



ENERGY STAR Imaging Equipment Specification Revision

Stakeholder Meeting

October 14, 2005

Washington, DC

Meeting Goals



- Ensure manufacturers are on schedule to complete TEC testing by November 1
- Share initial EPA conclusions from TEC and OM data submitted
- Discuss how specification limits will be developed
- Share EPA's initial thoughts on comments received on Draft 1. Explain how additional rationale will be conveyed
- Gain feedback on key topics to reach resolution
- Convey next steps and timeline

Completing the IE Spec.



| | |
|--|----------------------|
| Industry meeting | October 14 |
| <i>Industry tests to TEC</i> | |
| TEC data due | November 1 |
| <i>EPA reviews TEC data</i> | |
| Draft 2 published | December |
| <i>Industry reviews Draft 2</i> | |
| Industry meeting | Jan. or Feb. 2006 |
| Draft 2 comments due | February 2006 |
| <i>EPA reviews comments, finalizes spec.</i> | |
| Final spec. published | March 1, 2006 |
| Spec. effective | March 1, 2007 |



Typical Electricity Consumption (TEC) Data

TEC Data — TEC History



Test Procedure

- Close to final since April 15, 2005.
- Final since July 11, 2005.
- “Complete” data set for specification development due by November 1, 2005.

Reminder: Be sure to use Final version of spreadsheet (including Active times; no Job5)

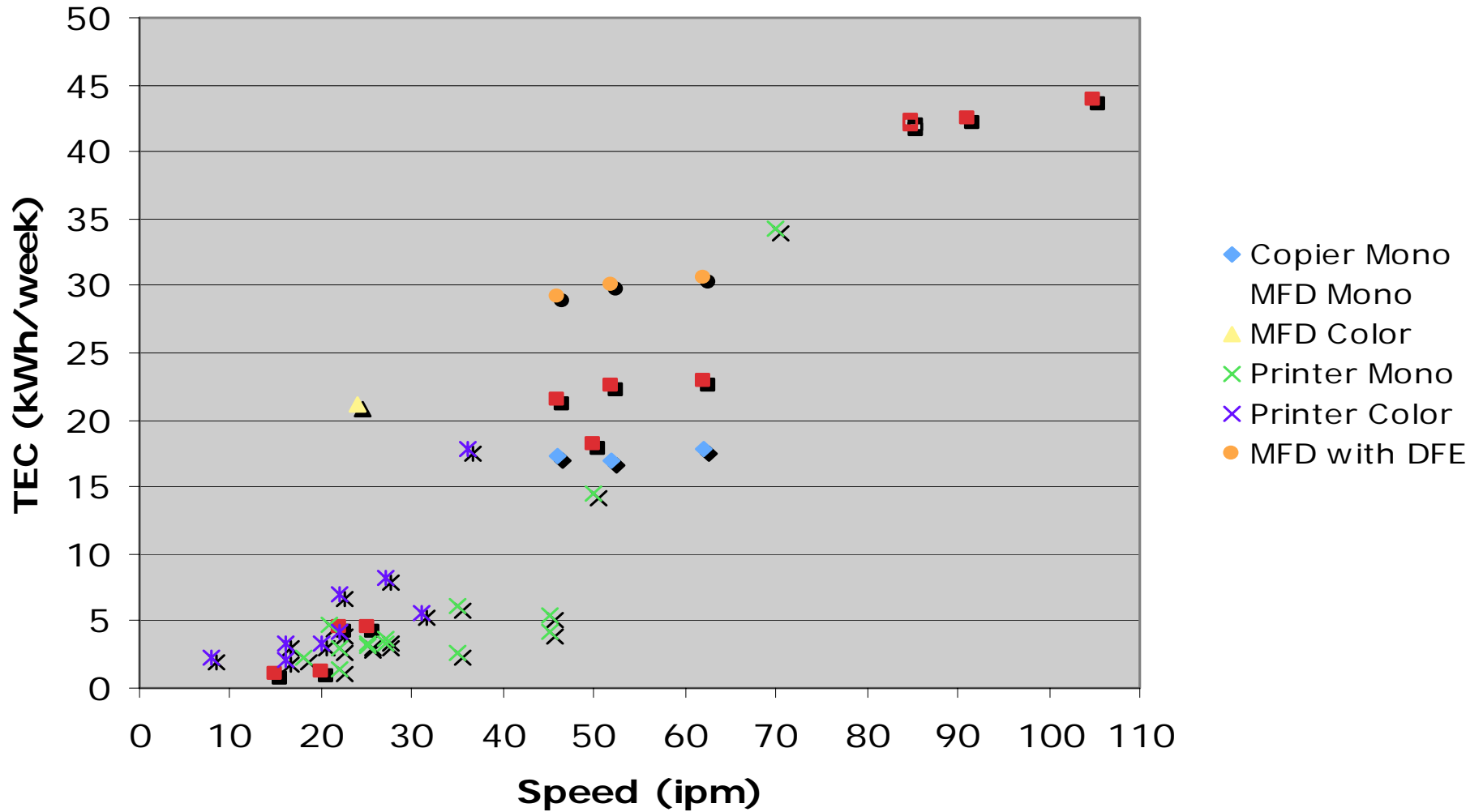
TEC Data — Data Overview



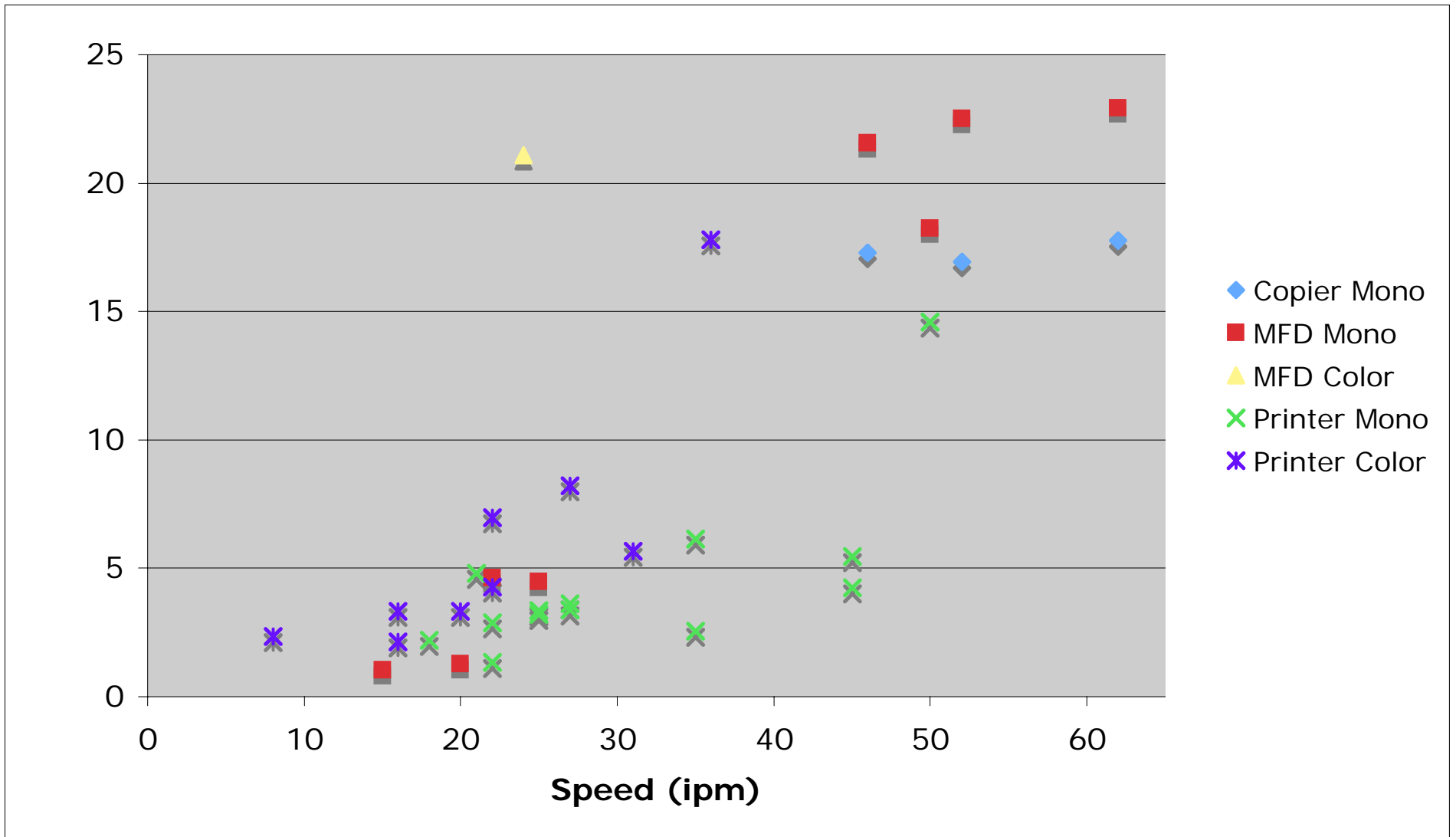
Data received to date

- 4 Manufacturers
- 39 (42) products
 - 3 Copiers (plus 3 MFDs with external DFE)
 - 12 Mono MFDs
 - 1 Color MFD
 - 14 Mono printers
 - 9 Color printers

TEC vs Speed — All Data



TEC vs Speed — Excerpt



TEC vs Speed — Observations



- Current data too sparse to draw quantitative conclusions
- Overall distribution consistent with expectations
 - Within each product type, trend is roughly linear
 - Color > Mono
 - MFDs > Printers, MFD > Copiers
- One straight line for spec. level too limiting

TEC — Job Stability

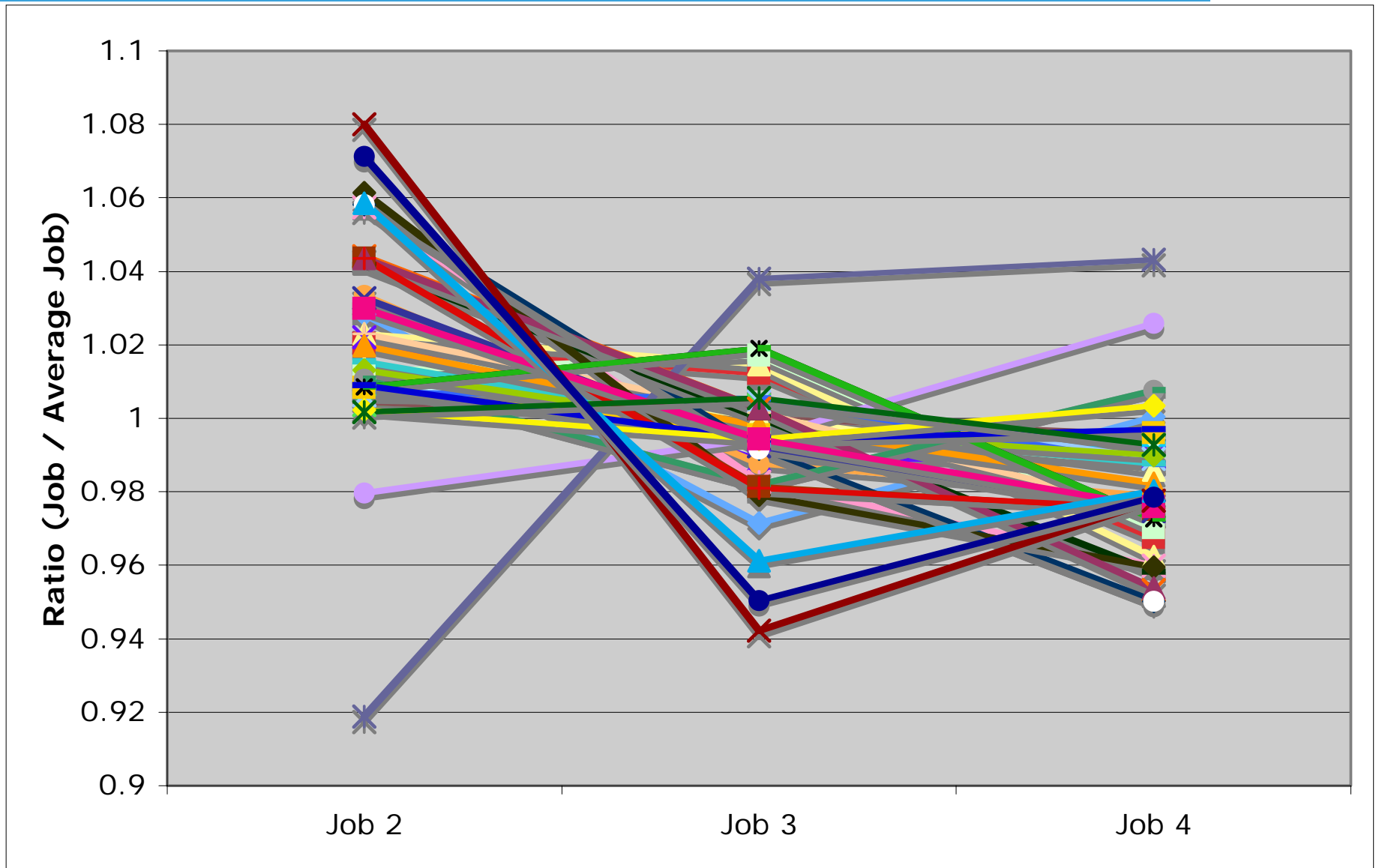


“ Reliability of Jobs 2, 3, 4 as indicator of all jobs other than Job 1”

- For each TEC test, calculated ratio of each job to average of jobs 2, 3, 4
- Averaged ratios across all tests
- Results
 - Job1: 1.54
 - Job2: 1.02 Job3: 0.99 Job4: 0.98

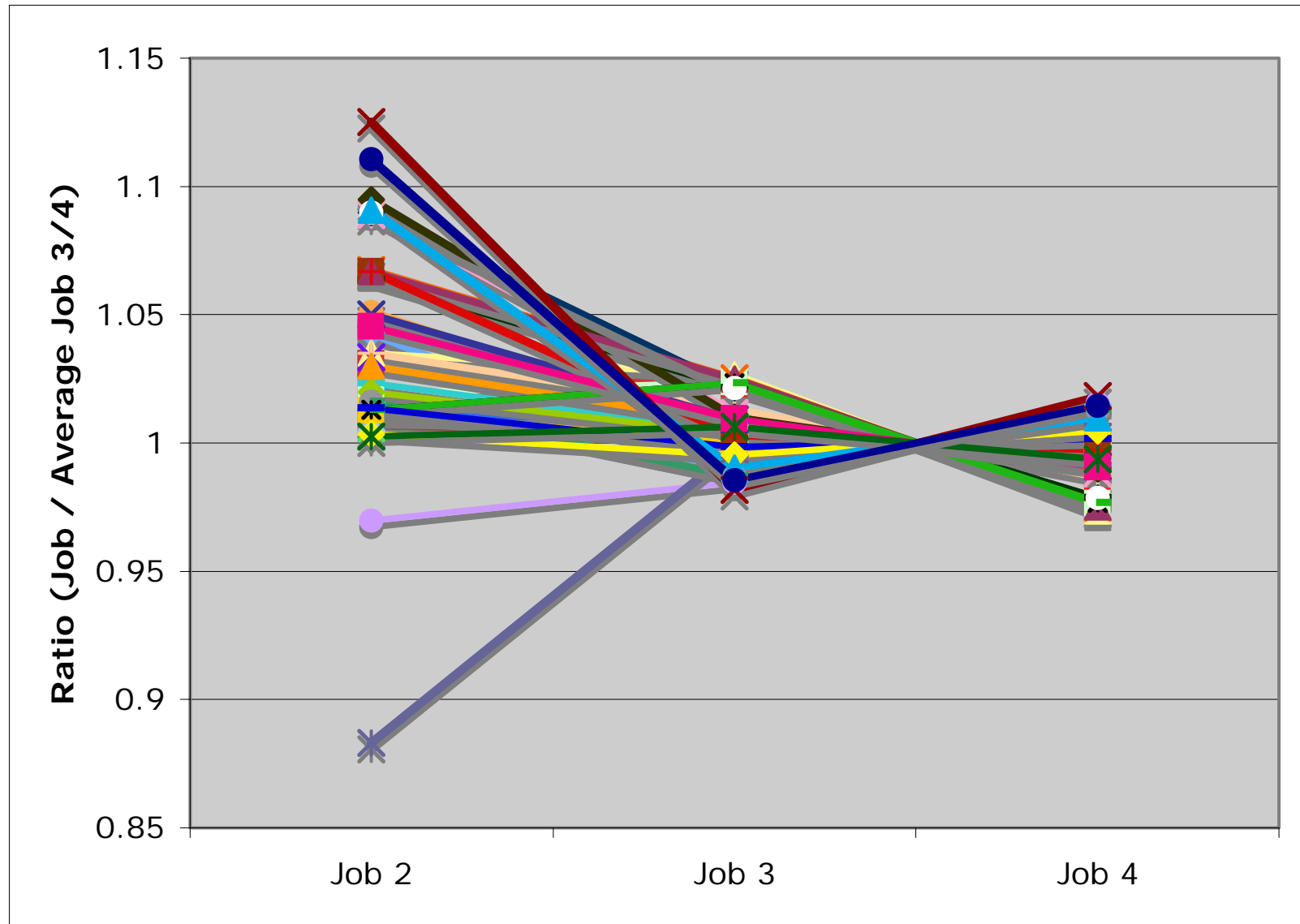
TEC — Job Stability

(norm. to average of 2, 3, and 4)



TEC — Job Stability

(norm. to average of 3 and 4)

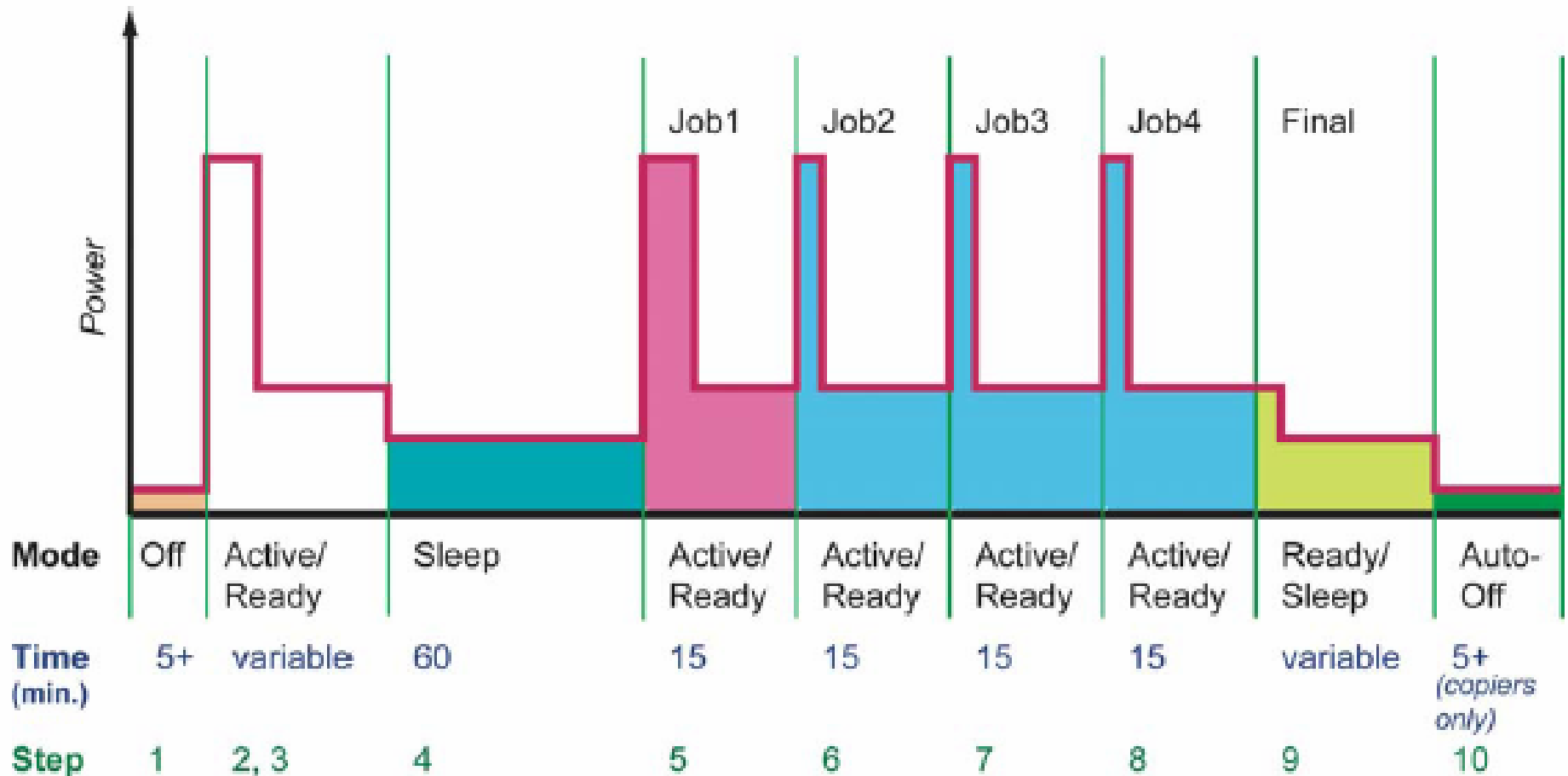


TEC — Job Stability



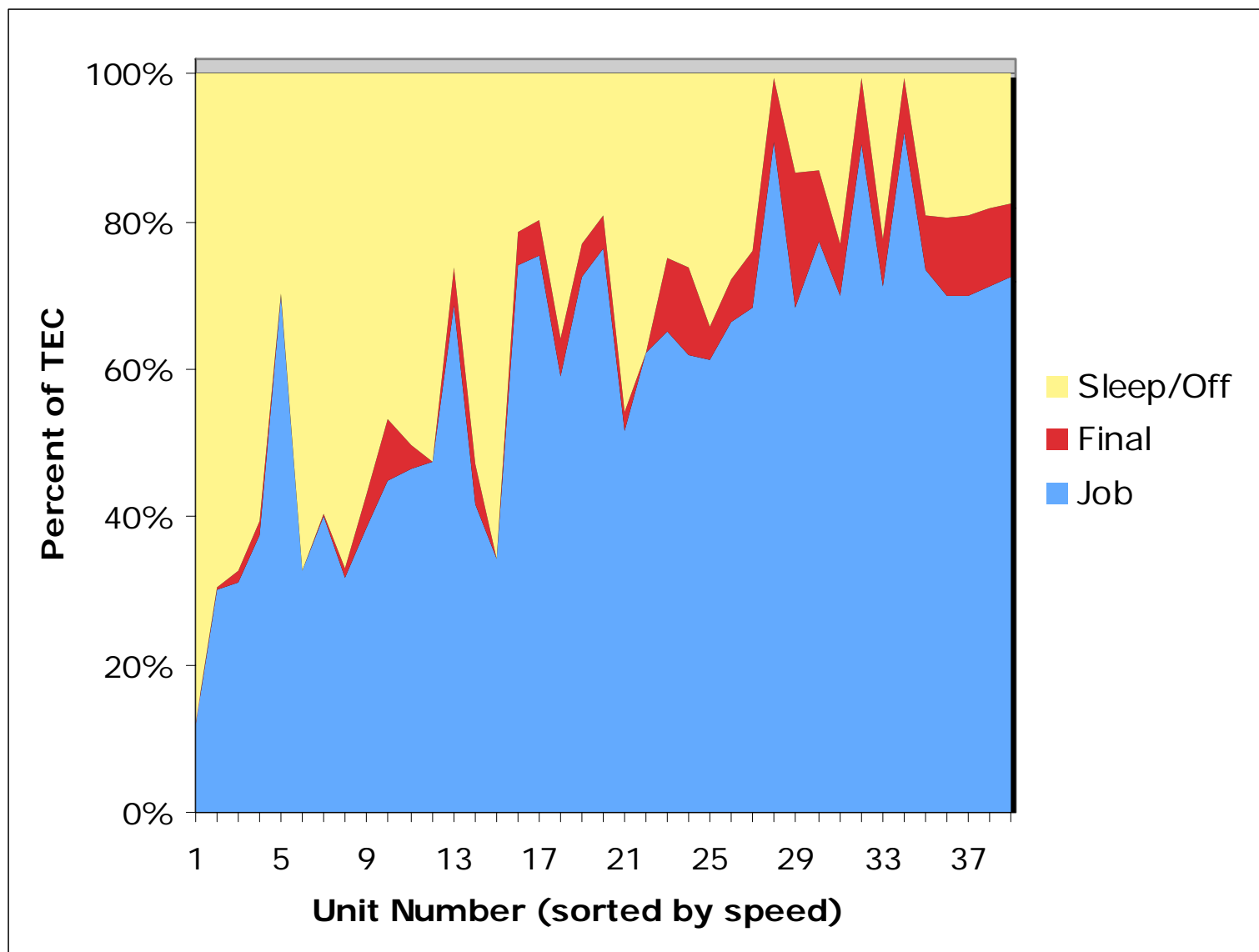
- Data do not show should decrease number of jobs
- Data do not show should increase number of jobs
- 4 Jobs appears to be the right number for test
 - From Job 3 to Job 4, similar # rise as fall
- Potential change to Calculation (not Test)
 - Average jobs 3 and 4, rather than 2, 3, and 4
 - Treat Job 2 as a second initial job

TEC Energy Consumption — Schematic of TEC Measurement



Note: 15-minute job periods may include sleep modes

TEC — Energy Consumption across Modes



TEC Energy Consumption across Modes



Observations

- As expected, job energy rises as % of total with speed
- Above 25 ipm, job energy always >50% of total
- 3 units with nearly no low-power are copiers — all low-power time is Auto-off

Setting TEC Specification Limits



Key Figure of Merit

- TEC — kWh/week
- TEC/image — Wh/image

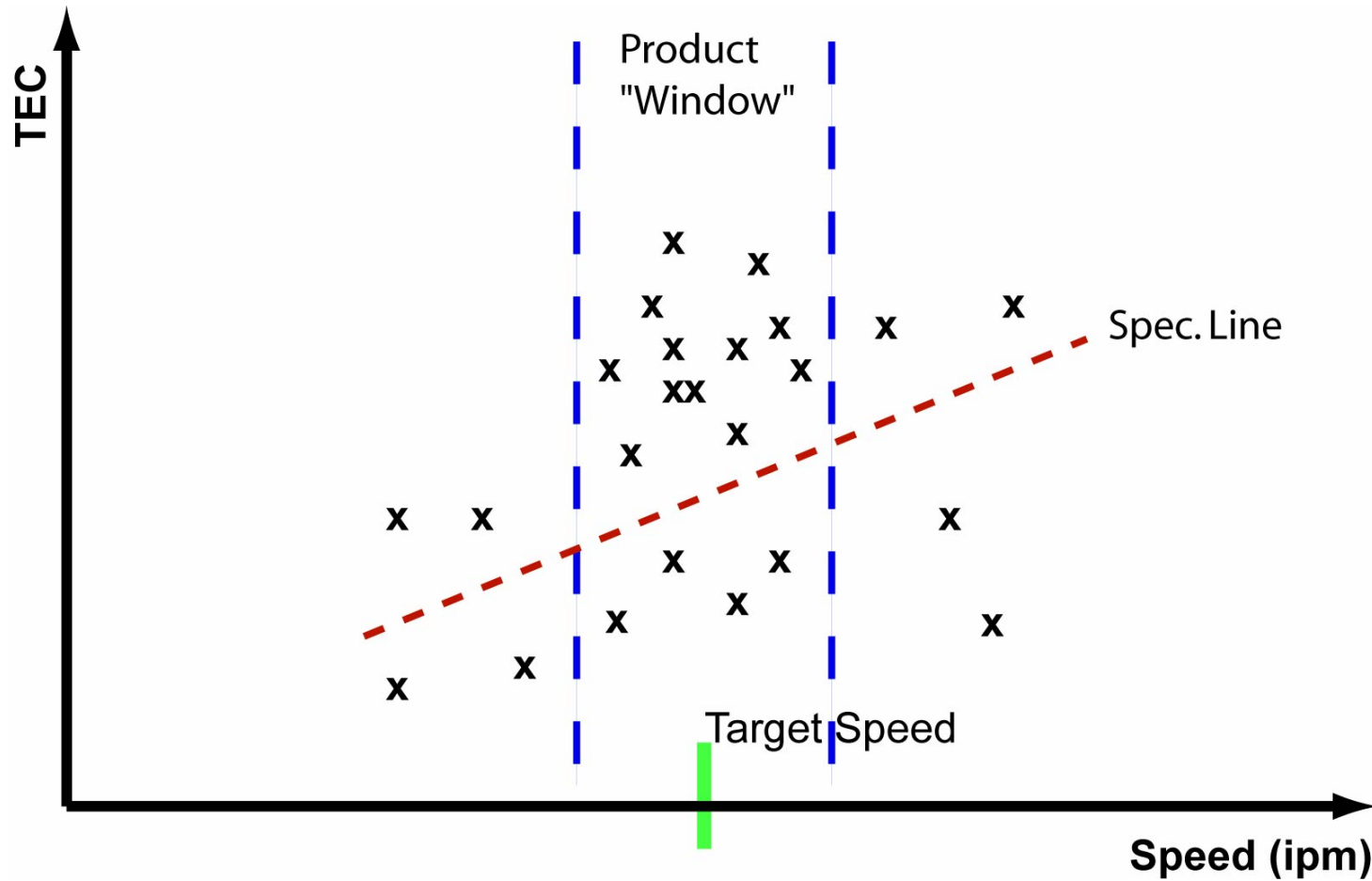
Best expression of spec. line — (simplicity, clarity, fairness)

- Straight lines (1 or more)
- More complex formula (e.g. quadratic)

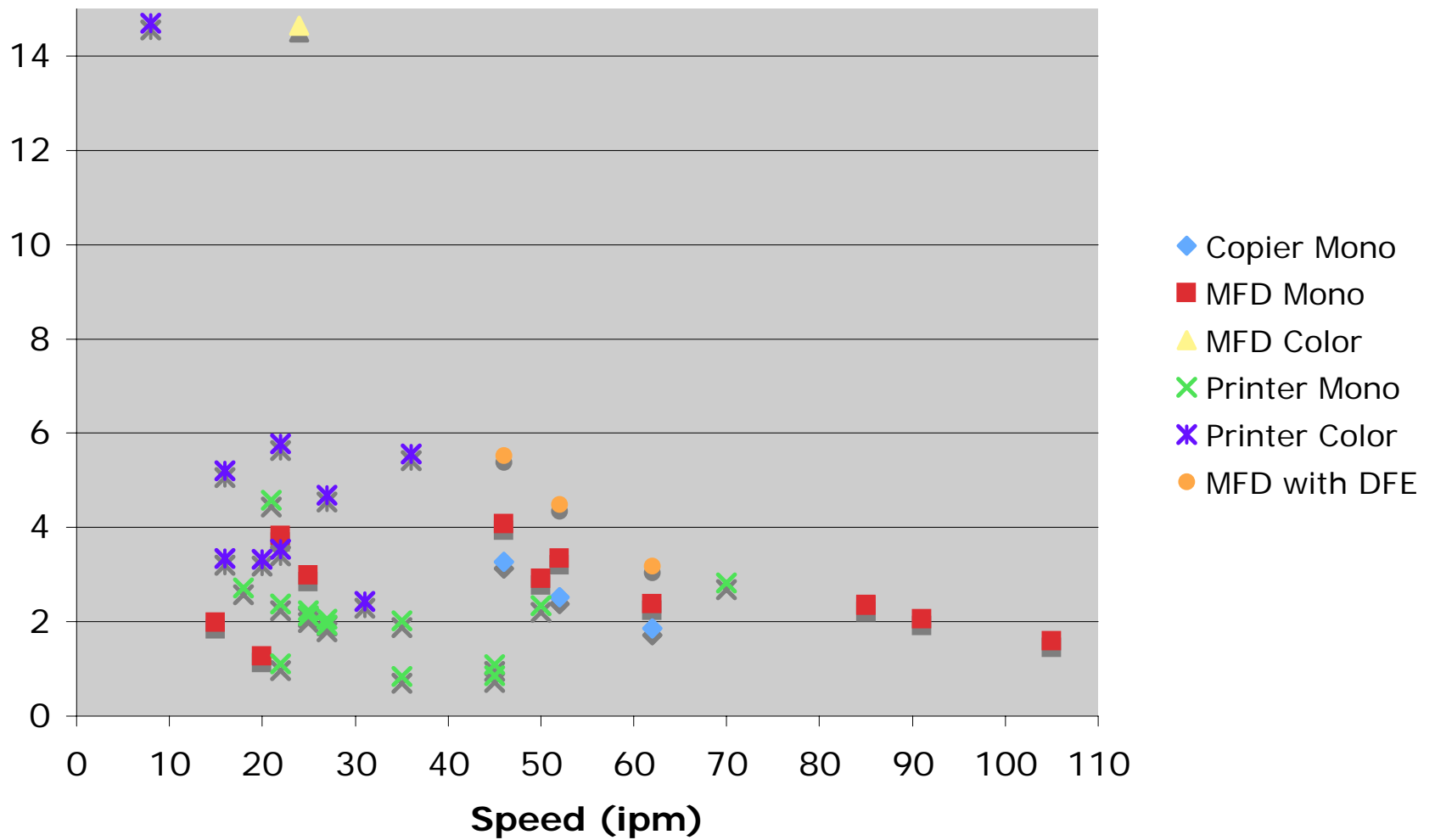
Determining an envelope that must be covered

- 25% of products within what speed bins?

Product "Windows"



TEC — Energy per Image



TEC Unit Accuracy



- Ensures variability falls within a reasonable range of the spec requirements
- Can prevent qualification disputes
- Monitor spec utilizes a range of 15%
- If test results fall within this range, two more units must be tested
- EPA is considering a 10% range and one more test for TEC products

Is this a reasonable approach?



Questions/Concerns?



Operational Mode (OM) Data

Initial Process and Analysis



- Spec levels will be based on qualified and non-qualified product data.
- Initial data sample will include models introduced to the market within the last two years.
- Data initially analyzed according to the categories presented in Draft 1.
- EPA will isolate the top 25% of models with regards to energy consumption for setting the spec.

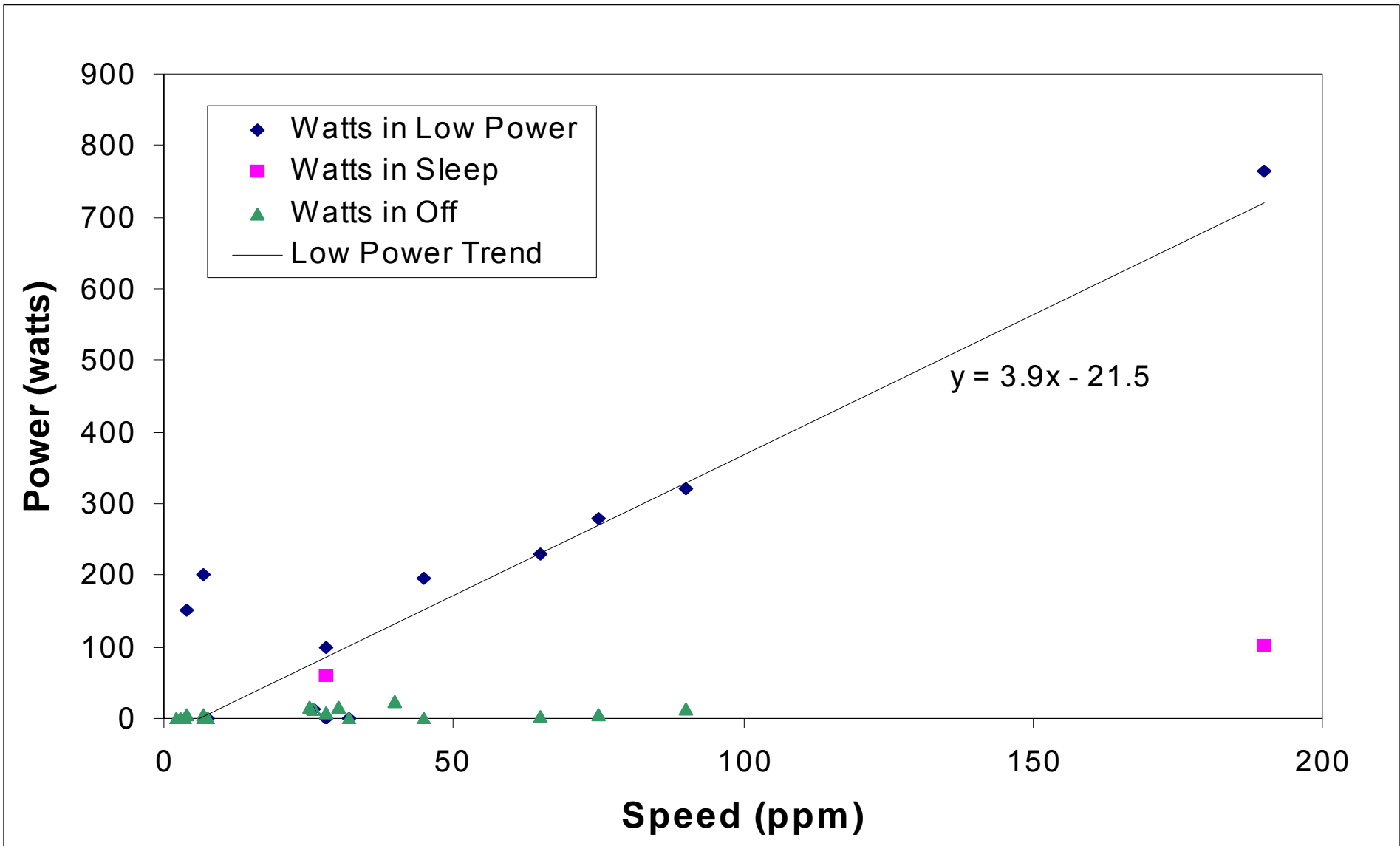
Data Challenges



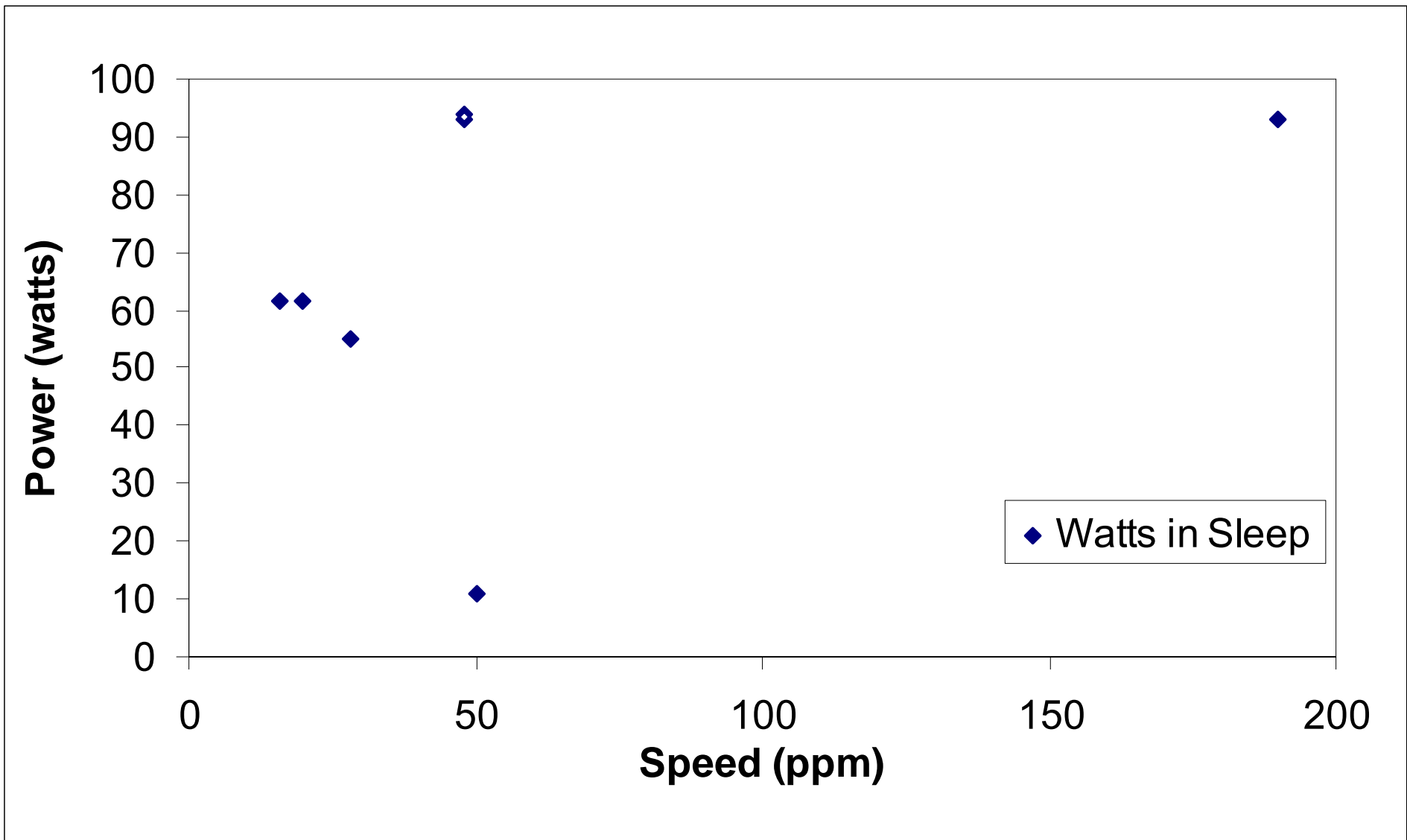
Some categories do not have sufficient data from which to draw meaningful trends:

| | |
|------------|--|
| OM Table 1 | Large Format Copies and MFDs |
| OM Table 3 | Large Format Ink Jet Printers and MFDs |
| OM Table 4 | Mailing Machines |
| OM Table 5 | Continuous Form Printers |
| OM Table 6 | Standard-size, Continuous Form, and Large Format Impact Printers |
| OM Table 7 | Large Format Non-Ink Jet Printers |
| OM Table 8 | Small Format Non-Ink Jet Printers |

OM Table 1: Power vs. Copy Speed for Large Format Copiers and MFDs



OM Table 7: Power vs. Print Speed for Large Format Non-Ink Jet Printers



Data Challenges, Continued



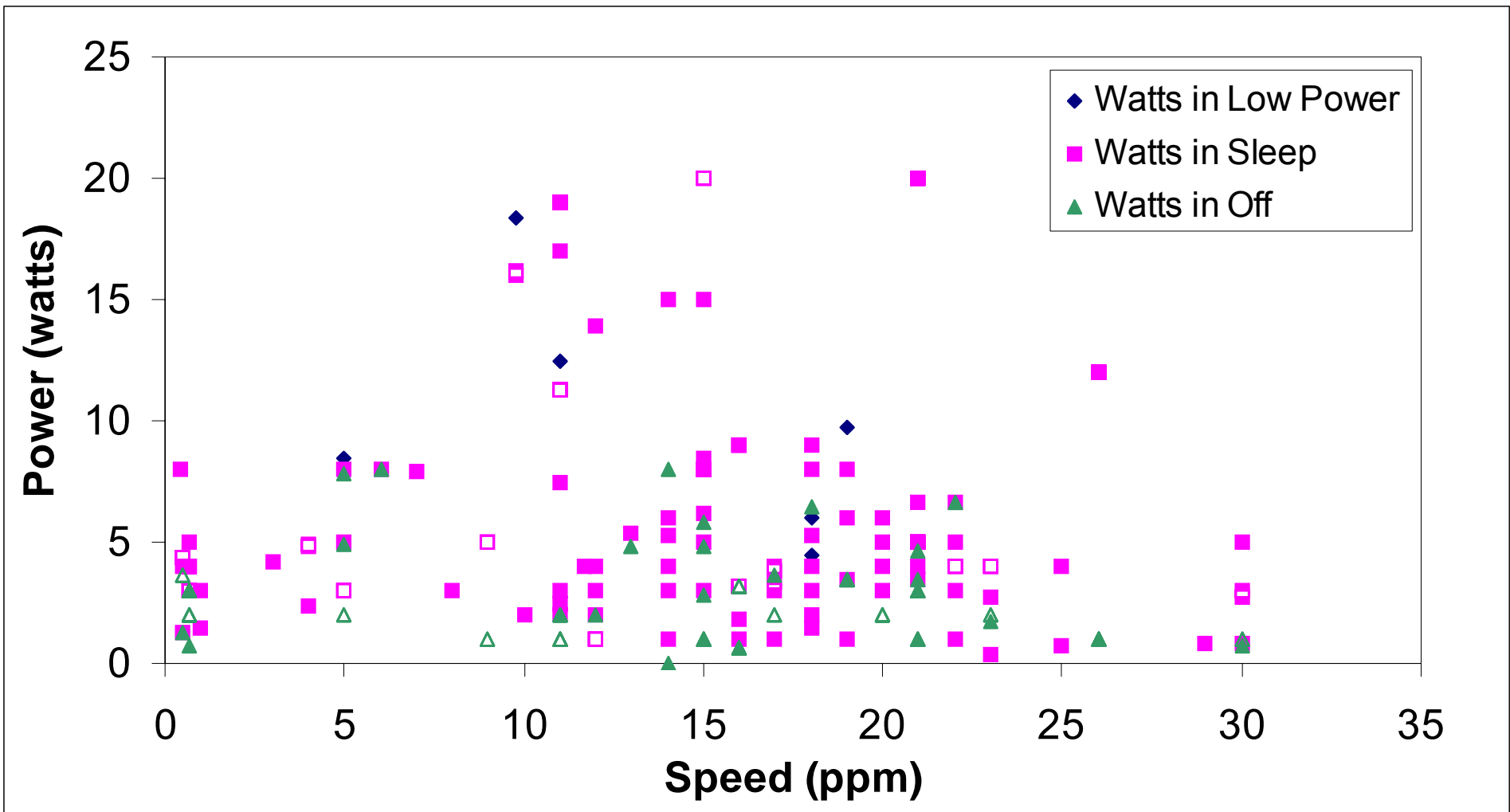
- Different industry definitions of a “model”
- Models vs. model families in database
- List serves as a reference for governments, consumers, and other organizations, therefore specificity is prevalent.
- Printer ABC-x and Printer ABC-y are the same model with minor differences
- Including ABC-x and ABC-y when setting spec limits effectively counts one model twice

Method for Setting Spec Limits



- Spec limits will be based on data trends
- Limits will vary by speed where speed dependencies exist
- Top 25% guideline
- Default times under consideration
- Standby levels will be discussed in depth later today

OM Table 2: Continuous Form, Standard-size, & Small Format IJ Printers, Faxes, and MFDs



OM Table 2: Continuous Form, Standard-size, and Small Format IJ Printers, Faxes, and MFDs



OM Table 2:

| | <u>Watts</u> |
|-----------------------|--------------|
| Average in Low-power: | 10.7 |
| Median in Low-power: | 9.7 |
| Highest Low-power: | 18.4 |
| Lowest Low-power: | 4.5 |
| Average in Sleep: | 6.5 |
| Median in Sleep: | 4.0 |
| Highest Sleep: | 66.0 |
| Lowest Sleep: | 0.4 |
| Total # Models: | 150.0 |

Sleep:

| | | |
|------------------------|----------------|--------------|
| In Sleep: % of models | 2.5 watts | 17.3% |
| that fall at or under: | 3 watts | 31.3% |

OM Table 9: Scanners



OM Table 9:

| | <u>Watts</u> | |
|-------------------|------------------|--------------|
| Average in Sleep: | 6.7 | |
| Median in Sleep: | 6.6 | |
| Highest Sleep: | 10.9 | |
| Lowest Sleep: | 3.3 | |
| Total # Models: | 42 | |
| % of models that | 4.5 watts | 26.2% |
| fall at or under: | 4 watts | 9.5% |

Unit Accuracy (OM)



- Ensures variability falls within a reasonable range of the spec requirements
 - Can prevent qualification disputes
 - Monitor spec utilizes a range of 15%
 - If test results fall within this range, two more units must be tested
 - EPA is considering the same range for IE
- Is this a reasonable range?**

Next Steps



- Investigate the product categories that have minimal data: Is data representative of the market?
- Collect additional data from industry where possible
- Consider combining categories where possible and where it makes sense to do so
- Develop criteria for Draft 2
- Distribute Draft 2 in December for review



Questions/Concerns?

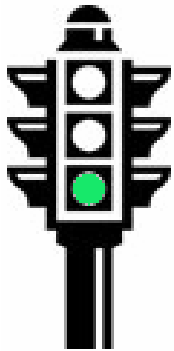


Summary of Draft 1 Comments

Responding to Draft 1 Comments



- EPA released a summary of comments on 10/7.
- All comments will receive responses.
- Three general categories of comments:



Can be
addressed in
writing



Clarification
needed



Discussion
needed

Comments Requiring Clarification



- Data will determine proper product categorization.
 - Condensing tables is desired
- Ready mode will be collected, but not specified for OM products.
- Definitions and terminology will be modified and redistributed for comment.

Duplexing Requirements



Blue Angel Requirements:

- EP and Ink Jet Printers
 - Max. speed ≥ 25 ipm equipped with auto-duplex unit or present as optional accessory
- EP and Ink Jet MFDs
 - Max. speed ≥ 25 ipm equipped with auto-duplex unit or present as optional accessory
- EP Copiers
 - Max. speed ≥ 25 ipm equipped with auto-duplex unit or present as optional accessory
 - Max. speed ≥ 45 ipm equipped with auto-duplex unit

Referencing Other ENERGY STAR Specifications



- Draft 1 references ENERGY STAR specifications for:
 - External power supplies
 - Computers used as Digital Front Ends (DFEs)
 - Cordless handsets sold with fax machines
- Stakeholders have suggested products should be required to meet specs, but not necessarily be qualified.

Non-Mains Powered Products



- USB scanners
- Other products?
- Current proposal: product must meet spec regardless of how power is supplied.





Labeling and Other Partner Commitments

Labeling & Other Partner Commitments



- Goals
 - Reinforce why EPA thinks the use of the mark with the product by our partners is important
 - Preview the requirements to show where we are firm and where we are flexible in terms of the use of the mark
 - Explain purpose of shipment data

The ESTAR Message Is More Important Than Ever



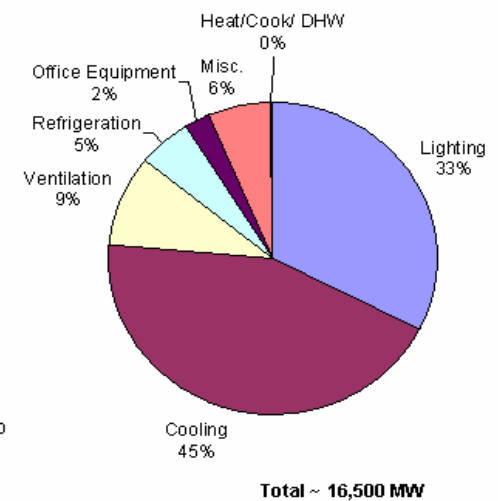
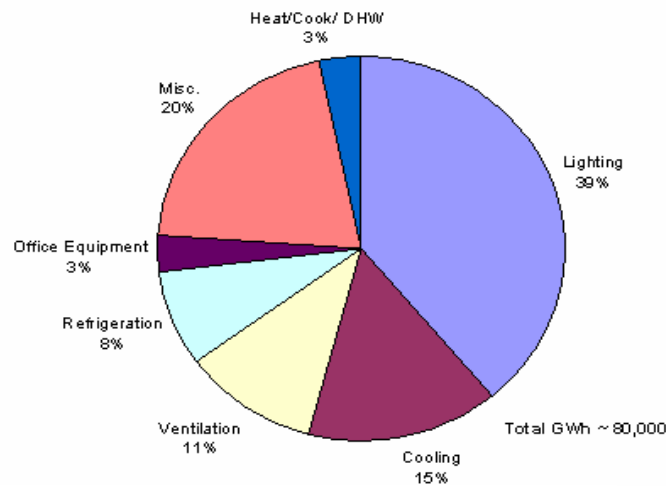
- The Changing energy landscape – The cost of most forms of energy increasing
- Long term structural/cyclical factors are at work and cant be overcome overnight
- **Energy is starting to get consumers attention**
 - Typical home energy budget
 - Gasoline
 - 500 miles/car/year (typical home has 2 cars)
 - \$2/gallon gasoline → \$1,000-\$2,000
 - \$3/gallon gasoline → \$1,500-\$3,000
 - Heating
 - Typical winter natural gas bill is \$480/yr
 - DOE projects 30-70% increase in winter → \$625-\$815
 - Electricity
 - \$1,200/yr
 - Projected to increase by 11% → \$1,350
 - 2004 home energy bill \$2,500 (\$3,500 with 2 cars)
 - **2005-06 home energy bill could be \$3,700-\$5,200**

How Big Are Commercial Plug Loads?



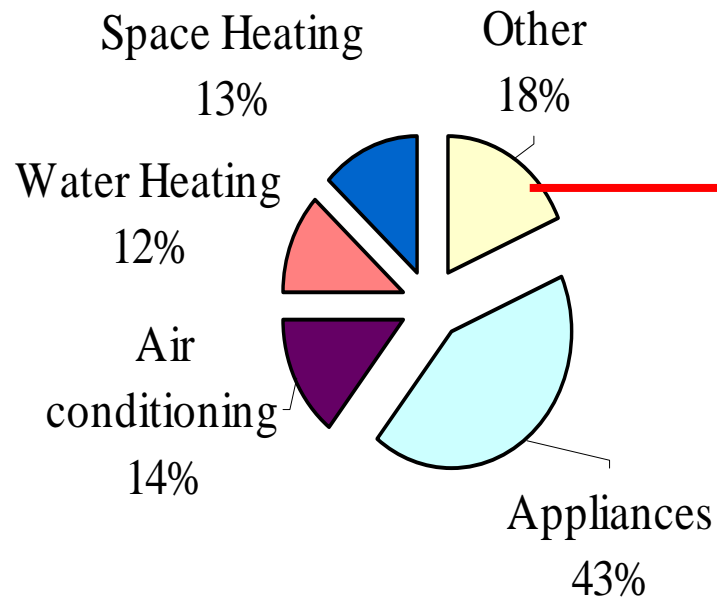
- DOE says 0.5-0.7 w/ft²
- Equal to half of lighting levels in offices or a third of lighting levels in schools
- California Energy Commission says 23% of commercial electricity use and 8% of peak demand
- Much more if you count associated cooling and ventilation

| Building Type | Lighting Peak Power Density (W/ft ²) | Plug Load Peak Power Density (W/ft ²) | Occupancy Peak Density (people/1000ft ²) |
|---------------|--|---|--|
| Assembly | 1.59 | 0.19 | 16.0 |
| Education | 1.45 | 0.48 | 10.7 |
| Food Service | 1.75 | 1.20 | 11.0 |
| Office | 1.32 | 0.64 | Average = 2.96 Range: 0.042 – 31.44 |
| Retail | 1.88 | 0.40 | 2.22 |
| Warehouse | 1.19 | 0.15 | Average = 0.44 Range: 0.089 – 3.5 |

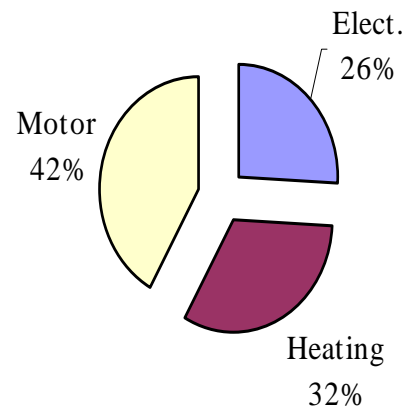


“Misc.” estimated at **18%** of home electric consumption, electronics only **26%** of “other”

1980 Residential Electricity 2.25 Quads

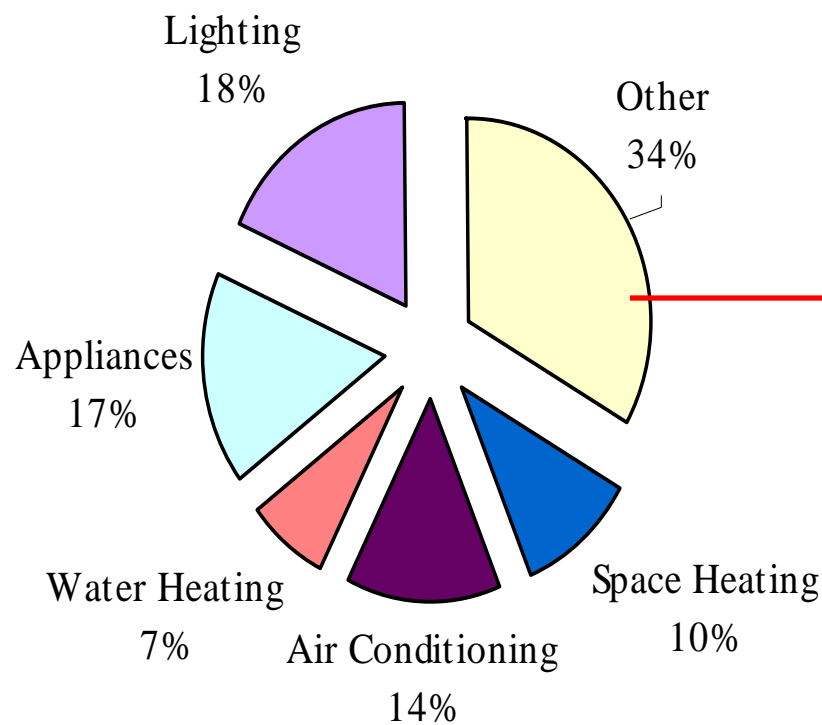


0.4 Quads "Other" 1980

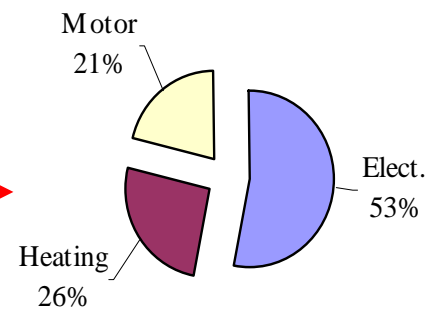


“Misc.” projected to grow to **34%** of home electric consumption, electronics **53%** of “other”

2015 Residential Electricity 5.4 Quads



1.8 Quads "Other" 2015



Source: US DOE, 2005

Leveraging the ENERGY STAR Mark



- The mark is an important visual cue
 - Communicates a positive energy and environmental message to the product end user
- EPA is increasingly requiring a level of consistency in how mark is used by partners
 - Some degree of flexibility to achieve mutually desired goals

Product Labeling - Physical



Labeled on the top/front of the product

Pitney Bowes
9920



FOR ASSISTANCE call toll-free **1-800-243-5556**
Calls for assistance must be from the facsimile telephone
FOR SUPPLIES call toll-free **1-800-462-6797** except Alaska & Hawaii

Key Operator _____ Ext. _____ Facsimile Telephone _____

When calling for assistance or supplies, please provide the following information:

| | | |
|----------------------|---------------------------|------------------------------|
| PCN No. _____ | Serial No. <u>9934087</u> | Model No. <u>9920</u> |
| Access # <u>9920</u> | | PG Form 67 (03/00) Rev. 2/94 |

Product Labeling - Electronic



Electronic labeling on the start-up screen of a qualified monitor


Web Labeling



PHOTOS
1 2 3 4

PRODUCT FEATURES SPECIFICATIONS GUIDES + LITERATURE

Where info. on qualified models is displayed

 Key Features

Features

Whirlpool® Replacement Filters - Order Here [feature details](#)

.....

ENERGY STAR® Qualified

.....

Clean Air Delivery Rate (CADR) of 330 [more](#)

.....

Electronic Controls

.....

4 Fan Speeds with Turbo Setting

.....

Pre-filter Helps Remove Large Particles and Reduces Odor

Web Labeling (cont.)



Energy Star appliances by Miele, Inc. - Microsoft Internet Explorer provided by ICF Consulting Group, Inc.

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Stop AutoFill Options

Address http://www.miele.com/usa/ENERGY/energy-star.asp Go Links

Google Search Web 1871 blocked AutoFill Options

Environmental Commitment

Miele

- Residential Appliances**
 - Vacuum Cleaners
 - Dishwashers
 - Cooking Appliances
 - Steam Oven
 - Coffee System
 - Laundry Products
 - Dealer Locator
- Miele Store**
- Professional Products**
 - Lab Glassware Washers
 - Dental Disinfectors
 - Wet Cleaning
 - Industrial Parts Cleaning



ENERGY STAR® was created to help consumers easily identify products, homes, and buildings that save energy and money, and help protect the environment. As the government-backed, trusted symbol for energy efficiency, the ENERGY STAR® label identifies highly efficient products and designates superior energy performance in homes and buildings. With ENERGY STAR®, money is not all you are saving; you are also making a difference in protecting the environment.

Miele is proud to offer our customers the following appliances with the ENERGY STAR® label:

Dishwashers **Laundry**

By using only as little water as needed, Miele also reduces energy consumption. **Every Miele dishwasher** made for North America qualifies for the ENERGY STAR® Program -- meaning it exceeds government energy standards by over 25%. This means that Miele dishwashers qualify for a variety of rebate programs available throughout the country. Contact your local energy supplier for rebates in your area.

Miele: anything else is a compromise

Internet

Package Labeling





Package Labeling (cont.)



Placement in Collateral Materials




Owner's Manual
Manuel del Propietario



ENERGY STAR®
A symbol of
energy efficiency

DEHUMIDIFIER
DESHUMIDIFICADOR

Model, Modelo 580.54351 35 Pint



ENGLISH

ESPAÑOL

Sears, Roebuck and Co., Hoffman Estates, IL 60179 U.S.A.
www.sears.com

The Value of Unit Shipment Data



- Assists in quantifying impacts of and making program improvements to ENERGY STAR
- High market penetration rates?
 - Revise specifications
 - Sunset program
- Low market penetration rates?
 - Revise specifications
 - Invest in marketing

Aggregating Unit Shipment Data



| <u>Product Category</u> | <u>Qualified Units Shipped 2004</u> | <u>Qualified Units Shipped 2003</u> | <u>Qualified Units Shipped 2002</u> |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Boilers | | | |
| Residential Gas Boilers | 96,100 | 49,626 | Not Collected |
| Residential Oil Boilers | 115,156 | 91,014 | Not Collected |
| Commercial Refrigerators & Freezers | | | |
| Refrigerators | 46,816 | 21,388 | 20,661 |
| Freezers | 20,526 | 18,983 | 16,553 |
| Residential Light Fixtures | | | |
| Indoor | 4,511,995 | 5,295,450 | 3,412,252 |
| Torchiere | 234,115 | 146,813 | Not Collected |
| Outdoor | 3,966,603 | 2,757,937 | 6,621,912 |
| Roof Products | | | |
| Commercial | 1,182,121,930 | 963,599,228 | 8,526,442 |
| Residential | 253,174,082 | 78,582,267 | 43,844 |



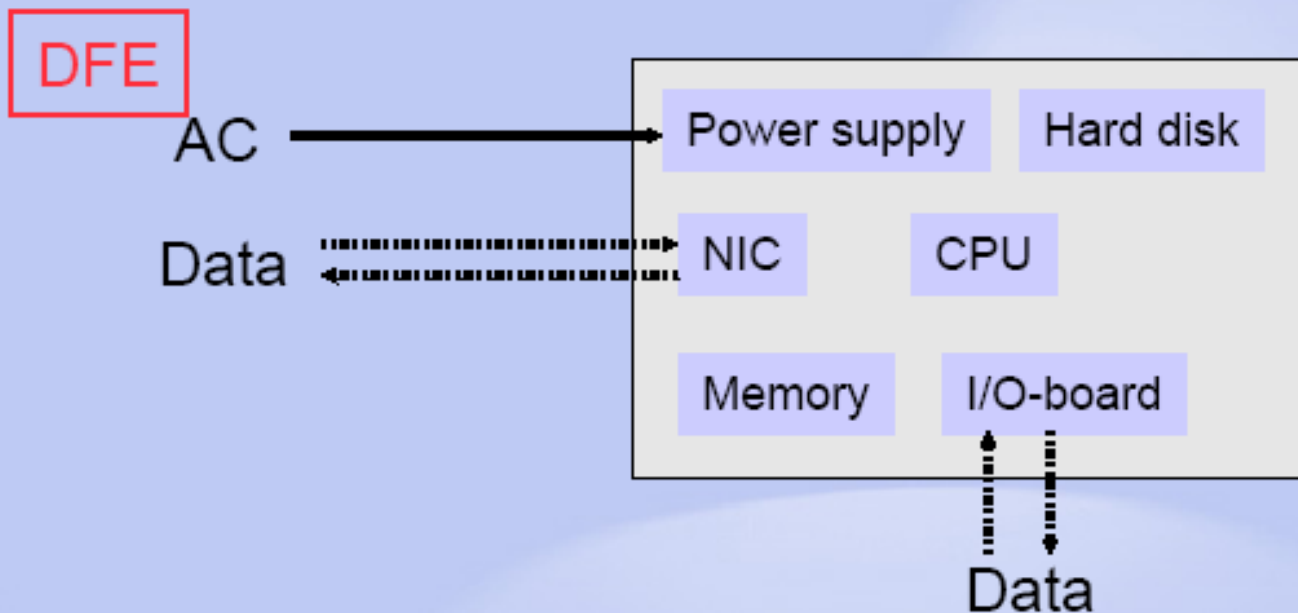
Digital Front-ends (DFEs)

Océ | Why use a DFE/controller?

- In (high volume/multi-user) environments a large part of the functionality is not directly linked to hardcopy output.
- E.g. mailbox functionality allows users to send their jobs, which will be stored and can be processed later (bundled jobs).
- Network connectivity in aforementioned environment is an essential functionality.
- A DFE/Controller takes care of this part of the functionality.



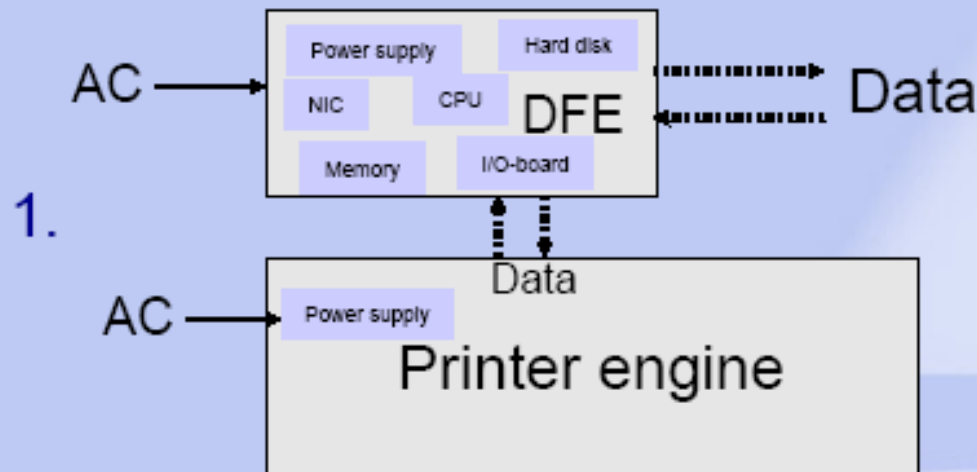
Océ DFE (schematic) vs controller



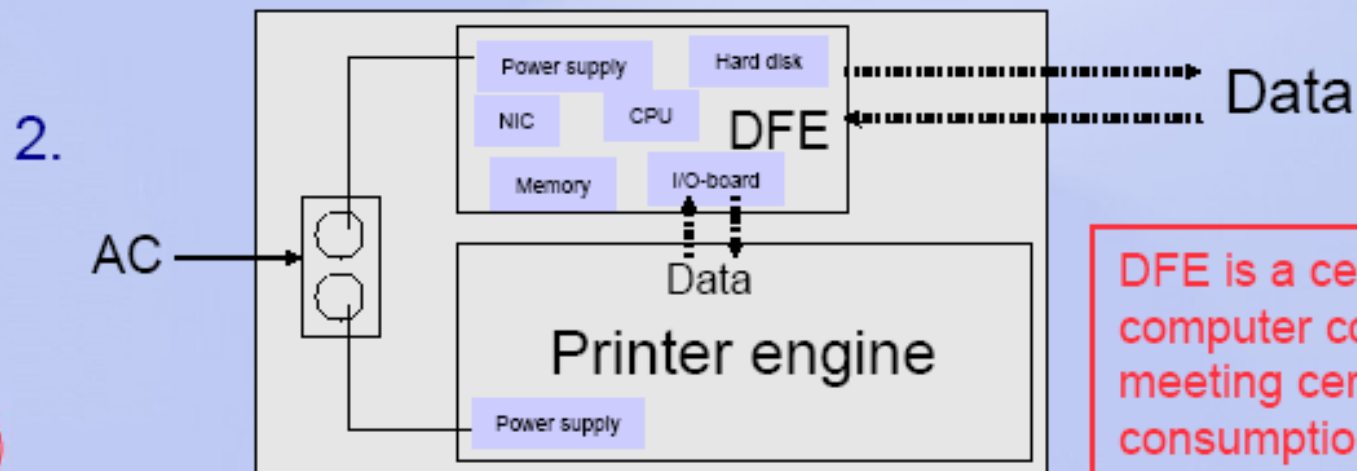
- Internal controller (in high-end situation) = “DFE without integrated power supply”
- DFE/ controller needs to remain reachable on the network, which cannot be guaranteed when the DFE is in sleep-mode (large variety in network config.)
- Printer engine can have sleep-mode independently from DFE or controller



Océ DFE and Im. Equipment (1&2)



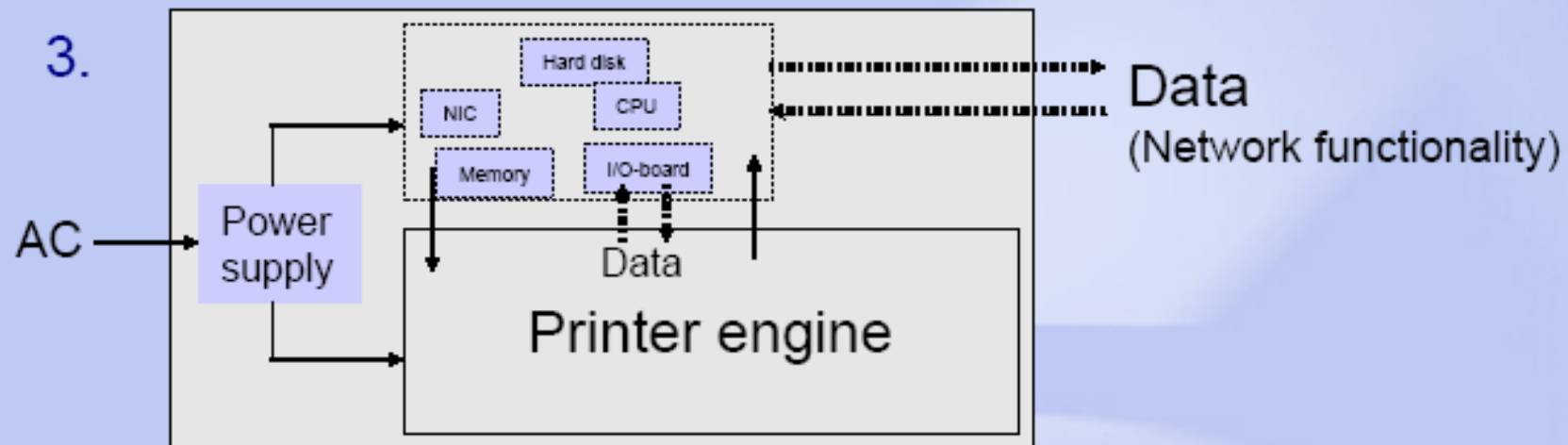
DFE is a certain set of computer components meeting certain (energy consumption) criteria



DFE is a certain set of computer components meeting certain (energy consumption) criteria



Océ Internal controller and IE (3)



- Less distinction between “DFE”/controller and Engine
- For high-volume/ multi-user environments the components are the same as for a DFE, except the power supply, because the functionality needs to be the same.
- The energy consumption of controller components is not higher than that of DFE components.



Océ Statements.

- Parts necessary for network-activities must remain awake (idle/on): server-like functionality. Engine parts can be sent to sleep in all cases.
- Situations 1 & 2 energy consumption DFE and engine can be measured separately, and should be specified separately.
- Situation 3: energy consumption controller related parts can be determined (only) on basis of analogy (functionality related components). Measuring more difficult.
- In essence situation 3 is the same as situation 1 and 2, and should be specified accordingly.



In all 3 situations the DFE/ controller functionality justifies that either DFE or controller are specified separately from the IE (-engine).





DFE Discussion



Recovery Time

Perspective on Specifying A Recovery Time for Imaging Equipment

**Lexmark International, Inc.
ENERGY STAR Partners Meeting for
Imaging Equipment
October 14, 2005**



Recovery Time General Comments

- **Lexmark's understanding of Recovery time**
 - The time needed for a device to transition from a **Reduced Power Mode** to a state where it is capable of producing hard copy within its specified **Time-to-first-copy** or **Time-to-first-print** specification
- **From its inception, ENERGY STAR specifications have be a trade-off between Responsiveness and Power Savings**
 - **Physics 101**
 - **Computers, Imaging Equipment, Monitors, CFLs ...**
 - **The challenge for manufacturers and the EPA has been to balance these contending forces**
- **Experience indicates that adjusting the Sleep Mode Timeout or disabling Sleep Mode is not “prevalent”**
 - **LBNL 53729 reports 5% of laser printer were disabled, 6% were set to 180 minutes or longer**
- **Only “unwanted user behavior” is to have the user not buy and use the product**

10 second recovery time (during job cycle) requirement proposal

We do not believe that this requirement is needed or appropriate

- **Customer expectations and a competitive marketplace will effectively and efficiently balance energy savings and responsiveness**
 - **To significantly effect TEC results timeout must be very short**
 - **Setting a 5 minute Sleep Mode timeout on a device that has a 2 minute recovery time is a significant change from present balance point**
 - **Responsiveness is a key product characteristic**
 - **As more pages flow to distributed devices, user intimacy increases**
- **Additional arbitrary requirements limit manufacturer innovation**
 - **In agreement with EPA proposal for watchful waiting**
 - **TEC should set the energy limits and allow industry to invent creative ways to meet the requirements**
 - **Lexmark's support for TEC has been tied to the flexibility it allows to leverage each partner's strengths**

Recovery Time Options



- Current proposal:
 - Test products as shipped and recommended for use
 - Submit delay and recovery time statements from product literature
 - Measure and report incremental recovery time
- Box insert or section in user manual
- Dedicated review of reported incremental recovery times and survey of disabling rates



Differentiating Ink Jet Products

Additional Power Allowances

- Directional Draft, Inkjet Sleep $\leq 3W$ (Top 25%)
 - All inkjets are not equal
 - Example: Standard format; full featured versus basic
 - 8x mass, 4x cost, 4x speed, 22x duty cycle, 32x memory
 - Has wireless, auto duplex, network capable
 - Uses more Sleep mode power
-

Additional Power Allowances

- Evaluate power allowances for speed and features
 - Sleep Power = $X + Y * \text{Speed} + Z$
 - X=Allowance for basic product
 - Y=Speed coefficient
 - Z=Allowance for additional features
 - Propose consistent speed measurement approach for Energy Star purposes
 - Without allowances, only slow and basic products will likely become Energy Star qualified
-



Discussion
Differentiating Ink Jet Products

Suggested Functional Adders



- Fax capability
- Scanning capability
- Wired interfaces (e.g., USB, parallel, Ethernet)
- Wireless interfaces (e.g., Bluetooth, 802.11, infrared)
- Paper handling (e.g., extra paper feeders, auto-duplexers, output/finishing devices)
- Memory/storage (e.g., disk drives, memory upgrades)
- External ports (e.g., memory card readers, camera interfaces, smart card readers)
- Enhanced displays/control panels (e.g., larger displays)
- Paper size capabilities (e.g., letter vs. 11"x17", A0 vs. A2)

Functional Adders — Network Connectivity



- Do existing OM data reflect network connectivity energy use for sleep?
- Were products tested connected to networks?
- ... Should they be ?
- Does this apply to wireless networks also?
- ... to portable products?

Once technology advances in PC realm,
will need to be adapted to imaging products

- Goal: Allow NIC to maintain network presence so that main processor on system can go to sleep — beyond what Wake On LAN (WOL) can do



Standby for OM Products

General Approach to Standby



Standby power levels are important to ENERGY STAR for:

- Consistency with FEMP
- Consistency with global 1 Watt goals
- Energy savings

EPA's starting point:

- 1 W for all products, via Off mode requirement
- 2 W for fax machines in Sleep (no Off mode required) per FEMP

Will consider other deviations from 1 W where merited

Deviations from 1 W Approach



OM products with potential difficulty meeting one watt standby level

- Fax machines;
- Large-format devices; and
- Products with an integrated DFE or powerful print controller
- Others?

EPA would like explanations of why the 1 W level is too difficult for these and any other categories to inform decision-making



Remanufacturing



Conclusion

Completing the IE Spec.



| | |
|---|----------------------|
| Industry meeting | October 14 |
| <i>Industry tests to TEC</i> | |
| TEC & OM data due | November 1 |
| Addtl. comments due | November 1 |
| <i>EPA reviews TEC & OM data & comments</i> | |
| Response to Draft 1 comments | November 18 |
| <i>EPA reviews TEC data</i> | |
| Draft 2 published | December |
| <i>Industry reviews Draft 2</i> | |
| Industry meeting | Jan. or Feb. 2006 |
| Draft 2 comments due | February 2006 |
| <i>EPA reviews comments, finalizes spec.</i> | |
| Final spec. published | March 1, 2006 |
| Spec. effective | March 1, 2007 |



Additional ENERGY STAR Information

Leveraging the ENERGY STAR Mark



- 78% of consumers rate energy efficiency as important to their purchase decision.
- Over 60% of Americans recognize the ENERGY STAR.
- 50-60% of consumers say the ENERGY STAR mark influenced their recent purchase decision.
- 71% of consumers are likely to recommend ENERGY STAR to a friend.

ENERGY STAR consumers are a large and growing segment of the population.

Leveraging the ENERGY STAR Mark (cont.)



- More than 7,000 print ads display the ENERGY STAR mark on products each month.
- www.energystar.gov receives an average of 120,000 Web hits per month.

ENERGY STAR products enjoy increasing market share and sales and high public visibility.

Leveraging the ENERGY STAR Mark (cont.)



- 160 utility and state partners promote ENERGY STAR, covering nearly 60% of the households across the country
- More than 800 retail partners with more than 21,000 US storefronts use ENERGY STAR to communicate value and quality to their customers and increase sales.

ENERGY STAR offers an extensive network of influential market players.