ENERGY STAR Computers Version 6.0 Kickoff Webinar

March 10, 2011

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RJ Meyers

US Environmental Protection Agency

ENERGY STAR Program

Agenda

Time (all EST)	Topic
9:00-9:15	**Meeting Introduction** • EPA and EU Presentation
9:15-9:45	**Review of V5 qualified data** • EPA Presentation • Stakeholder Presentation – *Data Collection Approach*
9:45-11	**Slates and Mobile Computing (*scope, testing, approach*)** • EPA Presentation • Stakeholder Presentation
11-noon	**Testing enhancements (*Ecma-383, displays and display power, TEC patterns*)** • EPA Presentation • Stakeholder Presentation
noon-12:30	**LUNCH**

Agenda

Time (all EST)	Topic
12:30-1:45	**Notebooks and Desktops** • EPA Presentation • Stakeholder Presentation - *Notebooks*
1:45-2:45	**Graphics** • EPA Presentation • Stakeholder Presentation
2:45-3:45	**Workstations, Thin Clients and Small-scale Servers** • EPA Presentation • Stakeholder Presentation
3:45-4:45	**Other Environmental Benefits** • EPA Presentation • Stakeholder Presentation
4:45-5	**Remaining topics; Review and Next Steps** EPA Presentation

Comments from the European Commission

Jan Viegand

Viegand & Maagøe

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Remote Attendees

- Call in and Live Meeting information available on the ENERGY STAR Computer PD page:
  - www.energystar.gov/productdevelopment
  - *Revisions to Existing Specifications*

- Audio provided via conference call in:

Call in:	+1.877.423.6338 (inside US)
	+1.571.281.2578 (outside the US)
Code:	693908

- Phone lines will remain on mute during presentations, opened during discussion (*please keep phone lines on mute unless speaking*)

- Please refer to the agenda for approximate discussion timing

Version 5: Data and Trends

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Current Specification

- The Version 5 ENERGY STAR Computers specification was published on November 14, 2008
  - The specification became effective on July 1, 2009
  - Version 5.2 was published on January 1, 2011 to incorporate ENERGY STAR Third-party Certification requirements and other minor changes.

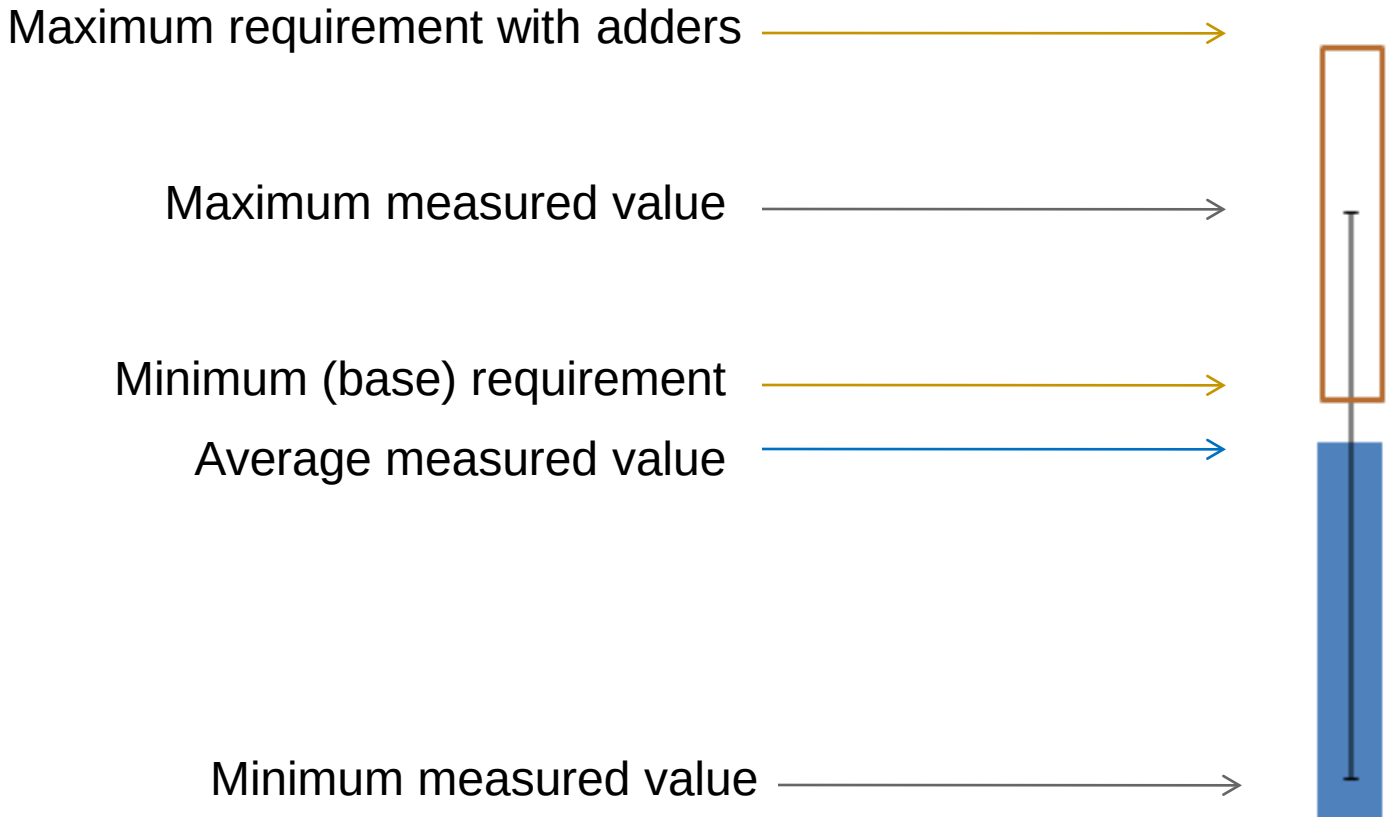
ENERGY STAR Qualified Computers

- Game consoles have been removed to their own specification which is still in development.
- Data in this section was compiled using the 2/15/11 Qualified Product List.

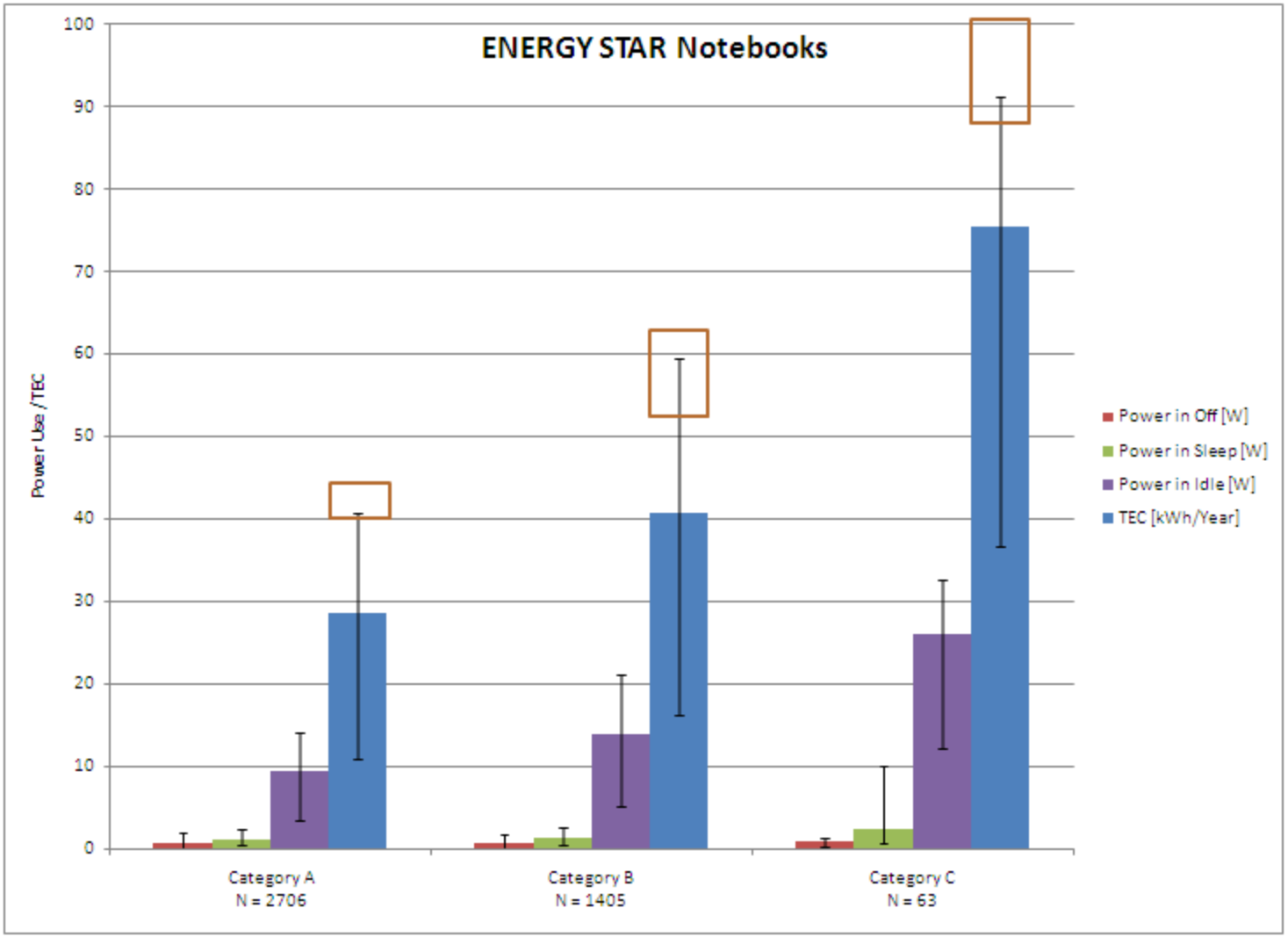
Product Type	Partner Count	Qualified Products (US)
Desktops & Integrated Desktops	53	1232
Notebooks & Tablets	43	3633
Workstations	6	97
Small-scale Servers	5	58
Thin Clients	8	56

Product Type	Qualified Products (US)			
Category	A	B	C	D
Desktops & Integrated Desktops	416	1016	461	525
Notebooks & Tablets	2706	1405	63	-
Small-scale Servers	28	32	-	-
Thin Clients	13	43	-	-
No Category				
Workstations	97			

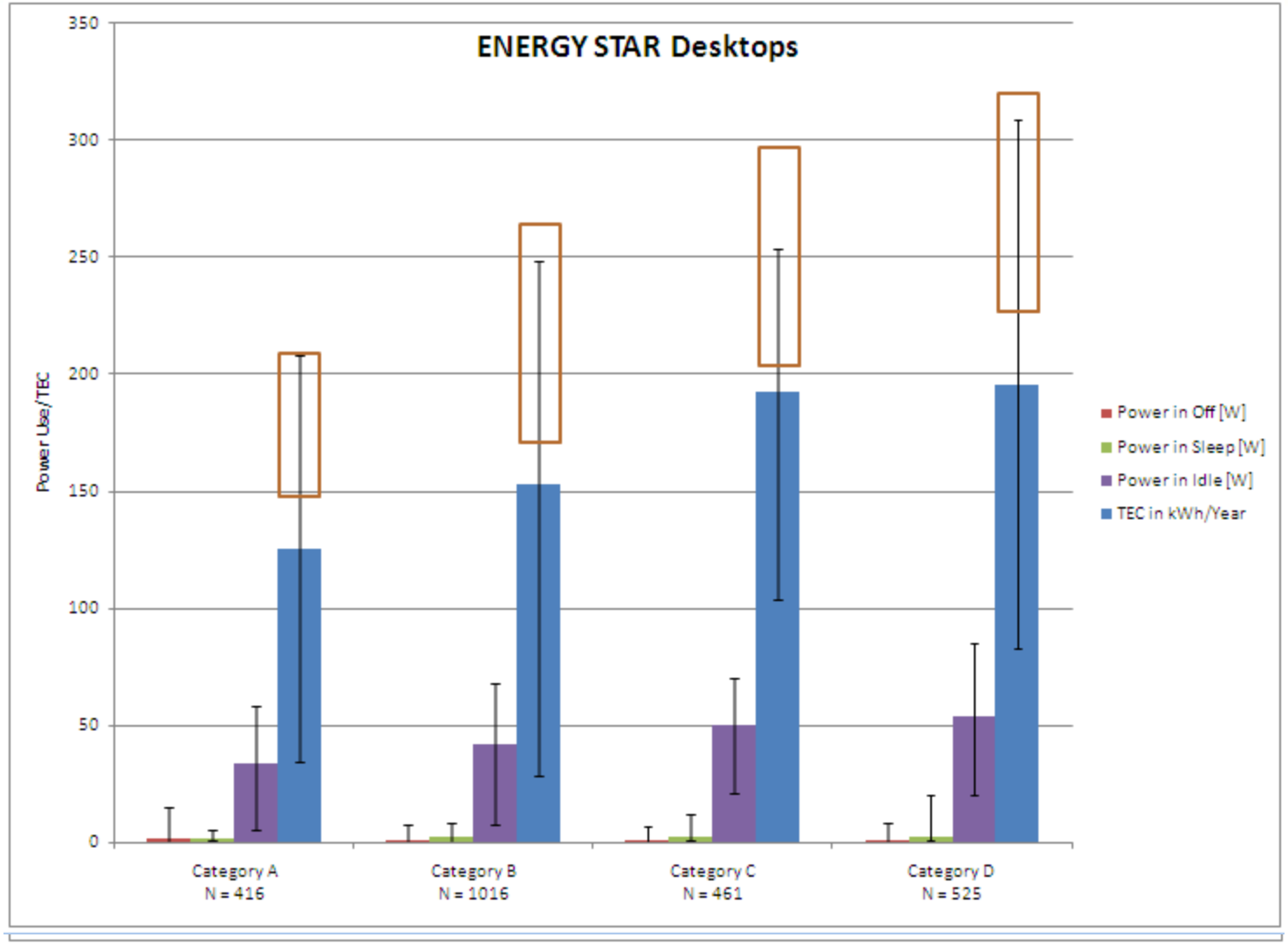
ENERGY STAR Qualified Computers



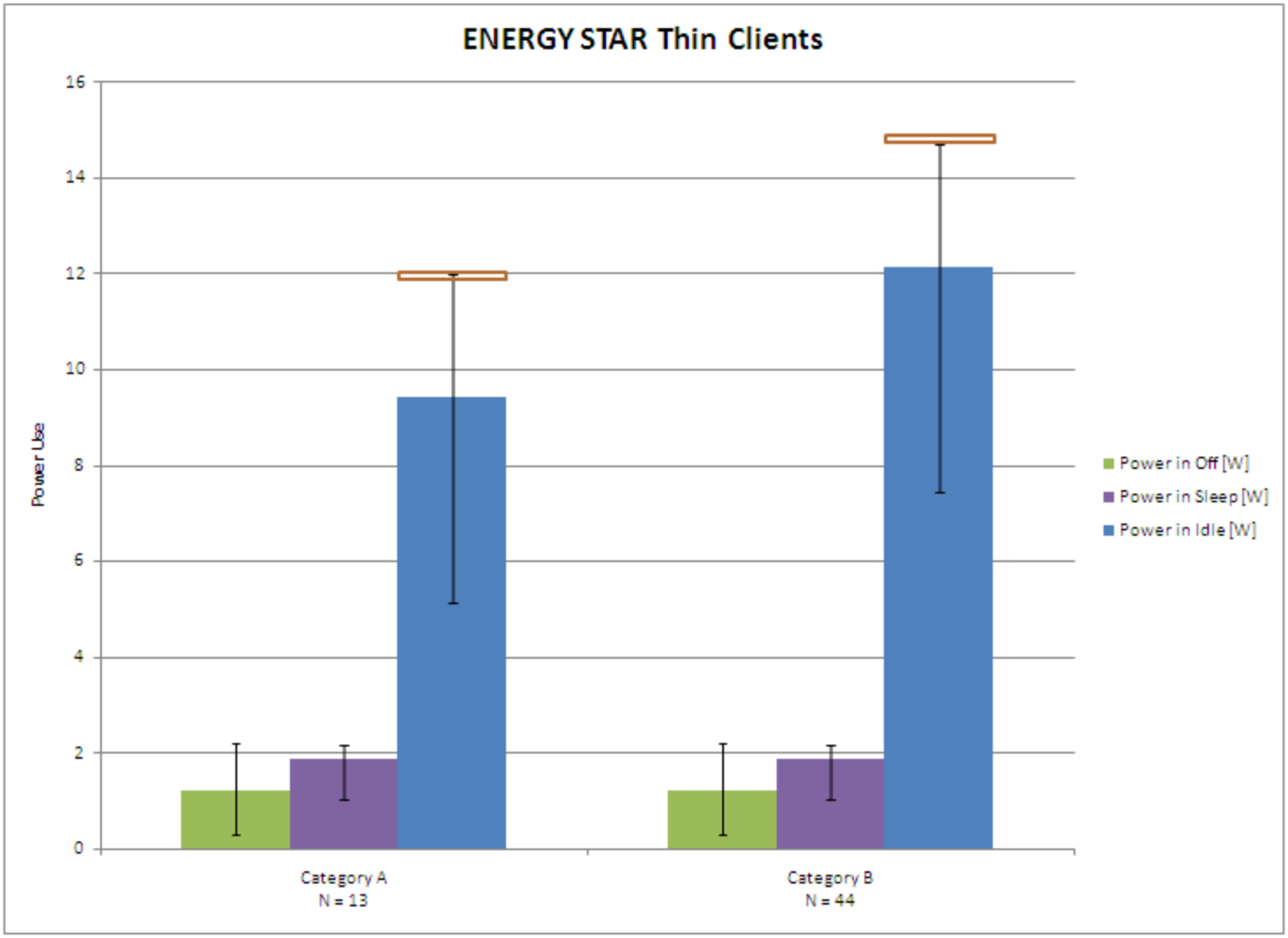
ENERGY STAR Qualified Notebooks



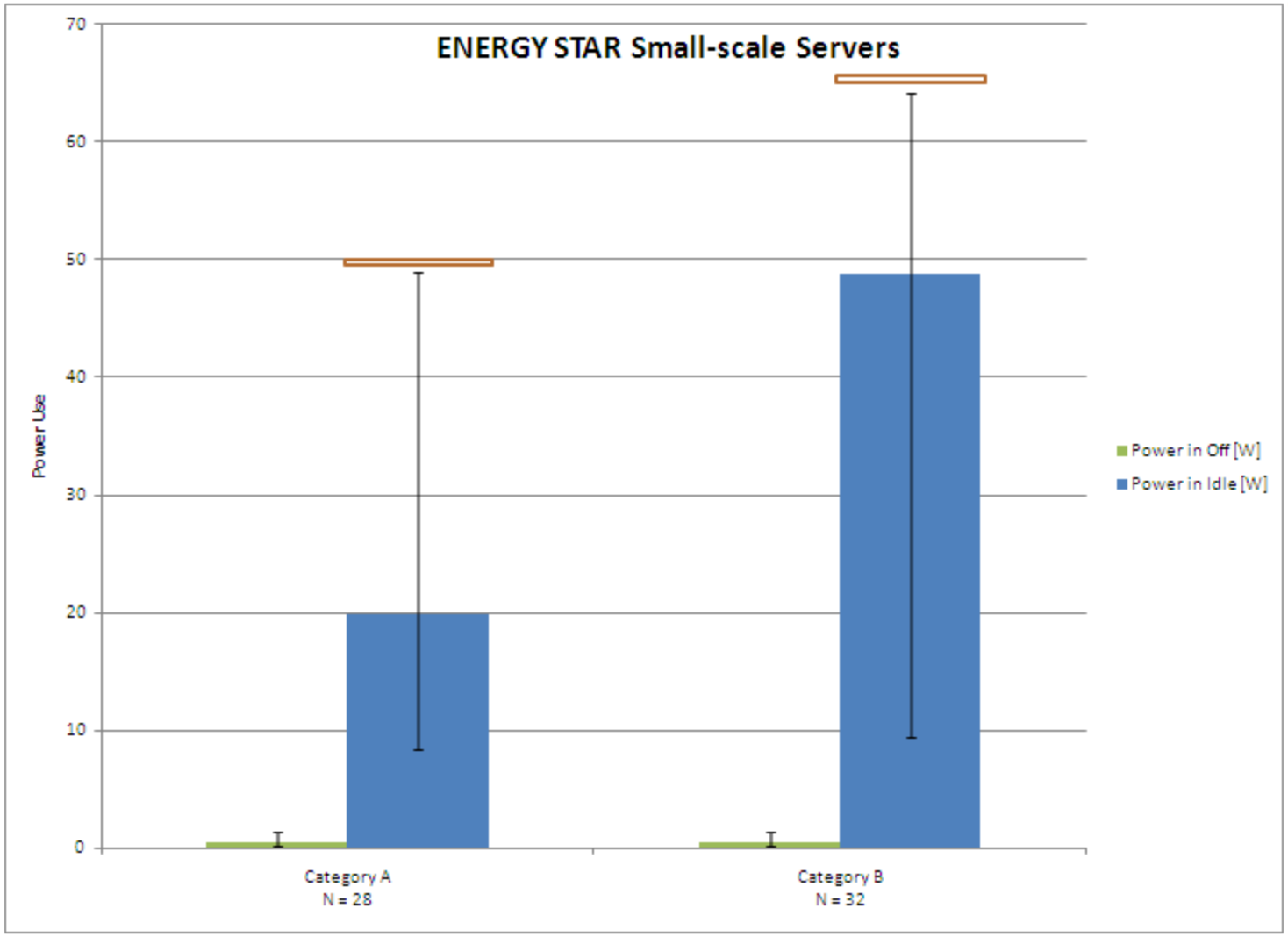
ENERGY STAR Qualified Desktops



ENERGY STAR Qualified Thin Clients



ENERGY STAR Qualified Small-scale Servers



ENERGY STAR Qualified Computers

- Workstations

Workstations	Qualified Products (US)			
Number of products	97			
	Average	Median	Min	Max
Power in Off	1.34	1.4	0.58	9.35
Power in Sleep	6.39	5.35	2.74	14
Power in Idle	135.25	123.3	62.18	327
TEC	75.5	69.08	35.09	181.64

Stakeholder Presentation

Shahid Sheikh

Intel

Discussion

- Does EPA need to address any other disruptive technology trends that may substantially change the way energy is distributed or consumed in the computing industry in the Version 6 specification (e.g., lower powered mobile products, new power management strategies)?

- For any of the existing product types, what changes may be necessary to ensure categorization represents current products?

Mobile Products – Tablets and Slates

Evan Haines

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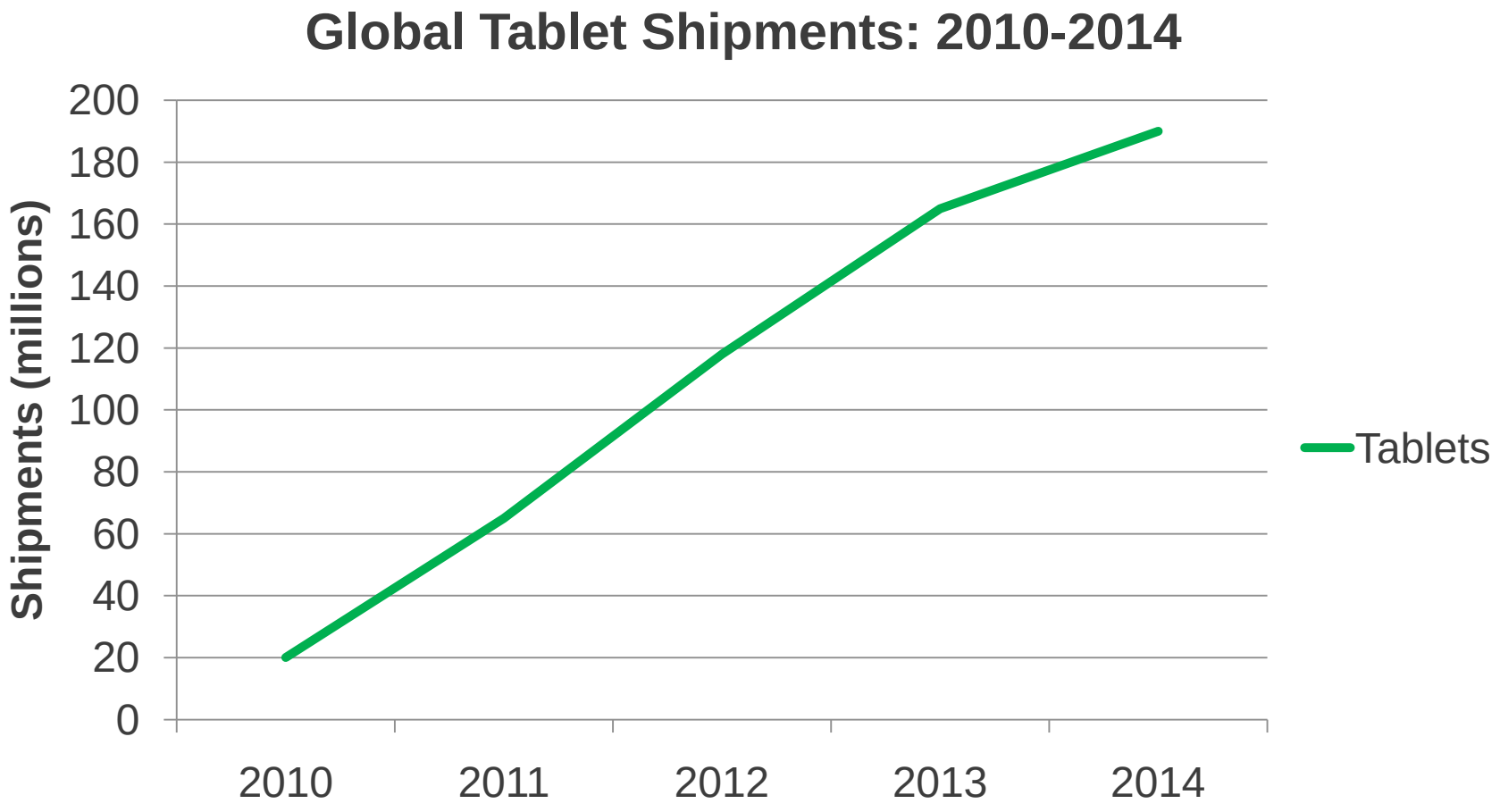
Tablet Computers: A Changing Market

- Significant and ongoing shift in the tablet market

Version 5

Version 6

Tablet Market



Source: Gartner

The “New” Tablet

Tablet Notebooks	Tablet (Slates)
•Two-handed	•One-handed
•Content creation (“lean-forward” experience)	•Content consumption (“lean-back”)
•PC software experience	•“Apps,” application repository
•PC	•PC companion? Replacement?

The “New” Tablet

- One-handed
  - Not designed for plugged-in use
- Content *consumption* (“lean-back”)
  - Cloud storage instead of local
  - Virtual keyboards
- “Apps,” application repository
  - Unique usage patterns from other computers
- PC companion? Replacement?
  - Usage pattern impacts
  - Savings potential

Considerations

- **Power**
  - If Tablets are expected to be plugged in only when charged, the efficiency of the charging system is the critical piece
- **Power Management**
  - Are there any standard capabilities for Tablets? Are techniques different from Notebooks?
- **Differentiation**
  - What separates the Tablet (Slate) category from Smartphones? From eReaders?

Approach

- Group netbook and Tablet (Slate) computers under the same set of efficiency criteria.
  - Test procedure development may be required for products that cannot be evaluated using the ECMA-383 protocol

- Consider feature-based requirements that foster development of energy-efficient technologies that may not be adequately identified in a TEC structure.

- Clarify the Notebook Computer definition to include Clamshell-Tablets and exclude Tablet (Slate) computers.

Approach

- Define **Tablet (Slate) Computer**:

A portable computer lacking a physical keyboard, relying primarily on touch-screen input, lacking integral wired network capability (e.g., Ethernet), and primarily powered from an internal battery charged via an external power supply or low-voltage dc (e.g., USB cable). For a computer to be considered a Tablet (Slate), any wired power connection to the mains must be designed to charge the battery and to be disconnected from device during normal operation.

Stakeholder Presentation

Jim Kardach

Intel

Discussion

- Should EPA handle low power, mobile devices (Tablet [Slate], Thin Client, etc.) differently from standard Notebook computers? Given the pace of change in markets for these categories, how can EPA create a program flexible enough to encompass these products during the lifetime of the Version 6 specification?

- What are the use patterns for ULEM computers? How can they be tested to accurately represent their power consumption, given these use patterns?

- Is it reasonable to group Netbook and Tablet (Slate) computers in a single class?

- Are there any studies available on battery charging patterns for ULEM and Notebook computers? Do manufacturers currently consider the efficiency of the battery charger in their designs for either category, and if so, how?

Product Testing

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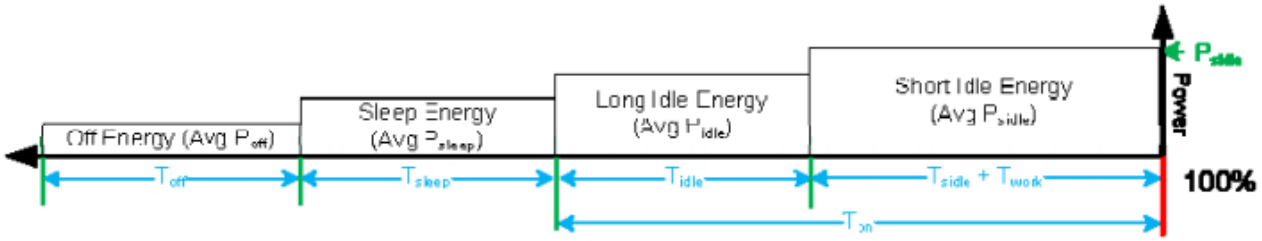
ECMA-383

- 3rd Edition finalized in December 2010
  - http://www.ecma-international.org/publications/files/ECMA-ST/ECMA-383.pdf
- Currently applies to both Desktop and Notebook Computer types
- Major components and additions
  - Graphics categories
  - Addition of a “Short Idle” mode
  - Review of usage patterns for Desktops and Notebooks

Idle

- ECMA-383 3rd edition partitions Idle State into two categories
  - **Short Idle**: intended to represent brief periods of idle during what a user perceived to be normal use, where dynamic component power management has not yet engaged
  - **Long Idle**: the “traditional” idle mode from past ENERGY STAR specifications. Represents a system that has been in idle for a longer period of time, allowing component power management to take place without the system going to sleep (e.g., display power management, hard drive spin down)

Idle in ECMA-383: Effects on Specification



- Short Idle will be introduced into the TEC metric
  - The Ecma working group researched prevalence of this mode

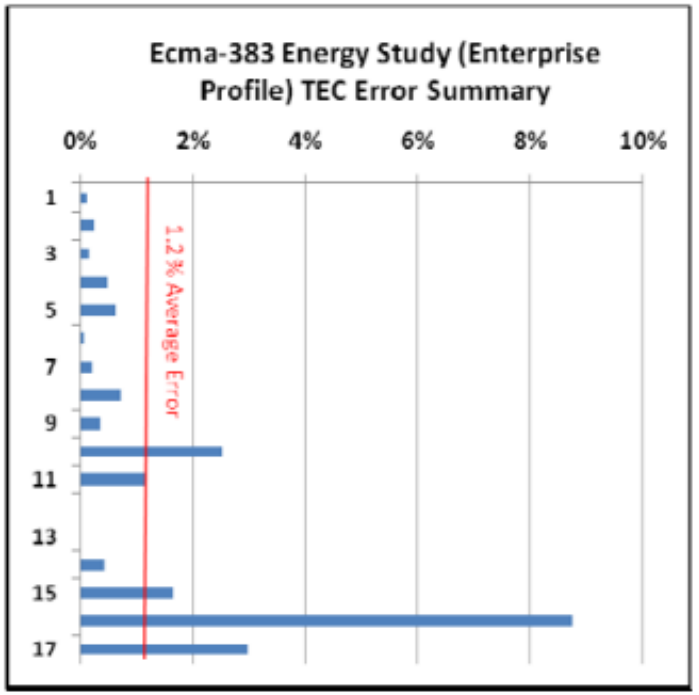
Active Mode

- ECMA-383 includes provisions to incorporate an Active Mode (Work) component into the TEC evaluation

- Annex B includes a “Majority Profile” based on an enterprise profile study conducted by the ECMA-383 working group
  - Study yielded a 1.2% average TEC variation between measured energy and estimated TEC energy
  - This is less than the 15% variation specified by the standard to trigger development of an Active workload

Active Mode

Users	Measured AC power					TEC Error Calculation		
	Active	Short idle	Long idle	Sleep	Off	TECact	TECcalc	% Error
1	42.8	42.7	36.7	1.5	0.5	160	160	0.1%
2	32.1	32.0	26.0	1.5	0.5	120	120	0.3%
3	33.8	33.9	23.9	1.5	0.5	123	123	0.2%
4	36.2	35.7	29.7	1.5	0.5	134	134	0.5%
5	21.2	21.0	15.0	1.5	0.5	79	78	0.6%
6	33.2	33.2	25.6	1.5	0.5	123	123	0.1%
7	35.1	35.0	26.1	1.5	0.5	128	128	0.2%
8	22.2	21.9	20.5	1.5	0.5	87	87	0.7%
9	40.4	39.7	33.7	1.5	0.5	149	149	0.4%
10	44.4	42.6	37.7	1.5	0.5	165	161	2.5%
11	28.4	27.9	17.7	1.5	0.5	101	100	1.2%
12	25.3	25.3	18.6	1.5	0.5	94	94	0.0%
13	22.1	22.1	10.8	1.5	0.5	77	77	0.0%
14	19.9	18.6	17.8	1.5	0.5	75	75	0.4%
15	30.4	29.6	21.8	1.5	0.5	111	109	1.7%
16	12.0	9.0	9.0	1.5	0.5	43	39	8.7%
17	72.4	35.9	29.9	1.5	0.5	139	134	3.0%
							Avg. Error =	1.2%



Display Power

- EPA will including display power in the evaluation of systems with integrated displays
  - Recognizes the significant portion of system power devoted to the display (~30%)
  - Allows more efficient backlighting technologies in integrated LCD
- Impacts Notebooks and Integrated Desktops (possibly some Thin Clients)
- Short Idle, by definition, includes an active display during power measurement

Display Power

- For notebooks, all products are affected
  - No adjustments are necessary to ensure fair comparisons between products
  - A new dataset (and testing in Short Idle) will be required to set TEC levels

- As part of the Desktop product type, Integrated Desktops will require adjustments to limit unfair comparisons with standard Desktops.
  - EPA-preferred approach: Create an adder for Integrated Desktops equal to the equivalent performance of an ENERGY STAR Display

Stakeholder Presentation

Pierre Delforge

Natural Resources Defense Council

Stakeholder Presentation

Jim Kardach

Intel

Discussion

1. What specific challenges exist for testing of products with integrated displays enabled? What modifications are required to the existing ENERGY STAR test method to allow for such testing?

2. The definitions for Short and Long Idle reference work done in the ECMA-383 working group. What, if any, levels of acceptable latency describe the Short and Long Idle modes? Under the definitions, where are individual sub-systems power managed (e.g., GPU, Memory, I/O devices)?

3. What special testing considerations should EPA consider for small-form factor and all-in one desktops (e.g., applicability of internal power supply requirements for supplies less than 75 watts, passive cooling)?

4. Is powering a computer via low-voltage DC (e.g., Power over Ethernet, USB) expected to become more common in the coming years? How prominent is it today?

5. Do requirements and test methods need to account for USB-powered devices? For other low-voltage DC powering (Power over Ethernet)? If so, how?

Desktops and Notebooks

Evan Haines

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Approach

- Testing updates
  - Harmonization (ECMA-383)
  - Short Idle
  - Inclusion of integrated display power with an allowance based on the ENERGY STAR Display specification
- TEC weighting (usage patterns)
- More stringent TEC levels
- Enhancing existing power management
  - Review exiting TEC weightings for Full Network Connectivity (FNC)
  - Seek information on FNC over Wi-Fi; efficient Wi-Fi networking

TEC Usage Patterns

- Version 5 TEC weightings were based on a dataset provided by Microsoft
  - 37,388 Desktops and 35,195 Notebooks
  - Collected between January and March 2008
  - Identified time spent in different ACPI states

- Additional sets of weightings have since been developed to provide incentive to implement Full Network Connectivity (ECMA-393)

Usage Patterns

- The 3rd Edition of ECMA-383 includes a proposed "Majority Profile" in an appendix to the standard
  - Based on enterprise users
  - Study of 500 computers
  - Largely consistent with Microsoft analysis

- Recommendations
  - Proposed TEC weightings for Desktops and Notebooks (with a Short Idle component)
  - Average error between calculated and measured TEC was low (~1.2%) – no active component recommended in TEC metric

TEC Usage Pattern Comparison - Desktop

Mode	Version 5 ENERGY STAR	Ecma-383 Majority Profile	Version 5 ENERGY STAR (Proxying)			
			Base	RW	SD/NS	Full
T_{OFF}	**55%**	**45%**	50%	47%	43%	40%
T_{SLEEP}	**5%**	**5%**	14%	20%	25%	30%
T_{IDLE}	**40%**	**15%**	36%	33%	32%	30%
T_{SIDLE} (Short Idle)	**n/a**	**35%**	n/a	n/a	n/a	n/a
T_{WORK}	**n/a**	**0%**	n/a	n/a	n/a	n/a

- Ecma-383 Majority Profile – 10% of Off applied to Idle

TEC Usage Pattern Comparison - Notebook

Mode	Version 5 ENERGY STAR	Ecma-383 Majority Profile	Version 5 ENERGY STAR (Proxying)			
			Base	RW	SD/NS	Full
T_{OFF}	**60%**	**25%**	54%	49%	48%	45%
T_{SLEEP}	**10%**	**35%**	18%	24%	26%	30%
T_{IDLE}	**30%**	**10%**	28%	27%	26%	25%
T_{SIDLE} (Short Idle)	**n/a**	**30%**	n/a	n/a	n/a	n/a
T_{WORK}	**n/a**	**0%**	n/a	n/a	n/a	n/a

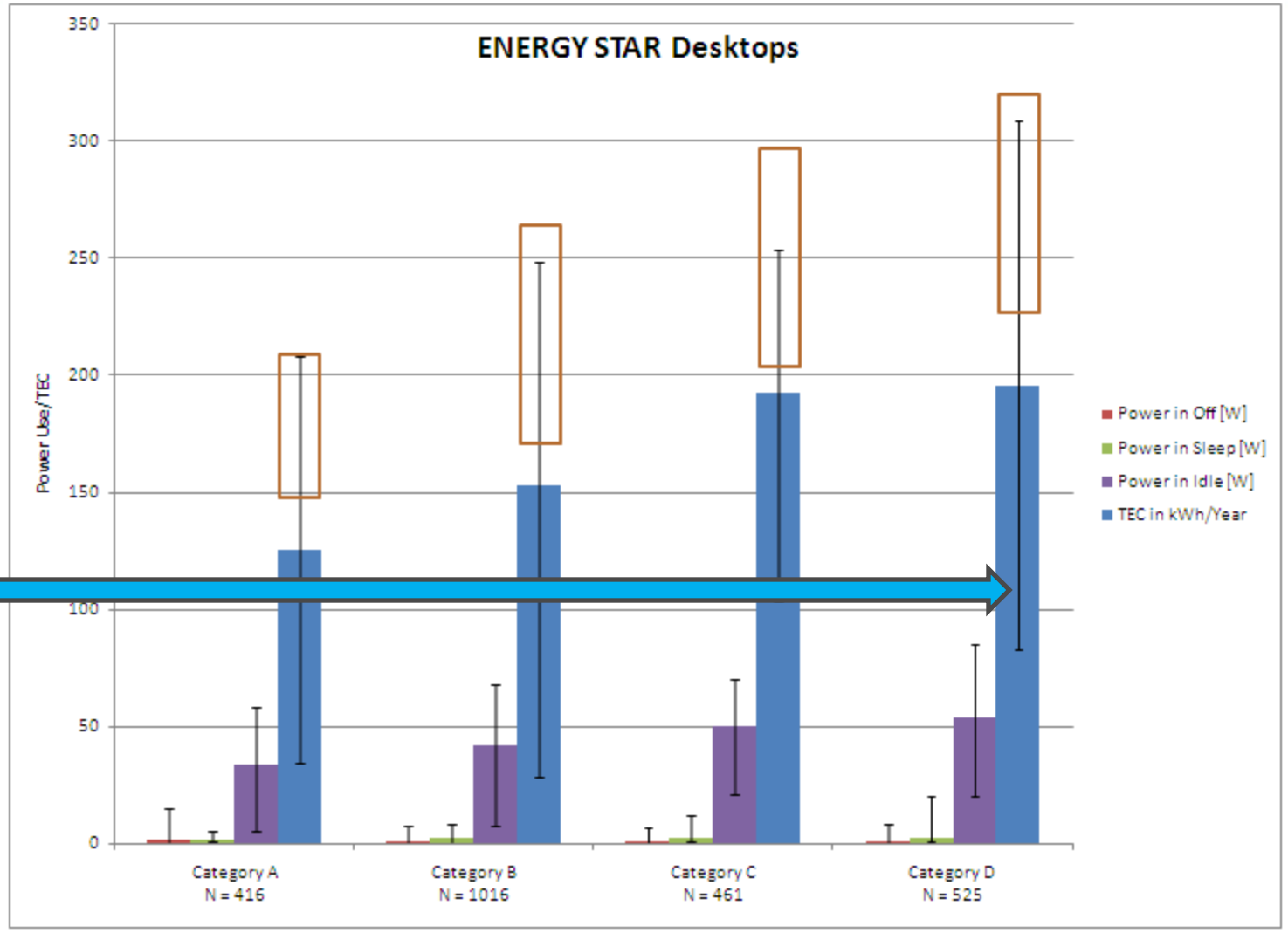
- Ecma-383 Majority Profile – Off is significantly less prominent than ENERGY STAR's existing model
  - Majority of time allocated to Sleep

TEC Usage Patterns – Areas for Input

- EPA encourages stakeholders to review the proposed Majority Profile in ECMA-383
- Further research into Desktop and Notebook usage patterns is encouraged and EPA appreciates input on further resources
- Comments on relevance of existing Desktop and Notebook Category structure during life of V6

TEC Levels – Opportunities

- **TEC range:** Wide range between top and bottom of TEC performance
- **Overlap:** Systems in upper categories capable of meeting bottom categories



Stakeholder Presentation

Louis Hobson

Hewlett Packard

Power Management

- EPA intends to maintain existing power management criteria
  - Display and system sleep by default on shipment
  - Required implementation times
- Adoption of Short Idle presents opportunity to showcase dynamic component power management during operation
- Additional input on emerging power management techniques welcome

Efficient Networking

- Energy Efficient Ethernet
  - EPA is interested in manufacturer experiences with EEE and product plans
- Full Network Connectivity over Wi-Fi
- Efficient Wi-Fi

Full Network Connectivity

- EPA retained its initial proposal for full network connectivity when finalizing the Version 5.2 specification for computers
- Some stakeholders raised concerns that the weightings for notebook computers did not provide appropriate benefits in the TEC evaluation
- EPA will review stakeholder proposed revisions that are accompanied by a rationale for the changes

Stakeholder Presentation:

Product Labeling and Disclosure Requirements

Dave Cassano

Steve Kuo

Apple

Discussion

- Are there any studies available on battery charging patterns for ULEM and Notebook computers? Do manufacturers currently consider the efficiency of the battery charger in their designs for either category, and if so, how?
- Is powering a computer via low-voltage DC (e.g., Power over Ethernet, USB) expected to become more common in the coming years? How prominent is it today?
- Usage Patterns: Which, if any, product studies or sources of data on computer usage patterns should EPA review to develop usage pattern assumptions in the specification?
- What (if any) emerging power management techniques should EPA become aware of for reference in the program requirements?
- Is USB Selective Suspend a feature commonly implemented by default?

ECMA-383 Categories

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Categories

- Ultra Low Energy
  - <20 kWh annual consumption by TEC
  - Not currently used by ENERGY STAR
- Notebook
- Desktop
- Graphics

- More here: http://www.ecma-international.org/publications/standards/Categories_to_be_used_with_Ecma-383.htm

Desktop

Category	DT 0 – Nov 09	DT 1 – Nov 09	DT 2 – Nov 09	DT 3 – Nov 09
Market	Entry	Mainstream	Performance	High-end
Cores	cores ≤ 2 (less than or equal to 2 cores)	cores ≤ 2 (less than or equal to 2 cores)	2 < cores < 6 (more than 2 cores and less than 6)	2 < cores < 6 (more than 2 cores and less than 6)
Channels of memory	ch mem = 1 (1 Channel of memory)	ch mem = 2 (2 Channels of memory)	2 ≤ ch mem < 4 (more than or equal to 2 channels of memory and less than 4)	2 ≤ ch mem < 4 (more than or equal to 2 channels of memory and less than 4)
Base memory	1GB	2GB	2GB	4GB
Base Graphics	iGfx (integrated graphics)	iGfx (integrated graphics)	iGfx (integrated graphics)	dGfx = G1 (discrete graphics = G1)
Graphics Adders	dGfx ≤ G4 (less than or equal to G4)	dGfx ≤ G4 (less than or equal to G4)	dGfx ≤ G4 (less than or equal to G4)	G1 < dGfx ≤ G4 (greater than G1 and less than or equal to G4)

Notebook

	NB 0 – Nov 09	NB 1 – Nov 09	NB 2 – Nov 09	NB 3 – Nov 09	NB4 – Nov 09
Market	Netbook	Thin / Low-end	Mainstream	Performance	High-end
Cores	cores ≤ 2 (less than or equal to 2 cores)	cores ≤ 2 (less than or equal to 2 cores)	cores = 2 (2 cores)	2 < cores ≤ 4 (more than 2 and less than or equal to 4 cores)	2 < cores ≤ 4 (more than 2 and less than or equal to 4 cores)
Channels of memory	ch mem < 4 (any number of channels less than 4)	ch mem < 4 (any number of channels less than 4)	2 ≤ ch mem < 4 (more than or equal to 2 channels of memory and less than 4)	2 ≤ ch mem < 4 (more than or equal to 2 channels of memory and less than 4)	2 ≤ ch mem < 4 (more than or equal to 2 channels of memory and less than 4)
Screen size	screen size ≤ 11.6" (screen size less than or equal to 11.6")	11.6" < Screen size ≤ 13.3" (screen size greater than 11.6" and less than or equal to 13.3")	Any screen size	Any Screen size	Any screen size
Base Memory	1GB	2GB	2GB	2GB	4GB
Base Graphics	iGfx (integrated graphics)	iGfx (integrated graphics)	iGfx (integrated graphics)	iGfx (integrated graphics)	dGfx = G1 (discrete graphics = G1)
Graphics Adders	dGfx ≤ G4 (less than or equal to G4)	dGfx ≤ G4 (less than or equal to G4)	dGfx ≤ G4 (less than or equal to G4)	dGfx ≤ G4 (less than or equal to G4)	G1 < dGfx ≤ G4 (greater than G1 and less than or equal to G4)

Graphics

- Main topics for discussion:
  - Categorization of Discrete Graphics
    - Proposals within ECMA-383 process: 5- and 7-categories
  - Review of graphics technologies and how they fit in the TEC model for Desktops and Notebooks
- Stakeholder presentations and discussion

Stakeholder Presentation

Pierre Delforge

Natural Resources Defense Council

Stakeholder Presentation

Sanjiv Lakhanpal

AMD

Small-scale Servers, Thin Clients, Workstations

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Small-scale Servers

- Category captures servers intended for SOHO environment delivering shared storage and backup services

- Enterprise and higher-end systems part of ENERGY STAR Server program

Small-scale Servers

- Efficiency criteria based on modal power limits developed for Version 4
- Version 5 retained the two lowest-power categories

Table 10: Classification & Power Consumption Requirements for Small-scale Servers

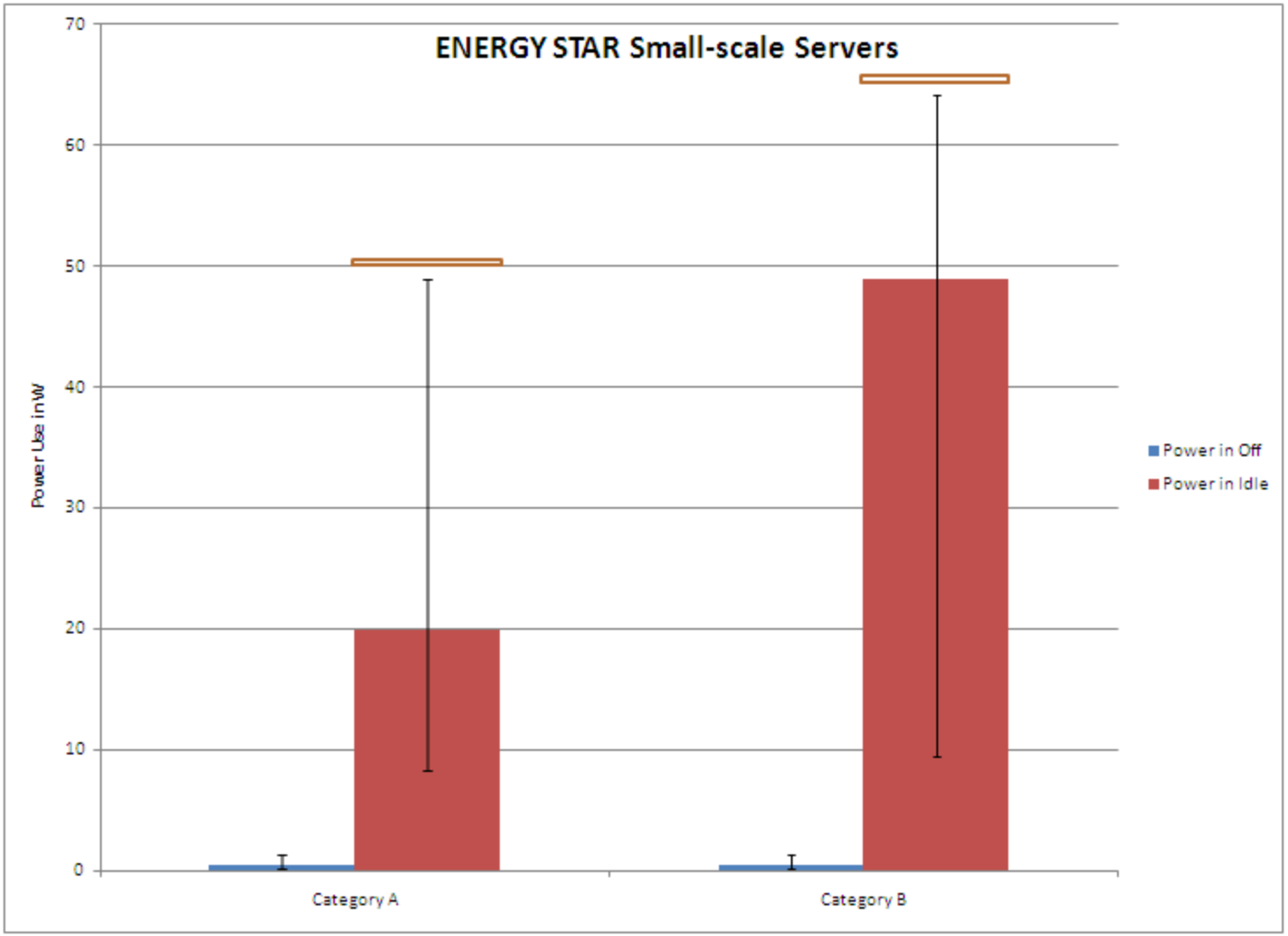
Small-scale Server Classification		Operational Mode Requirements		
Product Category	**Category Description**	**$P_{OFF\ BASE}$ (watts)**	**$P_{OFF\ WOL}$ (watts)**	**$P_{IDLE\ MAX}$ (watts)**
A	All Small-Scale Servers that do not meet the definition of Category B will be considered under Category A for ENERGY STAR qualification.	2.0	0.7	50.0
B	To qualify under Category B Small-Scale Servers must have: • Processor(s) with greater than 1 physical core or greater than 1 discrete processor; and • Minimum of 1 gigabyte of system memory.	2.0	0.7	65.0

Small-scale Server Qualification Activity

- Despite more stringent efficiency criteria in comparison to Version 4, there were many more qualifications in Version 5
  - Greater demand? Impact of ENERGY STAR Imaging?
- Idle power well below limits for many products

Version 5 Small-scale Server Activity (as of 3/3/2011)	
Models Qualified	59
Manufacturers	5
Average Idle (W) – Cat A	19.73
Median Idle (W) – Cat A	21.00
Average Idle (W) – Cat B	48.87
Median Idle (W) – Cat B	48.00

ENERGY STAR Qualified Small-scale Servers



Approach – Small-scale Servers

- Seek stakeholder input on market drivers
  - Size of market
  - Increase/decrease in demand
  - Software or technology drivers (e.g., more robust home server OSs)

- Analyze any available usage pattern information (*safe to assume majority of time in Idle, no time in Sleep?*)

- Assemble a dataset to add to qualification power data
  - New data will be evaluated in conjunction with qualified products to investigate the continued need for bifurcated requirements, implement more stringent efficiency requirements

Thin Clients

- Added as a new product category in Version 5
- Limited data available during level-setting process
- Currently two categories, delineated by internal multimedia capability

Ultra-thin Clients

- Stakeholders approached EPA in 2010 with “zero clients” – terminal devices that entirely rely on remote computing with minimal capability integral to the device
- Power consumption minimal – 4 Watts fully active or less
- Deployed as either interfaces to a server or shared desktop system (via desktop virtualization). Operating systems being offered to support this computing model

Challenges

- Unclear if Ultra-thin Clients are “computers”
  - No CPU or processing capability
- Energy savings in the client may be offset by connected desktop running as a “server”
- Similar functionality becoming integrated into other types of products (e.g., “smart” televisions and displays)

Approach – Thin Clients

- Further input and analysis required on the Ultra-thin Client category

- Initial definition proposal for **Ultra-thin Client**:

A Thin Client that lacks a traditional operating system, has no internal storage capability, and is controlled by a kernel that provides capability only for network initialization and display of graphics generated from remote computing resources.

Approach – Thin Clients

- Revise categories
  - Need for a better defined dividing line, if one is needed at all
- Assemble a dataset to add to qualification power data
  - As with Small-scale Servers, new data will be evaluated in conjunction with qualified product information
- Seek stakeholder input on market drivers
- Review any progress in power management
  - EPA informed by multiple manufacturers that system sleep modes were rarely implemented due to latency reestablishing network connectivity
  - Full Network Connectivity (ECMA-393)

Workstations - Active Mode Reporting

- EPA intends to return to efforts from Version 5.0 to incorporate active mode efficiency into Workstation requirements.

- EPA proposes development of an active mode reporting requirement, similar to what is being developed within the ENERGY STAR Computer Server effort
  - In addition to existing TEC power requirements, workstations run a designated benchmark to generate power-performance data (candidate: SPEC's Workstation power benchmark)
  - No levels are placed on this active mode data
  - Data is reported with ENERGY STAR qualification data

Workstations - Active Mode Reporting

- Rationale for creating the reporting requirement
  - Suits the product type
    - Workstations are more likely applied to advanced workloads
    - Performance is key to the purchase decision performance-oriented
  - Suits the purchaser
    - EPA believes that workstation purchasers are deeply knowledgeable about their computing needs, traits shared with purchasers of Computer Servers but not necessarily purchasers of other product types in the Computer program
    - Associating power-performance data with ENERGY STAR qualifications gives Workstation purchasers the tools to identify the appropriate balance of performance and power consumption

Stakeholder Presentation

Henry Wong

Intel

Discussion

- Is a better means of delineating Thin Client categories than “local multimedia encode/decode?” Is there any feedback on the effectiveness of the current categories?

- How can combined systems savings be accounted for in the Thin Client computing model in addition to individual product savings? Are there any standard ultra-thin client sales patterns that support this concept (e.g., ten ultra-thin clients sold with one ENERGY STAR base computer as a packaged purchase)? Is it suggested that EPA develop requirements to recognize purchase of ENERGY STAR base computers and ultra-thin clients together?

- Given the minimal amount of internal processing Ultra-thin Clients perform, are such products truly computers? Is the product name “Terminal” likely to be clearly understood if applied as an alternative description of this product type?

Other Environmental Benefits

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US Environmental Protection Agency
ENERGY STAR Program

ENERGY STAR Principles

2nd of ENERGY STAR's 5 Guiding Principles notes:

"Product performance can be maintained or enhanced with increased energy efficiency.

- *ENERGY STAR label is purchasing tool for a broad array of consumers.*
- *Label credible symbol for energy efficiency, but also found on products with features and performance that consumers demand."*

EPA

ENERGY STAR Principles

- *Principle guides EPA* ***to "Examine factors such as safety, performance, warranty to ensure product quality, features, and functionality not compromised."*** For example:
  - Lighting specifications address: start time, life, noise, dimming capability, safety and now RoHS.
  - Vent Fans specification addresses: noise.
  - Imaging specification: double sided copying.
  - Climate Controls: proposed usability, communication, ease of installation, battery life.
- Increasingly, consumers want additional environmental features in their ICT products

Discussion Points

- EPA plans to look at existing, tested industry standards for a source of such environmental criteria.
- Propose requirements to:
  - Ensure ENERGY STAR qualified computers deliver features consumers seek
  - recognize industry efforts to use address environmental issues with environmentally-conscious product and packaging materials and methods
- Suggested initial focus:
  - Reduced toxics
  - Designed for recyclability/upgradability
  - Recyclable packaging
- What existing standards address these environmental issues?
- How is conformity confirmed?

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Other Environmental Benefits:

Product Attribute to Impact Algorithm (PAIA) and Addressing Additional Consumer Interests

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ENERGY STAR Program

Agenda

- ENERGY STAR Rationale
- Product Attribute to Impact Algorithm (PAIA) overview
  - Description
  - Contributors
  - Example
  - Current status, future plans
- Opportunities for ENERGY STAR computers
  - Use of a PAIA
- How to get involved with the PAIA

ENERGY STAR Rationale

- Economic Input Output Life Cycle Assessment (EIOLCA)
  - Dr. Sangwon Suh, UC Santa Barbara
  - Examined many ENERGY STAR product types
    - Broad-brush, not individual product/model specific
  - Indicated that for some product types, manufacturing and end-of-life energy and emissions are greater than or comparable to use-phase
    - Includes computers, especially laptops

ENERGY STAR Rationale

- Short-lived products with high non-use phase energy consumption and GHG emissions represent a program vulnerability.
- Need to investigate the actual energy efficiency of these products.
  - Risk optimizing only one phase of product life for efficiency.
  - Must understand the lifetime energy of these products to continue meeting our program objectives.

ENERGY STAR Rationale

- Addressing non-use phase can:
  - Reduce the chance for unintended consequences
    - Attaching the ENERGY STAR label to products that are use phase efficient but have large embedded energy/emissions.
    - Especially problematic for short-lived products.
  - Bring greater environmental benefits to consumers
  - Assist industry in identifying costly energy consumption

Concerns with LCAs for Short-Lived Products

- Accuracy of process
  - LCAs can be prone to error, difficulty in comparisons
- High hurdle for manufacturers
  - LCAs, etc. can be expensive, time consuming
  - Want efficient, low-cost analysis tools
- Relevance to products
  - Must provide useful information to help consumer, industry partners

What is a PAIA?

- An algorithm that translates product attributes into resource impacts.
  - Minimum data collection
  - Minimum user input
- Laptops only at this point
- Efficient shortcut for estimation
  - Life cycle energy consumption, GHG emissions
- Support strategic decision making
  - Compare a product's life cycle phases, locate possible areas for improvement

PAIA Contributors

- MIT, CMU, ASU, TSC, UCB
- Carbon Trust, ENERGY STAR
- Dell, HP, Intel, Lenovo, AMD, Philips

What a PAIA Offers

- Accuracy
  - Use PAIA tool for rough estimate of life cycle phases. Not concerned with getting data or results exactly right.
- Lower hurdle for manufacturers
  - Simple algorithm: Input data, get output
  - Avoids process LCA or more involved method
- Relevance
  - Allows targeting of specific lifecycle phases, specific characteristics of the product

EPA

What a PAIA Doesn't Facilitate

- It is NOT a tool to set ENERGY STAR levels for manufacturing energy/emissions
- It is NOT a tool to compare between individual products
- Its results are NOT intended for mandatory disclosure to consumers.

PAIA Example

- Example: Laptop
  - Phases: Manufacture, assembly, packaging, transport, use, and end of life.
  - Input: Data on weight, lifetime, use location, screen size, backlight type, HDD, laptop casing, number of chips on MB, etc.
  - Output:
    - Energy per phase
    - GHG emission per phase
    - More detail per component may be possible

PAIA Status

- Phase 1 wrapping up
  - Established algorithm for laptops
- Phase 2 initiated
  - Test run the tool on a selection of laptops
  - Add new products
    - LCDs (TVs and monitors)
    - Desktops
    - Possibly imaging equipment

EPA's Proposed Use of PAIA

- Flag concrete opportunities for reducing GHG emissions outside of the use phase.
- Incent changes that deliver reductions.
  - But do not reduce functionality
- Plan to support MIT's work on other short-lived products
  - TV, imaging, etc.

How to Get Involved in PAIA Project

- Email Elsa Olivetti (MIT)
  - elsao@MIT.edu
- Actively looking for partners to collaborate with Phase 2 work

Timeline and Closing Thoughts

What's Next?

Tentative Timeline: Pre-draft Activities

Topic	Timeframe
Close of comment period for discussion guide	April 7
EPA proposal on duty cycles for super mobile products and test procedure for these products	Mid-April
Stakeholder webinar	Late April through Early May
Supplemental data assembly-mobile devices, non qualified data for DTs etc, display for notebook	Late April through Late June
Close of comment period on duty cycle proposal	Early May
EPA shares refined mobile device test method	Late May

What's Next?

Tentative Timeline: Drafts

Topic	Timeframe
Draft 1	Mid-July
Stakeholder meeting/webinar	Late-July
Close of comment period on Draft 1	Mid-August
Draft 2	Early-September
Stakeholder meeting/webinar	Mid-September
Close of comment period on Draft 2	Early-October
Final Draft	Late October
Close of comment period on Final Draft	Mid-November
V6 Computer Specification Finalized	Late November

References and Resources

- ENERGY STAR Computers specification revision: http://www.energystar.gov/index.cfm?c=revisions.computer_spec

- Version 5.2 ENERGY STAR Computers specification: http://www.energystar.gov/ia/partners/product_specs/program_reqs/Computers_Program_Requirements.pdf

Thank you!

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