ENERGY STAR qualification will no longer last for the life of the product model as allowed under previous specification 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. Grandfathering has been discontinued across all product categories for the following reasons:

- To deliver on expectations about ENERGY STAR by ensuring that the products perform at levels promised.
- 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.

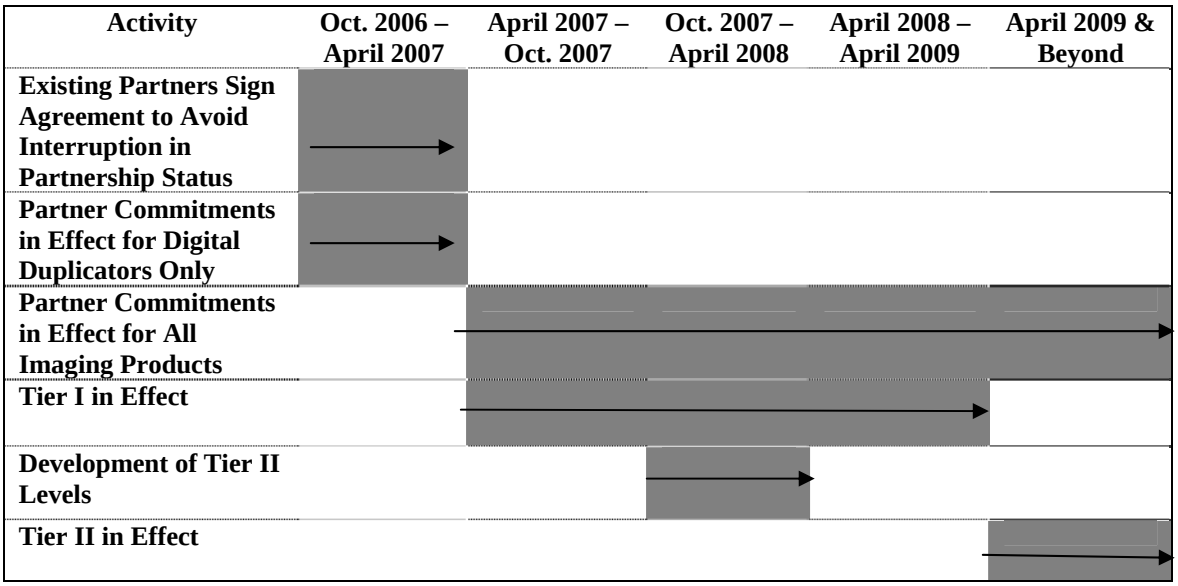
**Partner Commitments**

— *Submittal of Qualified Product Information:* As of April 1, 2007, partners will be required to provide updated information regarding qualifying models under the Version 1.0 specification on an annual basis and preferably on a monthly or quarterly basis as models are introduced or discontinued.

— *Submittal of Unit Shipment Data (USD):* Under this revised specification, annual USD will be collected from the imaging equipment industry for the first time. Partners will be required to submit USD by March 31, 2009 for their ENERGY STAR qualified products shipped in 2008. 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 not required. The data will be used by EPA only for program evaluation purposes and will be closely controlled.

— *Product Labeling:* Partners are required to provide clear and consistent labeling of ENERGY STAR qualified imaging equipment. The ENERGY STAR mark must be clearly displayed:
- Either on the top/front of product or through electronic messaging that is pre-approved by EPA unless it meets the minimum requirements below. Labeling on the top/front of product may be permanent or temporary. All temporary labeling must be affixed to the top/front of product with an adhesive or cling-type application. Minimum guidelines for electronic labeling are below:
  - The ENERGY STAR mark in cyan, black, or white (as described in "The ENERGY STAR Identity Guidelines" available at www.energystar.gov/logos), appears at system start-up. The electronic mark will display for a minimum of 10 seconds, unless the product turn-on process does not allow this. In this case the mark should show for as much time as possible, but for no less than 5 seconds; and
  - The ENERGY STAR mark must be at least 10% of screen size, may not be smaller than 76 pixels x 78 pixels, and must be legible.
- On the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed. Specific guidance on using the ENERGY STAR mark on Internet sites is provided in the "Web-Based Tools for Partners document;"
- Either in product literature (e.g., user manuals, specification sheets, etc.) or in a separate box insert that provides educational language about the product's ENERGY STAR settings; and
- On product packaging/boxes for products sold at retail.

**Timeline**




## VII. Relevant Imaging Equipment Acronyms

The following are common imaging equipment acronyms referenced in this Summary Rationale:

- CIAJ – Communications and Information network Association of Japan
- DFE – Digital Front-end
- DT – Direct Thermal
- DS – Dye Sublimation
- EP – Electrophotographic
- EPA – U.S. Environmental Protection Agency
- EPS – External Power Supply
- FEMP – Federal Energy Management Program
- GEEA – Group for Energy Efficient Appliances
- IJ – Ink Jet
- ITI – Information Technology Industry Council
- JBMIA – Japan Business Machine and Information System Industries Association
- JEITA – Japan Electronics & Information Technology Industries Association
- METI – Japan's Ministry of Economy, Trade and Industry
- MFD – Multifunction Device
- MOU – Memorandum of Understanding
- MtC – Million Metric Tons of Carbon
- NRC – Natural Resources Canada
- OM – Operational Mode
- Power Supply Output Rating – PSOR
- SI – Solid Ink
- TEC – Typical Electricity Consumption
- TT – Thermal Transfer
- UDC – Upgradeable Digital Copier
- USD – Unit Shipment Data