ENERGY STAR Imaging Equipment Version 2.0 Kickoff

April 13, 2011

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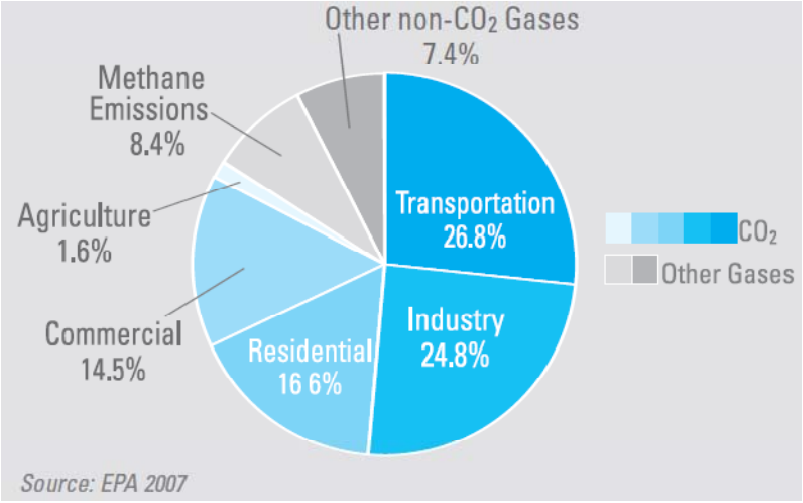
ENERGY STAR Program

Agenda

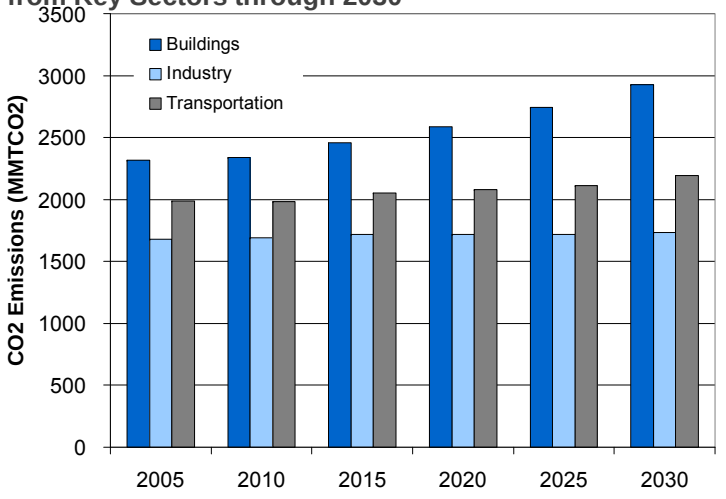
- Introduction
- Status of Current Version 1.2 ENERGY STAR Imaging Equipment Specification
- Proposed Timeline
- Walk through the 26 issues raised in Framework Document
- Next Steps

ENERGY STAR

- Started in 1992; Voluntary program
- GOAL: Reduce greenhouse gas (GHG) emissions through large win-win-win opportunities with today's energy efficient technologies and practices
- Achieve 30% savings possible in many buildings, homes, and facilities
- Provide credible information to buyers
- Work with the marketplace to capitalize on motivations of individual actors



Projected GHG Emissions from Key Sectors through 2030



Source: AEO 2008

2011 Program Priorities

- Addressing new challenges and opportunities
  - Third-party certification across all product types
  - Verification program
- Maintaining strong brand is priority
  - More frequent reviews / updates to ENERGY STAR criteria
    - Appliances to be reviewed at a minimum every 3 years OR when market share for ENERGY STAR qualifying products reaches about 35%
    - Consumer electronics will be updated about every 2 years, including the use of out-year criteria that anticipate improved efficiency based on market trends
- Rolling out Top Tier
- Engaging with consumers via social media campaigns
- Reinforcing international partnerships

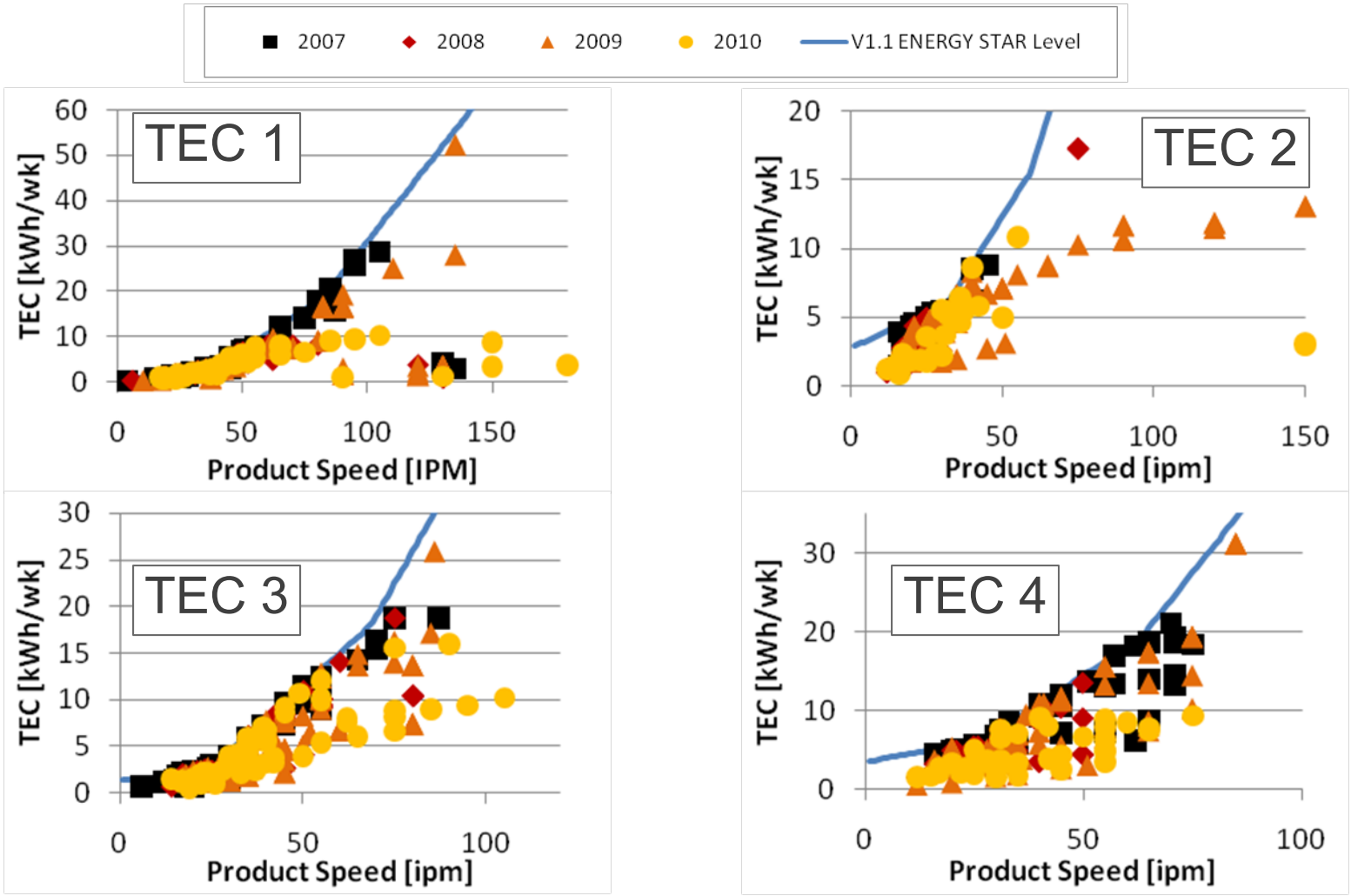
Current Specification

- For office equipment, specifications (new and revised) are developed jointly between EPA and the European Commission
- Version 1.1 ENERGY STAR specification for imaging equipment was published on October 1, 2008, and became effective on July 1, 2009
  - Version 1.2 was published on January 1, 2011, to incorporate ENERGY STAR Third-party Certification requirements and other necessary changes
- The current list of products includes Printers, Copiers, Digital Duplicators, Fax Machines, Mailing Machines, Scanners, and Multi-function Devices (MFDs)

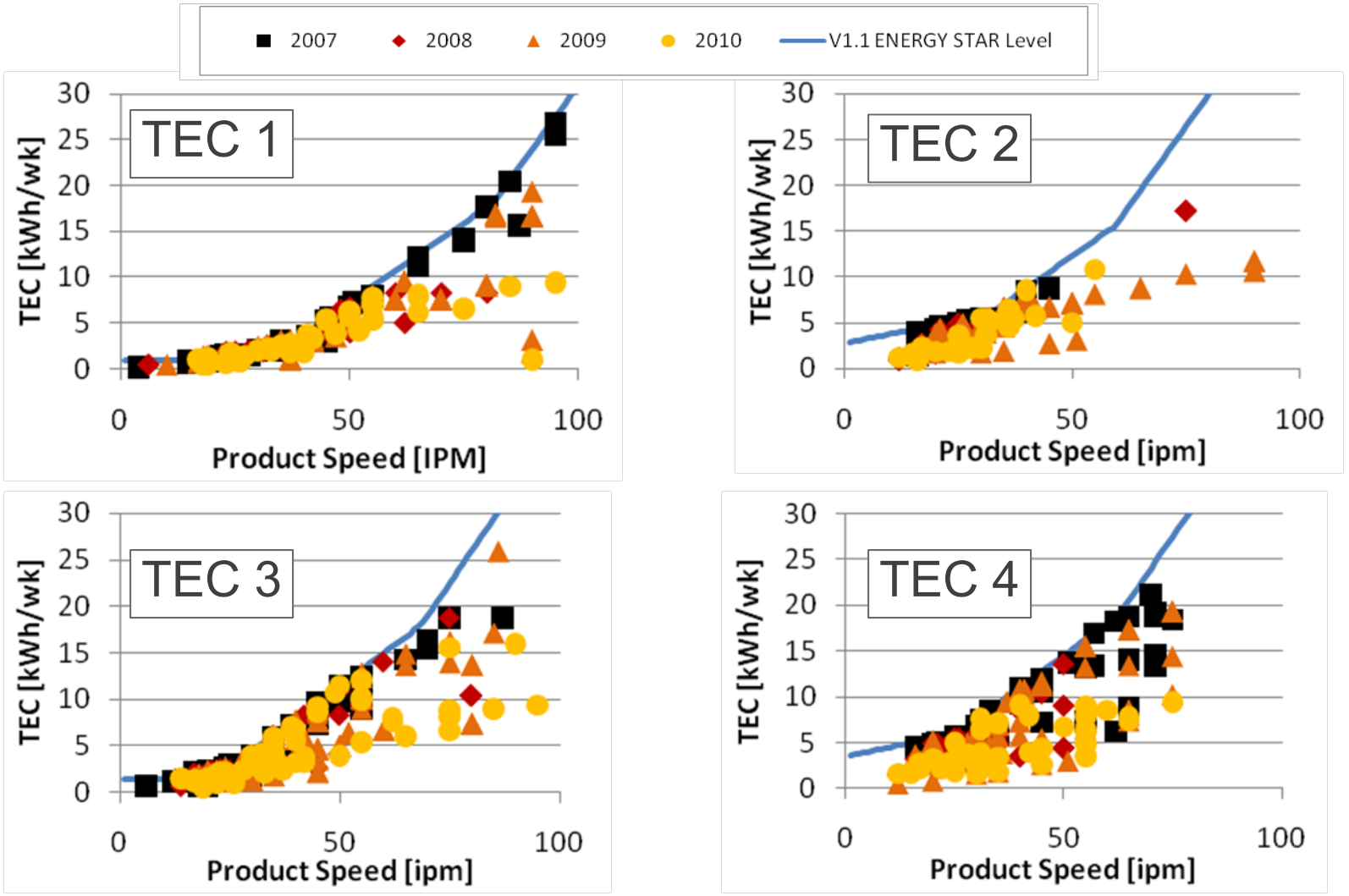
Current Market penetration

- High market penetration in 2009
  - 47% for MFDs
  - 67% for printers
  - 78% for copiers
  - 97% for scanners
  - But only 7% for fax machines
- Significant energy savings for revising specifications for TEC printers and MFDs
  - 51 kWh/year average per-unit savings
  - 380 GWh/year cumulative savings

TEC Qualified Models by Year



TEC Qualified Models by Year



Anticipated Timeline

- Timeline may be adjusted depending on any major changes to test methods:

Framework Document Published	March 11, 2011
Deadline for Written Comments on Scope and Test Method Issues	April 1, 2011
Imaging Equipment Webinar	April 13, 2011
Revision of Test Method (If Necessary)	Q2 2011
Dataset Assembly In Accordance with New Test Method (If Necessary)	Q2–Q3 2011
Draft 1 Version 2.0 Specification and Stakeholder In-Person Meeting	Q3 2011
Additional Draft Version 2.0 Specifications and Stakeholder Webinars	Q4 2011
Final Version 2.0 Specification	Q4 2011
Version 2.0 Specification Effective	Q3 2012

Framework Document

- EPA launched the specification revision by publishing a discussion document
  - Identified test method questions/issues
  - Highlighted many questions received since Version 1.1 went into effect
    - Questions posed by partners, certification bodies, others
- Comment period ended 4/1/11
  - Received 11 sets of comments

Issue 1: Non-Qualified Models

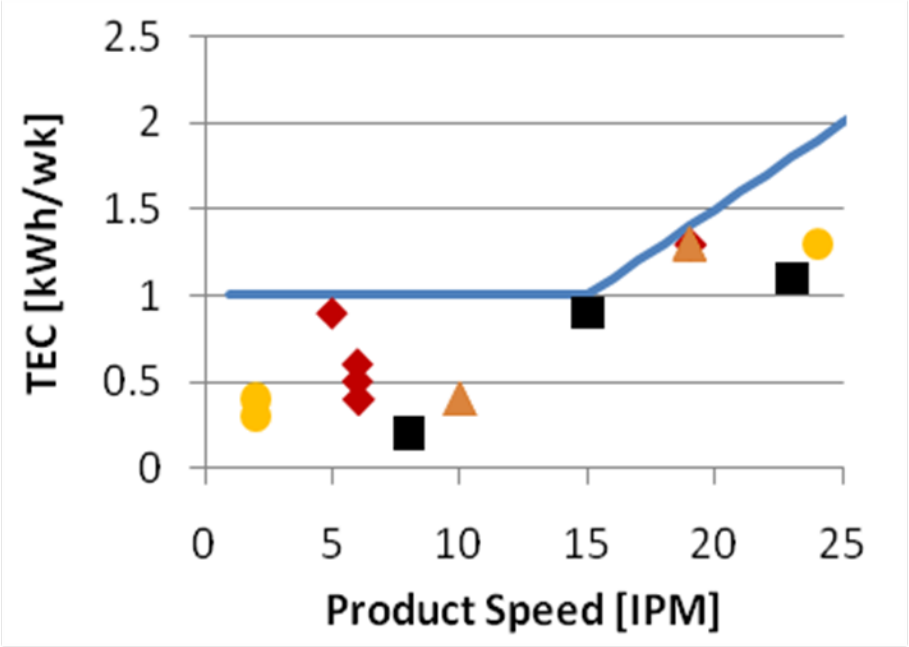
- EPA seeks to expand its data set to include current non-qualified models
  - Improve energy savings estimate
  - Help set revised specification levels
  - Complement shipment / market penetration numbers (only half the story)
- To date, EPA has received limited data from 3 manufacturers
- Spec development is a data-driven process,
  - Lacking new data from mfrs., EPA will rely on qualified product data and catalog information

Issues 2 & 3: Faxes and Scanners

- Very low market penetration of fax machines (7%)
- Very high market penetration of scanners (97%)
  - Latest draft of the Industry Voluntary Agreement of Lot 4 EuP directive does not include these equipment types
  - Does the ENERGY STAR label provide differentiation in the market for these two types?
  - What could be some consequences of removing these equipment types from the program?

Issues 2 & 3 - Fax Machines

- Manufacturers are not releasing new fax models—only MFDs
- Options (from comments):
  - Suggest separate category
  - Remove standby requirement
  - Remove from scope



Issues 2 & 3 - Scanners

- Several commenters asked that scanners be included despite low shipments:
  - In particular, large format and high-quality graphics scanners
  - May be subject to government procurement policies

- Others expressed support for removing scanners from the specification

Issue 4 - Comments

- Suggested removing copiers as they have reached maximum possible efficiency and are now being mostly offered as part of an MFD

- Several noted that all products should stay within the scope due to government procurement policies

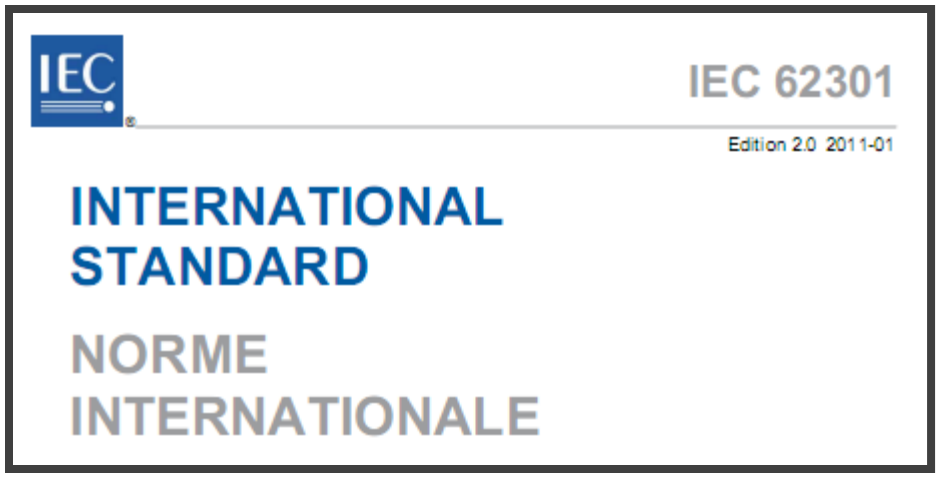
Issues 5 & 6: New Product Types for Potential Inclusion

- New products:
  - High-performance ink jet (IJ) printers with width ≤ 8 inches (small format)
    - Contrast with standard format high-performance ink jet (included in scope)
  - Impact MFDs

- EPA needs current and potential market and performance data on these new product types, if there is interest in including them

Issue 8: IEC Standard 62301 Ed. 2.0

- The International Electrotechnical Commission (IEC) recently published Ed. 2.0 of IEC standard 62301 “Household Electrical Appliances – Measurement of Standby Power.”
  - Commenters expressed concern with definitions
  - E.g., Standby is now Off Mode in Ed. 2.0



Issue 8 - Comments

- Doubted that IEC standard could improve test method
  - Low-power testing of imaging already well-developed
- Proposed modifications to the test method in light of IEC standard include:
  - Measurement uncertainty and frequency limits
  - Power measurement methods (sampling, averaging, or direct meter reading, depending on on conditions)
- Any specific problems with referencing Ed. 2.0?

Issue 9: Energy Consumption of Color Printing

- Color TEC products are becoming more popular
  - Impact of color printing was evaluated in 2005
  - Test image was a text document modified to include color—what about images?
- Stakeholders commented that fusing process is the same for monochrome and parallel color devices (dominant type) with little difference in energy consumption

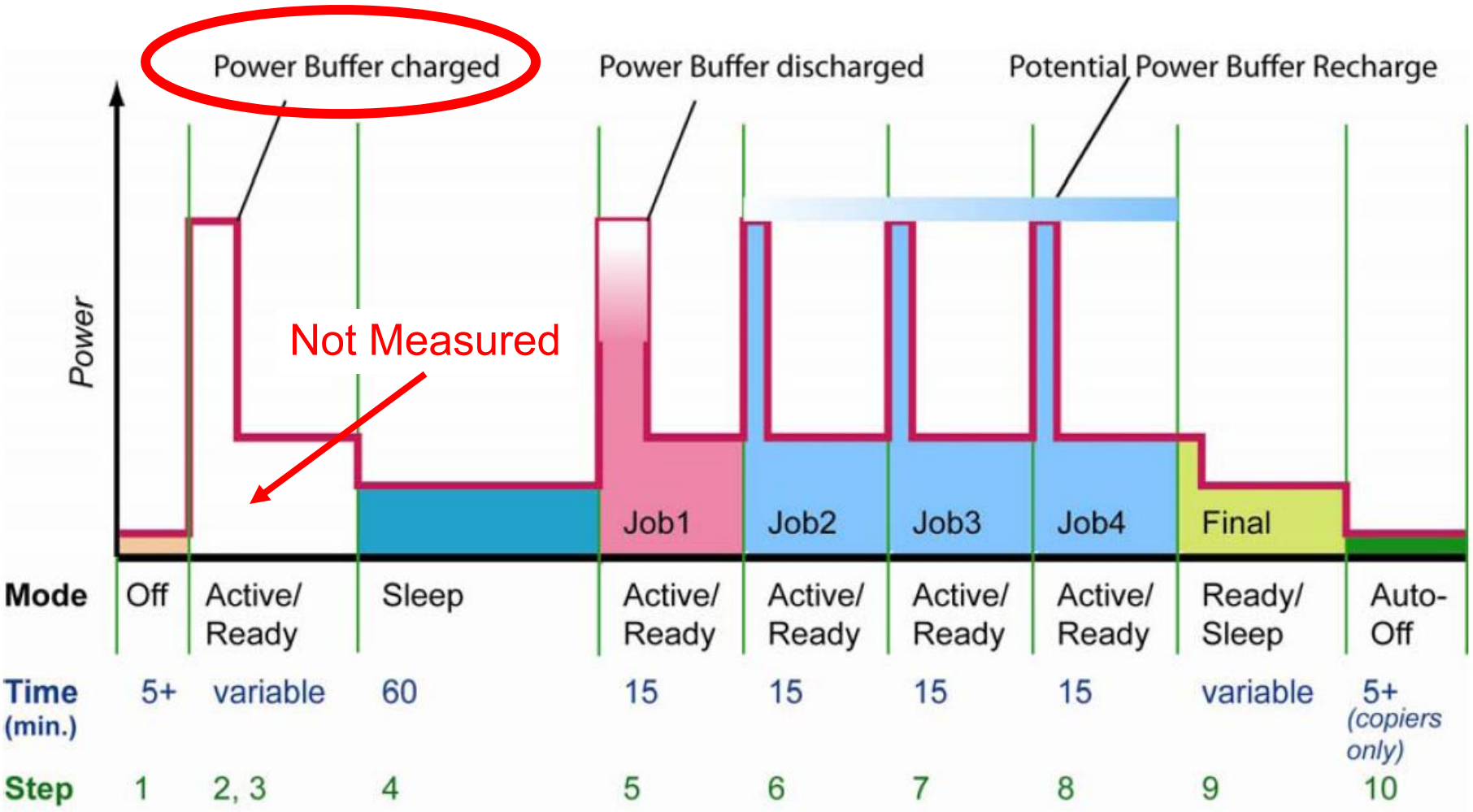
Issue 10: Prevalence of Color v. Monochrome printing

- Shipments of color printers have surpassed monochrome
- Energy consumption might still be impacted by color images
  - Color usage and image density remains low
    - Commenters recommend continuing to use text as test image

Issue 11: Energy Storage in a Power Buffer

- Possible to store energy in a “Power Buffer” prior to Job 1 during TEC test
  - Energy consumed would not be measured
  - Could be used later in the test, potentially leading to lower apparent energy consumption

Issue 11 (cont.)



Issue 11 - Comments

- Several were skeptical of the power buffer
  - Current test methods and third-party certification is sufficient
- Not prevalent in the market and is only expected to decline
  - Nonetheless, some concerned about accounting for all energy consumed

Issue 12: Print Driver Settings

- Driver settings are currently unspecified
  - Could be changed to decrease printing time, thereby decreasing the measured energy use
- Stakeholders generally commented that current “as shipped” rules are sufficient
  - Nonetheless, could be specified explicitly (current rules apply only to device)
  - Specify simplex, default quality, etc.
- Suggest use “drivers installed as shipped”

Issue 13: Additional Test Method Edits

- The TEC test method requires measurements of both energy and time in sleep and auto-off modes
  - Values are later used in the specification to calculate power

$$TEC = 5 \times \left[E_{JOB\_DAILY} + (2 \times E_{FINAL}) + \left[24 - (N_{JOBS} \times 0.25) - (2 \times t_{FINAL}) \right] \times \frac{E_{AUTO}}{t_{AUTO}} \right] + 48 \times \frac{E_{AUTO}}{t_{AUTO}},$$

  - May be simpler to measure the power directly, if stable (e.g., per IEC 62301)

Issue 13 - Comments

- TEC products with duplexing capability should be tested in duplex mode
- Several acknowledged the ambiguity in waiting for a unit to enter the final sleep mode and suggested:
  - Specifying the power level of the final sleep mode, or
  - Using the declared default delay time to stop the measurement

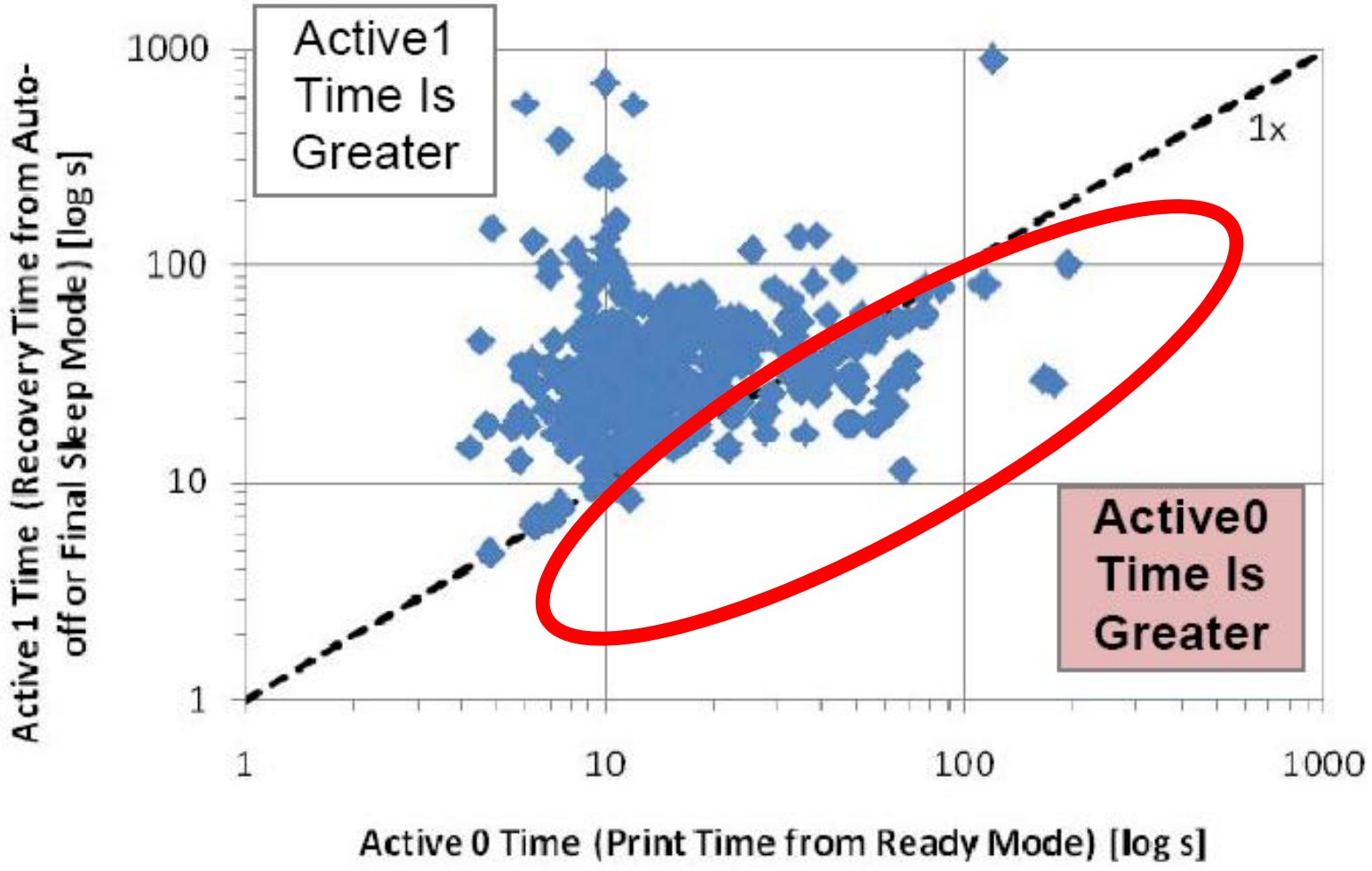
Issue 13 - Comments

- Off Mode should be measured after a user has manually switched off the device
  - Measuring right at plug-in may capture initialization activities
- Clarify Default Delay Time definition
- Measure Sleep and Fax Modes for TEC products

Issue 14: TEC Assumptions

- TEC usage assumptions may be too intensive and not representative of actual paper usage and energy consumption
- Commenters noted:
  - Modifying the TEC usage profile would invalidate existing data without providing a more accurate representation of usage
  - Developing a more accurate usage profile could be time intensive and add little additional value

Issue 15: Recovery Time Discrepancy



Issue 15 - Comments

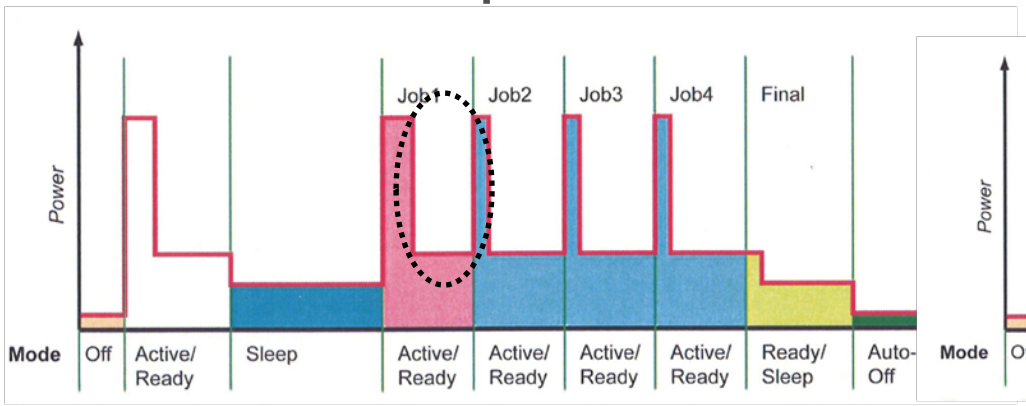
- Apparent discrepancy between Active1 time and Active0 time
  - [Active1 time (print time from sleep) should always be greater]
  - Some acknowledged ambiguities in the test method
  - Others disagreed or suggested individual intervention rather than test method changes are needed
- Curious about relationship btw. recovery time and energy consumption

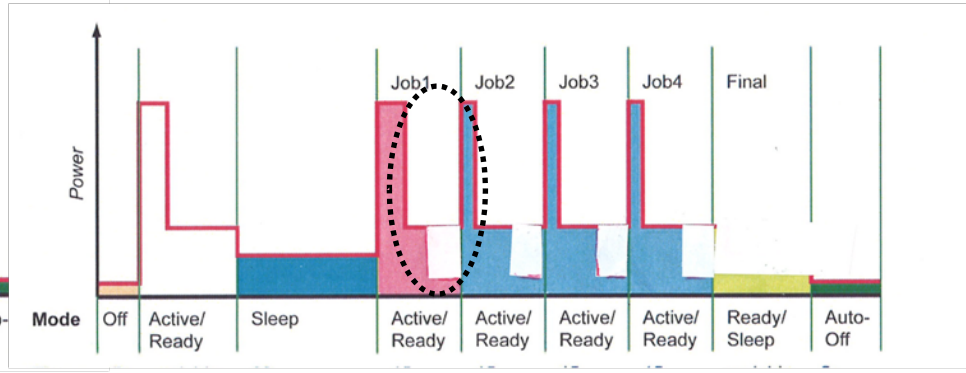
Issue 16: Recovery Time for OM Products

- EPA interested in similar measurement of Active1 time and Active0 time for large and small format MFDs/printers/copiers covered under OM
- Commenters noted
  - Irrelevant to non-EP OM products
    - (No heater = No recovery time issues)
  - Alternatively, copiers and large non-ink jet devices may benefit from this measurement

Issue 17: Recovery Time Requirements

- EPA received comments on setting a specific maximum recovery time and a default recovery time:
  - Need supporting data to justify the energy savings associated with specifying a recovery time requirement



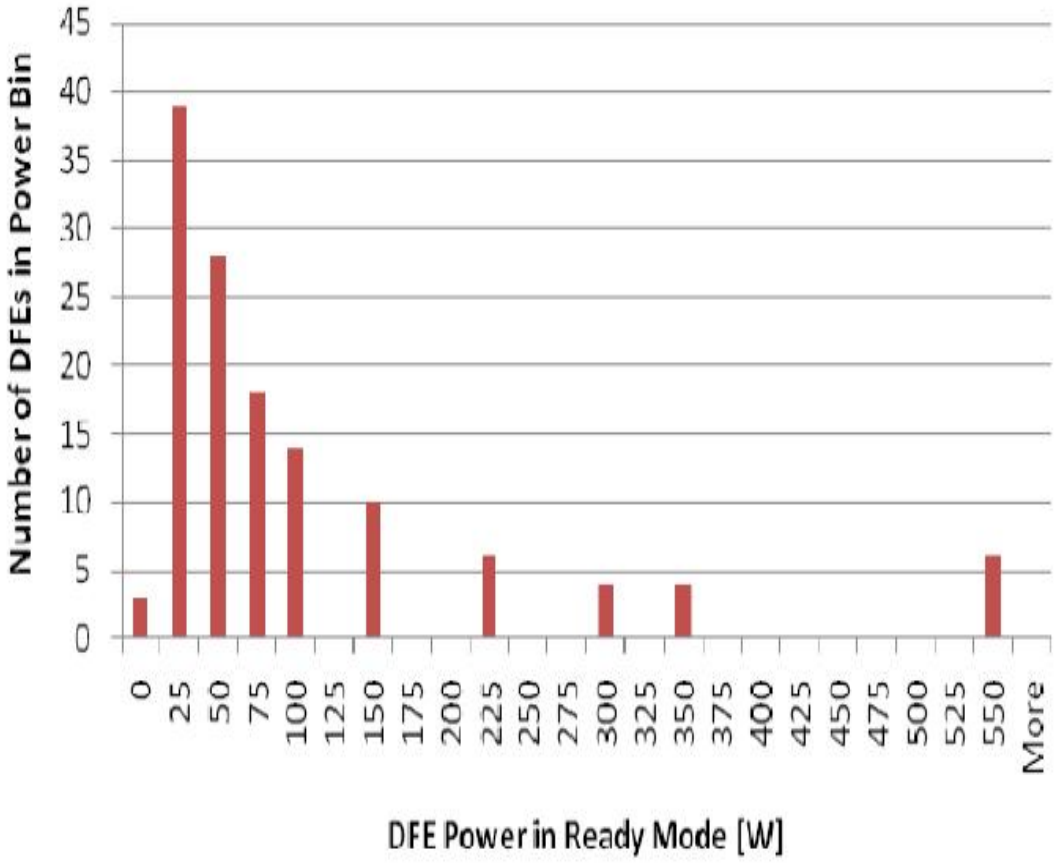


Issue 17 - Comments

- Recovery time depends on manufacturers' patented technologies and should therefore not be standardized
- Specifying recovery time may over-constrain TEC measurement
- Manufacturers can already ensure user satisfaction—no need to specify recovery time
  - Others disagree

Issue 18: Digital Front End (DFE) Energy Consumption

Figure 5: Distribution of DFE power in Ready Mode for ENERGY STAR qualified products.



Issue 18 (cont.)

- Options for reducing DFE energy consumption:
  - Qualification as a server or small-scale server
  - Treating as functional adders
  - Incenting or requiring a sleep mode for DFEs
  - Considering the DFE an integral component of imaging product
- Manufacturers commented that DFEs differ from other computers and servers
  - Disagree on best approach from above

Issue 18 (cont.)

- Reducing sleep mode energy
  - DFEs already matched to capabilities of imaging product—not much time spent in active mode outside of printing
  - Goal is to enter sleep mode immediately and remain there
- Could be enabled by efficient networking
  - ECMA-393 ProxZzzy and IEEE 802.3az standards
  - Concerns that components are unavailable

Issue 19: Number of Network Connections

- New certification and verification program requires clarity on number, order, and activity of network connections
  - Impact energy consumption

- EPA proposed specifying that only one network/data connection be used during testing
- Although some commenters agreed that such a change would remove ambiguity, others noted:
  - It should remain at the manufacturers' discretion
  - It would not be reflective of reality (E.g., multiple PCs connected over the network)

Issue 20: Order of Network Connections

- Specifying the type of network connection used during testing, in order of preference
  - (E.g., USB, Ethernet, WiFi, other wired, other wireless)
- Some commenters supported a specific order (dependent on application)
- Others promoted manufacturer discretion
  - Potential compromise could involve testing highest-power interface, as specified by mfr.

Issue 21: Network Activity

- EPA also welcomes comment on specifying network activity during testing
  - As network activity may affect device energy consumption, specifying this would improve repeatability and representativeness

Issue 21 - Comments

- Some commenters were opposed
  - Too difficult to specify
  - Requires revisions as network standards are revised
- One commenter was supportive
  - “Send an SNMP packet at least once every 10 minutes” through a network-connected PC

Issue 22: Connection to Telephone Line

- EPA welcomes comment on specifying that any fax function, if available, be enabled and connected to the phone line during testing
  - Fax Machines
  - MFDs
- Two stakeholders opposed to requiring connection to the telephone line
  - Would not significantly alter energy consumption

Issue 23: Default Delay Time to Sleep for TEC Products

- EPA only specifies default delay time to sleep for OM products
  - Should delay times be measured/specified for TEC products?
- Most commenters concerned with over-constraining:
  - Specifying both total kWh and modal limits (delay times)
  - Also, delay time measurement would impose additional burden—just require declaration

Issue 25: Testing Some OM Products in Active Mode

- Proposal to apply the TEC test method or on-mode measurement to some OM products that spend significant time in active mode
  - (E.g., receipt printers, ink jet printers for business)
- One commenter in favor; others opposed
  - One commenter noted that products without heaters (i.e., non-EP) would not benefit from active mode testing
  - Neither would most large-format devices
  - Should only be implemented for applications with standardized usage

Issue 26: Life Cycle Analyses

- EPA seeks clarification on sources of high GHG emissions in the imaging equipment life cycle and supporting data
- One commenter noted impacts of paper use on the life-cycle energy consumption of imaging equipment
  - Greater than electricity use, materials, or consumables

All ENERGY STAR Products Screened

- Economic Input-Output Life Cycle Assessment (EIO LCA) method performed on all ENERGY STAR product categories
  - Maps economic data against environmental data for industries to estimate GHG emissions associated with products during specific stages of lifecycle.
  - Based on Comprehensive Env. Data Archive (CEDA)
- Case by case, check unintended consequences (e.g. from incandescent to fluorescent/SSL)
- Flag products for additional analysis
- Also include end of life GHG emissions for select products (outside the scope of EIO LCA method)

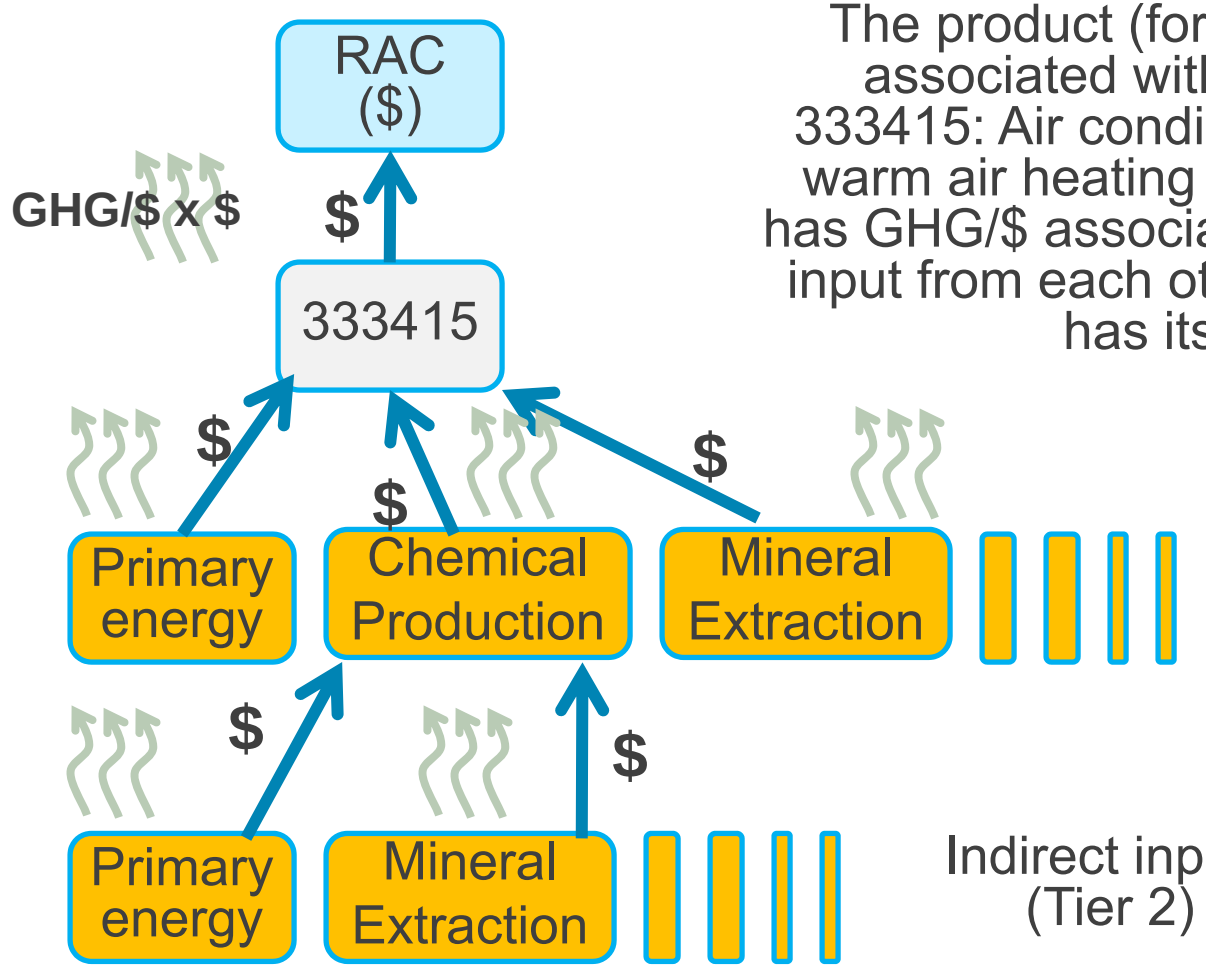
EIO Background

- Takes an aggregate view of economic sectors producing all goods and services in the U.S.
  - Relies on U.S. Department of Commerce input-output table that divides U.S. economy into 500 sectors
  - Calculates production from each sector that goes into each other sector ($ per $)
  - Final output (to consumers) from a sector can then be used to calculate inputs from every economic sector
- Advantages: Avoids the need to draw boundaries since it covers the entire economy; cheap and quick; relies on publically available data
- Disadvantages: Product assessments contain aggregate data, need to link monetary values with physical values, data issues (e.g., incomplete, aggregated, imports may not be current)

More about EIO

- Researchers (e.g. Sangwon Suh) calculate GHG intensity (GHG/$) of each sector
- Final production in a given sector can then also be used to calculate total emissions
  - Can be used to estimate relative contributions to an “average” product
  - More expensive products automatically emit more, which may not reflect reality

EIO LCA (pictorial)



The product (for instance, a room AC) is associated with a sector, in this case 333415: Air conditioning, refrigeration, and warm air heating equipment. Each sector has GHG/$ associated with it. It also has $/$ input from each other sector, each of which has its own GHG/$.

Direct inputs

Indirect inputs (Tier 2)

Indirect inputs (Tier 3,4,5,…)

The EIO tables allow direct inputs and indirect inputs (full depth) information.

Issue 26 - Comments

- Majority of commenters were opposed to LCA:
  - Expensive and burdensome
  - Distracts from ENERGY STAR brand
  - Large margin of error/uncertainty
  - Lack of standards governing LCA
- Similarly, stakeholders commented that ENERGY STAR should not cover substance restrictions / toxicity

Conclusion and Next Steps

- EPA will carefully weigh the potential benefit of any changes to the test method
  - Aware that significant changes will incur retesting burden
  - Will ensure any changes provide a net benefit

- Potential revised draft test method published in May
  - Followed by a webinar/meeting
- Otherwise, Draft 1 specification in June–July

Contact Information

- Please send any additional comments to imagingequipment@energystar.gov or contact:

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