

ENERGY STAR Program Requirements for Imaging Equipment

Explanation of Draft 1 Proposed Levels for Operational Mode (OM) Products and Functional Adder Allowances

Background

Imaging Equipment that uses small- or large-format paper or ink jet or impact marking technology can qualify for the ENERGY STAR by following the operational mode (OM) approach. Approximately 36% of currently qualified Imaging products qualify using the OM approach. Under this approach, the average input power of the product in Sleep Mode is compared against minimum requirements. There is also a Standby Power requirement (the power in the lowest energy consuming mode) and a Default Delay Time requirement.

The Sleep Mode requirement consists of a base requirement that varies depending on the product type, paper format, and marking technology, supplemented by power allowances for additional functionality, defined as data or network interfaces or other components that increase the energy use of the Marking Engine of the Imaging Equipment product. These power allowances ensure ENERGY STAR qualified products deliver the functionalities consumers seek.

Proposed Changes to Adders and Testing

The intent of the following proposed changes to our approach for OM products is to make functional adder allowances and the test method representative of current technology and actual use, and to promote the power-down of interfaces when not in use. Doing so will ensure ENERGY STAR products deliver on their promise once in the field and will also deliver additional savings through furthering power management. EPA believes that the proposed approach and new base performance requirements will differentiate top performers while allowing for a good selection of products at a price that remains cost effective.

ENERGY STAR qualified product data shows that due to efficiency improvements, the current base levels and adders are no longer reflective of the actual power needs of these products. Based on these data, EPA is proposing new allowances for Version 2.0 for base performance and for those functions that should remain active in Sleep Mode.

In addition to the proposed changes to the base and adder amounts, EPA and DOE have proposed a revision to the Test Method to limit the number of network connections that can be used during test, to better represent typical use. Currently, the number of connections is unspecified and manufacturers can claim up to three primary adder allowances for these connections. Under the Version 2.0 test method, nearing finalization, units under test can only use one network connection and this would be the only interface for which an allowance could be claimed.¹ However, since many interfaces that used to be connected will no longer need to be active, they may also power down, thereby reducing the total consumption of the product in Sleep.

Ensuring Functionality Allowances Reflect Current Energy Use

As noted above ENERGY STAR qualified product data show: 1) base allowances no longer reflect leadership performance; and 2) current adders are no longer reflective of the actual power needs of Imaging Equipment functionalities. Based on these data, EPA is proposing new base levels and new adder allowances for those functions that stakeholders have indicated need to remain active in Sleep Mode.

The table below shows the adder allowances originally proposed by EPA in July, the average amounts proposed by stakeholders, and the allowances being included in Draft 1 of Version 2.0, along with justifications.

¹ Products with fax capability are excepted and shall be tested with the fax also connected for a total of two network connections.

Proposed OM Adders with Rationale

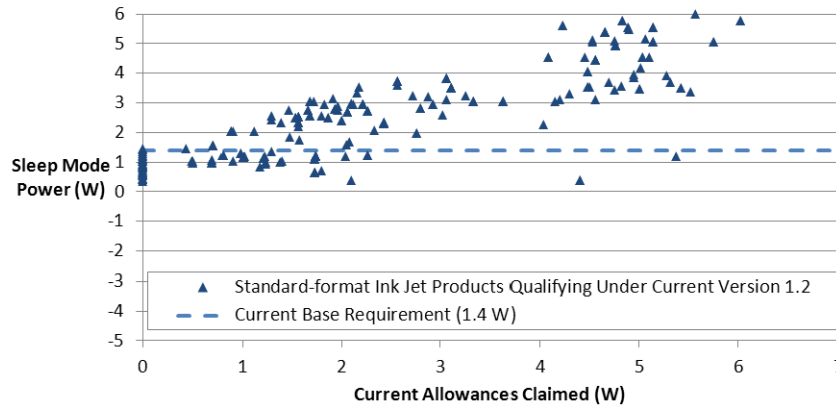
| Adder Type | Connection Type | Max. Data Rate, r | Proposed Allowance in V2.0 (W) | Average Imaging Stakeholder Suggested Allowance (W) | Revised Proposed Allowance in V2.0 (W) | Justification |
|-------------------------------|--------------------------------|-------------------|--------------------------------|---|--|--|
| Data or Network Connection | Wired | $r < 20$ | 0.1 | 0.2 | 0.2 | Changed the functional adder for (Wired<20MHz) from 0.1 W to 0.2 W to reflect commonly used components. |
| | | $20 \leq r < 500$ | 0.2 | 0.4 | 0.4 | Changed proposed allowance value in alignment with submitted data. |
| | | $r \geq 500$ | 0.5 | 0.7 | 0.5 | The draft test method requires testers to connect products that support Energy Efficient Ethernet (EEE) to a network that supports it, reducing consumption to 0.5 W. |
| | Flash Memory | Any | 0.1 | 0.2 | 0.2 | Partner recommendations ranged from 1.65 microwatts (μ W) to 0.3 W, with an average response 0.2 W. |
| | Wireless, Radio-frequency (RF) | Any | 0.5 | 2.1 | 2.0 | Revised allowance is reflective of Partner input regarding WiFi (ranging from 1.6 W to 3 W) and performance of other wireless technologies such as Bluetooth (where typical power is 1.7 W). |
| | Wireless, Infrared (IR) | Any | 0.1 | 0.1 | 0.1 | Kept original proposed value supported by comments. |
| Cordless Phone | N/A | Any | 0.5 | | 0.5 | Kept original proposed value in the absence of comments. |
| Internal Storage Drive | N/A | N/A | - | | - | Removed because hard drives are not typically active during Sleep Mode—both solid state and hard disk drives have low sleep power, with the controller the only component active. |
| Memory (Allowance is per GB) | N/A | N/A | - | 1.4 | 0.5 | Decreased 1.0 watt/GB adder for memory to 0.5 watt/GB. The OM test procedure does not require the device to actively be processing jobs. Hence the device can take advantage of energy savings techniques available in DRAM such as self-refresh mode. |
| Scanner | N/A | N/A | 0.0 | 0.5 | 0.5 | Retained 0.5 watt adder for scanning to permit printers and MFDs to be binned in the same category for purposes of qualification criteria. |
| PC Systems | N/A | N/A | - | | - | Removed adder as its applicability could not be verified easily. |
| Power Supply | N/A | N/A | - | $0.0154 * P_{no} + 0.158$ | - | Federal regulations require all external power supplies to have no-load power of 0.5 W, and a decrease to 0.1 W is achievable for power supplies with output power less than 50 W. |
| Product Control Panel Display | Mono-chrome | N/A | - | 0.3 | 0 | Displays will be turned off while product is in sleep mode. |
| | Color | N/A | - | 1.0 | 0 | |

Anticipated Product Qualification

EPA has examined the impact of the proposed approach on currently qualified models, with a particular focus on standard-format ink jet fax machines, printers, and MFDs, which have both the highest number

of qualified models (368 or 37% of the OM total) and the lowest base allowance (1.4 W), making these products most sensitive to changes in the number and amounts of functionality allowances.

The current Qualified Products list for standard-format ink jet fax machines, printers, and MFDs is illustrated below. The Sleep Mode power is on the vertical axis and the total allowance currently claimed is on the horizontal axis. Higher number of allowances can equate to increased functionality such that higher-functionality products claiming a higher allowance appear further to the right in the graph.



In our analysis, we:

- First removed the primary and secondary adders for the currently qualified products (and added in the non qualified data) which showed us that many of these products are receiving cumulatively large sleep adders.
- We then incorporated the new adder allowances for the interface and functions that stakeholders have indicated need to remain active used during the test.
- EPA next adjusted the data to reflect that unused interfaces (in particular wireless) can be powered down when not in use, which showed that many of the currently qualified products (even the feature rich products) have Sleep Mode power equivalent to more basic products.
- Based on this understanding, EPA developed the proposed new base allowances, accounting for one primary data or network connection.

As an example, for OM 2 products, depending on the claimed network or data connection used in the test, the range of sleep allowances is 0.6 W to 3.7W (assuming 1 GB memory) under this proposal. The below graph illustrates that under the Draft 1 proposal, a good selection of OM 2 products with adders that currently claim up to 5 W of allowances would be eligible for ENERGY STAR qualification. Thus EPA sees this proposal as differentiating top performers while allowing for a good selection of feature-rich products to qualify.

