



ENERGY STAR® Stakeholder Discussion: Draft 1 Specification

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Agenda



- Identify some key themes across all comments
- Provide initial EPA response and next steps for addressing comments
- Present development timeline moving forward
- Address additional questions and comments

Ground Rules/Housekeeping



- Scheduled time: 90 minutes
- Questions may be submitted through Live Meeting during the presentation
- EPA will address questions at end of presentation
- Notes will be distributed within the next 2 weeks

Philosophy, Policy, & Process



- ENERGY STAR server and data center efforts initiated in January 2006
 - Early efforts focused on learning about technologies and industry prior to launching development process
- Specification development process is transparent
 - Interaction with stakeholder critical during process
- Several opportunities to comment and provide data
- Final specification represents the top performers available in the marketplace (e.g., top 25%)

Comment Overview



- More than 30 stakeholders submitted written comments
 - Several discussions leading up to Draft 1 release
- Good mix of industry representatives
 - Equipment and component manufacturers
 - Trade Associations
 - International Interests
 - Data Center Managers, Designers, Consultants
- Individual comments are posted to ENERGY STAR Web site, with permission

Partner Commitments



Comments

- Concerns regarding physical labeling of the server and product packaging
 - Major issue for rack mounted, blades (space, airflow)
 - Product packaging used across many configurations

EPA Response

- Recognize that the server market is different from the client market
- Important for vendors to be able to identify ENERGY STAR qualified models
- Labeling requirements may need to differ based on form factor (e.g., rack vs. pedestal)

Section 1: Definitions



Product Scope – Comments

- Exclusion of direct current (dc) powered servers, storage, and network equipment
- Blades require separate consideration

EPA Response

- Dc powered servers may be considered if questions can be resolved re: test procedure, etc.
- Storage and network equipment, separate initiatives (FY 09)
- Blades likely to require unique requirements

Definitions *cont.*



Comments

- Focus on volume servers for Tier 1
 - Packaged in 1U or 2U high rack mount chassis
 - Include single processor, maximum 4 processor sockets
 - < 16 GB of DRAM
- Mixed feedback on defining servers by application or by hardware characteristics
- Characteristics unique to servers:
 - Reliability, Availability, Serviceability, and Manageability (RAS/M) features
 - Multiple LAN and/or WAN networking ports
 - Baseboard Management Controller
 - Error Correcting Code and/or Buffered Memory (mixed feedback)

EPA Response

- Goal is to provide broadest coverage while clearly differentiating between client and server computers
 - Evaluation ongoing re: desktop derived servers
- Important to identify product scope and definitions early in process
 - EPA will share revised definitions for review and comment prior to Draft 2 (e.g., next 2-3 weeks)

Section 3: Power Supply Efficiency



Test Procedure – Comments

- Support for Generalized Internal Power Supply Efficiency Test Protocol (as opposed to 80Plus draft server power supply protocol)
- Supplemental fan power designed to provide system cooling should not be included in test/efficiency calculation
 - Several suggestions provided on how to address this issue

EPA Response

- EPA is currently comparing the two protocols
 - Generalized test protocol does not cover 10% load
- More research needed in the area of fan power, impacts on energy efficiency

Power Supplies, *cont.*



Approach – Comments

- Harmonize with CSCI levels
- Remove 10% load from requirements
- End-user interest in addressing sizing issues

EPA Response

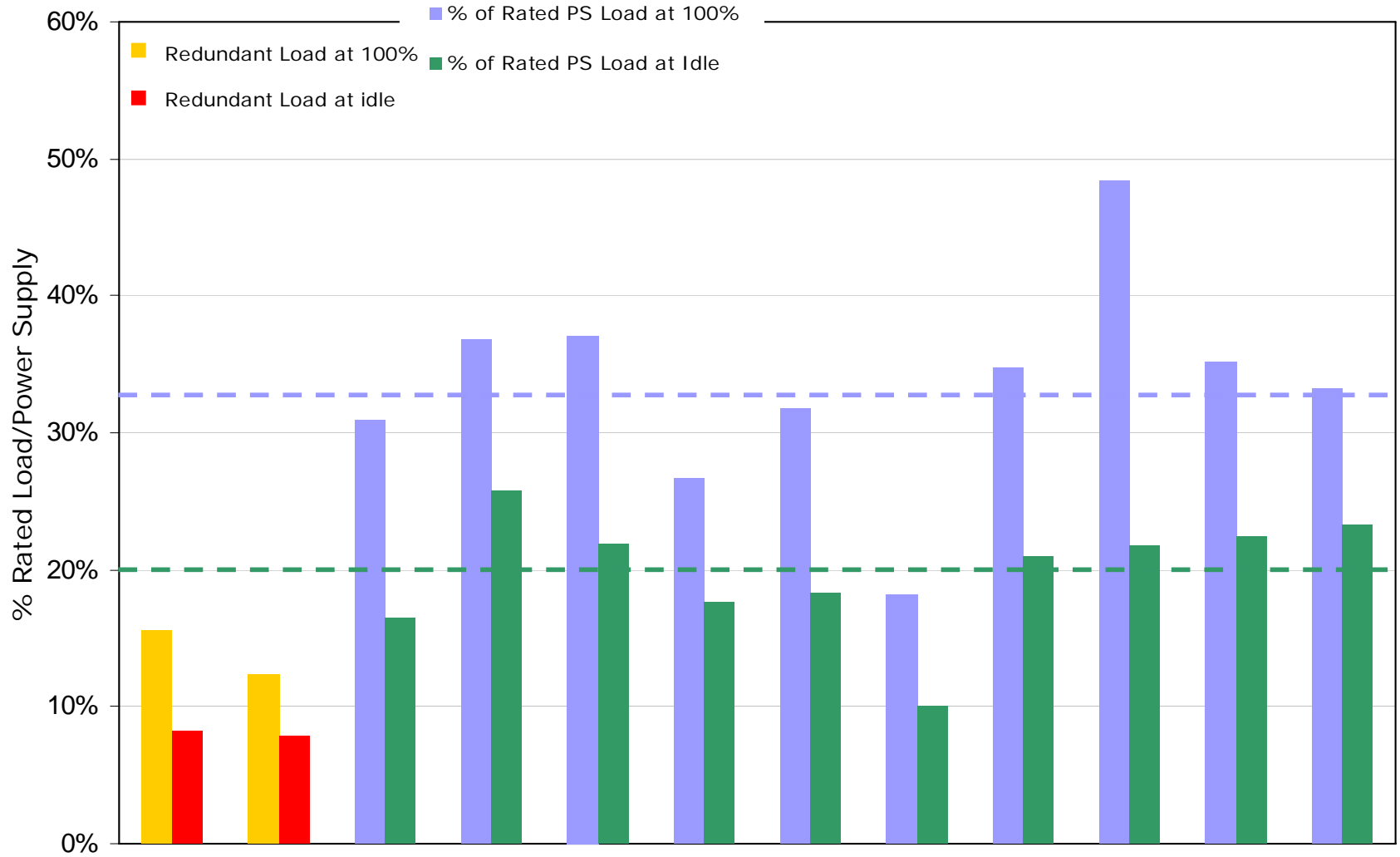
- EPA is interested in harmonization
 - Test procedure must be agreed on
 - Final levels will be based on data, need to determine % of market
- Data suggests that <20% load is quite common (especially in redundant configurations)
 - Need current data to show 10% not relevant
 - Assurance of proper sizing may eliminate 10% load

Approaches to Encouraging Minimal Energy Use for Power Conversion in Servers

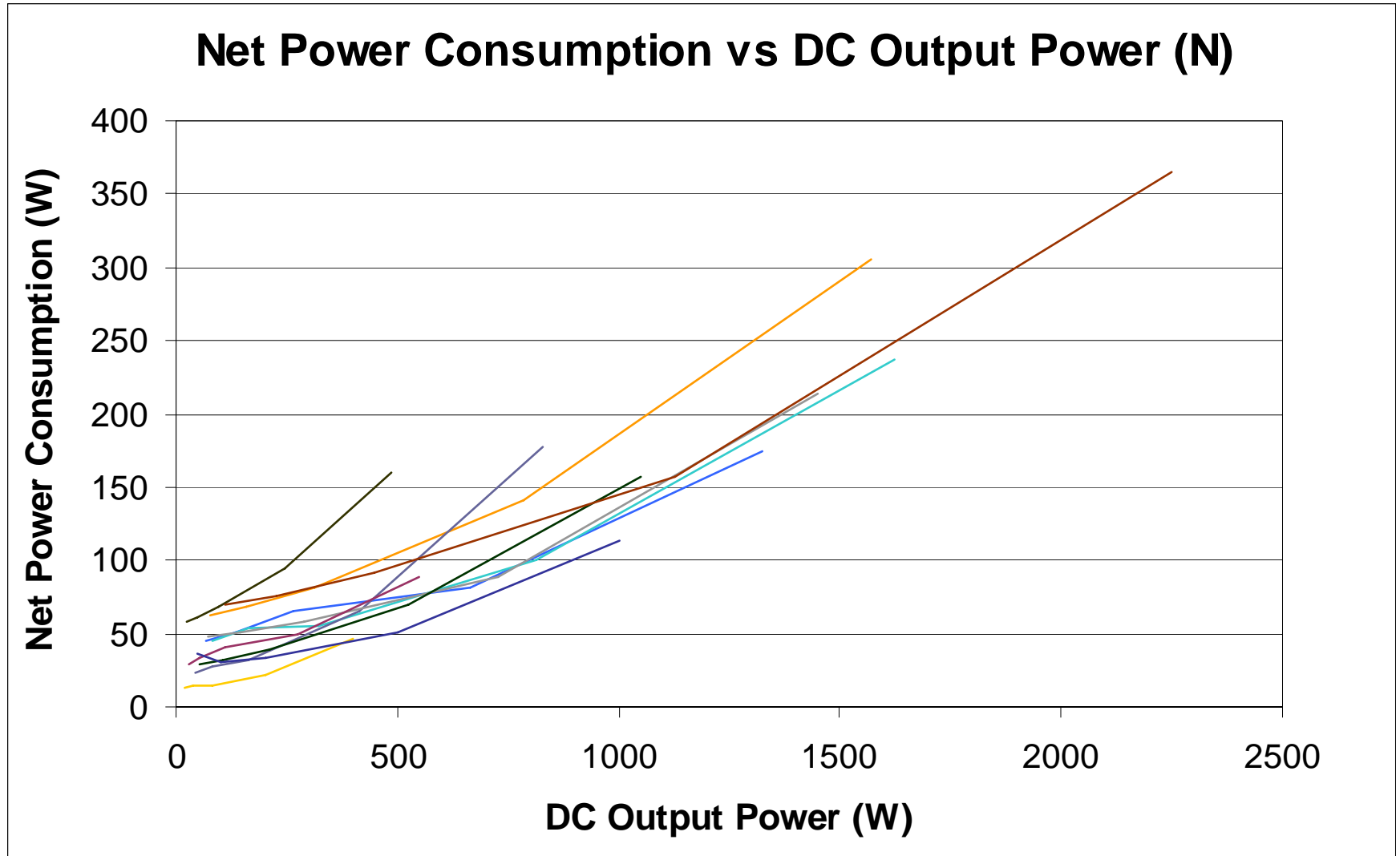


- Specifying minimum power supply efficiency and power factor across a wide range of anticipated load conditions (10% to 100% load)
 - Encourages power supply to be efficient on the lab bench, but has no influence on redundancy choice or power supply sizing, each of which affect energy use
- Alternative approach is to specify net consumption (ac power in minus dc power out) at two load conditions where servers can be readily tested: max consumption and idle.
 - Represents a server-specific measure of power conversion energy use, based on the redundancy configuration and power supply sizing chosen for that model.
 - Server manufacturers can comply by improving efficiency, sizing power supplies appropriately, or some combination of both.

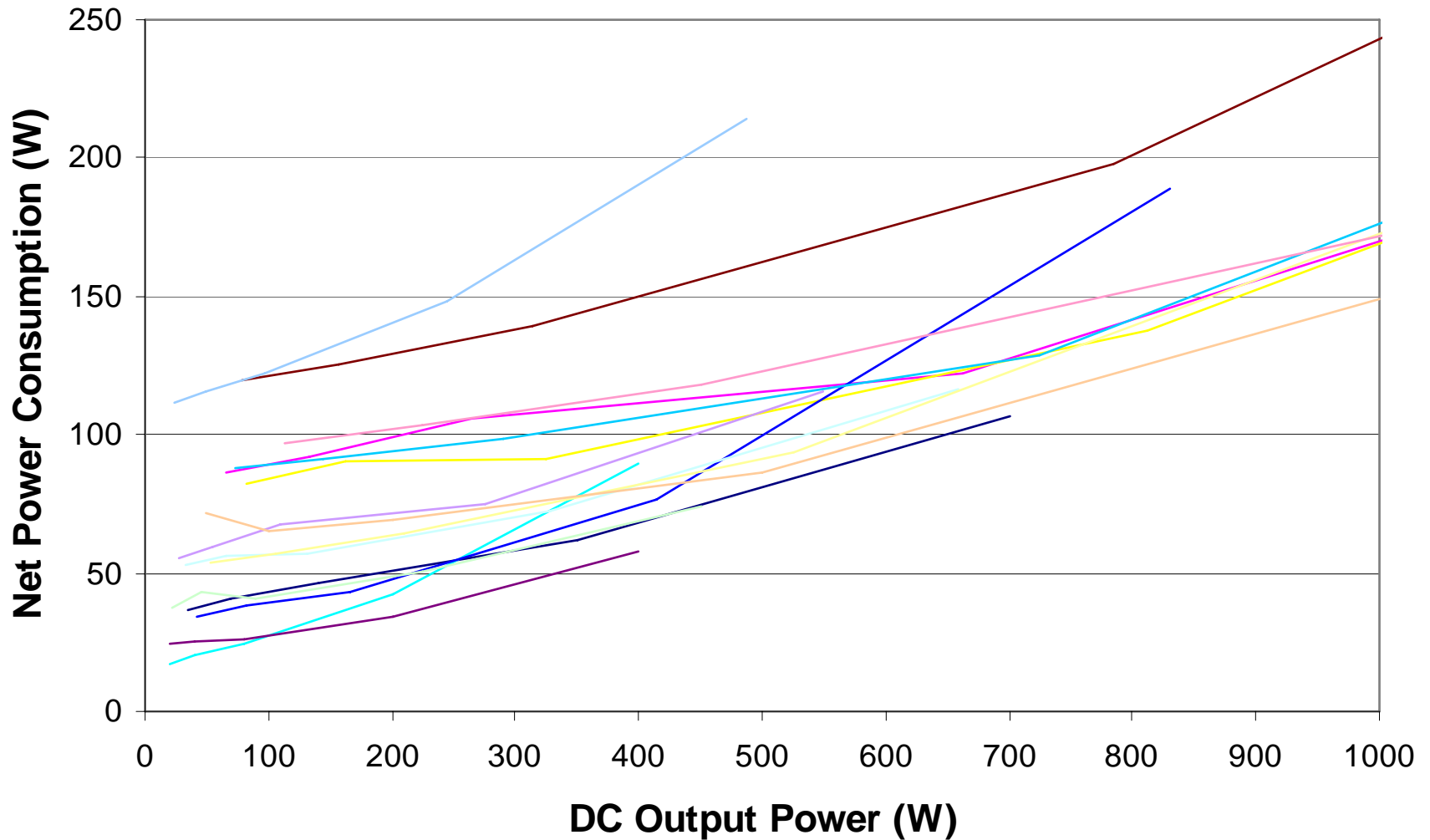
% Rated Load/Power Supply at 100% and Idle Processor Load for SPECpower Results



Sample Calculations for a Range of Server Power Supplies



Net Power Consumption vs DC Output Power (N+1)



Idle Energy



Comments

- Industry is working toward reducing time spent in idle through virtualization solutions
- Idle depends on hardware configuration and application, many classes would need to be defined
- Several concerns with using SPECpower* levels
- Base idle on % of power draw at max load
- Idle should be coupled with power at peak performance

Idle Energy *cont.*



EPA Response

- End users have indicated that many servers are spending a significant amount of time in idle state
- Virtualization is one key strategy for saving energy in the data center but current market penetration is low
- Understand that levels might need to be based on capability of server (e.g., computer 4.0 specification)
- Continued interest in using idle from SPECpower
 - Recognize existing reporting rules

Comments

- Overall strong support for this requirement
- Interest in including annual energy use
 - Do not include cost due to geographic variability
- Report by model not individual configuration
 - Could provide max, min, and typical power use for min and max configuration
 - Could also provide a link to a web based power calculator for specific configurations
- Add information on airflow rate and/or delta Temperature
 - Could help data center managers optimize facility
- No references to SPECpower
 - Must allow for several benchmarks depending on workload

EPA Response

- Goal is to provide transparency and consistency
 - Focus on items crucial to decision making process
- Recognize challenge re: model vs. configurations
 - Focus on base, typical, max, min?
- Understand limitations of using SPECpower for reporting purposes but believe there is some value
- Need to determine standardized information, drill down to the important elements

Virtualization



Comments

- Overall support for virtualization but uncertainty re: how it might be addressed as an ENERGY STAR requirement
 - Several different approaches to virtualization
 - Require hardware solution (e.g., embedded hypervisor)
 - May not be applicable to all servers

EPA Response

- Virtualization is a good strategy for reducing energy use
- Open to other ideas on how to best support virtualization (even outside of the specification)

Comments

- Significant support for including power management requirements
- Several stakeholders provided detailed lists of proposed requirements
 - EPA could require 2-3 enabled PM features from this larger list

Power Management *cont.*



- Current list of PM features from comments:
 - Reduced power levels with decreased workload
 - Power capping
 - Remote power management - ability to limit system power by external agent
 - Ability to migrate workloads across servers
 - Processor/chipset voltage/frequency scaling
 - Power management of individual processor cores
 - Low power memory states
 - Low power I/O interfaces
 - Dual/Variable speed fans w/ control
 - Embedded hypervisor for virtualization
 - Rack level or processor level liquid cooling

EPA Response

- EPA is not advocating low power performance levels
- Goal is to provide information on available PM features, should users want to implement them
 - In a vendor neutral way
- Can a list of features be developed that focuses on common set of PM functions, allowing for several approaches
- Should enabling of these features be a requirement?

Standard Data Output



Comments

- Strong support for measurement and reporting of input temperature and power use
- Mixed comments on what is more important: the ability to measure or standard reporting across the network
- Some concern over picking one protocol (e.g., DMTF), as there are many protocols currently used in the market
 - Could take a simpler approach of simply requiring the output in xml or CSV format
- In future could look at memory and hard drive utilization in addition to processor utilization

EPA Response

- Goal is to provide the ability for managers to access energy and temperature data in a vendor neutral way
- If no industry-wide standard protocol currently exists, and this is not an existing barrier to access this data, measurement and output of this data may be sufficient for the Tier 1 specification
- Additional research and discussions with end users is needed

Section 4: Test Conditions



- Majority support for testing at 230 VAC
- Interest in using 50 Hz in addition to 60 Hz
 - Align with European and U.S. markets
 - Frequency believed to have minimal effect on efficiency
- Allow for standard U.S. office voltages for servers deployed in this scenario (i.e., 115 VAC)
- Allow for other country voltages (Japan, 100 VAC)

EPA Response

- Servers should meet requirements in every market where they're sold
- Need to develop the right combination of frequency and voltage to represent the broadest application

Section 5: Effective Date



- Support for a Tier 1 effective date of Q4 08
 - Highly dependent on scope and testing requirements
- Tier 2 effective date should be based on lifecycle of equipment (e.g., 2-3 years after Tier 1)

EPA Response

- Tier 1 will expire on a set date and replaced by a more effective Tier 2
 - Tier 2 provides a road map of where EPA wants to go longer term with the specification
 - Need to balance need for market relevance with providing adequate time to prepare for new requirements

Next Steps and Timeline



- Stakeholders encouraged to provide additional comments and data following this meeting
- Proposed definitions will be distributed for review and comment within next few weeks
 - Need to establish product scope to base testing/levels
- Potential in person stakeholder meeting in June
 - Draft 2 specification release targeted for late May
- EPA continuing to work toward a final specification by the end of this year

Discussion/Questions