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OFFICE OF
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**Summary of Rationale for Version 2.0 ENERGY STAR® Refrigerated
Beverage Vending Specification
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I. Introduction and Background

This memorandum provides a summary of the rationale and key inputs that culminated in Version 2.0 of the Refrigerated Beverage Vending Machine specification. It contains the following information:

- Summary of the Version 2.0 specification
- Summary of key milestones in the development of the Version 2.0 specification
- Summary of comments provided by stakeholders
- EPA's rationale for deciding on key elements of the final Version 2.0 specification

II. Summary of Version 2.0 Specification

When initially launched in April of 2004, the ENERGY STAR specification for refrigerated beverage vending machines applied only to new machine models. However, the vending industry is unique in that vending machines once sold by the Original Equipment Manufacturer (OEM) may continue to be refurbished, leased, and placed on several host site locations throughout their lifetimes. As a result, the host site (and distributor) may have a choice of a new or existing machine. Many of the older machines can be retrofitted with high efficiency components and in the end perform at the same energy efficiency levels as brand new machines. To completely address the marketplace EPA needed an ENERGY STAR specification for both new and existing machines.

EPA's initial ENERGY STAR specification for vending machines addressed new machines. However, EPA did recognize the significant savings potential of upgrading the installed base to ENERGY STAR and therefore, agreed to continue to develop a rebuilt machine specification immediately following the release of the ENERGY STAR new machine specification. The new Version 2.0 specification was developed primarily for rebuilt machines to be able to earn the ENERGY STAR. The key revisions to the specification are described below:

- Starting August 31, 2006, rebuilt machines are eligible to qualify as ENERGY STAR. Rebuilt machines must meet or exceed the same minimum requirements as new machines to qualify for ENERGY STAR:

Tier I: $Y = 0.55 [8.66 + (0.009 \times C)]$

Tier II: $Y = 0.45 [8.66 + (0.009 \times C)]$

Where:

Y = 24 hr energy consumption (kWh/day) after the machine has stabilized

C = vendible capacity

- Partners must design their machines to be capable of operating in at least one of the following low power mode states: (1) lighting low power state; (2) refrigeration low power state, or (3) whole machine low power state (e.g., lights are off and the refrigeration operates in its low power state).
- When submitting rebuilt machines for ENERGY STAR qualification, partners must identify, test, and report each individual component/rebuilding kit and machine combination, separately. Each rebuilt component and machine combination must have a separate and discrete model number associated with it. Partner must also verify UL or equivalent safety requirements and that the components are Listed, Recognized, Classified, etc., as applicable for each component.
- For rebuilt vending machines, the original equipment manufacturer (OEM), the refurbishment center (RC), or a qualified component supplier (QCS) that qualifies and supplies the energy-efficient rebuilding kit(s) and/or rebuilds the machine is required to become an ENERGY STAR Partner.
- Each ENERGY STAR qualified rebuilt vending machine must include a “refurbishment label/sticker” that includes: (1) a new and discrete model number that is representative of that machine and rebuilding kit combination; (2) the date of rebuilding; and (3) the ENERGY STAR certification mark.
- Tier II requirements for both new and rebuilt machines were delayed until July 1, 2007.

III. Key Milestones of Specification Development

The rebuilt machine portion of the Version 2.0 specification was developed over the course of three years, and included the following key milestones:

- On December 18, 2002 EPA hosted a conference call with industry stakeholders to discuss the potential for including rebuilt vending machines in the proposed ENERGY STAR Refrigerated Beverage Vending Machine specification.
- On October 16, 2003 EPA shared a draft document with industry stakeholders that presented its preliminary thoughts regarding a potential ENERGY STAR program for rebuilt machines.

- EPA finalized the ENERGY STAR Refrigerated Beverage Vending Machine specification on March 8, 2004, which only included requirements for new machine models. At that time, EPA also informed stakeholders that it would continue working toward a rebuilt machine specification to be added at a later date.
- The new machine ENERGY STAR specification went into effect on April 1, 2004 and was launched at the NAMA Spring Expo in Las Vegas, NV, April 1-2, 2004. Soon after the launch of the new specification, EPA reopened the Draft 1 rebuilt machine strawman document and initiated discussions with NAMA and other industry stakeholders.
- EPA attended a meeting with the NAMA Energy Group in Atlanta, GA on October 26, 2005 to discuss the draft rebuilt machine specification.
- Based on the NAMA Energy Group meeting and subsequent discussions with industry stakeholders, EPA released a Draft 2 specification for rebuilt vending machines on March 2, 2006.
- EPA then released a Final Draft Version 2.0 specification on July 18, 2006 that included ENERGY STAR Partner Commitments and Eligibility Criteria.
- The new Version 2.0 specification for rebuilt and new vending machines was finalized on August 31, 2006. As of this date, rebuilt machines are eligible to qualify for ENERGY STAR.

IV. Summary of Stakeholder Input

Over a three-year period, EPA worked closely with industry stakeholders and received a number of comments on the draft documents that shaped the Final Version 2.0 specification. A summary of this input, along with EPA's response, follows:

- Stakeholders commented that the term “rebuilt” would better describe what needed to be done to existing machines to improve energy efficiency, rather than “remanufactured”, or “refurbished”. In addition, a definition for “rebuilt” machines would need to be developed.

EPA agreed with this suggestion and worked with industry stakeholders to develop a definition for “rebuilt” machines.

- Originally, EPA proposed that rebuilt machine and component combinations must be UL-Listed (or equivalent) as a finished product. The purpose of the UL Listing was to ensure that machines were rebuilt in a safe manner and according to manufacturer instructions, thus protecting consumers and the ENERGY STAR brand. However, industry argued that the UL process would be overly burdensome and assured EPA that current accepted industry practices, including record keeping, were in place to ensure continued safety of the machine and identification of responsible parties with respect to any future liability.

EPA agreed that requiring additional safety certification for every rebuilt machine and energy-saving rebuilding kit/component combination would be an additional burden on partners and does not necessarily ensure that once placed in the field other changes aren't made, further voiding UL. Based on the information presented to EPA, the UL Listed

requirement was removed. To help ensure the continued safety of the machine, the specification does require that partners test the components, or rebuilding kit, within the existing model type and verify the UL Listing (or equivalent) of the components.

- One commenter requested that EPA consider other UL safety designations in addition to UL Listed, such as Recognized and Classified, since UL Listed has a very specific technical and narrow meaning.

According to industry sources, all vending machine components are UL Recognized while only some may also be Listed and/or Classified. In an effort to be all inclusive while ensuring continued safety of the machine, EPA added the following statement to the specification: “It is also the responsibility of the Partner to verify UL or equivalent safety requirements and that the components are Listed, Recognized, Classified, etc., as applicable for each component.”

- Several comments stated that EPA would be missing out on an opportunity to influence and encourage the use of new and emerging technologies if the responsibility for qualifying rebuilt machines was limited to OEMs. A suggestion was made to also allow “qualified component suppliers (QCS)” to join as ENERGY STAR partners and qualify machines.

EPA’s intention in listing only OEMs was to ensure that ENERGY STAR qualified rebuilt vending machines maintained their functionality and safety requirements, based on the original machine design. However, EPA decided that as long as these organizations are held to the same testing, labeling, and safety requirements as all ENERGY STAR vending machine partners then they should be allowed to participate in the program. In addition to Refurbishment Centers (RC) and OEMs, EPA added QCS as eligible partners for this specification.

- EPA discussed a number of options for identifying and tracking ENERGY STAR qualified rebuilt machines. RCs could use existing software and database programs to track machines rebuilt to ENERGY STAR requirements. However, EPA and industry stakeholders agreed that in addition to the ENERGY STAR mark it was important to also be able to use a differentiator to identify in the field those machines that had been upgraded. One suggestion was to include a suffix such as “ES” on the end of the existing OEM string of numbers.

EPA worked closely with industry stakeholders to develop the following approach to identifying rebuilt ENERGY STAR qualified machines: “Each completed ENERGY STAR qualified rebuilt vending machine will receive a “refurbishment label/sticker” that includes the following information to indicate that the machine has been upgraded to ENERGY STAR performance levels: (1) a new and discrete model number that is representative of that machine and rebuilding kit combination; (2) the date of rebuilding; and (3) the ENERGY STAR certification mark.” All industry stakeholders agreed with this approach as an appropriate way to effectively and clearly identify rebuilt machines.

- EPA received a number of concerns from stakeholders regarding the requirement that rebuilt machines enter both lighting and refrigeration low power states. Although all new machines, ENERGY STAR and non-ENERGY STAR, come with these capabilities built-in, many of the older machines being rebuilt do not possess these capabilities. Some stakeholders suggested that the low power mode requirement be removed for rebuilt machines all together.

EPA understood that there may not be one cost effective solution in the marketplace that will address both lighting and refrigeration. However, the potential savings of low power mode for this product type are substantial. Many of these machines operate 24 hours and 7 days a week but may actually vend product only a portion of that time. EPA also recognized that there are greater savings in upgrading these existing machines than excluding them from qualifying based solely on the fact that they do not have these specific low power modes. To balance stakeholder and EPA interests, partners can choose 1 or more of the 3 low power modes listed in the specification to qualify machines under the low power mode requirement. New machine manufacturers are encouraged to continue to include all of the low power mode options in equipment designs and partners rebuilding machines should seek out new technologies that might help to achieve this goal.

- The original Version 1.0 specification required that the average beverage temperature while in the refrigeration low power mode rise above 40°F for an extended period of time. EPA’s intention in requiring this was to ensure the maximum savings were achieved while also recognizing product quality limits. It was brought to EPA’s attention that in some cases this temperature could require a machine to operate outside of equipment specifications.

To ensure that the ENERGY STAR specification is aligned with existing industry equipment specifications, EPA is now requiring that the average beverage temperature of the qualifying machine be allowed to rise to 40°F or higher.

- Stakeholders felt that continuing to require software enabling on-site would eliminate the new software programs now available in the marketplace that automatically place the machine into low power modes without the need of a user interface.

EPA’s intention of including this statement was to ensure that the hard wired low power mode software or device actually operates when the machine is placed on-site. Although some controls are automatically enabled when the machines is plugged in, others are not. EPA then added the following sentence to address this new capability: “Non-programmable software must be enabled prior to being placed on-site”. This statement then raised concerns regarding the fact that different host sites have different usage patterns and will therefore, have varying low power mode requirements. In an effort to address both concerns, the following language was added to the Final specification:” The low power mode-related controls/software shall be capable of on-site adjustments by the vending operator or machine owner unless the low power controlling device is already pre-programmed when installed into the machine. EPA encourages partners to train vending machine installers to provide information to host sites on the low power mode capabilities of their machines so that these capabilities may be enabled as desired by the host site.” Again, EPA’s goal in requiring a low power mode requirement is to ensure that the machine uses less energy during off-peak hours (i.e., not vending product), regardless if it is through automatic or manual means.

- Many stakeholders commented that the original Tier II effective date of January 1, 2007 was insufficient to rebuild, test, qualify, and place ENERGY STAR qualified rebuilt machines in accordance with the more stringent Tier II requirements.

EPA agreed to move back the effective date to July 1, 2007 to allow partners approximately one year to rebuild existing machines to ENERGY STAR Tier I and begin planning for Tier II requirements. This change applied to both new and rebuilt machine models to avoid potential confusion in the marketplace caused by two different simultaneous Tiers for the same product (one for new machines and a second for rebuilt machines).

- In response to the Final Draft specification, some stakeholders asked that the Tier II effective date be pushed back further to January 1, 2008.

EPA decided to retain the date of July 1, 2007 (which is 6 months later than the original Tier II date) established in Version 1.0 and changed in response to comments on earlier draft documents. There are a number of solutions already available in the marketplace that can help machines meet Tier II performance levels. OEMs already incorporating these more efficient solutions should not be further delayed in being able to competitively promote these technologies. EPA has also recently been made aware of component suppliers gearing up to make even more efficient components available.

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 the decision making process and help EPA to 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. Customers looking to purchase highly efficient products know that ENERGY STAR qualified models will deliver substantial energy savings and 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 2.0 refrigerated beverage vending machine specification relative to each of these criteria.

- *Expected Energy Savings and Environmental Benefits.* Each rebuilt ENERGY STAR qualified vending machine will save end users approximately 600 kWh/year, or nearly \$130 annually on utility bills. Remanufactured machines represent a significant share of new machine placements. According to industry estimates, as many as 100,000+ machines go through a refurbishment process each year. By encouraging the rebuilding of these machines to ENERGY STAR levels EPA is providing another option to the host site, further ensuring ENERGY STAR qualified machine placement and resulting energy savings. The addition of rebuilt machines to the ENERGY STAR refrigerated beverage vending machine specification is projected to save end users more than \$2 million the first year. Over the next five years, the Version 2.0 specification (for new and rebuilt machines) will save almost \$40 million and avoid greenhouse gas emissions equivalent to the emissions of more than 50,000 cars.
- *Technical Feasibility/Impact on Product Performance/Functionality.* Several options exist for improving the energy performance of existing vending machines. In fact, many of the rebuilt machines will utilize the same component upgrades that new machines incorporate at the time of manufacturing to qualify for ENERGY STAR. Energy-efficient retrofit kits and components have been available to end users for the last 3+ years. Furthermore, since the

release of the initial ENERGY STAR specification for new machines in 2004, EPA has seen even more emerging technologies introduced in the marketplace that seek to reduce energy use. Lastly, many of the energy-efficient upgrades actually improve product performance and reliability, such as longer lasting lighting and high quality compressors.

- *Cost-Effectiveness.* Machines are taken in to be refurbished approximately every 4-5 years. It costs between \$200-300 for a basic refurbishment package, which includes cleaning up the machine, minor repairs, and new side/front panels. More substantial changes made to the internal cabinet, such as component change-outs and new insulation, add additional cost. Key components that impact energy consumption are not changed out during refurbishment unless there is a failure so ENERGY STAR upgrades will be based on demand and/or commitment of partners to conduct rebuilds. The cost increase for more efficient key components will vary, ranging from \$10 - \$100 per component. Rebuilding existing machines to ENERGY STAR requirements will range from \$50 - \$400. EPA first considered a rebuilt program in response to stakeholder concerns that (1) a large piece of the market was not being accounted for, one that offered large energy savings and (2) the cost of ENERGY STAR new machines could prohibit widespread implementation. With new machines costing upwards of \$5,000, the addition of rebuilt machines to the ENERGY STAR program offers distributors a more cost effective option for providing energy-efficient solutions to their accounts.

Similar to new machines cost effectiveness this continues to be a difficult item to address given the split incentive: the host site that receives the energy benefits of the upgrade is not the purchaser/owner of the machine. For the host site, the payback is immediate since they do not have to purchase the upgrade. Although the savings go to the operator rather than the owner of the machine, an average of \$130 will be saved each year by upgrading to ENERGY STAR. For the machine owner there are some additional benefits to ENERGY STAR qualified machines including more efficient and longer lasting lighting systems and refrigeration components which equate to less maintenance calls. In addition, by offering a selection of new and rebuilt ENERGY STAR qualified vending machines, distributors that participate in the program early may attract new accounts that are looking for multiple ENERGY STAR solutions in response to rising energy costs.

- *Several Technology Options, including some with Non-proprietary Technology.* EPA developed this specification to be performance-based, allowing the partners flexibility in designing their end products to meet a single kWh/day requirement. At the time of writing the specification, there were a number of machine components and software options that could be used to upgrade existing machines to ENERGY STAR levels including: more efficient lighting systems, compressors, fan motors, and power management systems.
- *Testing Procedure.* Similar to new machines, rebuilt machines must be tested using ASHRAE 32.1-2004. There were some concerns as to whether certain power management software (permanently installed) could be enabled during the energy consumption test. During the specification development process, new energy management devices were introduced into the marketplace that required installation in such a way that the operator would not be able to adjust the settings. These devices respond to external conditions, such as product sales and temperature, to control the refrigeration cycle of the machine. To ensure that these products could be tested under ASHRAE 32.1-2004, and thus meet the requirements of ENERGY STAR, EPA contacted the managing ASHRAE Committee for a formal interpretation. The Committee found that “vending machines that have energy management devices permanently installed and not adjustable by the operator meet the requirements of Sections 7.1.1(d) and 7.2.1 of the referenced standard.”

- *Product Differentiation and Labeling.* EPA tries to capture the top 25% of existing product models to set specification lines. However, in the case of this specification it was also important to require existing machines to meet the same requirements as new machines for purposes of being consistent within the ENERGY STAR specification. Stakeholders agreed with this approach early on in the process. The end user should be able to choose an energy-efficient vending machine simply based on its ENERGY STAR qualification and be assured of the same energy savings whether it is new or rebuilt. Furthermore, even though EPA did not conduct a performance analysis on existing machine inventory, industry stakeholders agreed that only a small percentage of existing machines would qualify for ENERGY STAR after rebuilding.

For purposes of identifying and tracking ENERGY STAR rebuilt machines EPA worked with industry stakeholders to develop a label that would be placed on the machine and include the following information: (1) a new and discrete model number that is representative of that particular machine and rebuilding kit combination; (2) the date of rebuilding; and (3) the ENERGY STAR certification mark. Since the machine OEM model number would remain on the machine, it was important that a separate identifier representing the upgraded version of that machine be visible and easily tracked.

ENERGY STAR has been present in the refrigerated beverage vending machine market for more than 2 years. During this time, interest in ENERGY STAR qualified vending machines has been increasing as utilities and end users look for ways to cut energy costs. Previously, the fact that only new machines could qualify as ENERGY STAR presented some challenges to implementation due to first cost challenges and overall saturation of the marketplace (low sales of new machines). Under the new specification end users can now identify a number of energy saving options when deciding to place an ENERGY STAR qualified machine on-site.