



ENERGY STAR

Version 6.0 Computers

Certification Body (CB) Training

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Agenda



1	ENERGY STAR Overview
2	Version 6.0 Specification Overview
•	Overview, Definitions, Scope
•	General Requirements
•	Efficiency Criteria
3	Overview of CB Details
4	Open Questions & Comments

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ENERGY STAR Overview



- Voluntary labeling program managed the U.S. Environmental Protection Agency (EPA)
- Strategic approach to energy management, promoting energy efficient products and practices
- Tools and resources to help save money and protect the environment
- Influential brand recognized by 85 percent of Americans

ENERGY STAR Portfolio



- Define and educate on energy performance through a single designation: **ENERGY STAR**
 - Product Efficiency
 - New/Existing Home Efficiency
 - Commercial and Industrial Efficiency



The ENERGY STAR Product Label



- The ENERGY STAR label was established to:
 - Reduce greenhouse gas emissions and other pollutants caused by the inefficient use of energy
 - AND
 - Make it easy to identify energy-efficient products that offer savings on energy bills without sacrificing performance, features, and comfort.

Benefits of the ENERGY STAR Label



- Energy efficiency with same or better performance
- Standard test procedures applied to all products
 - Apples to apples comparison
- Detailed, publicly available data
 - Soon to be available in XML, other machine readable formats
- Unbiased, 3rd party source for energy efficiency information.

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Timeline of Version 6.0 Computer Specification Development



- 2011:
 - March - Kickoff
 - July → Sept - Data Assembly
- 2012:
 - Feb - Draft 1 Specification and Test Method
 - May - Draft 2 Specification and Test Method
 - Nov - Draft 3 Specification and Test Method
- 2013:
 - July - Final Draft Specification and Test Method
 - Sept - Final Program Requirements

Significant Changes Between V5.2 and V6.0



- New Mode – Short Idle
- New category system for Desktops, Integrated Desktops, and Notebooks
 - Developed in collaboration with manufacturers
- New provisions for alternative low-power modes
- New power supply incentive

New Definitions In Version 6.0



- Thin Clients
 - Mobile Thin Client
 - Integrated Thin Client
 - Ultra-thin Client
- Graphics Processor Unit
 - Discrete Graphics
 - Integrated Graphics
- Display
 - Enhanced Performance Integrated Display
- Idle
 - Short Idle
 - Long Idle
- Energy Efficient Ethernet (EEE)
- Switchable Graphics

Revised Definitions From Version 5.2



- Computer
 - Added clarification for when no CPU is present
- Notebook computer
 - Definition expanded to include products referred to as Tablets in Version 5.2
 - New Slate/Tablet definition (TBD) outside of Version 6.0 scope
- Product Family
 - Expanded to allow differences in housing, color, and electrical components other than the chassis/motherboard (e.g. CPU, GPU, memory)

Scope – Included Products



Desktop



Integrated Desktop



Notebook



Workstation



Small Scale
Server



Thin Client

Scope – Excluded Products



Docking Station



Game Console



eReader



Handheld Gaming Device



PDA



Non-PC POS Product



Slate/Tablet



Smartphone

- Also out of scope: Mobile Thin Clients, Ultra-thin Clients, and Small Scale Servers used in data centers

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General Requirements



- Internal Power Supply Efficiency
- External Power Supply Efficiency
- Power Management Requirements
- User Information Requirements

Internal Power Supply Efficiency



- IPS with rated power of 75 watts or less must meet efficiency requirements in Table 1 below
- IPS with rated power greater than 75 watts must meet both the efficiency and power factor requirements in Table 1 below

Table 1: Requirements for Internal Power Supplies

Loading Condition (Percentage of Nameplate Output Current)	Minimum Efficiency	Minimum Power Factor
20%	0.82	-
50%	0.85	-
100%	0.82	0.90

External Power Supply Efficiency



- All Single- and Multiple-voltage EPSs shall meet the Level V performance requirements under the International Efficiency Marking Protocol
 - Tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430

Power Management Requirements



- Changes from Version 5.2:
 - Products that do not support Sleep Mode by default are only subject to the Display Sleep Mode requirement
 - Thin Clients are now required to meet the System Sleep Mode requirement in Table 2

Table 2: Power Management Requirements

Mode or Mode Transition	Requirement	Desktops	Integrated Desktops	Notebooks	Small-scale Servers	Thin Clients	Workstations
System Sleep Mode¹	(1) Sleep Mode shall be set to activate after no more than 30 minutes of user inactivity. (2) The speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode.	Yes	Yes	Yes	No	Yes	Yes

User Information Requirements



- Change from Version 5.2
 - Required user information may now be provided electronically, given the electronic documentation meets the requirements of Section 3.4.3 of the Eligibility Criteria
- Specific topics covered in the user information requirements remain unchanged from Version 5.2

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Efficiency Criteria by Product Type



- Desktops, Integrated Desktops and Notebooks
- Workstations
- Small Scale Servers
- Thin Clients

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- E_{TEC} shall be less than or equal to E_{TEC_MAX}
- Use Equation 1 to calculate E_{TEC} :

Equation 1: TEC Calculation (E_{TEC}) for Desktop, Integrated Desktop, Thin Client and Notebook Computers

$$E_{TEC} = \frac{8760}{1000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE} + P_{SHORT_IDLE} \times T_{SHORT_IDLE})$$

Where:

- P_{OFF} = Measured power consumption in Off Mode (W);
- P_{SLEEP} = Measured power consumption in Sleep Mode (W);
- P_{LONG_IDLE} = Measured power consumption in Long Idle Mode (W);
- P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode (W); and
- T_{OFF} , T_{SLEEP} , T_{LONG_IDLE} , and T_{SHORT_IDLE} are mode weightings as specified in Table 3 (for Desktops, Integrated Desktops, and Thin Clients) or Table 4 (for Notebooks).

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- Mode Weightings for T_{OFF} , T_{SLEEP} , T_{LONG_IDLE} , and T_{SHORT_IDLE} :

Table 3: Mode Weightings for Desktop, Thin Clients, and Integrated Desktop Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery/ Name Services	Full Capability
T_{OFF}	45%	40%	30%	25%	20%
T_{SLEEP}	5%	15%	28%	36%	45%
T_{LONG_IDLE}	15%	12%	10%	8%	5%
T_{SHORT_IDLE}	35%	33%	32%	31%	30%

Table 4: Mode Weightings for Notebook Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery / Name Services	Full Capability
T_{OFF}	25%	25%	25%	25%	25%
T_{SLEEP}	35%	39%	41%	43%	45%
T_{LONG_IDLE}	10%	8%	7%	6%	5%
T_{SHORT_IDLE}	30%	28%	27%	26%	25%

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- For a product to qualify for Full Network Connectivity Mode Weightings, the following apply:
 1. Meet a non-proprietary Full Network Proxy standard (e.g. ECMA 393).
 2. Applied level of functionality must be enabled and configured by default upon shipment.
 3. Products shall be capable of Sleep Mode or alternative low power modes with power less than or equal to 10 watts.

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- Use Equation 2 to calculate E_{TEC_MAX} :

Equation 2: E_{TEC_MAX} Calculation for Desktop, Integrated Desktop, and Notebook Computers

$$E_{TEC_MAX} = (1 + ALLOWANCE_{PSU}) \times (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{SWITCHABLE} + TEC_{EEE})$$

Where:

- $ALLOWANCE_{PSU}$ is an allowance provided to power supplies that meet the optional more stringent efficiency levels specified in Table 5; power supplies that do not meet the requirements receive an allowance of 0;
- TEC_{BASE} is the Base allowance specified in Table 6; and,
- $TEC_{GRAPHICS}$ is the discrete graphics allowance as specified in Table 7, with the exception of systems with integrated graphics, which do not receive an allowance, or Desktops and Integrated Desktops with switchable graphics enabled in ac mode, which receive an allowance through $TEC_{SWITCHABLE}$; and
- TEC_{MEMORY} , $TEC_{STORAGE}$, $TEC_{INT_DISPLAY}$, $TEC_{SWITCHABLE}$, and TEC_{EEE} are adder allowances as specified in Table 7.

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- ALLOWANCE_{PSU} is calculated using Table 5 below:

Table 5: Power Supply Efficiency Allowance

Power Supply Type	Computer Type	Minimum Efficiency at Specified Proportion of Rated Output Current ⁱⁱ				Minimum Average Efficiency ⁱⁱⁱ	Allowance _{PSU}
		10%	20%	50%	100%		
IPS	Desktop	0.81	0.85	0.88	0.85	-	0.015
		0.84	0.87	0.90	0.87	-	0.03
	Integrated Desktop	0.81	0.85	0.88	0.85	-	0.015
		0.84	0.87	0.90	0.87	-	0.04
EPS	Notebook or Desktop	0.83	-	-	-	0.88	0.015
		0.84	-	-	-	0.89	0.03
	Integrated Desktop	0.83	-	-	-	0.88	0.015
		0.84	-	-	-	0.89	0.04

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- TEC_{BASE} is calculated using Table 6 below:

Table 6: Base TEC (TEC_{BASE}) Allowances

Category Name	Graphics Capability ^{iv}	Desktop or Integrated Desktop		Notebook	
		Performance Score, P^v	Base Allowance	Performance Score, P^v	Base Allowance
0	Any Graphics dGfx \leq G7	$P \leq 3$	69.0	$P \leq 2$	14.0
I1	Integrated or Switchable Graphics	$3 < P \leq 6$	112.0	$2 < P \leq 5.2$	22.0
I2		$6 < P \leq 7$	120.0	$5.2 < P \leq 8$	24.0
I3		$P > 7$	135.0	$P > 8$	28.0
D1	Discrete Graphics dGfx \leq G7	$3 < P \leq 9$	115.0	$2 < P \leq 9$	16.0
D2		$P > 9$	135.0	$P > 9$	18.0

- Where $P = [\# \text{ of CPU cores}] \times [\text{CPU clock speed (GHz)}]$

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- Adders for graphics, memory, storage, integrated display are calculated from Table 7

Table 7: Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client, and Notebook Computers

Function		Desktop	Integrated Desktop	Notebook
TEC_{MEMORY} (kWh) ^{vi}		0.8		
$TEC_{GRAPHICS}$ (kWh) ^{vii}	Graphics Category ^{viii}	G1 ($FB_BW \leq 16$)	36	14
		G2 ($16 < FB_BW \leq 32$)	51	20
		G3 ($32 < FB_BW \leq 64$)	64	26
		G4 ($64 < FB_BW \leq 96$)	83	32
		G5 ($96 < FB_BW \leq 128$)	105	42
		G6 ($FB_BW > 128$; Frame Buffer Data Width < 192 bits)	115	48
		G7 ($FB_BW > 128$; Frame Buffer Data Width \geq 192 bits)	130	60

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



Table 7: Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client, and Notebook

$TEC_{\text{SWITCHABLE}}$ (kWh) ^{ix}	0.5 × G1		N/A
TEC_{EEE} (kWh) ^x	8.76 × 0.2 × (0.15 + 0.35)		8.76 × 0.2 × (0.10 + 0.30)
TEC_{STORAGE} (kWh) ^{xi}	26		2.6
$TEC_{\text{INT_DISPLAY}}$ (kWh) ^{xii}	N/A	8.76 × 0.35 × (1+EP) × (4×r + 0.05×A)	8.76 × 0.30 × (1+EP) × (2×r + 0.02×A)

- Additional information for enhanced-performance integrated displays can be obtained from Equation 3 below:

Equation 3: Calculation of Allowance for Enhanced-performance Integrated Displays

$$EP = \begin{cases} 0, & \text{No Enhanced Performance Display} \\ 0.3, & \text{Enhanced Performance Display, } d < 27 \\ 0.75, & \text{Enhanced Performance Display, } d \geq 27 \end{cases}$$

Where:

- d is the diagonal of the screen, in inches;

Desktop, Integrated Desktop, and Notebook Efficiency Criteria



- Additional considerations:
 1. The storage adder is only applied to products with more than one storage device
 2. The integrated display adder only applies to integrated desktops and notebooks
 3. For desktops, integrated desktops, and notebooks with no sleep mode, but low power mode ≤ 10 watts, $(P_{\text{SLEEP}} \times T_{\text{SLEEP}})$ is replaced with $(P_{\text{LONG_IDLE}} \times T_{\text{SLEEP}})$ in Equation 1
 4. Products with switchable graphics cannot apply discrete graphics adder. Desktops and integrated desktops with switchable graphics enabled by default may apply the $\text{TEC}_{\text{SWITCHABLE}}$ adder in Table 7

Workstation Efficiency Criteria



- P_{TEC} shall be less than or equal to P_{TEC_MAX}
- Use Equation 4 and Table 8 to calculate P_{TEC} :

Equation 4: P_{TEC} Calculation for Workstations

$$P_{TEC} = P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE} + P_{SHORT_IDLE} \times T_{SHORT_IDLE}$$

Where:

- P_{OFF} = Measured power consumption in Off Mode (W);
- P_{SLEEP} = Measured power consumption in Sleep Mode (W);
- P_{LONG_IDLE} = Measured power consumption in Long Idle Mode (W);
- P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode (W); and
- T_{OFF} , T_{SLEEP} , T_{LONG_IDLE} , and T_{SHORT_IDLE} are mode weightings as specified in Table 8

Table 8: Mode Weightings for Workstations

T_{OFF}	T_{SLEEP}	T_{LONG_IDLE}	T_{SHORT_IDLE}
35%	10%	15%	40%

Workstation Efficiency Criteria



- Use Equation 5 to calculate P_{TEC_MAX} :

Equation 5: P_{TEC_MAX} Calculation for Workstations

$$P_{TEC_MAX} = 0.28 \times (P_{MAX} + N_{HDD} \times 5) + 8.76 \times P_{EEE} \times (T_{SLEEP} + T_{LONG_IDLE} + T_{SHORT_IDLE})$$

Where:

- P_{MAX} = Measured maximum power consumption (W)
 - N_{HDD} = Number of installed hard disk drives (HDD) or solid state drives (SSD)
 - P_{EEE} is an EEE allowance of 0.2 W per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.
- Linpack and SPECviewperf active state benchmark results must also be submitted

Small Scale Server Efficiency Criteria – Off Mode Power



- Measured P_{OFF} shall be less than or equal to P_{OFF_MAX}
- P_{OFF_MAX} calculated using Equation 6 and Table 9 below:

Equation 6: Calculation of P_{OFF_MAX} for Small-scale Servers

$$P_{OFF_MAX} = P_{OFF_BASE} + P_{OFF_WOL}$$

Where:

- P_{OFF_BASE} is the base allowance as specified in Table 9; and
- P_{OFF_WOL} is the Wake-on-LAN allowance as specified in Table 9.

Table 9: Off Mode Power Allowances for Small-scale Servers

P_{OFF_BASE} (watts)	P_{OFF_WOL} (watts)
1.0	0.4

- P_{OFF_WOL} shall only be applied to products that offer WOL enabled by default upon shipment

Small Scale Server Efficiency Criteria – Idle State Power



- Measured $P_{\text{LONG_IDLE}}$ shall be less than or equal to $P_{\text{IDLE_MAX}}$
- $P_{\text{IDLE_MAX}}$ calculated using Equation 7 and Table 10 below:

Equation 7: Calculation of $P_{\text{IDLE_MAX}}$ for Small-scale Servers

$$P_{\text{IDLE_MAX}} = P_{\text{IDLE_BASE}} + (N - 1) \times P_{\text{IDLE_HDD}} + P_{\text{EEE}}$$

Where:

- *N is equal to the number of installed storage devices in the Small Scale Server (either hard disk drives or solid state drives);*
- *$P_{\text{IDLE_BASE}}$ is the base allowance as specified in Table 10;*
- *$P_{\text{IDLE_HDD}}$ is the hard drive allowance as specified in Table 10; and*
- *P_{EEE} is an EEE allowance of 0.2 W per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.*

Table 10: Idle Mode Power Allowances for Small-scale Servers

$P_{\text{IDLE_BASE}}$ (watts)	$P_{\text{IDLE_HDD}}$ (watts)
24.0	8.0

Thin Client Efficiency Criteria

- Measured E_{TEC} shall be less than or equal to E_{TEC_MAX}
- E_{TEC} is calculated using Equation 1 on slide 20
- E_{TEC_MAX} is calculated using Equation 8 and Table 11 below:

Equation 8: Calculation of E_{TEC_MAX} for Thin Clients

$$E_{TEC_MAX} = TEC_{BASE} + TEC_{GRAPHICS} + TEC_{WOL} + TEC_{INT_DISPLAY} + TEC_{EEE}$$

Where:

- TEC_{BASE} is the Base Allowance specified in Table 11;
- $TEC_{GRAPHICS}$ is the Discrete Graphics allowance specified in Table 11 if applicable;
- TEC_{WOL} is the Wake-on-LAN allowance specified in Table 11 if applicable;
- $TEC_{INT_DISPLAY}$ is the Integrated Display allowance for Integrated Desktops specified in Table 7 if applicable; and
- TEC_{EEE} is the Energy Efficiency Ethernet incentive for Desktops specified in Table 7 if applicable, per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.

Table 11: Adder Allowances for Thin Clients

Adder	Allowance (kWh)
TEC_{BASE}	60
$TEC_{GRAPHICS}$	36
TEC_{WOL}	2

Thin Client Efficiency Criteria



- Additional considerations:
 1. Adders can only be applied if functionality enabled by default
 2. Thin Clients can utilize proxy weightings in Table 3 on slide 21 when calculating E_{TEC}
 3. For Thin Clients that lack a discrete System Sleep Mode, $(P_{SLEEP} \times T_{SLEEP})$ is replaced with $(P_{LONG_IDLE} \times T_{SLEEP})$ so long as the system still meets the E_{TEC_MAX} level

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Frequently Asked CB Questions



- **Internal Power Supplies (IPS):** Would it be acceptable for CBs to allow testing to a previous EPRI Generalized IPS Efficiency Test Protocol version than 6.6 if the test procedure changes are not significant?
 - It would be fine for a CB to review test results conducted to a previous version of the EPRI Internal Power Supply test method and judge whether the changes in the test procedure are significant for a given power supply.

Frequently Asked CB Questions



- **100% Power Supply Incentive:** How is the external power supply (EPS) efficiency incentive calculated and what evidence should be provided?
 - To receive the EPS efficiency incentive, an independent lab will have to perform additional tests at 10% of rated current, as well as 25%, 50%, 75%, and 100% of rated current (to calculate average efficiency), per the EPS test method (10 CFR 430 Appendix Z).

Frequently Asked CB Questions



- **Test Order:** What is the test procedure order for sleep mode, long idle mode, short idle mode, off mode?
 - The modal tests can be conducted in any order, while obeying the following requirement: 5.2.G) For all testing specified in Section 6, the UUT shall not be rebooted or restarted until after the power measurements for Long Idle Mode and Short Idle Mode tests are taken.

Frequently Asked CB Questions



- **Integrated Desktop Computers:** How to treat computers with novel form factors (e.g., detachable components, etc.)?
 - Try to apply the current Version 6.0 definitions.

For example, the model to the right would be tested as a Desktop if possible, with an external non-portable monitor, and meet the applicable requirements.

Per the second question, the Desktop part could then be labeled, but not the detachable Slate/Tablet.



Frequently Asked CB Questions



- **Screen Dimming:** Can the screen be gradually dimmed to save power during short idle mode testing?
 - At this time the ENERGY STAR test procedure is not set up to recognize these kinds of changes. While I would definitely encourage you to explore these kinds of options for energy savings, to qualify products for ENERGY STAR you will have to follow our test procedure and test with the display at the required brightness.

Frequently Asked CB Questions



- **Dual NIC Configuration, do both NICs have to be proxy capable?**
 - One device on the UUT must be capable
- **Models sold with 2 different operating systems**
 - A manufacturer should submit the highest power consuming OS per category.
- **Models with different operating systems – verification testing?**
 - Test the model with whatever OS is available at the time of purchase. If it fails testing, it would be considered a testing failure.

QPX Field Explanations



- **Switchable Graphics Enabled by Default in Ac Mode:**
 - Required when a device has both integrated graphics and switchable graphics. This setting means that the graphics is switched to integrated graphics when the graphics demand is low. The OEM can provide guidance on detecting what state the graphics is in. This setting is only applicable when a device has both integrated graphics and discrete graphics.

QPX Field Explanations



- **CPU Base Clock Speed:** Provide the base CPU clock speed, not the burst, turbo, maximum, temporary, or intermittent clock speed.
- **CPU Maximum Clock Speed:** Provide the burst, turbo, maximum, temporary, or intermittent clock speed.

QPX Field Explanations



- **Proxy Support:** This is a manufacturer-reported parameter. On Mac computers, “Wake for network access” enabled within the Energy Saver/Power Adapter Preferences signifies Base Capability or better. On Windows computers, “ARP Offload” or “NS Offload” or similar enabled within the Advanced Properties of the Network Interface Card (accessed through the Device Manager) signifies Base Capability or better. OEM can provide further guidance on how to confirm Proxy Support.

QPX Field Explanations



- **User-activated Low-power Mode Enabled by Default:** Indicate if model offers Sleep Mode enabled by default or another low-latency user-activated mode or state that preserves machine state.

Reporting Requirements



CBs shall report the following data to EPA which includes both tested and verified data and manufacturer provided information:

- General characteristics
- Electrical characteristics
- Relevant power measurements for off mode, sleep mode, short idle, and long idle for all tested configurations

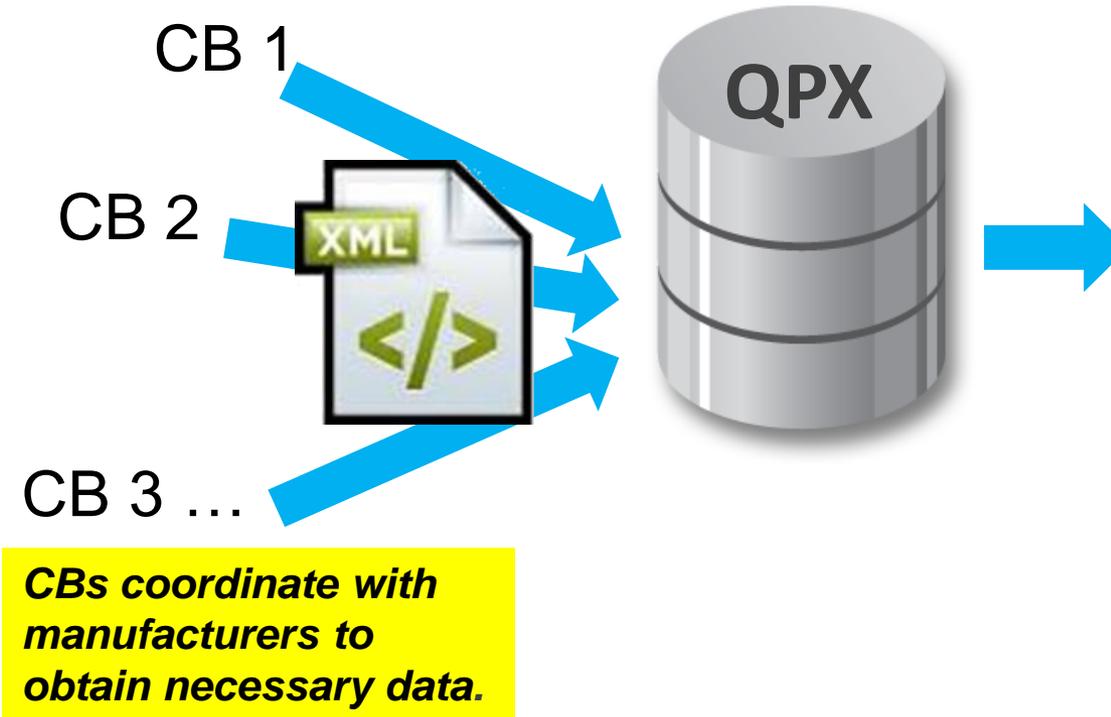
Fields are specified in the data reporting template (QPX). This template was released for CB and stakeholder review in September and is currently being finalized.

ENERGY STAR Data Submission



- Qualified Product Exchange (QPX) EPA-recognized certification bodies submit data

- System characteristics and power data information displayed on ENERGY STAR website



CBs coordinate with manufacturers to obtain necessary data.

New Qualified Product Lists



- Enormous data set
 - One of the largest in the world
 - Lists all ENERGY STAR qualified products for the US market
 - All 65+ products types
- Transition in process to new system
 - Target completion date late-2013
- “ENERGY STAR Product Finder”
 - Basic View
 - Compare Feature
 - Product Details
 - Advanced View
 - Export Options
 - Filter Options
 - Direct access to all datasets
 - Machine readable data export formats (XML, etc.)
- Automated updates Monday, Wednesday and Friday of each week

Remaining Version 6.0 Timeline



- September 10, 2013: Program Requirements finalized
 - Products can be certified to Version 6.0
- January 15, 2014: Cease certification of products to Version 5.2
- June 2, 2014: Effective date of Version 6.0
 - All products must meet Version 6.0 requirements in order to bear the ENERGY STAR logo.
 - Certifications of products to Version 5.2 are no longer valid

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Upcoming Version 6.1 Revision



- EPA is currently evaluating the inclusion of Slate/Tablet products in the computer specification
- Goal is to develop acceptable definitions and determine which products are appropriate for scope expansion in Version 6.1, finalizing prior to the effective date of Version 6.0
- Version 6.1 discussion document will be distributed to stakeholders by the end of November 2013

References and Resources



Questions?

Please send any technical questions to:
computers@energystar.gov

Please send any certification questions to:
certification@energystar.gov

Please find CB Resources at:
www.energystar.gov/CBresources

Thank You!



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