



# **ENERGY STAR Computers Version 6.0 Draft 2 Meeting**

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# Agenda



Time (all EST)	Topic
10:00 AM	Introduction
10:10 AM	<b>Desktop and Notebook Requirements – Session 1:</b> <ul style="list-style-type: none"><li>- Draft 2 analysis and levels</li><li>- Integrated Displays</li></ul>
11:15 AM	<b>Desktop and Notebook Requirements – Session 2:</b> <ul style="list-style-type: none"><li>- Industry Categorization Proposal</li><li>- Duty Cycle</li></ul>
12:00 PM	Break – Lunch
12:45 PM	<b>Scope and Definitions (Slates and Ultra-thin Clients)</b>
1:15 PM	<b>Topic Discussions:</b> <ul style="list-style-type: none"><li>- Power Supplies</li><li>- Workstations</li><li>- Small-scale Servers</li><li>- Thin Clients</li></ul>
3:15 PM	<b>Consumer Benefit Requirements</b>
3:30	<b>Closing Topics</b>



# Desktop and Notebook Requirements

## Session 1

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# Desktop and Notebook Requirements

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- Structure of today's discussion:
  - First Session (now):
    - Post-Draft 1 dataset review
    - Base TEC Levels in Draft 2
    - Display adders in Draft 2
  - Second Session:
    - Discussion of alternative categorization structure from industry (and timeline to complete evaluation)
    - Duty cycle

# Desktop and Notebook Draft 2 Overview

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- Prior to Draft 2 development, EPA worked with stakeholders to conduct a thorough review of the dataset for quality
  - Output of this joint effort distributed on March 3, 2012
  - Revised TEC levels developed from this dataset, distributed as memorandum
  - Data and levels posted to ENERGY STAR web site

# Desktop and Notebook Draft 2 Overview

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- From stakeholder feedback, EPA re-examined integrated display adder from Draft 1
  - Adder impacts Base TEC level calculation
  - Revised:
    - Integrated Display Adder (iDT and NB)
    - Base TEC levels changed as adder changed
  - Added:
    - Enhanced-performance Integrated Display Adder

# Data Analysis Assumptions



- Short Idle for V5 Data
- Driven by analysis of submitted data:
  - Desktops: [Short Idle] = [Long Idle]
  - Integrated Desktops: [Short Idle] = 1.8 \* [Measured Long Idle]
  - Notebooks: [Short Idle] = 1.5 \* [Measured Long Idle]
- Graphics Adder
  - DC to AC conversion: losses of 18%
  - GPU Long Idle Power = 66% \* GPU Short Idle Power (assumes savings from long idle)
  - Equivalent Notebook GPU Short Idle Power = 38% \* Desktop GPU Short Idle Power
  - Power in Sleep = Power in Off = 0 watts

# Base TEC Levels – Draft 2



Product Category	Draft 1 Feb. 14	(Revised dataset)	Memo Mar. 3	(Revised display adder)	Draft 2 May 15
<b>Desktops</b>					
DT 0	100.0	→	67.0	→	<b>74.0</b>
DT 1	103.0	→	128.0	=	128.0
DT 2	135.0	→	145.0	=	145.0
DT 3	190.0	→	205.0	=	205.0
<b>Notebooks</b>					
NB 0	25.0	→	26.0	→	<b>24.0</b>
NB 1	25.0	→	26.0	→	<b>24.0</b>
NB 2	25.0	→	30.0	=	30.0
NB 3	27.0	→	32.0	=	32.0
NB 4	30.5	→	55.0	=	55.0





# Integrated Displays

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- Stakeholders recommended a review of the impact of integrated displays, and the proposed adder for this feature, on the base TEC levels
- Analysis focused on new data from V6 Data Assembly effort (ended 9/14/11). Why:
  - Adder impacts only Short Idle
  - Data provided during V6 dataset development has full information required to set the adder, including a measured Short Idle
  - V5 products assessed using an extrapolated value to generate Short Idle from measured Long Idle. The factors impacting the Integrated Display adder are not part of the equation

# Integrated Displays: Changes



*Display Adder = [TEC Conversion term] \* [W/Mpix term] \* [Screen Area term]*

- In analysis, the approach for integrated displays in computers was moved away from the “binning” approach from the ENERGY STAR Displays specification
- Created single, linear fit for data instead.
  - Less discontinuity across the spectrum of display sizes
  - Displays program differs in that it deals with multiple distinct product types within the requirements, each falling within a likely size range: digital photo frames, computer displays, professional signage
- Revised Watts per Megapixel: Values in Draft 1 did not reflect brightness levels in the Computer Test Method

# Enhanced-performance Integrated Displays



- Newer panel technologies offer better display quality but require additional power to operate
- Such technologies have been reviewed through the ENERGY STAR Display effort
- Draft 2 defines Enhanced-performance Integrated Displays and provides an adjusted adder consistent with the approach taken in ES Displays
- ***Enhanced-performance Integrated Display:*** An integrated Computer Display that has all of the following features and functionalities:
  - A contrast ratio of at least 60:1 at horizontal viewing angles of at least 85°;
  - A native resolution greater than or equal to 2.3 megapixels (MP); and
  - A color gamut of at least sRGB (IEC 61699 2-1).

# Enhanced-performance Integrated Displays

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- Analysis
  - Version 5 qualification data does not include panel technology
  - In the Version 6 dataset, panel technology provided for some, but not all, products
  - Better data for Integrated Desktops – evaluated in analysis for Draft 2

# Revised Adder



## Draft 2 Integrated Display Adders

iDT

Notebook

$(4.0 * r) + (0.05 * A)$	$(2.0 * r) + (0.02 * A)$
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iv TEC<sub>INT\_DISPLAY</sub> Adder: r = Screen resolution in megapixels; A = Viewable screen area.

## Enhanced-performance Integrated Display Adder

Equation 3: TEC<sub>INT\_DISPLAY</sub> Calculation for Enhanced-performance Integrated Displays

$$TEC_{INT\_DISPLAY}' = 1.2 * TEC_{INT\_DISPLAY}$$

Where:

- $TEC_{INT\_DISPLAY}$  is the adder calculated as specified in Table 9.



# Desktop and Notebook Requirements

## Session 2

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# Desktop and Notebook Requirements

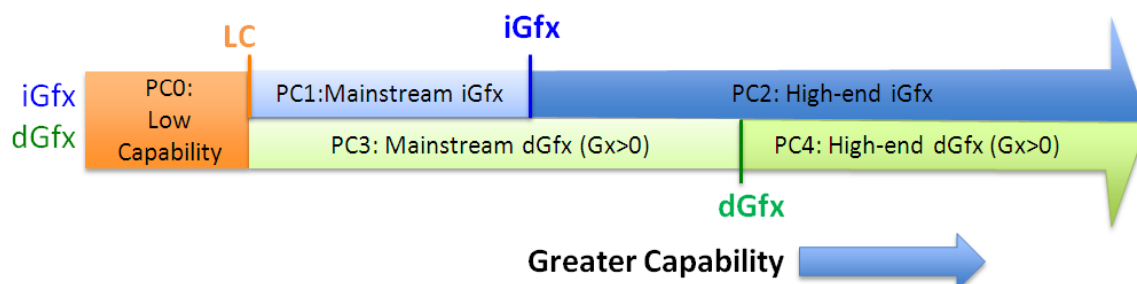
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- Discussion of alternative categorization structure from industry (and timeline to complete evaluation)
- TEC Duty cycle

# Industry Category Proposal

- In Draft 2, EPA noted the proposed structure raised by industry immediately prior to Draft 1 distribution
- Today's goal: Further discuss the proposal and set the timetable with stakeholders to complete assessment of this proposal



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



# ITI Proposal Questions

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- What criteria will be used to develop category barriers?
  - Objective or Subjective?
- What impact does this have on a per architecture basis?
  - Can non x86 architectures compete?

# Industry Presentation

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# Industry Category Proposal – Work Plan



Task	Completion by (from today)
Any analytical input from stakeholders forwarded to EPA:	+2 weeks
EPA Review	+3 weeks
Stakeholder Review	+5 weeks

# Desktop and Notebook TEC Weightings (Duty Cycle)



Desktop Computers		
	V5 (1)	V6, Draft 1 (2)
<b>Off</b>	55 %	45%
<b>Sleep</b>	5 %	5%
<b>Long Idle</b>	40 %	15%
<b>Short Idle</b>		35 %
Notebook Computers		
<b>Off</b>	60 %	25%
<b>Sleep</b>	10 %	35%
<b>Long Idle</b>	30 %	10%
<b>Short Idle</b>		30 %

Sources:

- (1) [http://www.energystar.gov/ia/partners/prod\\_development/revisions/downloads/computer/Microsoft\\_PowerTransitionReport.pdf?f0fe-40d2](http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/computer/Microsoft_PowerTransitionReport.pdf?f0fe-40d2)
- (2) Ecma-383, 3<sup>rd</sup> Edition, Annex B.

- TEC weightings in Drafts 1 and 2
  - Based on a review of the existing Version 5 weighting and recommendations included as part of the Ecma-383 standard
- Versus V5:
  - Desktops: Slightly more emphasis is given to Idle Modes.
  - Notebooks: Power levels in Off and Sleep are similar, so increased emphasis is also placed on higher power idle states.

# Desktop and Notebook TEC Weightings (Duty Cycle)



- Established weightings in Drafts 1 and 2 are supported by the general consistency between the V5 weightings
  - Based on measurement of over 70,000 systems
  - Input focused specifically on the partition between Short- and Long- Idle
- Approach relies solely on tested data
  - Not from self-reporting, survey responses, consumer/user interviews, which may have lower reliability
- The Draft 1 and 2 weighting values are consistent with engagement of computer power management (e.g., percentage of time in Idle does not suggest always-on status)



# Scope and Definitions

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# Version 2.0 Scope

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- Draft 2 incorporated two primary changes
  - Slate Computing Devices: Returned to within the scope for Version 2.0 specification
  - Ultra-thin Clients: Removed from the scope of eligible products

# Slate Computing Devices



- Proposed for inclusion in the Computer Specification (revised Section 2.1.1)
- EPA received numerous stakeholder recommendations, particularly from the federal purchasing community, to include slates in the Computers Specification to aid in allowing such products to access existing procurement procedures in place for bulk purchases of computing equipment.
- EPA understands that slate products are designed to
  - Minimize energy use
  - Maximize battery lifetime
- Most energy losses due to inefficiency will occur during battery charging;
  - Original rationale for assigning products to the Battery Charging Systems program.



# Slate Computing Devices



- Proposal: Slate Computing Devices evaluated based on the battery charging system
  - Appropriate sections of the ENERGY STAR Battery Charging Systems test procedure would be introduced into the program requirements
  - No other modes or states are proposed for considered in the efficiency evaluation (e.g., Idle, Low Power Mode)
- Result:
  - Slates tested exactly as they would have been under the BCS specification  
Federal purchasers can more easily acquire efficient slate products
  - Manufacturers can more easily get their products to purchasers.

# Ultra-thin Clients



- The possibility of including Ultra-thin Clients in the scope of this specification was raised in Draft 1 and previous Version 6.0 specification development materials
  - Example: class of “smart displays” containing features of a thin client integrated into a computer display chassis.
- In feedback, stakeholders expressed concern about the challenges fitting such products under the scope of the Computer program and existing Thin Client category
- Lack of data, definitions for Ultra-thin Clients
- Proposal:
  - Ultra-thin Clients removed from scope of program
  - Information on the efficiency opportunity of these products needed in Draft 2 comments to consider further



# Topic Discussions



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Power Supplies
Workstations
Small-scale Servers
Thin Clients

- The remainder of today's meeting will cover topics where proposals or input from stakeholders was provided or is pending
- Today's goals:
  - Dialogue on each topic
  - Identification of action items for EPA and Stakeholders to address each

# Discussion: Power Supplies



- In Draft 1, EPA welcomed feedback on the opportunity to provide an incentive for ENERGY STAR Computers with power supplies (PSUs) exceeding the PSU efficiency/power factor requirements set in the specification

## Anticipated opportunities from this approach:

- Allows existing PSU criteria to become foundational across the market
- Reduces risk of disqualifying ENERGY STAR systems that otherwise meet efficiency requirements

## Requirements to proceed

- Must support program energy savings (opportunity vs. incentive provided for qualification)

# Feedback



- NRDC provided a proposal to this end – provided below for today’s discussion

	Criteria	Allowance
<i>Internal</i>	<p><i>“Silver +”</i></p> <p><i>All of the following:</i></p> <ul style="list-style-type: none"> <li>• 85% efficiency @20% Load</li> <li>• 88% efficiency @50% Load</li> <li>• 85% efficiency @100% Load</li> <li>• 81% efficiency @10% Load</li> </ul>	2% TEC
	<p><i>“Gold +”</i></p> <p><i>All of the following:</i></p> <ul style="list-style-type: none"> <li>• 87% efficiency @20% Load</li> <li>• 89% efficiency @50% Load</li> <li>• 87% efficiency @100% Load</li> <li>• 83% efficiency @10% Load</li> </ul>	4% TEC
<i>External</i>	<p><i>“88% +”</i></p> <ul style="list-style-type: none"> <li>• 88% Average Active Efficiency (AAE), AND</li> <li>• 88% AAE @10% Load (w/o PFC)</li> <li>• 86% AAE @10% Load (w/ PFC)</li> </ul>	2% TEC
	<p><i>“89% +”</i></p> <ul style="list-style-type: none"> <li>• 89% Average Active Efficiency (AAE), AND</li> <li>• 89% AAE @10% Load (w/o PFC)</li> <li>• 87% AAE @10% Load (w/ PFC)</li> </ul>	4% TEC

# Discussion: Workstations



- EPA and DOE are in the process of validating the SPEC workstation benchmark approach for active-mode data disclosure
- Version 6.0 approach remains consistent:
  - Active mode tested and data provided as part of qualification activities, but no levels set or based upon it in Version 6.0
  - Other requirements remain consistent with Version 5

# Discussion: Small-scale Servers



Table 11: Classification & Power Consumption Requirements for Small-scale Servers

Operational Mode Requirements			
$P_{\text{OFF BASE}}$ (watts)	$P_{\text{OFF WOL}}$ (watts)	$P_{\text{IDLE BASE}}$ (watts)	$P_{\text{IDLE HDD}}$ (watts)
1.0	0.4	24.0	8.0

Equation 6: Calculation of  $P_{\text{IDLE\_MAX}}$  for Small-scale Servers

$$P_{\text{IDLE\_MAX}} = P_{\text{IDLE\_BASE}} + (N - 1) * P_{\text{IDLE\_HDD}}$$

Where:

- $N$  is equal to the number of installed storage devices in the Small Scale Server (either hard drives or solid state drives).



# Discussion: Small-scale Servers

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- Stakeholders requested in written comments an opportunity to further review the Draft 1 approach
- Draft 2 noted this and EPA welcomes feedback based on further review of the proposal

# Discussion: Thin Clients



Table 12: Classification & Power Consumption Requirements for Thin Clients

Thin Client Classification		Operational Mode Requirements				
Product Category	Category Description	$P_{\text{OFF BASE}}$ (watts)	$P_{\text{OFF WOL}}$ (watts)	$P_{\text{SLEEP BASE}}$ (watts)	$P_{\text{SLEEP WOL}}$ (watts)	$P_{\text{IDLE MAX}}$ (watts)
A	All Thin Clients that do not support Sleep Mode.	0.5	0.4	n/a	n/a	12.0
B	All Thin Clients shipped with a Sleep Mode enabled by default.	0.5	0.4	2.0	0.4	15.0

# Discussion: Thin Clients



- Off Mode: Stakeholders asked for the opportunity to develop a proposal that did not preclude disabling core features
- Power Management:
  - Feedback suggested that use of Power Management in the categorization of Thin Clients was premature given that some customers ask for systems without power management
  - EPA believes that the existing proposal remains valid:
    - Takes a concrete step toward implementation of power management in the Thin Client space
    - Still allows a qualification path for systems without power management, for customers who do not want power management.
- Levels (other than Off)
  - Stakeholders recommended various Idle Power levels and treatment of Discrete Graphics (dGfx) with adders
  - Data required for EPA to validate: market and test



# Consumer Benefits

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# Consumer Benefits



- While energy efficiency remains the basis upon which top performers are selected, EPA addresses attributes related to other aspects of product performance in ENERGY STAR specifications as applicable to ensure that overall product performance is maintained relative to a non-qualifying product. By including additional attributes, the ENERGY STAR program seeks to avoid associating the label with models of poor quality or models with features that are not compatible with broadly held consumer or societal interests, thereby preserving the influence of the label in the market
- Requirements moved to ENERGY STAR Computer Partner Commitment document, which is unique to the US market
- Clarification provided
  - Harmonization of the Toxicity requirements with EU RoHS
  - Toxicity recyclability requirements are not subject to third-party certification



# Closing

# Timeline



Topic	Timeframe
Draft 1	Distributed on February 14, 2012
Close of comment period on Draft 1	March 30
Draft 2	Distributed on May 15, 2012
Stakeholder meeting/webinar	Today
Close of comment period on Draft 2	<b>June 8, 2012</b>
Draft 3	July 9, 2012
Stakeholder webinar	~July 23, 2012
Close of comment period on Draft 3	August 6, 2012
Final Draft	August 20, 2012
V6 Computer Specification Finalized	September 10, 2012

# References and Resources

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



# Thank you!



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