



ENERGY STAR Specification Development for Uninterruptible Power Supplies (UPSs)

Stakeholder Meeting

November 8, 2011

U.S. Environmental Protection Agency

U.S. Department of Energy

Webinar Details



- Webinar and related materials will be available on the UPS Web page:
 - www.energystar.gov/NewSpecs
 - Follow link to “Uninterruptible Power Supplies”
- Audio provided via teleconference:
 - Call in:** +1 (877) 423-6338 (U.S.)
+1 (571) 281-2578 (International)
 - Code:** 456-417
 - Phone lines will remain open during discussion
 - Please keep phone lines on mute unless speaking
 - Press *6 to mute or un-mute your line
 - Refer to the agenda for approximate discussion timing

Agenda



Time (EST)	Topic
10:00 – 10:15	Meeting Introduction & General Topics
10:15 – 10:30	Stakeholder Presentations
10:30 – 11:00	Ac-output UPS Efficiency Requirements
11:00 – 11:15	Dc-output UPS/Rectifiers
11:15 – 11:45	Metering Credit
11:45 – 12:30	Proposed Test Method Modifications
12:30 – 1:15	<i>Lunch/Break</i>
1:15 – 1:45	Energy Efficiency Program Partner Considerations <i>CEE Guest Speaker, Jason Erwin</i>
1:45 – 2:45	PPDS/Data Reporting Requirements, Qualification Processes, Labeling, and Timeline
2:45 – 3:00	Open Comment

Meeting Introduction & General Topics



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Meeting Introduction



- EPA thanks all stakeholders who have participated thus far in the development of the ENERGY STAR specification for UPSs
 - Stakeholder participation is critical to the specification development
 - EPA looks forward to finalizing the specification based on stakeholder feedback

EPA-DOE ENERGY STAR Team



EPA: Brand and Specification Manager	DOE: Test Procedure Manager
<ul style="list-style-type: none">• New Products• Performance Levels• Marketing & Outreach• Monitoring & Verification• Product Database	<ul style="list-style-type: none">• Federal Test Procedures• Metrics• Monitoring & Verification

- DOE team will provide overview of support and findings related to the test method

Activities To Date



- Late 2010: Development of Draft Test Method
- January–March 2011: Data assembly
- May 5: Draft 1 Specification released
- July 15: Draft 2 Specification and Test Method
- October 25: Draft 3 Specification Test Method
- **Today, November 8:** Stakeholder webinar to present Draft 3 changes and receive comment

Webinar Objectives



1. Overview of revisions to the specification and test method following stakeholder comments on Draft 2
2. Opportunity for questions and comments with the goal of resolving all outstanding issues
3. Discuss implementation of the UPS specification and next steps for manufacturers, labs, and CBs

Webinar Overview



- Meeting sections will cover the following:
 - General Topics
 - Ac- & Dc-output UPS Efficiency Requirements
 - Metering Credit
 - Test Method
 - Utility efficiency program considerations
 - Reporting requirements (PPDS), labeling, qualification, and timeline
- EPA/DOE/contractors will present work on each topic
 - Stakeholders are welcome to comment at any time
 - Additional time will be provided at the end of each section for broader discussion on each topic

Written Comments



- In addition to making verbal comments during the meeting, stakeholders are strongly encouraged to submit written comments and data.
- Please send all comments to:

ups@energystar.gov

Comment Deadline

November 22, 2011

General Topics



- EPA would like to begin by covering a few topics that affect all products
 - Scope
 - Refurbished Units
 - Power Factor
 - Toxicity and Recyclability

UPS Specification Scope



Included Products

- Consumer, Commercial, and Data Center UPSs



- Telecommunications Dc-output UPSs/Rectifiers



Excluded Products:

- Products internal to a computer or another end use load
- Distributed UPSs
- Industrial UPSs
- Utility UPSs
- Cable TV (CATV)
- UPSs designed to comply with specific UL safety standards

UPS Specification Scope: Refurbished Units



- In Draft 2, EPA proposed that refurbished units be eligible for ENERGY STAR qualification
 - Stakeholders commented that vendors of these units are not likely to be ENERGY STAR Partners
 - High risk of labeling and certification violations particularly as new version of the specification take effect
 - General lack of interest in these products among stakeholders to warrant inclusion in the specification
- EPA has decided to exclude refurbished and/or remanufactured units from the scope
 - Consistent with other IT product specifications

Power Factor Requirements



- In Draft 3, EPA is proposing a minimum power factor requirement for all UPSs

Minimum Power Factor Requirement
0.90

- EPA dataset indicates average power factor of 0.98
- Requirement will avoid disqualifying large numbers of products that are otherwise energy efficient
- By setting a minimum level for power factor the needs of diverse stakeholders are met

Toxicity and Recyclability

- In Draft 2, EPA proposed including toxicity and recyclability requirements including EU Restriction of Hazardous Substances Directive (RoHS), however, stakeholders expressed the following concerns:
 - Many UPSs comply with RoHS via exemptions and certain products are not subject to RoHS until 2014
 - Tracking RoHS & non-RoHS model variants is difficult
 - Pending release of IEC 62040-4 is more pertinent
- EPA has decided to exclude toxicity and recyclability requirements

Open Comment



- EPA would now like to open the line for any comments pertaining to:

General Topics

Stakeholder Presentations



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Stakeholder Presentations



- EPA would now like to open the line for stakeholders who have requested time to make presentations.

Ac-output UPS Efficiency Requirements



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Product Classification



- Stakeholders proposed revising the definitions for Consumer, Commercial, and Data Center to improve classification of products
- Suggested characteristics included:
 - Connector current ratings
 - Emission limits
 - Independency characteristic
 - Pluggable Equipment Types (IEC 60950-1)
 - Phase power

Product Classification



- EPA has retained the simple output power categorization for products and eliminated the descriptive terms from the Definitions and Qualification Criteria

Consumer UPS	Commercial UPS	Data Center UPS
$P \leq 1500 \text{ W}$	$1500 \text{ W} < P \leq 10,000 \text{ W}$	$P > 10,000 \text{ W}$

- Descriptive terms not relevant to actual product efficiency
 - Output power and input dependency sufficient
- Descriptive terminology only used to define Scope
- Output power is consistent with previous classification efforts such as the EU Code of Conduct

Loading Profiles by Class


- Average Efficiency calculated based on expected loading:

$$Eff_{AVG} = t_{25\%} \times Eff|_{25\%} + t_{50\%} \times Eff|_{50\%} + t_{75\%} \times Eff|_{75\%} + t_{100\%} \times Eff|_{100\%}$$

Output Power	Proportion of Time Spent at Specified Proportion of Reference Test Load, $t_{n\%}$			
	25%	50%	75%	100%
Consumer $P \leq 1.5 \text{ kW}$	0.2	0.2	0.3	0.3
Commercial $1.5 \text{ kW} < P \leq 10 \text{ kW}$	0	0.3	0.4	0.3
Data Center $P > 10 \text{ kW}$	0.25	0.5	0.25	0

Loading Profiles by Class



- Loading profiles based on output power is more straightforward for setting efficiency levels and conveying product qualification to end users
 - Loading profiles from Draft 2 have remained unchanged, as there is not enough data to indicate a shift in either direction
- 
- EPA supports industry-led efforts to survey UPS utilization to inform future specification revisions

Ac-Output UPS Efficiency Requirements



- Stakeholders expressed concern about potential bias in efficiency due to change in the draft to final version of IEC 62040-3:
 1. Draft version did not specify that the test load have a power factor of 1; it did specify thermal stability
 2. Difficult for EPA to disqualify test results from prior data collection given limited data for particular combinations of input dependency and output power
 3. However, specification levels correspond to the **top 25-30% of available models** likely providing enough margin to account for any bias due to the final version of IEC 62040-3

Ac-Output UPS Efficiency Requirements



- EPA revised the efficiency requirements so that the VFI requirement for all output power is a logarithmic curve

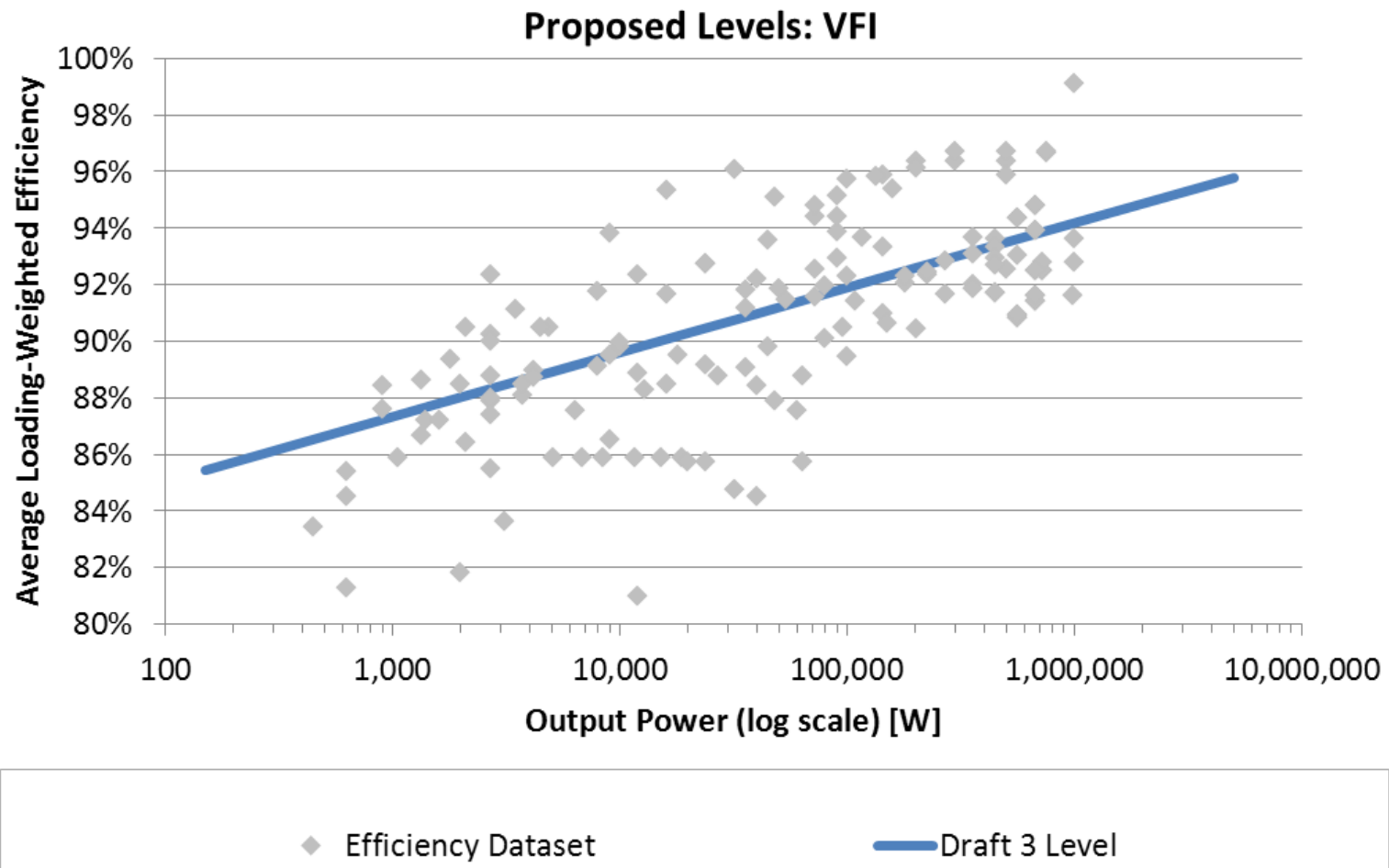
EPA notes significant load protection and price differences between similarly sized models of different input dependency.

Revised VFI level allows different end uses to be captured.

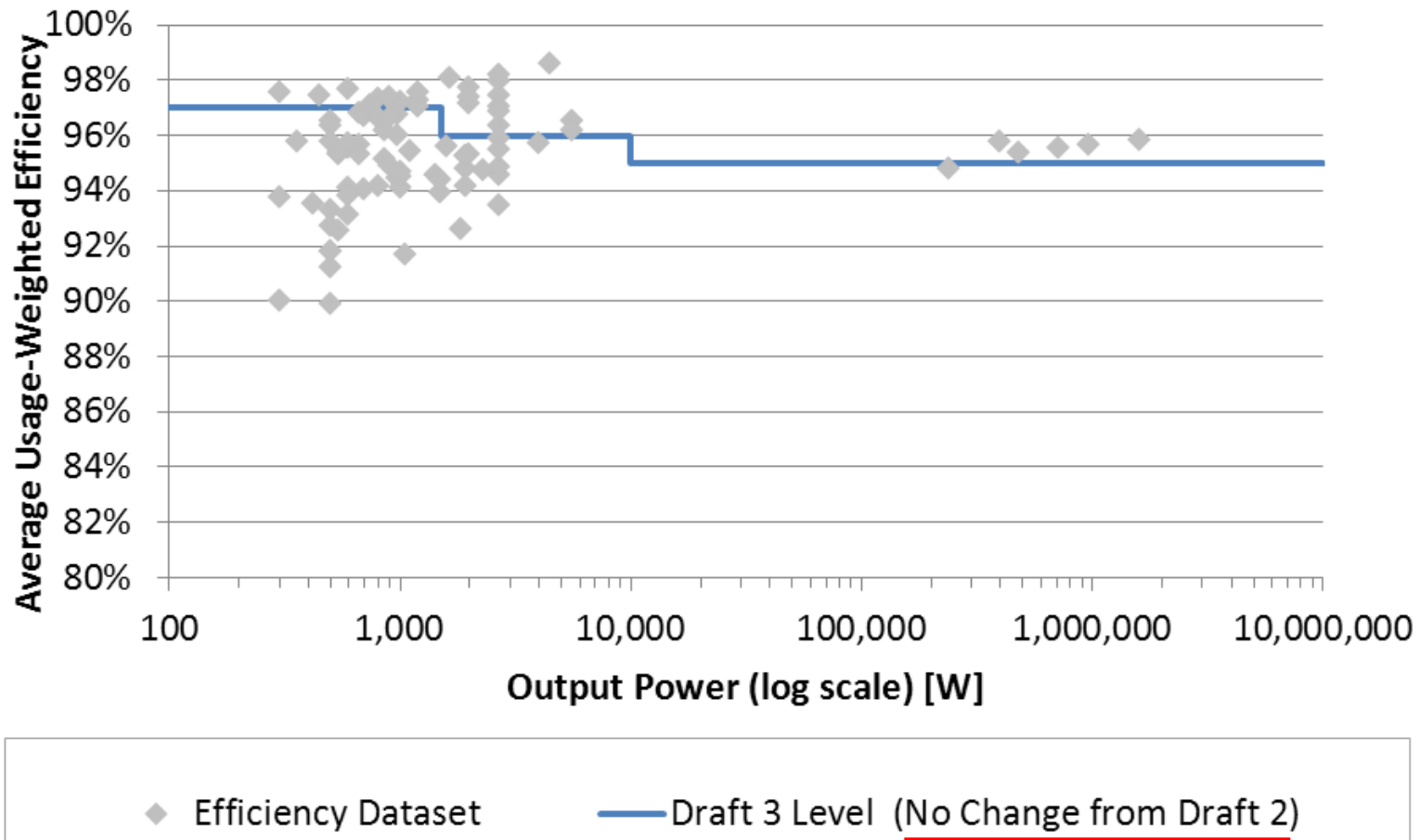
Minimum Average Efficiency Requirement (Eff AVG MIN), Where: P is the Output Power in watts (W), and ln is the natural logarithm			
Output Power	Input Dependency		
	VFD	VI	VFI
$P \leq 1.5 \text{ kW}$	0.97		$0.0099 \times \ln(P) + 0.805$
$1.5 \text{ kW} < P \leq 10 \text{ kW}$	0.97	0.96	
$P > 10 \text{ kW}$	0.97	0.95	

- EPA did not revise the Draft 2 VFD and VI levels

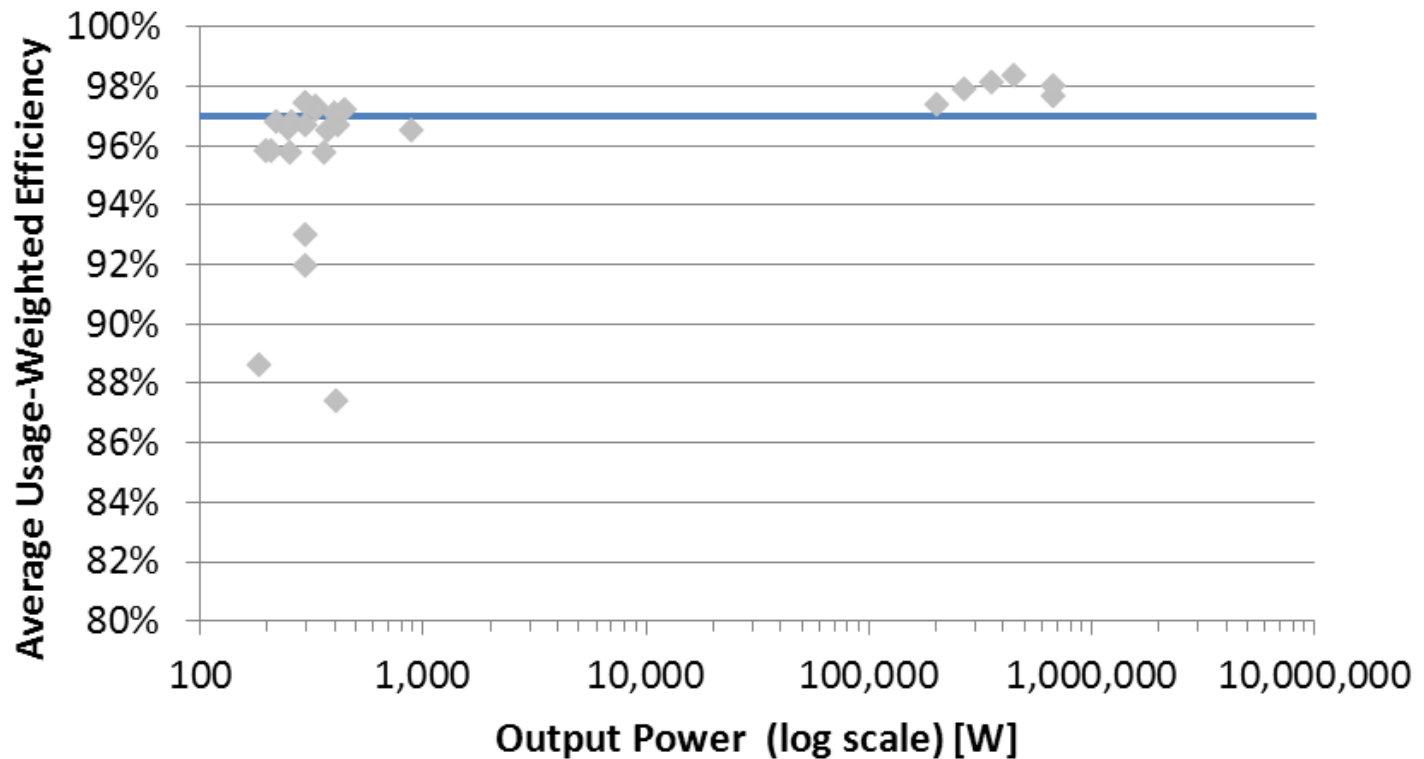
Draft 3 Specification Level: VFI



Draft 3 Specification Level: VI



Draft 3 Specification Level: VFD



◆ Efficiency Dataset — Draft 3 Level (No Change from Draft 2)

Multiple-normal-mode UPS



- ‘Multi-Mode UPS’ potentially misinterpreted as UPS’s ability to operate in Normal, Stored-energy, and Bypass Modes



- EPA has revised the multiple mode UPS definitions for clarity:

~~Single-Mode UPS~~ → **Single-normal-mode UPS**: A UPS that functions within the parameters of only one set of input dependency characteristics. For example, a UPS that functions only as VFI.

~~Multi-Mode UPS~~ → **Multiple-normal-mode UPS**: A UPS that functions within the parameters of more than one set of input dependency characteristics. For example, a UPS that can function as either VFI or VFD.

Multiple-normal-mode UPS Average Efficiency Calculation



- Weighted average of the highest- and lowest-input dependency mode must surpass the efficiency requirement for the lowest-input dependency mode:

$$\text{Eff}_{\text{Avg}} = 0.75 \times \text{Eff}_1 + 0.25 \times \text{Eff}_2$$

Where:

- **Eff1** is the average load adjusted efficiency in the lowest-input dependency mode (i.e., VFI or VI)
 - **Eff2** is the average load adjusted efficiency in the highest-input dependency mode (i.e., VFD)
- EPA has retained the Draft 2 proposed weighting given the lack of data concerning deployed usage

Multiple-normal-mode UPS Testing



- Stakeholders noted that a UPS may have several modes with the same input dependency characteristic

- Example: 2 VI modes & 2 VFI modes



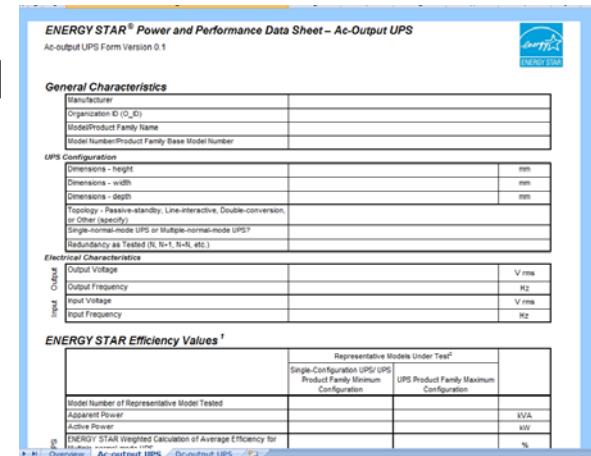
VI 1
VI 2
VFI 1
VFI 2

- EPA has revised Draft 3 to specify that the unit be tested only in the highest efficiency sub-mode of each tested normal mode

Multiple-normal-mode UPS Reporting Requirements



- Multiple-normal-mode UPS **efficiency information** shall be reported on the PPDS
 - **Longest transfer time** between normal modes shall also be reported – i.e. the worst-case scenario type of fault that causes transfer shall be considered
- Transfer time is a manufacturer declared value and shall not be tested
 - Stakeholders noted that a true Multiple-normal-mode UPS should have a transfer time < 4-6 ms, which is the standard for static switches



The image shows a screenshot of the ENERGY STAR Power and Performance Data Sheet for Ac-Output UPS. The form is titled "ENERGY STAR® Power and Performance Data Sheet - Ac-Output UPS" and "Ac-output UPS Form Version 0.1". It includes sections for General Characteristics, UPS Configuration, Electrical Characteristics, and ENERGY STAR Efficiency Values. A curved arrow points from the text "Longest transfer time" in the list above to the "Transfer Time" field in the Electrical Characteristics section of the form.

ENERGY STAR® Power and Performance Data Sheet - Ac-Output UPS			
Ac-output UPS Form Version 0.1			
General Characteristics			
Manufacturer			
Organization ID (O_ID)			
Model/Product Family Name			
Model Number/Product Family Base Model Number			
UPS Configuration			
Dimensions - height		mm	
Dimensions - width		mm	
Dimensions - depth		mm	
Topology - Passive-standby, Line-interactive, Double-conversion, or Other (specify)			
Single-normal-mode UPS or Multiple-normal-mode UPS?			
Load Capacity as Tested (N, N+1, N+1.5, etc.)			
Electrical Characteristics			
Input	Output Voltage	V rms	
	Output Frequency	Hz	
	Input Voltage	V rms	
	Input Frequency	Hz	
ENERGY STAR Efficiency Values¹			
Representative Models Under Test ²		Single-Configuration UPS/UPS Product Family Minimum Configuration	
Model Number of Representative Model Tested		UPS Product Family Maximum Configuration	
Apparent Power		kVA	
Active Power		kW	
ENERGY STAR Weighted Calculation of Average Efficiency for		%	

Multiple-normal-mode UPS Default Settings



- In Draft 3, EPA has maintained that Multiple-normal-mode UPSs shall ship with their highest-input dependency (highest efficiency) mode enabled by default.

Modular Ac-output UPS



- Most stakeholders agreed with Draft 2 proposal regarding modular Ac-output UPSs



- EPA has retained the requirement that both the maximum and minimum configurations are considered Representative Models
 - Both maximum and minimum configurations shall be tested and must meet the minimum efficiency requirements
 - All intermediate configurations can then qualify (“Modular UPS Product Family”)



Modular Ac-output UPS Testing



- Manufacturers shall test at the min and max capabilities of the chassis
 - Ensures customers can be assured of efficient operation after adding modules
- Modular Ac-output UPSs shall be tested with redundant components functioning according to the unit's as-shipped default behavior
 - i.e., fans, controllers, etc. operating for vacant module slots in minimum configuration per default settings

Open Comment



- EPA would now like to open the line for any comments pertaining to:

Ac-output UPS Efficiency Requirements

Dc-output UPS/Rectifiers



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Dc-output UPS/Rectifiers Market Overview



- Telecommunications represents the largest sector for Dc-output UPS shipments
 - 48 V dc equipment is widely available and deployed



- Dc-output UPSs are expected to enter the IT data center industry with higher output voltages (380 V)
 - Industry groups have been formed to speed adoption
 - These types of Dc-output UPSs will be considered more closely in future specifications

Dc-output UPS Systems and Modules



- In Draft 3, EPA proposes option to qualify both systems and individual modules
- A single module can be tested, qualified, and sold individually allowing for high efficiency replacement modules for legacy systems



Dc-output UPS System Test Requirements



- For a Dc-output UPS system to receive the ENERGY STAR label, the vendor shall specify exact module models tested in the following configurations:
 1. Minimum output power non-redundant configuration as typically shipped to the user (e.g., system with a single rectifier installed)
 2. Maximum output power non-redundant configuration as typically shipped to the user (e.g., system with all of the modules installed)
- Dc-output UPS systems shall be:
 - tested in configurations determined by capabilities of chassis
 - tested with redundant components (fans, controllers, etc.) functioning according to the unit's as-shipped default behavior
- ENERGY STAR qualified systems may not be marketed or sold with module models different than those tested

Dc-Output UPSs/Rectifiers Average Efficiency Calculation



- Draft 3 retains proposed Average Efficiency equation derived from ATIS-0600015.04.2010:

$$\text{Eff}_{\text{Avg}} = 1/6 (\text{Eff}|_{30\%} + \text{Eff}|_{40\%} + \text{Eff}|_{50\%} + \text{Eff}|_{60\%} + \text{Eff}|_{70\%} + \text{Eff}|_{80\%})$$

- Unless other data is provided, EPA will maintain equal weightings for the 30-80% load points
 - Stakeholders commented this profile is a realistic reflection of actual telecommunication applications
 - As with Ac-output UPSs, EPA hopes that concrete data to revise this profile can be acquired for UPS V2.0 development

Dc-Output UPS/Rectifier Dataset Assembly Recap

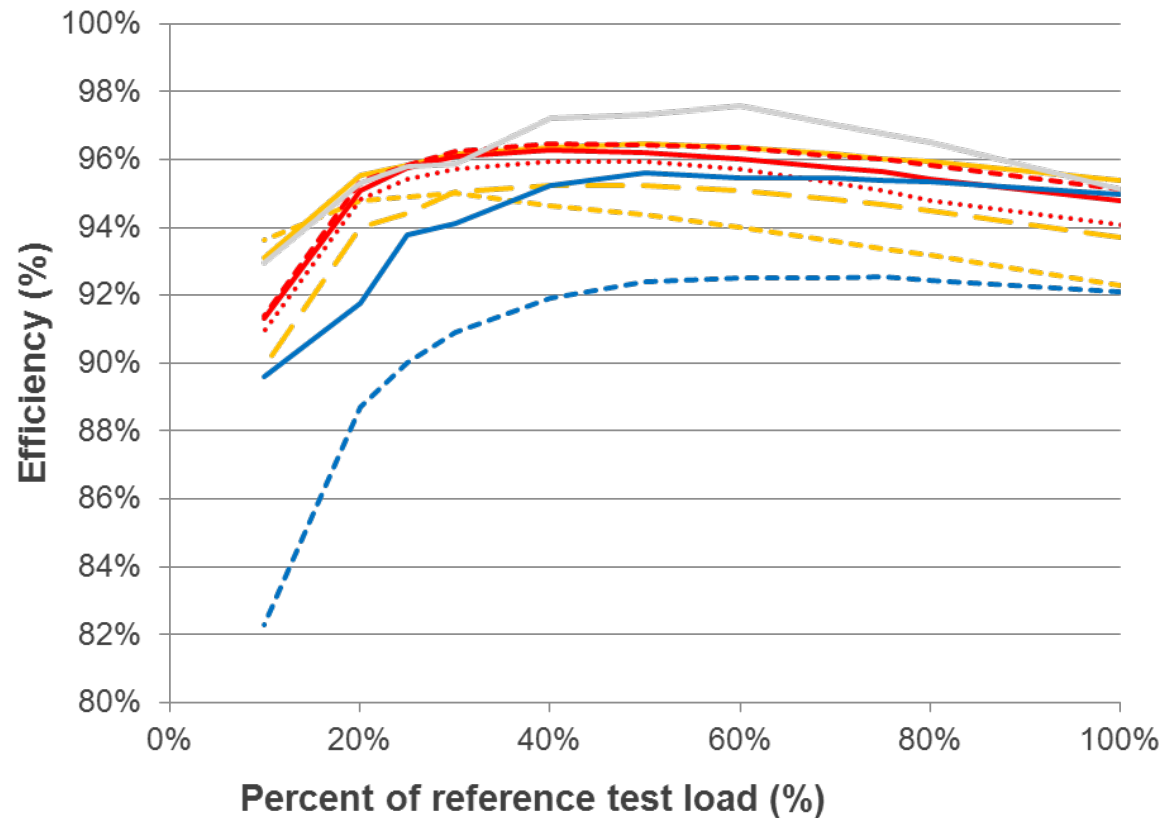


- Same data as for Draft 2

- EPA is retaining the Draft 2 requirement

Minimum Average
Efficiency Requirement
($\text{Eff}_{\text{AVG_MIN}}$)

0.955



Open Comment



- EPA would now like to open the line for any comments pertaining to:

Dc-output UPS/Rectifiers

Metering Credit

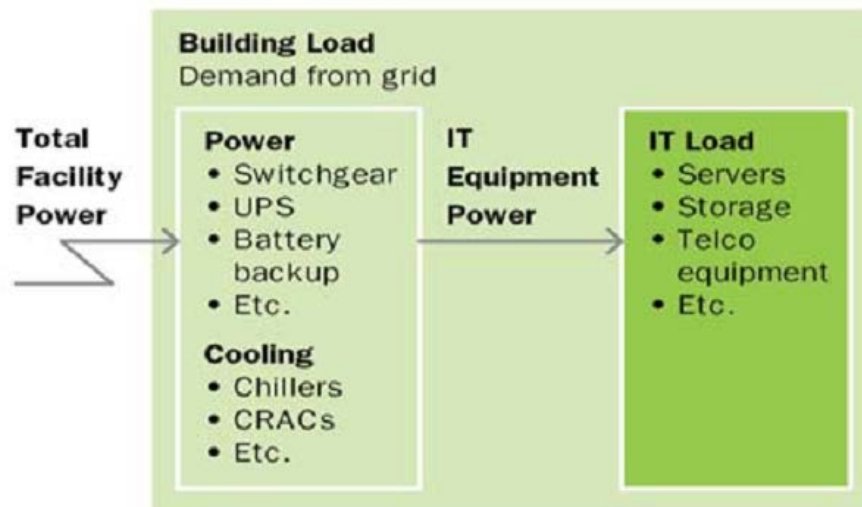


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Metering Credit Goals



- Support measurement of data center Power Usage Effectiveness (PUE) =
$$\frac{\text{Data center energy}}{\text{IT energy}}$$
 - Promote consistent measurement
 - Promote ease of measurement



(Source: The Green Grid)

August 8 Webinar



- ENERGY STAR Buildings Program encouraged shipment of meters with each UPS
 - ENERGY STAR Buildings Program to begin requiring PUE measurement of all participating buildings with data centers in 2012
 - Previously those with less than 10% data center floor area were excluded
 - Want to enable new buildings to join program by easing installation of UPS metering, PUE measurement in small data centers


Stakeholder Feedback



- Stakeholders expressed support for PUE measurement but were concerned about how effective metering each UPS would be
 - Per-unit UPS measurement could be more expensive and difficult to read in multi-unit UPSs
 - Potential for conflict between building management and data center tenants

Proposed Approach: 2% Credit



- EPA considered 4 approaches:
 1. Require all ENERGY STAR UPSs be sold with an internal or bundled external meter.
 2. Require alternative model SKU incorporating a meter be made available for every ENERGY STAR qualified UPS model.
 3. Provide an efficiency credit incentive to UPSs that sold with a meter.
 4. Require only informational reporting on PUE, data center efficiency, ENERGY STAR Buildings, and the role that metering can play in increasing data center efficiency.
- 
- Proposed approach: 2% efficiency credit for models with a meter

Open Comment



- EPA would now like to open the line for any comments pertaining to:

Metering Credit

Proposed Test Method Modifications



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Table of Contents



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Proposed Test Method Modifications

Validation Testing Overview



- DOE completed validation testing on ENERGY STAR Draft 2 Test Method
 - 26 products from various manufacturers
 - Products ranging from 1 to 10 kVA max output
 - Voltage and Frequency Dependent (VFD) , Voltage Independent (VI), and Voltage and Frequency Independent (VFI) topologies
- Status of Stage 1 testing at DOE-NETL Appliance Technology Laboratory: Complete
- Status of Stage 2 testing at independent test lab: Complete

Test Setup and Tests Performed



- Charged all UPSs overnight
- Set load condition; waited for UPS to hit target load before collecting data
- Order of tested loads (% of max output): 100%, 75%, 50%, 25%, 0%
- Power stability verified (discussed in Slide 59)
- 15 minute test per load

Summary of Proposed Changes



Topic	Draft 2 Test Method	Draft 3 Test Method
Firmware Modifications	None	Prohibit adjusting the UPS's firmware in order to prevent battery charging functions
Energy Storage System	Not defined	If the unit's user manual instructs the user not to operate the unit if the battery has been disconnected, then the unit shall be tested with the battery connected
Sampling Method	One sample per second for 15 minutes	Calculate average power from 15 minute accumulated energy measurement
Stability Verification	Evaluate the slope of a regression of the average power per hour	Compare two 5-minute average power measurements taken 10 minutes apart

Proposed Change: Firmware Modifications



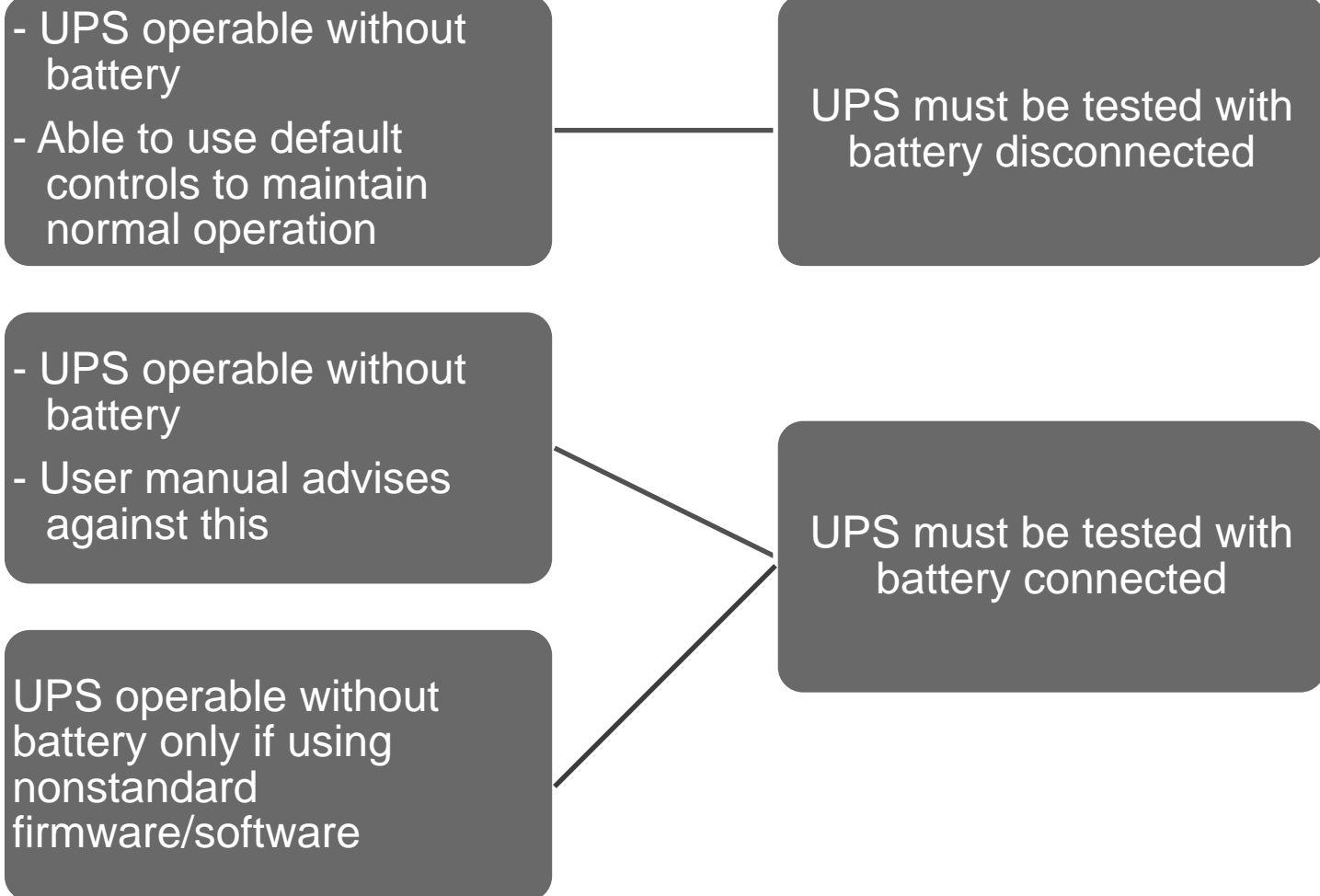
- Stakeholder comments indicated that some manufacturers modify the UPS's firmware to disable battery charging functions (trickle charge, battery self-test)
- Allowing these firmware modifications may lead to:
 - Circumvention of the test method
 - Inconsistent test environment
 - Unfair market advantage among manufacturers
- ENERGY STAR is a label for the consumer and must, as closely as possible, reflect consumer usage and savings
- Proposed Change:
 - Prohibit adjustments to UPS's firmware

Proposed Change: Energy Storage System



- Stakeholder comments indicated that many units are unable to have the battery removed and still operate normally without customizing the UPS
- Many units, especially at the consumer size, have interlocks that trigger alarms or prevent the unit from operating if the battery is disconnected
- Workarounds to force the unit to run may go against the UPS's user manual
- Proposed Change:
 - If the unit's user manual instructs the user not to operate the unit if the battery has been disconnected, then the unit shall be tested with the battery connected

Energy Storage System - Example Scenarios



Proposed Change: Sampling Method



- DOE and EPA recognize that increasing the sampling rate to 1 reading/second, as proposed in Draft 2, may require some stakeholders to develop an automated testing apparatus
- Stakeholders' comments requested the use of an accumulated energy measurement (kWh) if the final sampling method diverts from IEC 62040-3, Ed. 2.0
- Proposed Change:
 - Measure accumulated energy for the 15 minute test period
 - Calculate the average power using this value and the test time

Proposed Change: Power Stability Verification



- In order to ensure that the stability time is adequate, DOE and EPA have added a check that will be performed before each load point
- Immediately after the manufacturer-recommended rise time:
 - Two 5-minute average power measurements will be taken 10 minutes apart;
 - The UPS shall be considered in steady-state if the difference between the two measurements is less than 1% of the average;
 - If the UPS is not in steady-state, perform another 5-minute measurement and perform the same comparison with the previous measurement

Proposed Changes: Based on Stakeholder Draft 2 Comments



- Deletions:
 - Proposed stabilization method
 - Section 4.2.A: Power Meter Setup
- Additions:
 - Back-feeding shall not be used during testing
 - Restored frequency column to Table 1: Input Power Requirements
 - 595 V dc test condition to Table 2: DC-output Power Requirements and Precedence

Proposed Changes: Based on Stakeholder Draft 2 Comments (cont'd)



- Additions (cont'd)
 - Modular UPSs shall be tested with redundant components functioning according to the unit's as-shipped default behavior
 - If the UPS needs to be tested with a battery:
 - If the unit is shipped with a battery, use the battery shipped with the unit for testing
 - Otherwise, the manufacturer shall specify a compatible battery to be used for testing
- Clarifications:
 - If the energy storage system is able to be disconnected (per the user manual), the unit shall be tested in this configuration, as specified in IEC 62040-3, Ed. 2.0

Open Comment



- EPA would now like to open the line for any comments pertaining to:

Proposed Test Method Modifications

Lunch/Break



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Energy Efficiency Program Partner Considerations



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Energy Efficiency Program Partner Considerations



Jason Erwin
Consortium for Energy Efficiency (CEE)

Reporting Requirements & Qualification Processes



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Reporting Requirements & Qualification Processes



Topics:

1. Third-party Certification
2. Data Submission
3. Power and Performance Datasheet (PPDS)
4. Labeling Requirements
5. Product Families
6. Next Steps

Reporting Requirements & Qualification Processes



Topics:

- 1. Third-party Certification**
2. Data Submission
3. Power and Performance Datasheet (PPDS)
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ENERGY STAR Third Party Certification



- Third-party certification of test data prior to qualification and labeling
- Organizations become recognized by EPA under the scope of each product category

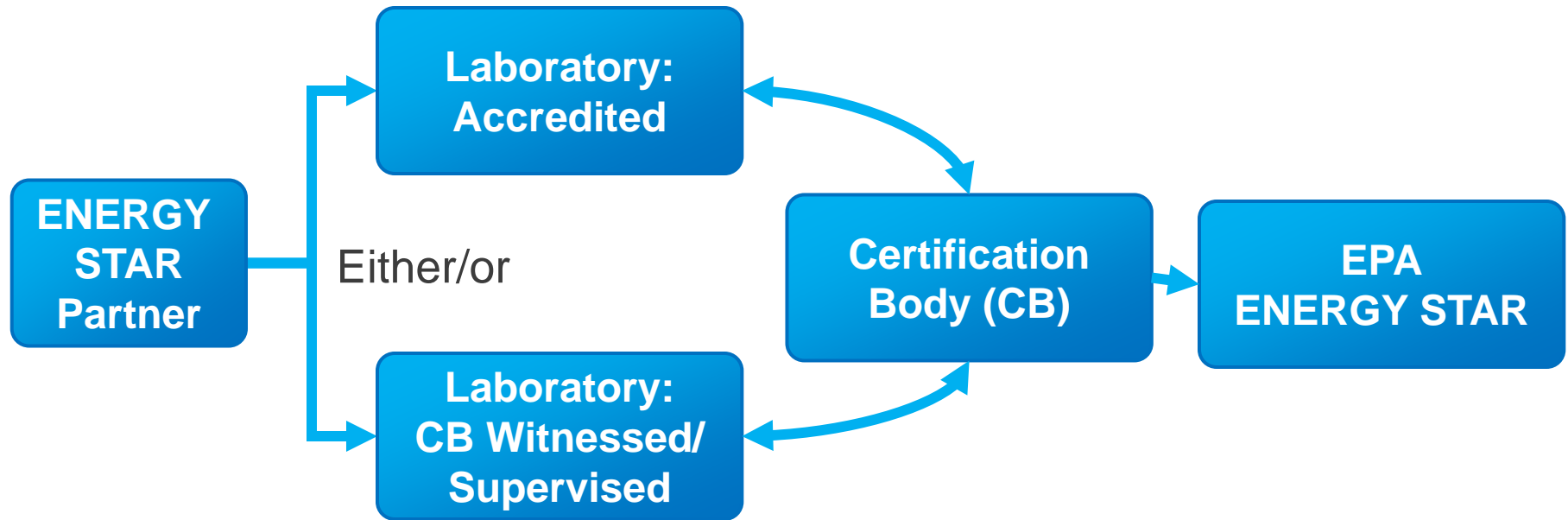
EPA Recognized Organizations:

certification bodies

accreditation bodies

laboratories

Product Qualification Process



Units may be tested in:

- A **third-party** EPA-recognized accredited laboratory, **or**
- A **first-party** lab operating under witness or supervision—i.e. a witnessed or supervised manufacturer's test lab (WMTL/SMTL)

ENERGY STAR Recognized Certification Bodies for UPSs



- CB is responsible for operating product certification program compliant with ISO/IEC Guide 65
 - After certification process is completed, CB will notify partner of qualification or rejection, or request additional information
 - If CB determines the product is qualified, it will provide EPA with appropriate data so the product may be added to the ENERGY STAR Qualified Product List
- EPA encourages interested certification bodies to participate in the UPS specification development process

ENERGY STAR Ongoing Testing and Verification



- EPA conducts ongoing verification – at least 10% of models qualified by each CB to be tested per year, taking product families into account
- Certification body to administer verification testing:
 - Combination of random and pre-selected models
 - Unit procurement: off-the-shelf where feasible; other channels possible as long as 3rd party personnel selects units
 - 3rd party laboratory should be used, but if not feasible, CB witnesses testing at manufacturer lab

Testing and Verification Resources



- For more information regarding testing and verification please visit:

www.energystar.gov/testingandverification

- Access final requirements for accreditation bodies, laboratories, and certification bodies
- Find answers to frequently asked questions
- View complete ENERGY STAR Third-Party Certification Process Flow Diagram

Reporting Requirements & Qualification Processes



Topics:

1. Third-party Certification
- 2. Data Submission**
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Qualified Product List (QPL)

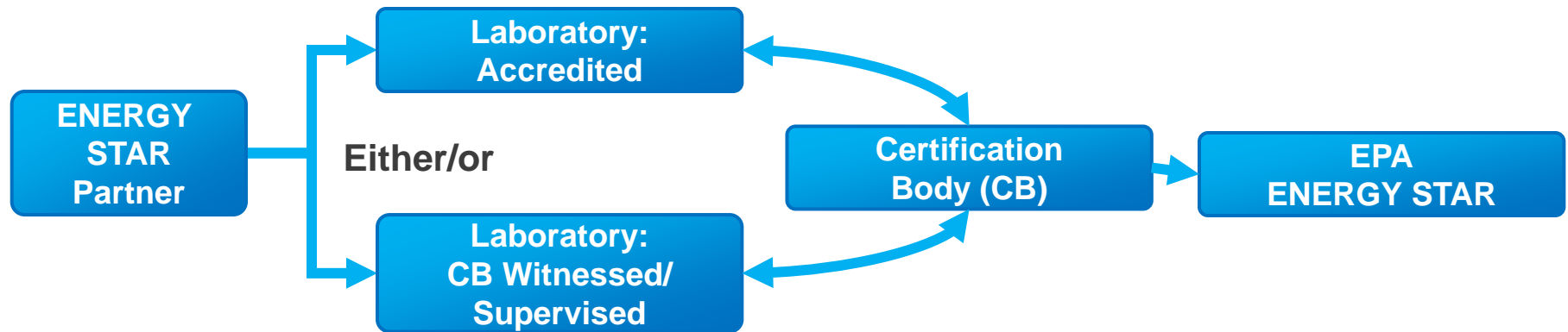


- EPA posts a Qualified Product List on the ENERGY STAR website
- Standard Excel and PDF format across all product categories

The screenshot shows the ENERGY STAR website interface. The top navigation bar includes links for PRODUCTS, HOME IMPROVEMENT, NEW HOMES, BUILDINGS & PLANTS, and PARTNER RESOURCES. The main content area is titled 'Uninterruptible Power Supplies' and contains a draft specification document dated October 25, 2011. Below the website screenshot, an Excel spreadsheet is displayed with the following structure:

PD_ID	Product (Unit) Type	Partner Name	Brand	Model Name	Model Number	Configuration ID or SKU	Number of Hard Drives	Total Installed Storage Capacity	Power Supply Rated Output	Power Supplies Installed	Power Supplies Installed for Redundancy	Open Name

Data Submission Process



- Labs complete Test Reporting Template per UPS Test Method Section 6 Test Records Requirements
- CBs review test data and coordinate with manufacturers to submit a complete data form to EPA database
- Qualified Product List (QPL) is generated from data form submissions

Draft Data Form



- EPA to release Excel draft data form with Final Specification for stakeholder review
 - Includes all data fields that CBs submit to EPA
 - Test data and unit characteristics

Copy of ENERGY STAR Certified Product Data Submission Forms 1.0_V3_-_Set-top_Boxes_2011-10-25[1].xls [Compatibility Mode] - Microsoft Excel

Home

Insert

Page Layout

Formulas

Data

Review

View

Acrobat

Reporting Requirements & Qualification Processes



Topics:

1. Third-party Certification
2. Data Submission
3. **Power and Performance Datasheet (PPDS)**
4. Labeling Requirements
5. Product Families
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Reporting Requirements



- From Section 3.6 of the Draft 3 Specification:
A standardized Power and Performance Data Sheet (PPDS) shall be completed for each ENERGY STAR qualified UPS or Product Family and posted with other product information on the Partner's website

- Example:
Computer Servers

ENERGY STAR® Power and Performance Data Sheet
Dell PowerEdge R210 featuring the 250W Power Supply

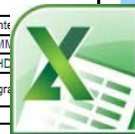
System Characteristics

Form Factor	1U
Available Processor Sockets	1
Available DIMM Slots / Max Memory Capacity	4/16 GB
ECC and/or Fully Buffered DIMMs	Yes
Available Expansion Slots	1 PCI-E
Minimum and Maximum # of Hard Drives	1 to 2
Redundant Power Supply Capable?	No
Power Supply Make and Model	Dell Energy Smart N250E-SO
Power Supply Output Rating ¹ (watts)	250
Minimum and Maximum # of Power Supplies	1
Input Power Range (AC or DC)	100-240VAC
Power Supply Efficiency at Specified Loadings ²	74.15%@10%, 82.6%@20%, 86.0%@50%, 85.8%@100%
Power Supply Power Factor at Specified Loadings ³	0.96@10%, 0.98@20%, 0.99@50%, 0.99@100%
Operating Systems Supported ²	Microsoft Windows® Server 2003 and 2008 Microsoft Windows Essential Business Server 2008 Microsoft Windows Small Business Server 2008 Red Hat Enterprise Linux 4 and 5 SUSE Linux Enterprise Server 10 and 11
Installed Operating System for Testing	Microsoft Windows Server 2008

1. Power supply information is for a single power supply only.
2. Available operating systems as shipped configurations from the factory.
3. Minimum as shipped configuration is installed 80 disk.

System Configurations

	Minimum	Typical	Maximum
Configuration ID			
Processor Information	1, Intel Xeon 3430	1, Intel Xeon 3430	1, Intel Xeon 3430
Memory Information	1 DIMM, 1 GB	2 DIMMs, 1 GB each	4 DIMMs, 16 GB
Internal Storage	1 HDD	1 HDDs / 1 DVD	2 HDDs
I/O Devices	2 integrated 1 Gb NICs	2 integrated 1 Gb NICs	2 integrated 1 Gb NICs
Power Supply Number and Redundancy Configuration	1	1	1
Management Controller or Service Processor Installed?	Yes	Yes	Yes




UPS PPDS History



- EPA presented a Draft PPDS during the Draft 2 specification release
 - Draft UPS PPDS based on internal data assembly forms used for creation of ENERGY STAR dataset
- Stakeholder feedback on the Draft PPDS:

Draft PPDS Feedback



- Stakeholder feedback on the Draft PPDS:
 - Document contains too much detail
 - IEC 62040 is not widely accessible:
remove references
 - Remove ambiguous information on battery life and other characteristics
- 
- EPA has revised the PPDS for clarity:
 - Included the most valuable consumer-facing content
 - Focused on efficiency related info

Power & Performance Data Sheet



- The Draft PPDS released with Draft 3 contains:
 - General characteristics
 - Efficiency for each loading point, normal mode, and configuration
 - Measurement and communications
 - Energy storage characteristics
 - Recycling and other voluntarily reported environmental aspects

ENERGY STAR® Power and Performance Data Sheet – Ac-Output UPS
Ac-output UPS Form Version 0.1

General Characteristics

Manufacturer	
Organization ID (O_ID)	
Model/Product Family Name	
Model Number/Product Family Base Model Number	

UPS Configuration

Dimensions - height		mm
Dimensions - width		mm
Dimensions - depth		mm
Topology - Passive-standby, Line-interactive, Double-conversion, or Other (specify)		
Single-normal-mode UPS or Multiple-normal-mode		
Redundancy as Tested (N, N+1, N+N, etc.)		

Electrical Characteristics

Output Voltage		V rms
Output Frequency		Hz
Input Voltage		V rms
Input Frequency		Hz

ENERGY STAR Efficiency Values¹

Multiple-normal-mode UPS	Representative Models Under Test ²			
	Configuration UPS/UPS Product Family Minimum	UPS Product Family Maximum Configuration		
Model Number of Representative Model Tested				
Apparent Power				kVA
Active Power				kW
ENERGY STAR Weighted Calculation of Average Efficiency for Multiple-normal-mode UPS				%
ENERGY STAR Minimum Average Efficiency (Eff _{min}) Requirement for Given Output Power and Lowest Available Input Dependency				
Transition time between normal modes ³				
If Multiple-normal-mode UPS, efficiency values for each Normal-mode are reported ⁴	Highest input efficiency	Lowest input efficiency	Highest input efficiency	Lowest input efficiency
Input Dependency of Normal Mode(s) Tested (VFI, VI, or VFD)				
ENERGY STAR Weighted Calculation of Average Efficiency for Each Tested Normal Mode				

Additional Stakeholder Feedback



- Stakeholders further requested that PPDSs be:
 - Easier to browse and compare between products
 - Easier to update with new product information
- The above capability is not supported by static .pdf and .xls files



- EPA is developing an online widget that would consolidate PPDS information and allow easy browsing and updating

PPDS Widget Under Development



.xls Template

Data provided by partner

PPDS Widget

Aggregated data for online display

ENERGY STAR® Power and Performance Data Sheet – Ac-Output UPS
Ac-output UPS Form Version 0.1

General Characteristics

Manufacturer	
Organization ID (O_ID)	
Model/Product Family Name	
Model Number/Product Family Base Model Number	

UPS Configuration

Dimensions - height		mm
Dimensions - width		mm
Dimensions - depth		mm
Topology - Passive-standby, Line-interactive, Double-conversion, or Other (specify)		
Single-normal-mode UPS or Multiple-normal-mode UPS		
Redundancy as Tested (N, N+1, N+N, etc.)		

Electrical Characteristics

Output Voltage		V rms
Output Frequency		Hz
Input Voltage		V rms
Input Frequency		Hz

ENERGY STAR Efficiency Values¹

Model Number of Representative Model Tested	Representative Models Under Test ²		kVA
	Configuration UPS/UPS Product Family Minimum	UPS Product Family Maximum Configuration	
Apparent Power			kVA
Active Power			kW
ENERGY STAR Weighted Calculation of Average Efficiency for Multiple-normal-mode UPS			%
ENERGY STAR Minimum Average Efficiency (Eff _{avg,min}) Requirement for Given Output Power and Lowest Available Input Dependency			
Transition time between normal modes ³			
If Multiple-normal-mode UPS, efficiency values for each Normal-mode are reported ⁴	Highload input depends on...	Lowload input depends on...	Highload input depends on...
Input Dependency of Normal Mode(s) Tested (VFI, VI, or VFD) ⁵			
ENERGY STAR Weighted Calculation of Average Efficiency for Each Tested Normal Mode			

Power and Performance Datasheet - Product Comparison

Specification	APC X1000	General Electric UP900-G
Form Factor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Topology	Double Conversion	Double Conversion
Power Rating – Apparent	14 kVA	20 kVA
Performance Classification	VI-VFI	VI-VFI

PPDS Widget Request for Feedback



- EPA seeks feedback on the data for presentation
 - Format may change, but is the content correct?
 - Want to provide additional data to end-users to aid purchase and design decisions
 - Some overlap with QPL data, but also some new information
 - Currently PPDS data is reported using .xls form
 - E.g., servers
 - PPDS form is distinct from data form used by CBs to qualify products
 - EPA will attempt to minimize reporting burden

PPDS Widget

Request for Feedback (cont.)



- How should UPS performance data be presented online for maximum usability?
 - What 3–4 parameters are most important to users? For data filtering:
 - Output power
 - Input voltage dependency
 - Physical size
 - Other?
 - How many UPSs should then be compared?

The screenshot shows a web browser window with the Energy Star logo in the top right corner. The main content area displays a "Power and Performance Datasheet - Product Comparison" table. The table compares two UPS models: APC X1000 and General Electric UP900-G. The specifications listed are Form Factor, Topology, Power Rating – Apparent, and Performance Classification. The APC X1000 has a Form Factor of Rackmount and a Power Rating of 14 kVA, while the General Electric UP900-G has a Form Factor of Tower and a Power Rating of 20 kVA. Both have a Topology of Double Conversion and a Performance Classification of VI-VFI.

Specification	APC X1000	General Electric UP900-G
Form Factor	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Topology	Double Conversion	Double Conversion
Power Rating – Apparent	14 kVA	20 kVA
Performance Classification	VI-VFI	VI-VFI
...		

Reporting Requirements & Qualification Processes



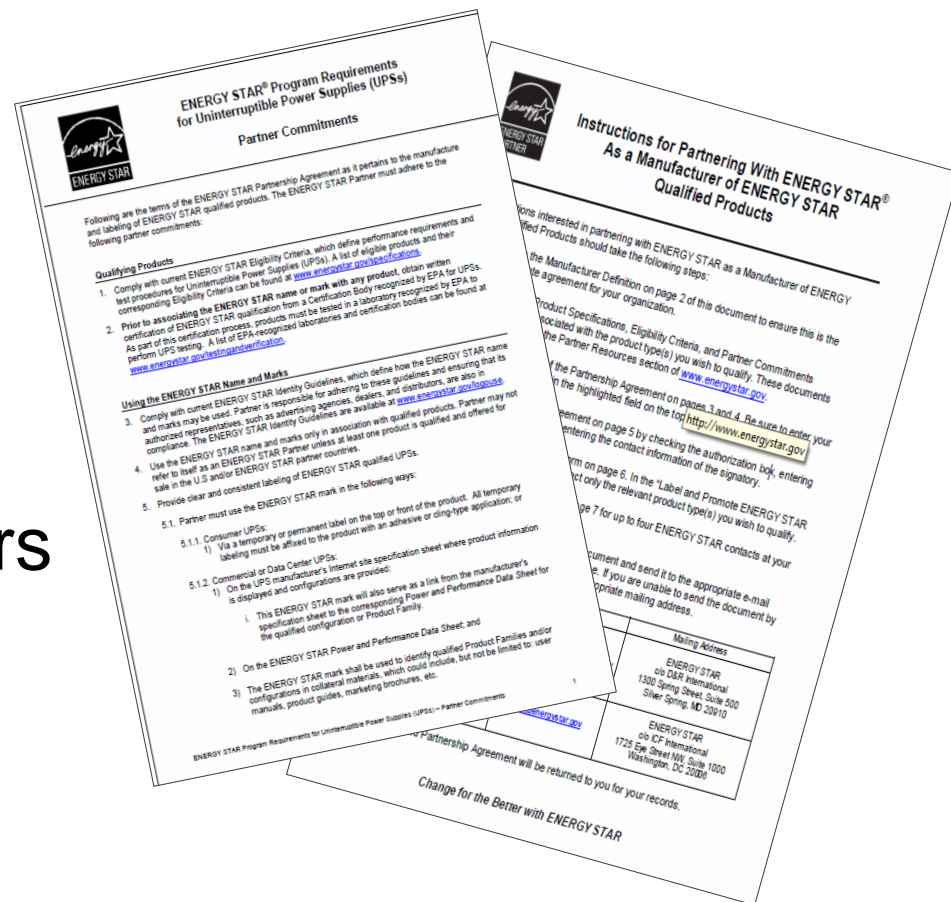
Topics:

1. Third-party Certification
2. Data Submission
3. Power and Performance Datasheet (PPDS)
4. **Labeling Requirements**
5. Product Families
6. Next Steps

ENERGY STAR Manufacturer Revised Partner Commitments



- Revised Draft UPS Partner Commitments released for review
- Once UPS Program Requirements are finalized, manufacturers submit a Partnership Agreement



Labeling Requirements



- Partner Commitments require using the ENERGY STAR mark in one of the following ways:
 - Via electronic labeling
 - Via permanent or temporary label on top or front of the product.



Labeling Requirements

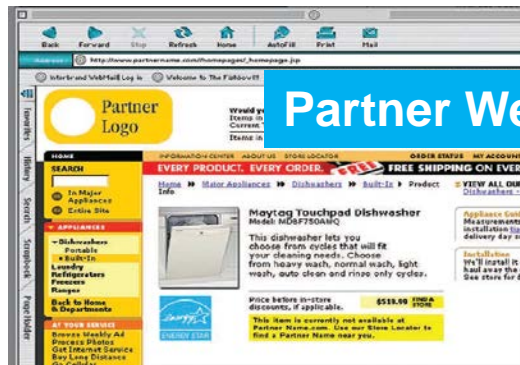


- Partner must use the mark to identify qualified products in collateral
- Partner must use the mark on the manufacturer's Internet site

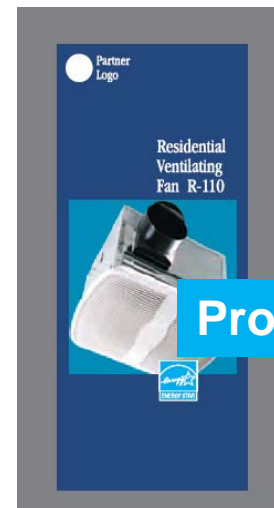
Advertisements



Partner Website



Product Brochures



Labeling Requirements



- Partner must use the ENERGY STAR mark on product packaging for products sold at retail:



- For more information on labeling, please visit:

www.energystar.gov/LogoUse

Reporting Requirements & Qualification Processes



Topics:

1. Third-party Certification
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- 5. Product Families**
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Product Families



- In Draft 3, EPA added the following definition:

Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR qualification criteria, and (3) of a common basic design. For UPSs, product families consist of product models that meet the definition of Modular UPS as specified herein. For UPSs, acceptable variations within a product family include:

- 1) Number of installed modules;
- 2) Redundancy;
- 3) Input and output filters; and
- 4) Number of rectifier poles.


Product Families (cont.)




Modularity

Other Characteristics:

- 1) Redundancy;
- 2) Input and output filters; and
- 3) Number of rectifier poles.



Min and Max configuration are both considered the Representative Model for testing



Highest energy using configuration is considered the Representative Model for testing



When submitting product families, manufacturers are held accountable for any efficiency claims made about their products, including those not tested or for which data was not reported

Product Families (cont.)



- EPA welcomes further stakeholder comment on the variations within a 'Product Family'
 - Model and part # convention within a product family or product series—e.g., 16 kVA UPS → **UPS16XXX**
 - Example: represents Product Family with varying characteristics (batteries, filters, etc.): *UPS16MNO*, *UPS16PQR*, *UPS12STU....*

Model Name	Model Number / Configuration ID		Additional Models Represented/ Intermediate Configurations
	Minimum Config.	Maximum Config.	
UPS	UPS04ABC	UPS16ABC	UPS08***, UPS10***, UPS12***

Reporting Requirements & Qualification Processes



Topics:

1. Third-party Certification
2. Data Submission
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5. Product Families
6. **Next Steps**

Specification Effective Date



Proposed Specification Effective Date

April 1, 2012

- EPA anticipates that the UPS Program Requirements including the specification and test method will be finalized around Jan. 1, 2012
- Effective date allows up to three extra months for Certification Bodies and Laboratories to be recognized by EPA

Anticipated Specification Development Timeline



- **Late November/December 2011:**
 - Receive comments on Draft 3 Specification and Test Method by **Tuesday, November 22**
 - Compile comment summary and EPA-DOE response
 - Final Draft specification and test method revisions
 - Test Method to be completed by December 2011
- **After January 1, 2012:**
 - UPS Program Requirements are published
 - Release Data Forms for stakeholder review
 - Manufacturers may apply to become Partners
 - Accreditation Bodies, Certification Bodies, Laboratories may be recognized by EPA

Proposed Specification Effective Date
April 1, 2012

Specification Effective Date



Proposed Specification Effective Date

April 1, 2012

- EPA anticipates that the UPS Program Requirements including the specification and test method will be finalized around Jan. 1, 2012
- Effective date allows some period of time (shown here as 3 months) for Certification Bodies and Laboratories to be recognized by EPA
- Activities/steps within this time period
 - (Eamon Monahan, ENERGY STAR)

Written Comments



- In addition to making verbal comments during today's meeting, stakeholders are strongly encouraged to submit written comments and data
- Please send all comments to: ups@energystar.gov

Comment Deadline

Tuesday, November 22, 2011

Open Comment



- EPA would now like to open the line for any comments pertaining to:

**PPDS/Data Reporting Requirements,
Qualification Processes, Labeling, & Timeline**

Open Comment



Time (EST)	Topic
10:00 – 10:15	Meeting Introduction & General Topics
10:15 – 10:30	Stakeholder Presentations
10:30 – 11:00	Ac-output UPS Efficiency Requirements
11:00 – 11:15	Dc-output UPS/Rectifiers
11:15 – 11:45	Metering Credit
11:45 – 12:30	Proposed Test Method Modifications
12:30 – 1:15	<i>Lunch/Break</i>
1:15 – 1:45	Energy Efficiency Program Partner Considerations <i>CEE Guest Speaker, Jason Erwin</i>
1:45 – 2:45	PPDS/Data Reporting Requirements, Qualification Processes, Labeling, and Timeline
2:45 – 3:00	Open Comment

Open Comment



- EPA would now like to open up the line for any general comments from stakeholders.

References and Resources

- ENERGY STAR UPS specification development:
Go to www.energystar.gov/NewSpecs and Click on “Uninterruptible Power Supplies”
- ENERGY STAR Data Center efficiency initiatives:
http://www.energystar.gov/index.cfm?c=prod_development.server_efficiency
- US Task Force Leaders Agreement on Measuring Efficiency in a Data Center (energy must be measured at output of UPS):
http://www.energystar.gov/ia/partners/prod_development/downloads/DataCenters_AgreementGuidingPrinciples.pdf
- Global Task Force Leaders Agreement on Measuring Efficiency in a Data Center (energy must be measured at output of UPS):
http://www.energystar.gov/ia/partners/prod_development/downloads/Harmonizing_Global_Metrics_for_Data_Center_Energy_Efficiency.pdf

Thank you!



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