ENERGY STAR Computers Version 6.0 Draft 1 Webinar

March 1, 2012

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Agenda

Time (all EST)	Topic
11:00 AM	Introduction
11:10 AM	Draft 1 Overview
11:40 AM	Product Type Overview: Desktops and Notebooks
12:20 PM	Product Type Overview: Workstations
12:35 PM	Break
12:50 PM	Product Type Overviews: Small Scale Servers and Thin Clients
1:10 PM	Power Supplies and Power Management
1:25 PM	Test Method
1:45 PM	Proposed Toxicity and Recyclability Requirements
1:55 - 2:00 PM	Closing Topics

Version 5: Impact to Date

Product Type	ENERGY STAR market penetration as percentage of overall shipments
Computers – Overall	71 %
Desktop	47 %
Notebook	84 %
Workstation	20 %
Small-scale Server	Not calculated
Thin Client	Not calculated

-Source: ENERGY STAR Program, *Unit Shipment and Market Penetration Report Calendar Year 2010 Summary*. www.energystar.gov/usd

Draft 1: Overview

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Partner Commitments and Section 1 (Definitions)

- Partner Commitments
  - Format and content is consistent with Version 5.2
  - Proposals welcomed on updates to the electronic labeling requirement

- Definitions – Key revised definitions
  - Previously Undefined Products: Mobile/ Integrated/Ultra Thin Clients, Slate Computers
  - Short/Long Idle

Section 2 (Scope)

- The list of included products (Section 2.2) is generally consistent with Version 5

- Excluded products section (2.3) proposes exclusion of Slate Computers and clarifies which Mobile Thin Clients are considered within scope

Qualification Criteria:

Sections 3.2-3.4

- Power Supplies (3.2)
  - Removal of provisions for External Power Supplies (EPS) with integrated cooling (a game console consideration)
  - Maintained Version 5 criteria for Internal Power Supplies (IPS) and EPS
  - Request for feedback on providing appropriate incentive for power supply efficiency/power factor performance in excess of the baseline ENERGY STAR PSU requirements

- Power Management (3.3) and User Information (3.4)
  - Power management requirements remain consistent with Version 5
  - User information requirements clarified regarding electronic media and standard information templates

Qualification Criteria:

Sections 3.5-3.6

- Desktop and Notebook Computers (3.5)
  - Updates to TEC requirements
    - Categories: Updated to harmonize with official Ecma-383 recommendations
    - Formula: Idle State split into Long- and Short-Idle modes
    - Levels and Functional Adders: Revised based on data received from stakeholders and Version 5 ENERGY STAR qualification activity
- Workstations (3.6)
  - Requirement for submittal of active mode data – will inform TEC requirement development in future versions of the ENERGY STAR Computer program
  - Power requirements consistent with Version 5

Qualification Criteria:

Sections 3.7-3.8

- Small-scale Servers (3.7)
  - A single category for Idle Power with adder for additional installed storage (i.e., HDD or SSD)
  - Revised Idle and Off power limits
- Thin Clients (3.8)
  - Categories based on sleep capability

Qualification Criteria:
Section 3.9 and Test Method

- Toxicity and recyclability requirements (3.9)

- Test Method
  - Testing criteria and conditions for integrated displays
  - Incorporation of Ecma-383, 3rd Edition

Product Type Overview: Desktops and Notebooks

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Version 6.0 Dataset

- EPA analyzed a combined dataset of Version 5 ENERGY STAR qualified product data and submissions during the Version 6.0 call for data:
  - Industry Submitted Data: Total of 236 products
    - Notebooks: 55
    - Desktops: 144
    - Integrated Desktops: 37
    - Manufacturers: 24
  - ES V5 Qualified Data: Total of 3268 products
    - Notebooks: 2080
    - Desktops: 944
    - Integrated Desktops: 244
    - Manufacturers: 102
    - Includes all models qualified before December 1

Version 6.0 Dataset

- Pre-analysis review
  - Data from V6.0 dataset development and V5 ENERGY STAR qualification process was not altered
  - Computers removed prior to analysis:
    - Data missing power criteria at 115 V
    - Models with duplicate data
  - Data from different sources was organized such that all data fields aligned
  - Each model was classified according to the *Ecma-383* structure based on the data available

Version 6.0 Dataset

- To account for the nature of Version 5 qualified product data, EPA took the following actions:
  - **Short Idle Power**: The Version 5 computers specification requires only (Long) Idle Power
    - Information gathered during Version 6.0 dataset development was analyzed to provide insight into the difference between Short and Long Idle. On Average:
      - Notebooks: Short Idle = 1.5 * (Long Idle)
      - Integrated Desktops: Short Idle =1.8 * (Long Idle)
      - For Desktops, the Short and Long Idle values were assessed to be the same
    - These factors were used to calculate a Short Idle value for Version 5 qualified products in the dataset
  - **Graphics**: Discrete GPU model names optionally provided as part of Version 5 Computer qualification
    - Thus, for systems indicated to have discrete graphics, but without GPU model name, the G3 graphics level was assumed

Version 6.0 Dataset

- ITI has voiced concerns over entries in the Desktop and Notebook dataset
  - Discrete Graphics without GPU model information (*from previous slide, treated as G3 in analysis*)
  - CPU information from certain units
  - Memory information on certain units

- EPA is committed to correcting any dataset errors that affect levels proposed in Draft 1

- EPA will take the following steps to investigate and correct, as needed, errors flagged by ITI:
  - Contact manufacturers of indicated computers individually to review concerns and revise data entries for their products, if necessary
  - Work with graphics manufacturers to replace G3 assumption with actual graphics categorization, where needed

Version 6.0 Dataset

- Following these steps, EPA will re-run its analysis and share resulting proposed levels and a marked up dataset for Desktops and Notebooks with all stakeholders

- Stakeholders are asked to continue review of all aspects of the Draft 1 Computer Specification but hold review of Draft 1 levels for Desktops and Notebooks until receipt of an updated dataset and, if necessary, a supplemental proposal from EPA

- EPA will extend the comment period for all aspects of Draft 1 until **March 30** to allow stakeholders greater time for review

Categories

- Desktops and Notebooks were categorized using structure presented out of the *Ecma-383* process
  - http://www.ecma-international.org/publications/standards/Categories_to_be_used_with_Ecma-383.htm

Categories

- An alternative approach was recommended external to the Ecma process by industry in 2011
- Use of these categories resulted in the same base levels due to the nature of existing V5 qualified product data. Example:

Desktop & Integrated Desktop Categories

Note: Unless specified, Integrated Desktop computers will have same category definition as traditional DT categories but with different TEC limits.

Category	DT 0	DT 1	DT 2	DT 3	DT 4
Market *	Entry	Mainstream	Performance	High Performance	Very High-end/Enthusiast
Cores	N/A	cores ≤ 2 (less than or equal to 2 cores)	≥3 cores (greater than or equal to 3 cores)	≥4 Cores (greater than or equal to 4 cores)	≥4 Cores (greater than or equal to 4 cores)
Channels of memory	Ch mem = 1 (1 Channel of memory)	Ch mem = 2 (2 Channels of memory)	≥ 2 channels (more than or equal to 2 channels of memory)	≥2 Channels (more than or equal to 2 channels of memory)	≥2 Channels (more than or equal to 2 channels of memory)
Base memory (min)	1GB	2GB	2GB	≥4 GB	≥4 GB
Base Graphics	iGfx (integrated graphics)	iGfx (integrated graphics)	iGfx (integrated graphics)	dGfx ≥ G5 based on 7-class dGfx classes (any additional dGfx allowed)	dGfx ≥ G5 based on 7-class dGfx classes (any additional dGfx allowed)
Graphics Adders	dGfx ≤ G7 (less than or equal to G7)	dGfx ≤ G7 (less than or equal to G7)	dGfx ≤ G7 (less than or equal to G7)	≥G6 (greater than or equal to G6)	≥G6 (greater than or equal to G6)
PCIe					
PSU Rating					
Form Factor	Both Traditional & Integrated DT	Both Traditional & Integrated DT	Both Traditional & Integrated DT		

Key differences between DT3 and DT4 are PCIe, PSU Rating, and Form Factor. This data is not part of required data submitted for V5 product review.

- An Industry stakeholder additionally recommended a third alternative shortly before Draft 1 development – available for review on the ENERGY STAR web site

TEC Formula

$$E_{TEC} = (8760/1000)*\{(P_{OFF}*T_{OFF})+(P_{SLEEP}*T_{SLEEP})+$$
$$(P_{LONG\_IDLE}*T_{LONG\_IDLE})+(P_{SHORT\_IDLE}*T_{SHORT\_IDLE})\}$$

- Terms added to partition Idle State into Short and Long Idle
  - Short Idle allows for testing of systems with integrated displays both with and without the presence of display power (a more accurate TEC calculation)
  - The division between Idle States provides an opportunity for intermediate power management features (e.g., hard drive spin down)

TEC Formula: Mode Weighting

- Mode weighting structure updated to account for Short and Long Idle
  - Harmonized with *Ecma-383* recommendations
    - *See Annex B: http://www.ecma-international.org/publications/files/ECMA-ST/ECMA-383.pdf*
    - *For a reference to the Usage mode weightings in V5, see* http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/computer/Microsoft_PowerTransitionReport.pdf?f3aa-6448

Table 5: Mode Weightings for Desktop and Integrated Desktop Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery/Name Services	Full Proxying
T_{OFF}	45%	TBD			
T_{SLEEP}	5%				
T_{LONG_IDLE}	15%				
T_{SHORT_IDLE}	35 %				

Table 6: Mode Weightings for Notebook Computers

Mode Weighting	Conventional	Full Network Connectivity			
		Base Capability	Remote Wake	Service Discovery / Name Services	Full Proxying
T_{OFF}	25%	TBD			
T_{SLEEP}	35%				
$T_{LONG\ IDLE}$	10%				
T_{SHORT_IDLE}	30 %				

TEC Formula: Mode Weighting

- Full Network Connectivity
  - Version 5 included alternative weighting structures to accommodate systems capable of full network connectivity from low power modes
    - Stakeholders noted deficiencies with the Notebook weightings
  - Mode weighting for compliance with *Ecma-393* remain TBD
  - EPA will revise after feedback received in response to Draft 1 TEC criteria

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T_{OFF}	45%	TBD			
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T_{SHORT_IDLE}	35 %				

Table 6: Mode Weightings for Notebook Computers

Mode Weighting	Conventional	Full Network Connectivity			
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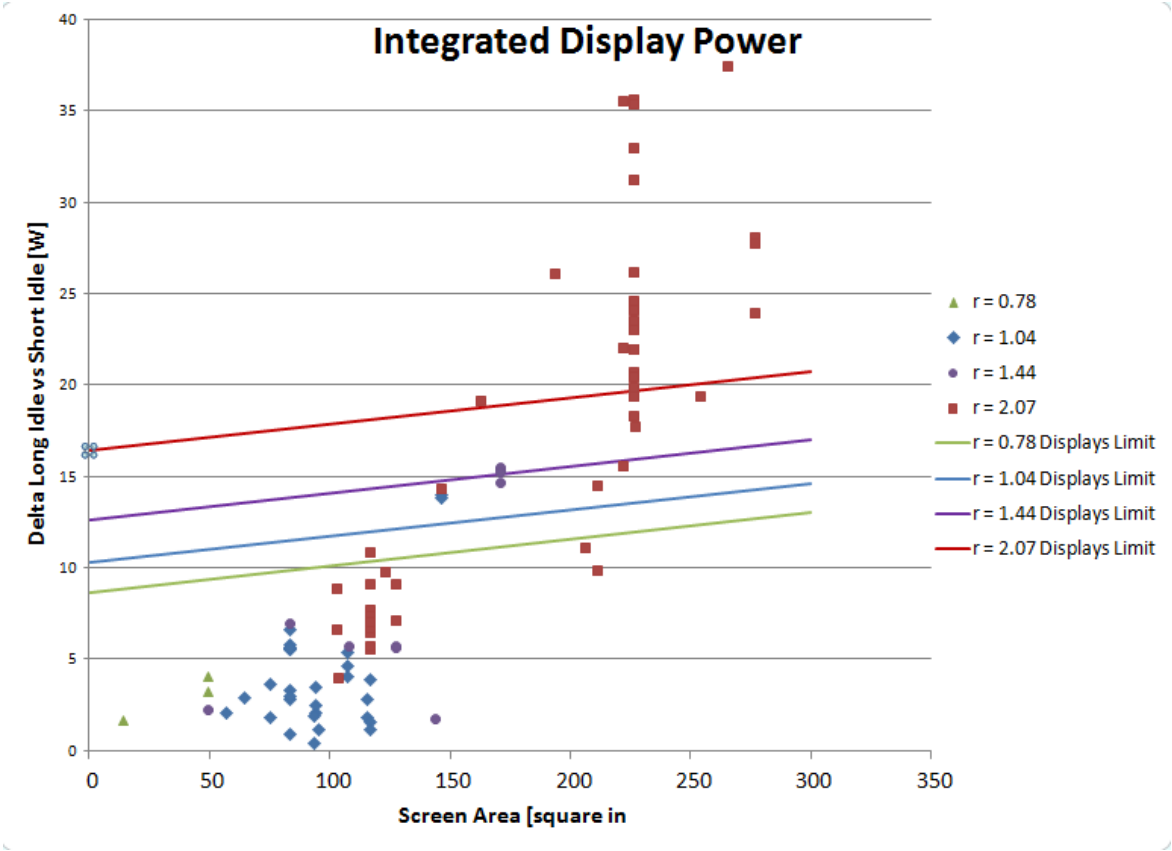
T_{OFF}	25%	TBD			
T_{SLEEP}	35%				
$T_{LONG\ IDLE}$	10%				
T_{SHORT_IDLE}	30 %				

Adders

- Draft 1 proposals include revised Functional Adders
  - Present in Version 5
    - Additional Storage
    - Memory
    - Graphics
  - **New: Display Power**
    - The display power adder is based on the Draft 2 Version 6.0 Displays specification proposed On Mode Power Levels
    - The maximum allowable power of a display is calculated using the diagonal screen size and the resolution of the screen
    - Why
      - For Integrated Desktops: allows for direct comparison across the entire Desktop Computer category
      - For Notebooks: allows for direct comparison across the entire Notebook Computer category since allowance scales with a combination of screen size and resolution

Display Power



- Based on the Draft 2 Version 6.0 Displays Specification

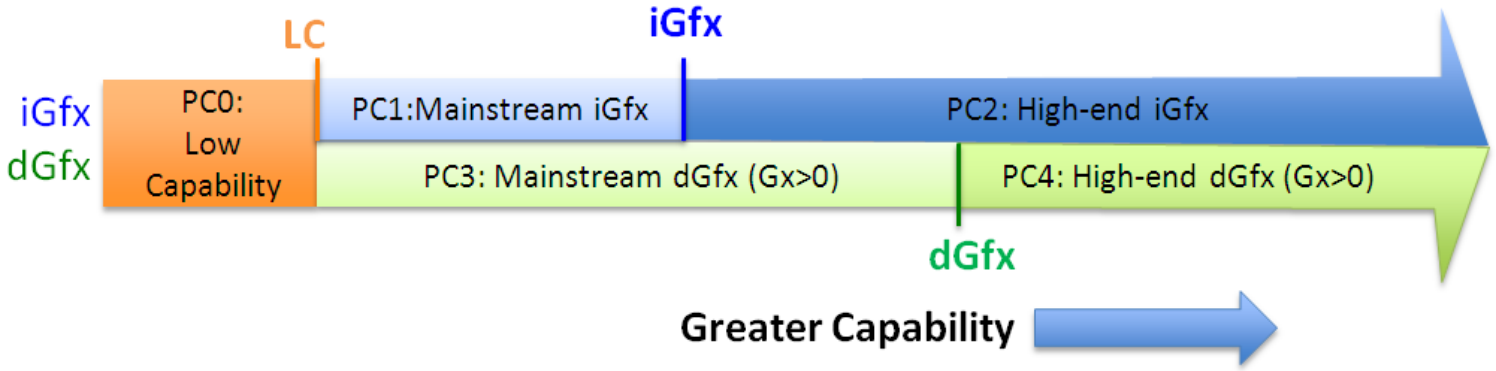
Draft 1 Levels and Pass Rates

Category	Draft 1 Base TEC	Total Number of Models in Category	Number of Models Meeting V6.0 Draft 1	Qualification %
NB0		213	55	**25.82%**
NB1	**25.0**	418	85	**20.33%**
NB2		1240	316	**25.48%**
NB3	**27.0**	91	20	**21.98%**
NB4	**30.5**	173	43	**24.86%**

Category	Draft 1 Base TEC	Total Number of Models in Category	Number of Models Meeting V6.0 Draft 1	Qualification %
DT0	**100.0**	250	61	**24.40%**
DT1	**103.0**	543	135	**24.86%**
DT2	**135.0**	317	80	**25.24%**
DT3	**190.0**	259	68	**26.25%**

EPA

Stakeholder Comments: ITI



Performance Class	Performance Range	System Description
PC0	P < **LC**	LC=Low Capability
PC1	**LC** <= P < **iGfx**	Main stream iGfx
PC2	P > **iGfx**	High-end iGfx
PC3	**LC** <= P < **dGfx**	Main stream dGfx
PC4	P > **dGfx**	High-end dGfx

Product Type Overview: Workstations

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Workstations in ENERGY STAR

- In 2010, ENERGY STAR qualified Workstations formed 20% of the overall market
  - 2010 ENERGY STAR Unit Shipment Data Report (most recent compiled report available)
  - www.energystar.gov/usd

- EPA has not proposed changes to the Version 5 Workstation Definition or efficiency requirements

Setting the Stage for TEC

- Draft 1 includes a requirement to submit active mode data
  - Will allow future versions to adopt a usage pattern-based TEC requirement structure
- Confusion about SPECworkstation active workload
  - It exists in GPC working group
- Not to be used for this revision but in setup for next revision
- Data won't be published, but used to validate and create v7 limits/categories

Break

Product Type Overviews: Small Scale Servers and Thin Clients

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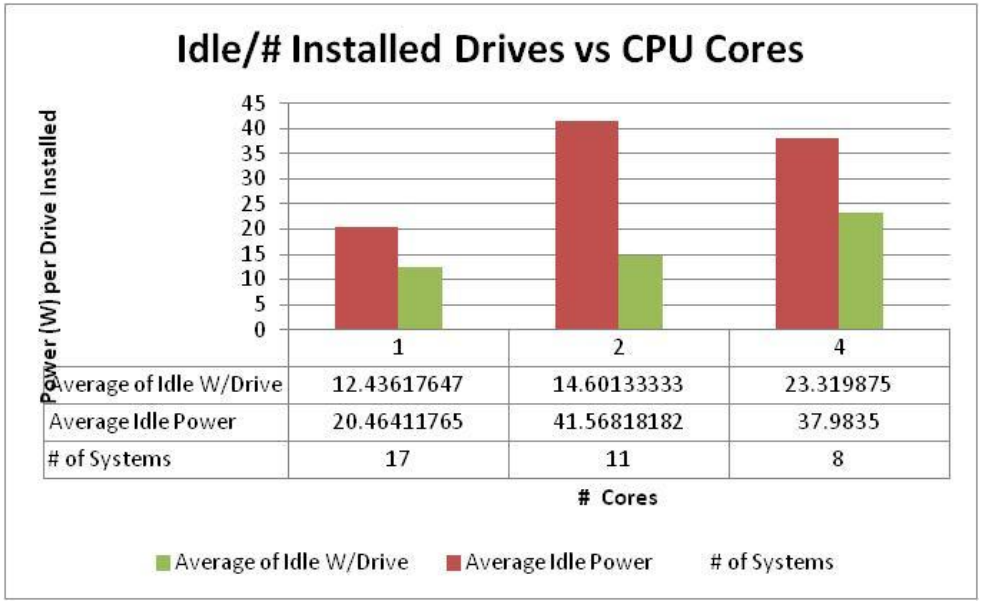
Small-scale Servers

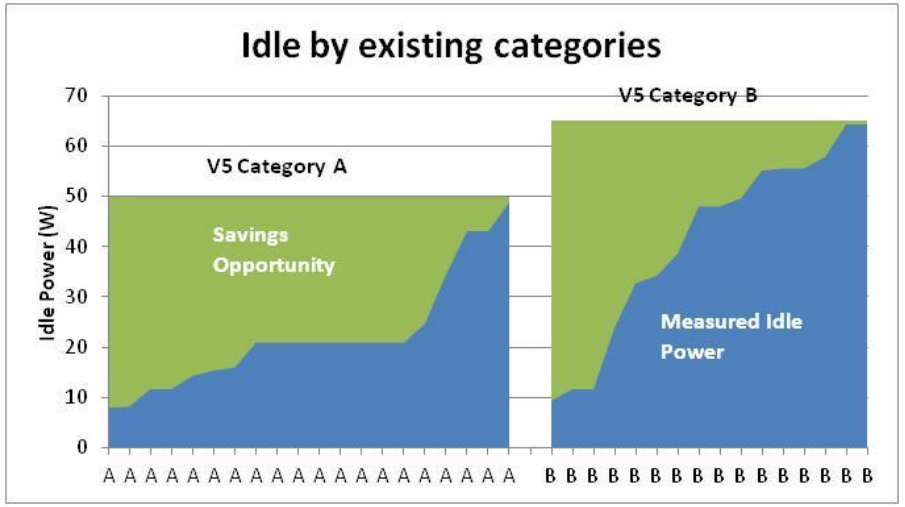
- Version 5 Idle Power limits date back to Version 4.0 (effective mid-2007)

- Presence of a multi-core processor and 1 GB memory split categories

Small-scale Servers

- Data Analysis
  - Between 1-2 Core CPU systems, installed HDD's drove power consumption
  - Of units analyzed, power consumption was well under V5 criteria. On average:
    - V5 Cat A: -55%
    - V5 Cat B: -36%



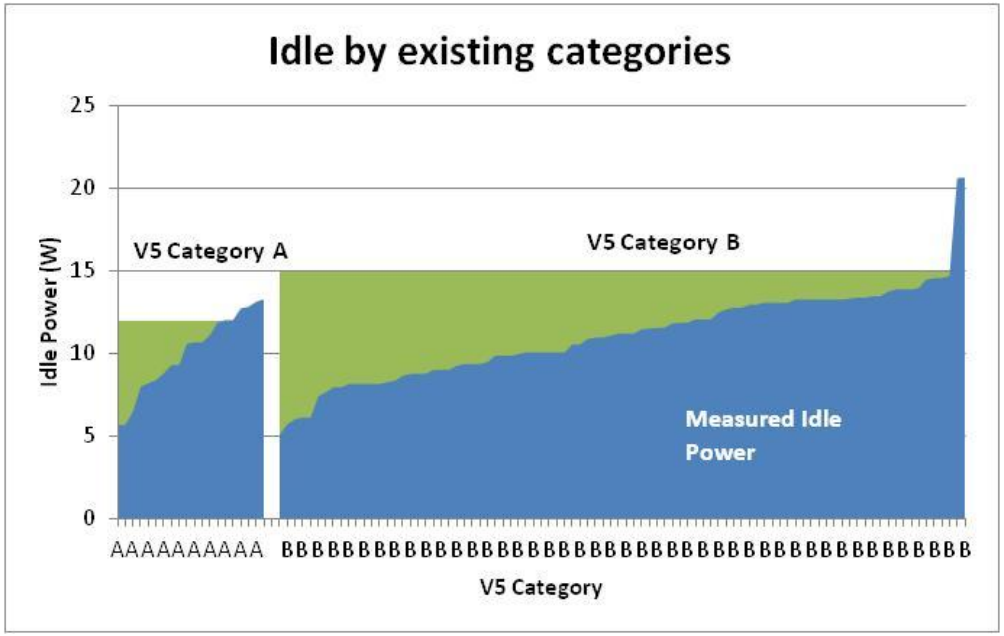


Small-scale Servers

- Draft 1 Proposal
  - Streamline (and update) Idle requirements to have a single base Idle power value
  - Storage (HDD or SDD) adder for additional installed drives
- Recognizes power requirements of additional installed drives (e.g., redundancy or RAID)
- Reflects improvements in component power consumption (e.g., use of mobile CPUs)

Thin Clients

- Version 5 requirements based on multimedia capability
- Dataset shows little differentiation in power scale between categories split in this manner
- Based on responses to Sleep Power fields in the dataset, less than 40% of the Thin Clients submitted are capable of entering low power mode



Sleep Mode Engagement

- Taking these factors into consideration, EPA proposes categories based on Sleep Functionality:
  - Category A: the lower Idle limit applied to Thin Clients not supporting Sleep Mode
  - Category B: the higher Idle Limit applied to Thin Clients supporting Sleep Mode enabled on shipment

Power Supplies and Power Management

Internal and External Power Supplies

- EPA continues to support incorporation of efficient power supplies into ENERGY STAR and non-ENERGY STAR computer products
- Stakeholder feedback welcomed on providing an appropriate incentive to source power supplies more efficient than required

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

3.2.3 External Power Supplies (EPS): EPS shall meet the level V performance requirements under the International Efficiency Marking Protocol and include the level V marking. Additional information on the Marking Protocol is available at www.energystar.gov/powersupplies.

Power Management

- An area of continued innovation in the industry
  - Beginning to see more seamless application of low power modes
  - Instant-on functionality could encourage broader adoption of low power modes while plugged in
  - Incorporation of Short Idle Mode for Desktops and Notebooks recognizes the opportunity to implement power management of components during short periods of inactivity

Power Management

- EPA encourages continued innovations guiding power management and implementation of low power modes
  - Appropriate incentives (where applicable)
  - Avoid excluding new approaches that offer increased energy savings

- EPA welcomes stakeholder input on this point:
  - Technique features
  - Timeline in which technique will be viable/available at scale

Test Method

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Test Method Introduction

July 21, 2011 – Computers v6.0 Test Method published

- First revision for Version 6.0
- Modeled after Ecma-383
- Added guidance for Workstation Max Power Test

August 12, 2011 – Dataset Assembly Testing

- Proposed fixed luminance level and EPA Test Image

November 2011 – Display Setup Validation

- DOE testing to validate proposed test modifications

February 14, 2011 – Draft 1 Test Method published

Reason for Updating Test Method

- Previous ENERGY STAR draft test method incorporated short idle for first time
  - Display power consumption affects short idle
  - Tested Display brightness and background as-shipped
- General consensus that:
  - Brightness control settings are easily accessed (or automated) and are often changed by users
  - Creates unfair comparison between units
- Goal for updated test method
  - Specify consistent integrated Display set-up for Short Idle testing

Test Method Modifications

- Display Setup
  - Preparing Display Luminance of Notebooks and Integrated Desktops (Section 5.2)
  - Light Measuring Device (Section 4-F)
  - Dark Room Conditions (Section 4-G)

Display Luminance Setting

1. Disable ABC and other display sleeping/dimming
2. Display *IEC 60107:1-1997* Three Vertical Bar Signal
3. Allow 30 Minute Warm-up Period
4. Set Appropriate Luminance Level: ≥90 nits for Notebooks, ≥150 nits for Integrated Desktops
5. Display ENERGY STAR Test Image

Light Measuring Device (LMD)

- Consistent with ENERGY STAR Displays Version 6.0
- **Accuracy:** ± 2 percent (± 2 digits) of displayed value

Example:

- Measuring screen luminance of 150 nits

±2% of 150 nits = ***± 3 nits***

- If least significant digit of LMD for this range is a tenth of a nit

±2 digits = ***± 0.2 nits***

- Total Accuracy must be within…

±3 nits ± 0.2 nits = ± 3.2 nits

- **Repeatability:** ± 0.4 percent (± 2 digits) of displayed value
- **Acceptance Angle:** 3 degrees or less

Dark Room Conditions

- Illuminance at display with the UUT in Off Mode shall be less than or equal to 1.0 lux

- Consistent with ENERGY STAR Displays Version 6.0

NOTE: Using a Contact Meter for luminance measurements precludes necessity for dark room conditions

Test Method Conclusion

Questions?

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Proposed Toxicity and Recyclability Requirements

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Proposed Toxicity and Recyclability Requirements

- ENERGY STAR: differentiating products based on energy efficiency only
- In developing these requirements, EPA seeks to avoid associating the ENERGY STAR label with poor quality or otherwise undesirable products
- Many ENERGY STAR product specifications (e.g. lighting) incorporate non-energy requirements. Reflects longstanding practice of ensuring that ENERGY STAR products deliver on consumer expectation for quality

In making CE purchase decisions, factors such as price (95%) and product features (88%) are most vital in purchase decision making.

Surprisingly, environmental factors, including energy consumption (85%) and the ability to recycle a device (70%) were highly rated on the decision tree (above elements such as brand and size) – a possible indication that these considerations are weighing more heavily on consumers' minds.

- Source: *Consumer Electronics Association*, "Powering Intelligent Electricity Use," 2011.

Proposed Toxicity and Recyclability Requirements

- For Computer Version 6.0 Draft 1, EPA drew from existing standards for toxicity (RoHS Directive) and design for recyclability (IEEE 1680.1)
  - RoHS Directive: Computer products manufacturers have extensive experience with designing products free from certain toxic materials in compliance with the RoHS Directive
    - EPA welcomes feedback from stakeholders to understand if any materials exempted for a given period of time under the RoHS Directive currently apply to components typically found in Computers
  - IEEE 1680.1: Based on the Electronic Product Environmental Assessment Tool (EPEAT) product registry, more than 50 manufacturers have registered greater than 3,000 products that meet these requirements

Proposed Toxicity and Recyclability Requirements

- In response to stakeholder feedback:
  - clarified that non-energy requirements are exempt from third party certification process
  - clarified that non-energy requirements are not intended for international adoption and that when products are sold in countries other than US, they are not subject to proposed non-energy requirements
  - added exemptions for toxicity harmonized with RoHS Directive where applicable to computers and displays. EPA seeks feedback on additional exemptions that apply to computers and computers with integrated displays

Closing

Timeline

Topic	Timeframe
Draft 1	Distributed on February 14, 2012
Close of comment period on Draft 1	~~March 13~~ **March 30**
Draft 2	Mid-April
Stakeholder meeting/webinar	Late April
Close of comment period on Draft 2	Early May
Final Draft	Late May
V6 Computer Specification Finalized	Late June/Early July

References and Resources

- ENERGY STAR Computers specification revision: www.energystar.gov/RevisedSpecs (click on Computers)

Thank you!

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