ENERGY STAR®

Imaging Equipment Draft 1, Version 3.0 Specification and Draft 2 Test Method Webinar

March 28, 2018

Webinar Details

- Webinar slides and related materials will be available on the Imaging Equipment Product Development Web page:
  - *www.energystar.gov/revisedspecs*
  - *Follow link to "Version 3.0 is in Development" under "Imaging Equipment"*

- To use your telephone after joining GoToWebinar:

  Call in: +1 (877) 423-6338 (U.S.)
  +1 (571) 281-2578 (International)
  Code: **198-920 #**

  - Phone lines will remain open during discussion
  - Please mute line unless speaking

Webinar Agenda

1. Introductions and Recap of ENERGY STAR Process
2. General Requirements
   - Default Delay Time to Sleep
   - Maximum Delay Times to Sleep Adjustable by the User
3. Typical Electricity Consumption (TEC) and Operational Mode (OM) Requirements

Webinar Agenda

4. Other Changes
   - Maximum TEC_{DFE} Requirements
   - Scope: Exclusion of copiers and fax machines
   - New Multifunction Device (MFD) Definition
5. Network Activity Test Method
6. Other Test Method Issues
   - ISO Standards for Print Speed
   - Replacement of dc Test
   - DFE Test Procedure
7. Professional Imaging Products
8. Timeline and Open Discussion

Introductions

Time	Topic
1:00–1:15	**Introductions and Specification Development Recap**
1:15–1:45	General Requirements
1:45–2:15	TEC and OM Requirements
2:15–2:45	Other Changes
2:45–3:00	Network Activity Test Method
3:00–3:15	Other Test Method Issues
3:15–3:40	Professional Imaging Products
3:40–4:00	Timeline and Open Discussion

Introductions

Ryan Fogle
U.S. Environmental Protection Agency

Matt Malinowski
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Zenia Montero
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John Clinger
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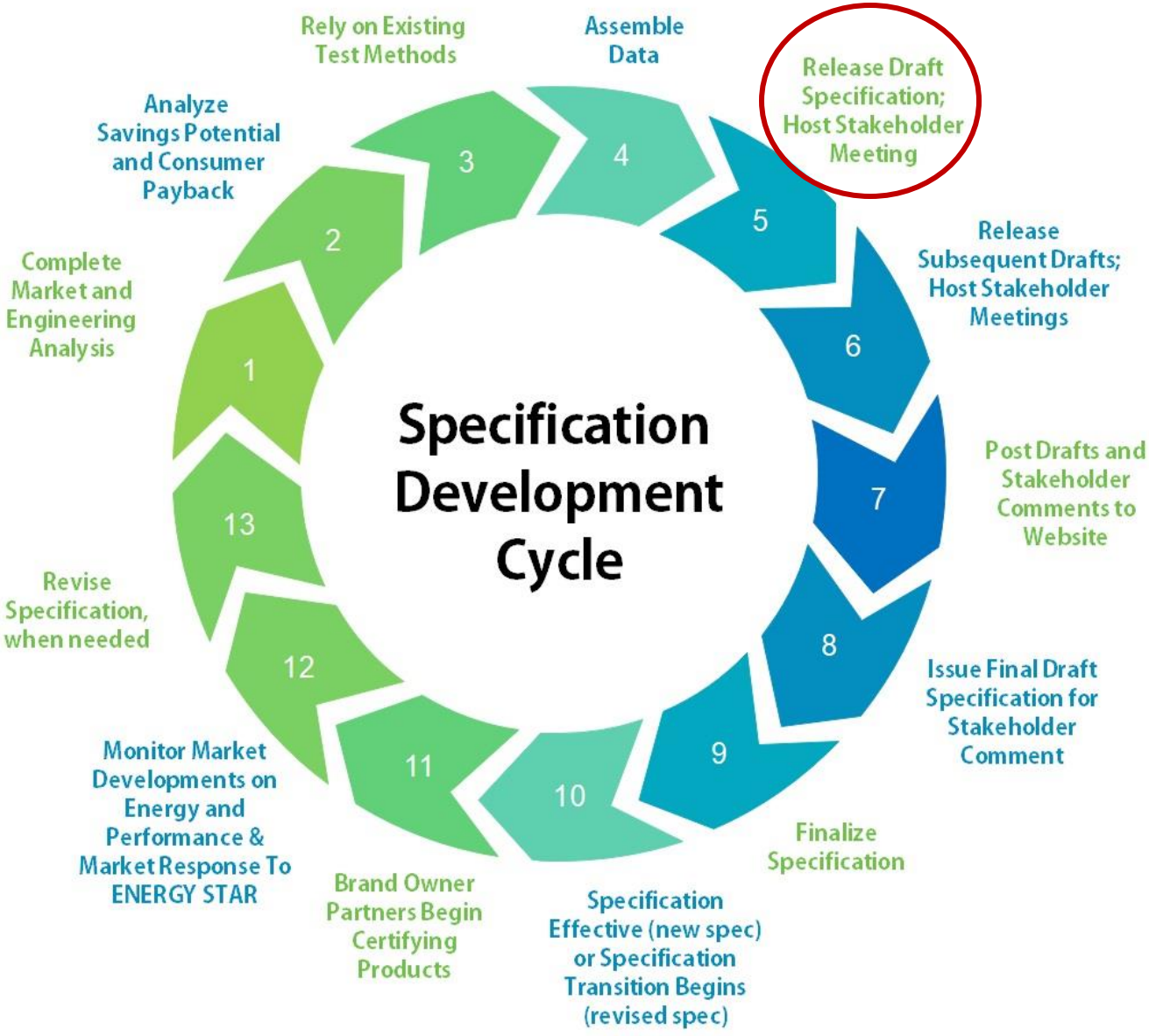
ENERGY STAR Guiding Principles

- ENERGY STAR criteria are designed to balance these foundational principles:
  - Significant energy and/or water savings
  - Product performance maintained or enhanced
  - Purchasers can recover investment in increased efficiency within a reasonable time period
  - Efficiency can be achieved without proprietary technology
  - Energy/water consumption can be measured and verified with testing
  - Label provides meaningful differentiation


Specification Development Cycle
1
Complete Market and Engineering Analysis
2
Analyze Savings Potential and Consumer Payback
3
Rely on Existing Test Methods
4
Assemble Data
5
Release Draft Specification; Host Stakeholder Meeting
6
Release Subsequent Drafts; Host Stakeholder Meetings
7
Post Drafts and Stakeholder Comments to Website
8
Issue Final Draft Specification for Stakeholder Comment
9
Finalize Specification
10
Specification Effective (new spec) or Specification Transition Begins (revised spec)
11
Brand Owner Partners Begin Certifying Products
12
Monitor Market Developments on Energy and Performance & Market Response To ENERGY STAR
13
Revise Specification, when needed

Milestones to Date

Milestone	Date
Specification Launch and Discussion Document	February 22, 2017
Launch Webinar	March 1, 2017
Draft 1 Test Method	August 14, 2017
Draft 1 Test Method Webinar	August 24, 2017
Draft 1 Specification and Draft 2 Test Method	March 16, 2018
Draft 1 Specification and Draft 2 Test Method Webinar	**Today, March 28, 2018**

Objectives for Specification and Test Method

- **Market penetration**
  - At roughly 100% for Electro-photographic (EP) and Ink Jet (IJ) products
- **Update efficiency requirements**
  - Potential for additional savings and differentiation
- **Increase representativeness of the test method and minimize burden**
  - Ensure that tested results are representative of real-world performance
  - Wherever possible, make changes without requiring re-testing, to minimize burden on Partners.

Professional Imaging Products

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	**General Requirements**
1:45–2:15	TEC and OM Requirements
2:15–2:45	Other Changes
2:45–3:00	Network Activity Test Method
3:00–3:15	Other Test Method Issues
3:15–3:40	Professional Imaging Products
3:40–4:00	Timeline and Open Discussion

Introduction

- Default Delay Time to Sleep
- Maximum Delay Time to Sleep Adjustable by the User

Default Delay Time to Sleep

- Several stakeholders commented on various aspects of Blue Angel criteria for Office Equipment with Printing Function (Printers and Multifunction Devices), DE-UZ-205, 2017
- The criteria have a requirement for default delay time to sleep.
- Most OM and TEC models would meet these Blue Angel requirements, though they are more stringent in places than Version 2.0.

RAL

Basic Criteria for Award
of the Environmental Label

Office Equipment with Printing Function
(Printers and Multifunction Devices)

RAL-UZ 205

DER BLAUE ENGEL
KLIMA

Edition January 2017

Version 1.0

RAL gGmbH

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Proposal – Default Delay Time to Sleep

- Simplify and harmonize the default delay time requirements with Blue Angel.
- Requirements would be applicable to all Imaging Equipment products (both TEC and OM).

Proposal – Default Delay Time to Sleep

Version 2.0 Requirement (OM Only)

Table 6: Required Default Delay Time to Sleep for OM Products

Product Type	Media Format	Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm or mppm)	Required Default Delay Time to Sleep, t_{SLEEP_REQ} (minutes)*
Copier	Large	$s \leq 30$	30
		$s > 30$	60
Fax Machine	Small or Standard	All	5
MFD	Small or Standard	$s \leq 10$	15
		$10 < s \leq 20$	30
		$s > 20$	60
	Large	$s \leq 30$	30
		$s > 30$	60
Printer	Small or Standard	$s \leq 10$	5
		$10 < s \leq 20$	15
		$20 < s \leq 30$	30
		$s > 30$	60
	Large	$s \leq 30$	30
		$s > 30$	60
Scanner	All	All	15
Mailing Machine	All	$s \leq 50$	20
		$50 < s \leq 100$	30
		$100 < s \leq 150$	40
		$s > 150$	60

* Measured Default Delay Time to Sleep (t_{SLEEP}) shall be less than or equal to the Required Default Delay Time to Sleep (t_{SLEEP_REQ}), as specified in Section 3.4.3.

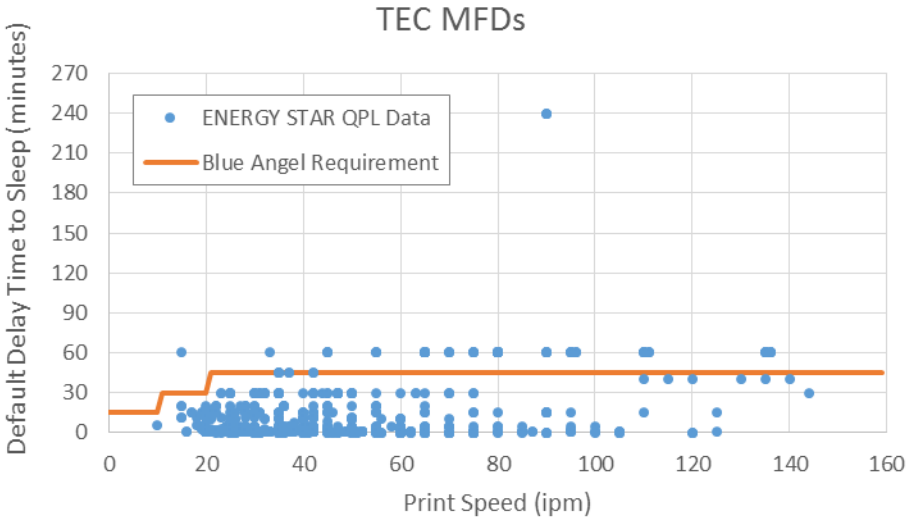
Proposed Version 3.0 Requirement (OM and TEC)

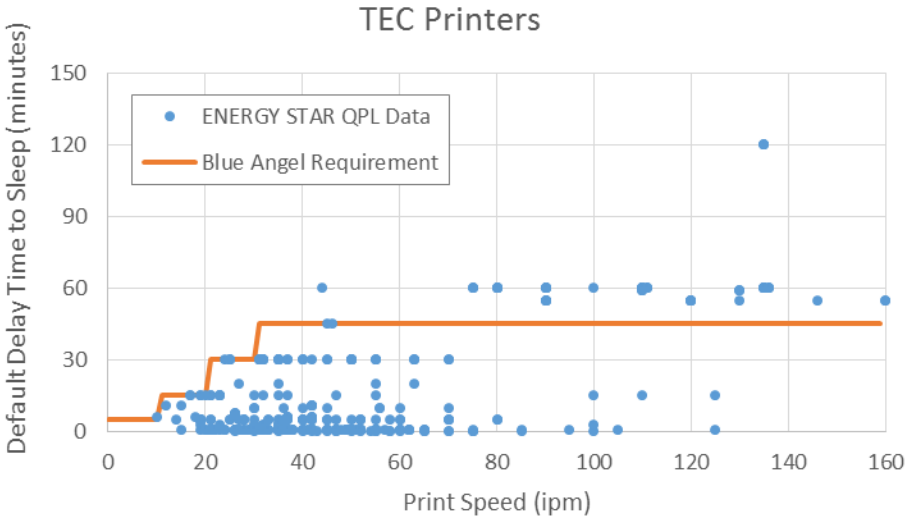
Table 3: Required Default Delay Time to Sleep for OM and TEC Products

Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm or mppm)	Required Default Delay Time to Sleep, $t_{DEFAULT\_REQ}$ for MFDs, Scanners, Mailing Machines, and Digital Duplicators with Copying Capability (minutes)*	Required Default Delay Time to Sleep, $t_{DEFAULT\_REQ}$, for Printers and Digital Duplicators without Copying Capability (minutes)*
$s \leq 10$	15	5
$10 < s \leq 20$	30	15
$20 < s \leq 30$	45	30
$30 < s \leq 50$	45	45
$s > 50$	45	45

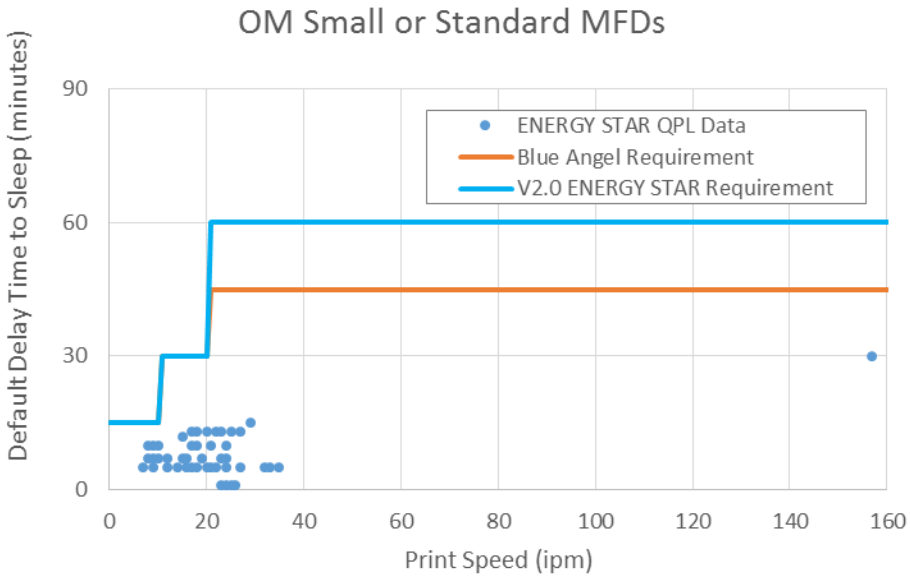
*Measured Default Delay Time to Sleep (t_{SLEEP}) shall be less than or equal to the Required Default Delay Time to Sleep (t_{SLEEP_REQ}), as specified in Section 3.2.5.

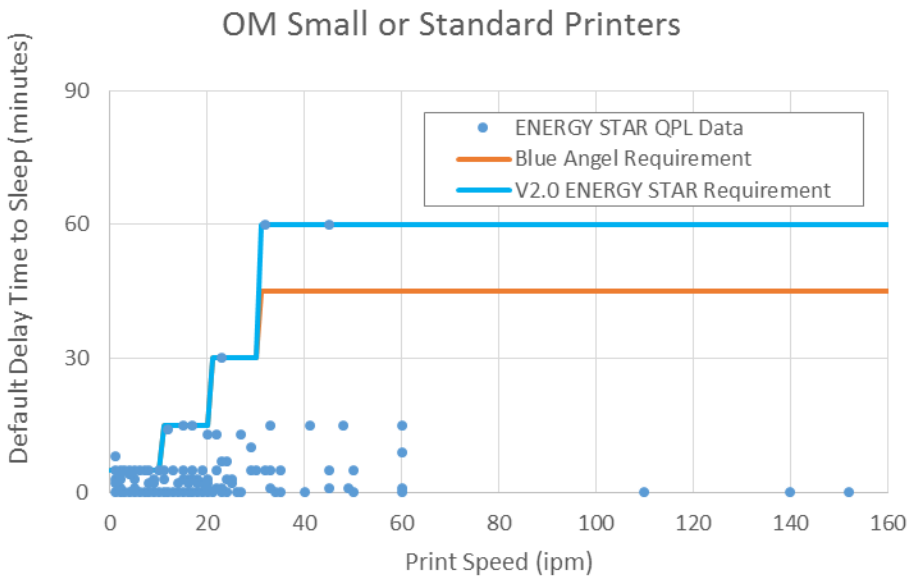
Proposal – Default Delay Time to Sleep



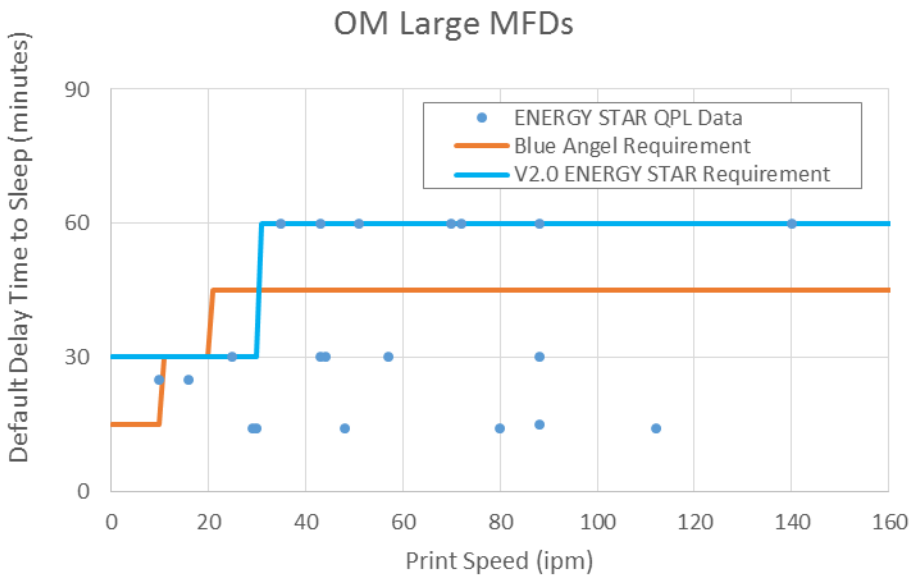


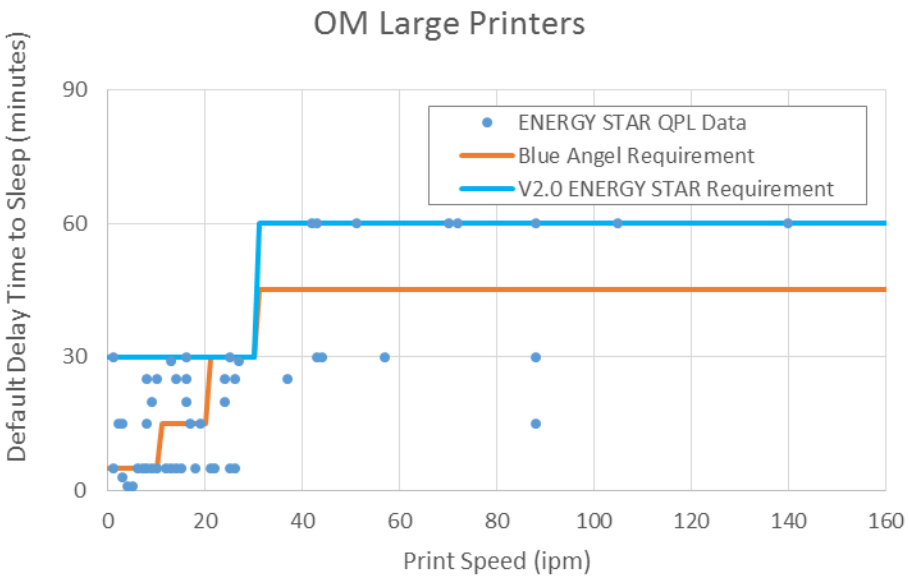
Proposal – Default Delay Time to Sleep





Proposal – Default Delay Time to Sleep





Measuring Default Delay Time to Sleep

- Default Delay Time is already reported for TEC and OM products through the ENERGY STAR Qualified Product Exchange (QPX).

- EPA is proposing to further clarify the specific measurement to report in Step 4 of both the TEC and OM test procedures.
  - Using the variable name $t_{DEFAULT}$ (formerly t_{SLEEP} in the OM test method)

Table 8: TEC Test Procedure for Printers, Digital Duplicators with Print Capability, and MFDs with Print Capability

Step	Initial State	Action	Record (at end of step)	Unit of Measure	Possible States Measured
1	Off	Connect the UUT to the meter. Ensure the unit is powered and in Off Mode. Zero the meter; measure energy over 5 minutes or more. Record both energy and time.	Off energy	Watt-hours (Wh)	Off
			Testing Interval time	Minutes (min)	
2	Off	Turn on unit. Wait until unit indicates it is in Ready Mode.	–	–	–
3	Ready	Print a job of at least one output image but no more than a single job per Table 11. Measure and record time to first sheet exiting unit.	Active0 time	Minutes (min)	–
4	Ready (or other)	Wait until the meter shows that the unit has entered its final Sleep Mode or the time specified by the manufacturer.	Default delay time to Sleep, $t_{DEFAULT}$	–	–
5	Sleep	Zero meter; measure energy and time over 1 hour. Record the energy and time.	Sleep energy, E_{SLEEP}	Watt-hours (Wh)	Sleep
			Sleep time, t_{SLEEP} (≤ 1 hour)	Minutes (min)	

Table 10: Operational Mode (OM) Test Procedure

Step	Initial State	Action(s)	Record	Unit of Measure
1	Off	Plug the UUT into meter. Turn on unit. Wait until unit indicates it is in Ready Mode.	–	
2	Ready	Print, copy, or scan a single image.	–	
3	Ready	Measure Ready power.	Ready power, P_{READY}	Watts (W)
4	Ready	Wait and measure Default Delay Time to Sleep.	Sleep default-delay time, $t_{DEFAULT}$	Minutes (min)
5	Sleep	Measure Sleep power.	Sleep power, P_{SLEEP}	Watts (W)

Summary of Feedback – Maximum Delay Times to Sleep Adjustable by the User

- Stakeholders commented that:
  - A maximum delay time that is adjustable by the user could save energy
  - However, 4-hour limits are already standard in Imaging Equipment products.
  - Blue Angel already has such a requirement.

Proposal – Maximum Delay Times to Sleep Adjustable by the User

- The current V2.0 specification requires Maximum Machine Delay Time of 4 hours (applies to OM products only).
- EPA is proposing to harmonize with Blue Angel's requirement of 1 or 2 hours, depending on product speed, and to extend the requirement to TEC products.

Table 4: Maximum Delay Times to Sleep Adjustable by the User

All Devices with a Monochrome Product Speed, *s*	Maximum Delay Times for Sleep Mode Adjustable by the User (min)
$s \leq 30$	60
$s > 30$	120

Proposal – Maximum Delay Times to Sleep Adjustable by the User

- EPA is also proposing to rename Maximum Machine Delay Time requirement to "Maximum Delay Times to Sleep Adjustable by the User."
  - Stakeholders have asked about this term, and the new proposed name provides more clarity.
  - Similar to ENERGY STAR AV specification and Blue Angel.

Examples of Requirement Name

- ENERGY STAR AV:

3.3.3 APD Timing Default Settings shall be as follows:

i. APD Timing ≤ 30 minutes: This timing option is acceptable for use as a default setting. If APD timing is set by default to no more than 30 minutes and APD cannot be disabled or increased to greater than 30 minutes, products do not have to meet Idle State power requirements.

ii. 30 minutes < APD Timing ≤ 2 hours: This timing option is acceptable for use as a default setting. If APD can be disabled, or if APD timing can be set to greater than 30 minutes, products shall meet Idle State power requirements.

- Blue Angel:

Table 13: Upper Limit for the Range of the Delay Times t_{iA} for the Sleep Mode Adjustable by the User

All Devices with a Page Throughput S_M of	Minutes
> 0-30 Pages/Minute	60
> 30 Pages/Minute	120

Discussion

- EPA appreciates any feedback and relevant data on these topics:
  - Default Delay Time to Sleep
  - Maximum Delay Times to Sleep Adjustable by the User

TEC and OM Requirements

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	General Requirements
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3:15–3:40	Professional Imaging Products
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Proposal: TEC Requirements

- EPA is proposing to replace the TEC metric with TEC_{2017}, which incorporates:
  - Lower print volumes, and
  - Annual energy consumption period.
  - Intended to avoid confusion in calculations and messaging.

- Based on stakeholder data presented in the Draft 1 test method, EPA proposes to:
  - Decrease the contribution of the On Mode in the TEC by a factor of 4, dividing the energy contributions from all jobs (E_{JOB_DAILY}) by a factor of 4 in Equation 5

  - Increasing the duration of Sleep Mode by reducing the assumed time spent in On Mode from $N_{JOBS}/4$ (as each job is assumed to take 15 minutes or ¼ hours) to $N_{JOBS}/16$ in Equation 3

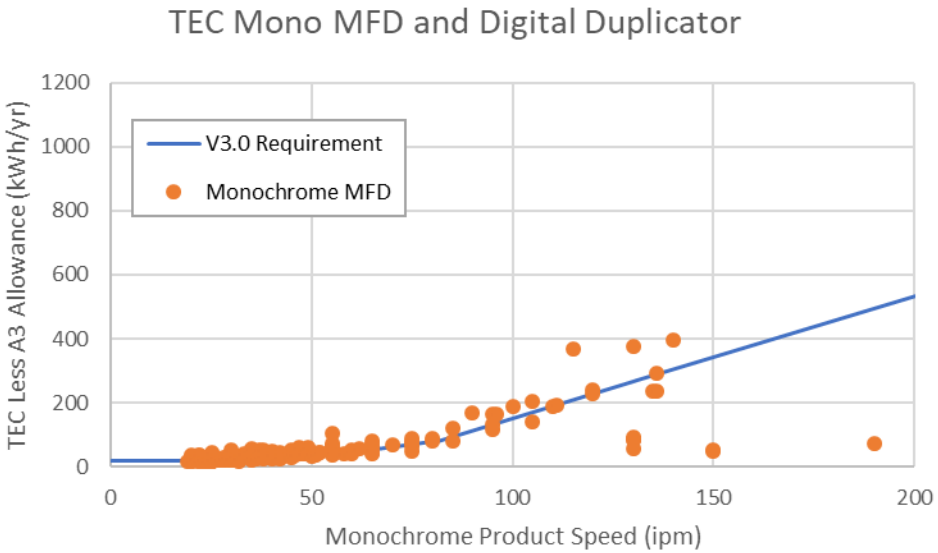
Proposal: TEC Requirements

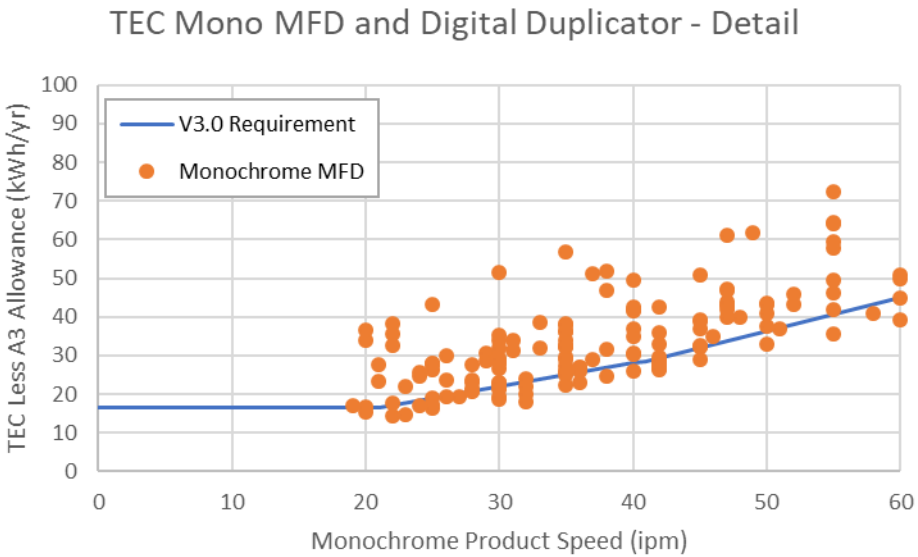
- Proposed requirements try to maintain an even pass rate across each speed bin.
  - Speed bins based on distribution of models of each type
  - Maintaining separate requirements for all four types
  - But requirements no longer linked together
- EPA is proposing to remove the A3 adder.
  - Less differentiation with the reduced print volume assumed under the TEC_{2017} metric

Table 6: TEC Requirement

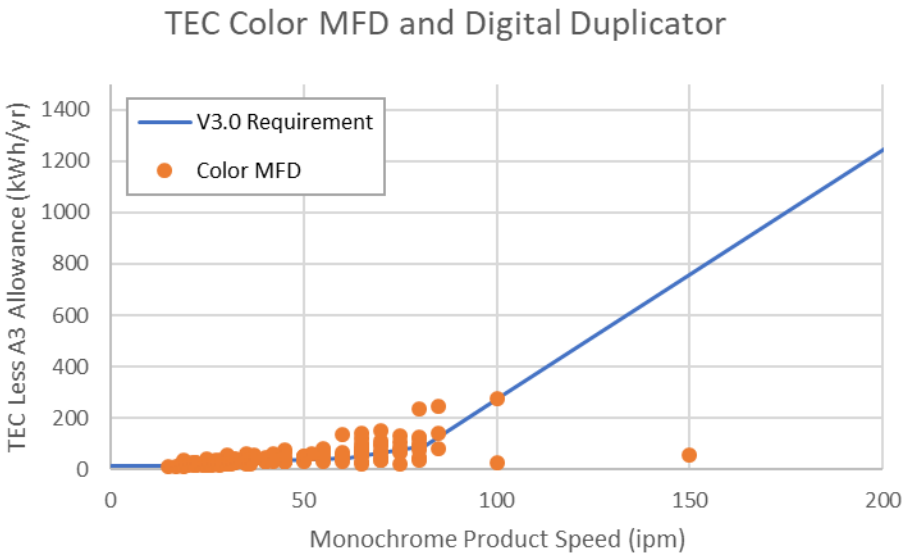
Color Capability	Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm)	TEC_{REQ} (kWh/year, to the nearest 0.1 kWh/year for reporting)
Monochrome Non-MFD	s ≤ 20	13.1
	20 < s ≤ 40	0.7 × s – 1.6
	40 < s ≤ 60	0.7 × s – 1.6
	60 < s ≤ 135	2.6 × s – 117.5
	s > 135	10.2 × s – 1151.1
Monochrome MFD	s ≤ 20	16.6
	20 < s ≤ 40	0.6 × s + 4.0
	40 < s ≤ 60	0.9 × s – 8.3
	60 < s ≤ 80	1.6 × s – 51.0
	s > 80	3.8 × s – 229.2
Color Non-MFD	s ≤ 20	13.9
	20 < s ≤ 40	0.9 × s – 5.0
	40 < s ≤ 60	0.4 × s + 15.5
	s > 60	6.0 × s – 326.1
Color MFD	s ≤ 20	14.8
	20 < s ≤ 40	0.9 × s – 4.1
	40 < s ≤ 60	0.6 × s + 8.2
	60 < s ≤ 80	2.2 × s – 89.4
	s > 80	9.7 × s – 696.9

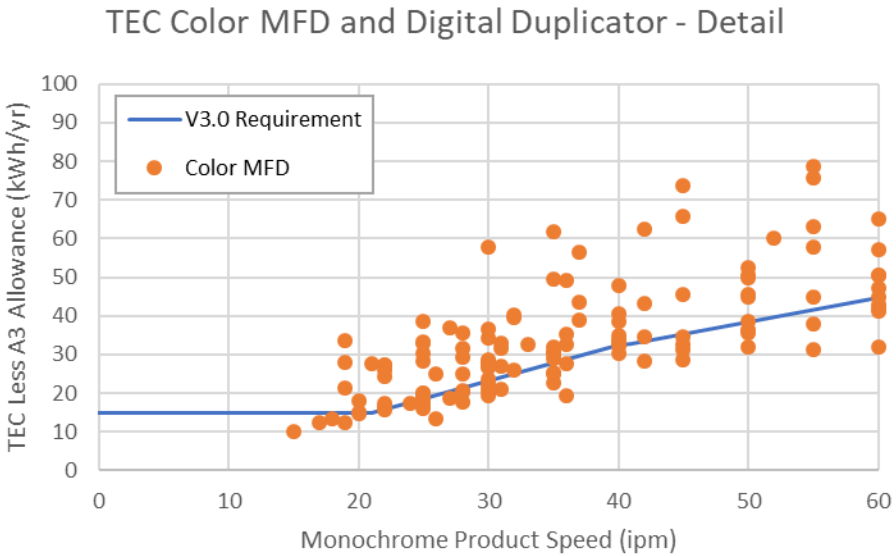
Proposal: TEC Requirements



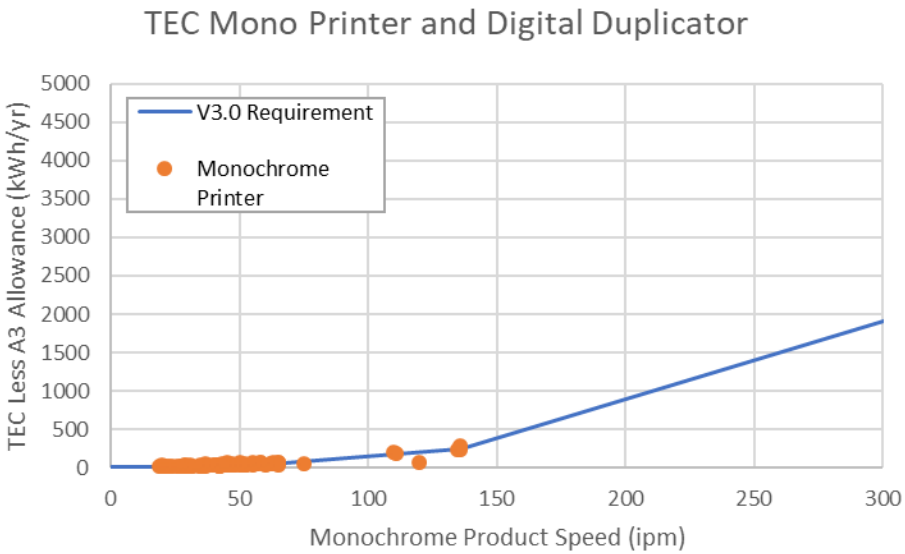


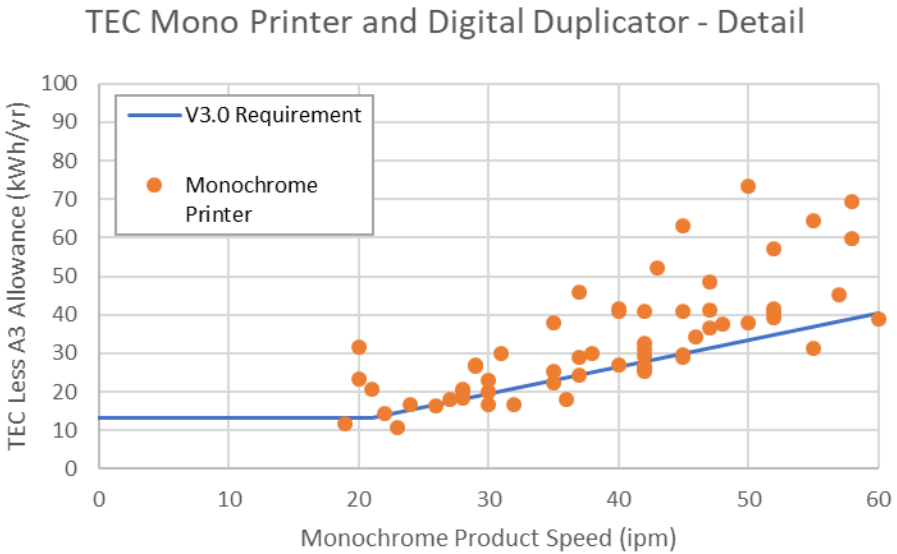
Proposal: TEC Requirements



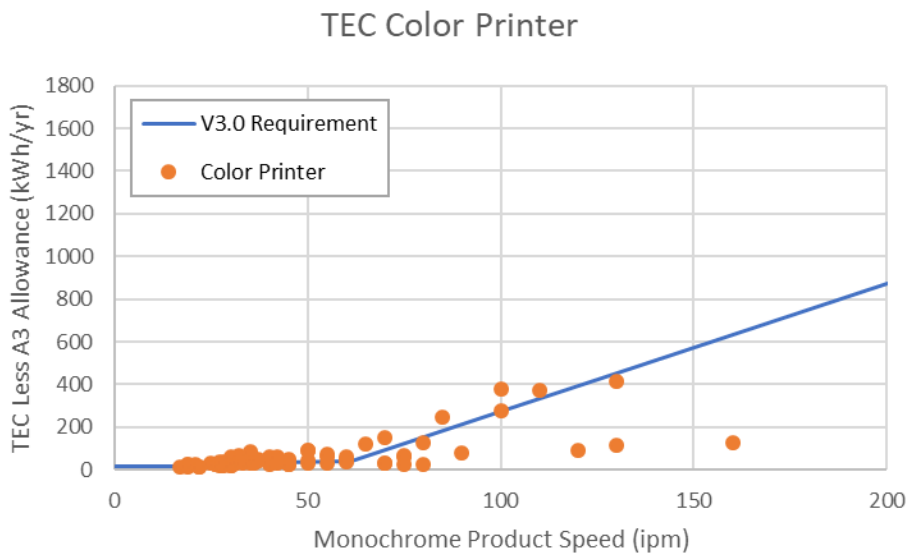


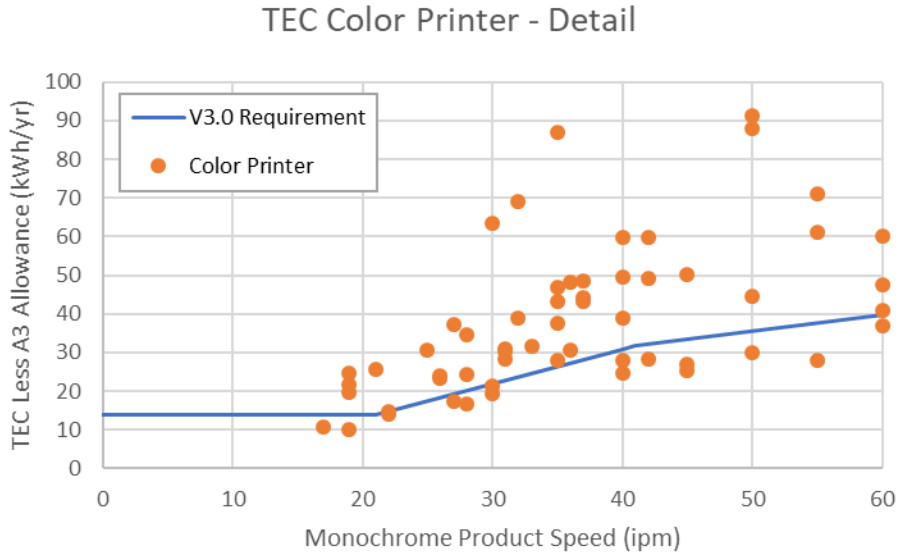
Proposal: TEC Requirements





Proposal: TEC Requirements





Summary of Feedback – Recovery Time

- A stakeholder commented that:
  - Recovery time requirement could encourage stakeholders to keep products in Sleep Mode
  - Harmonize with Germany's Blue Angel resume (recovery) time requirements.

- EPA is proposing to require maximum recovery times from sleep equivalent to the Blue Angel requirements for TEC products.

Proposal – Recovery Time

- Definition: The time it takes for a device to return from a Sleep or Off Mode to a Ready State.

Equation 6: Recovery Time

$$t_R = t_{Active1} - t_{Active2},$$

Where:

- t_R *is Recovery Time;*
- $t_{Active1}$ *is the time from Sleep Mode to the first sheet exiting the unit, in minutes, as measured per the test method; and*
- $t_{Active2}$ *is the time from Ready Mode to the first sheet exiting the unit, in minutes, as measured per the test method.*

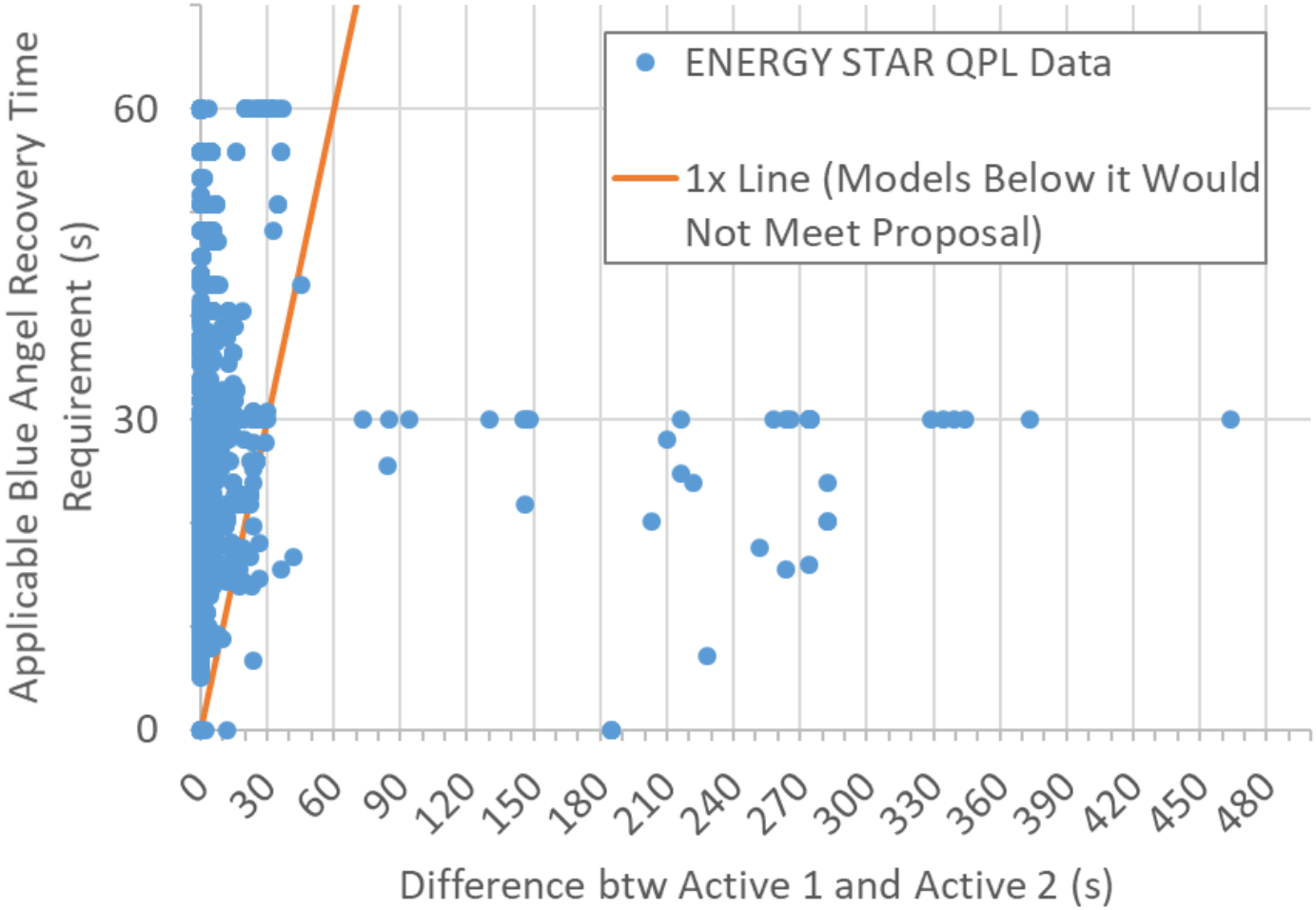
Proposal – Recovery Time

Table 7: Determination of Maximum Recovery Time (Minutes)

Print Speed, *s* (ipm)	Maximum Default Delay Time to Sleep to Permit Applicability of Shorter Recovery Time in Equation 7 (min)	Maximum Default Delay Time to Sleep to Permit Applicability of Longer Recovery Time in Equation 8 (min)
$0 < s \leq 5$	5	10
$5 < s \leq 10$	10	15
$10 < s \leq 20$	10	20
$20 < s \leq 30$	10	45
$30 < s \leq 40$	10	45
$s > 40$	15	60

$$t_{R\_MAX} = \min(0.42 \times s + 5, 30),$$

$$t_{R\_MAX} = \min(0.51 \times s + 15, 60),$$


ENERGY STAR QPL Data
1x Line (Models Below it Would Not Meet Proposal)
Applicable Blue Angel Recovery Time Requirement (s)
0
30
60
0
30
60
90
120
150
180
210
240
270
300
330
360
390
420
450
480
Difference btw Active 1 and Active 2 (s)

Proposal – Duplexing

- EPA proposes to make the duplexing requirement more stringent.
  - Eliminate the option for products at some speeds to meet the requirement through an optional accessory (<5% of products used to comply).
  - 38% of monochrome products and 69% of color products at the affected speeds would meet the requirement.

- As in V2.0, printers intended to print on special single-sided media are exempt.

Version 2.0 Requirement

Table 3: Automatic Duplexing Requirements for all Color TEC Copiers, MFDs, and Printers

Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm)	Automatic Duplexing Requirement
$s \leq 19$	None
$19 < s < 35$	Integral to the base product or optional accessory
$s \geq 35$	Integral to the base product

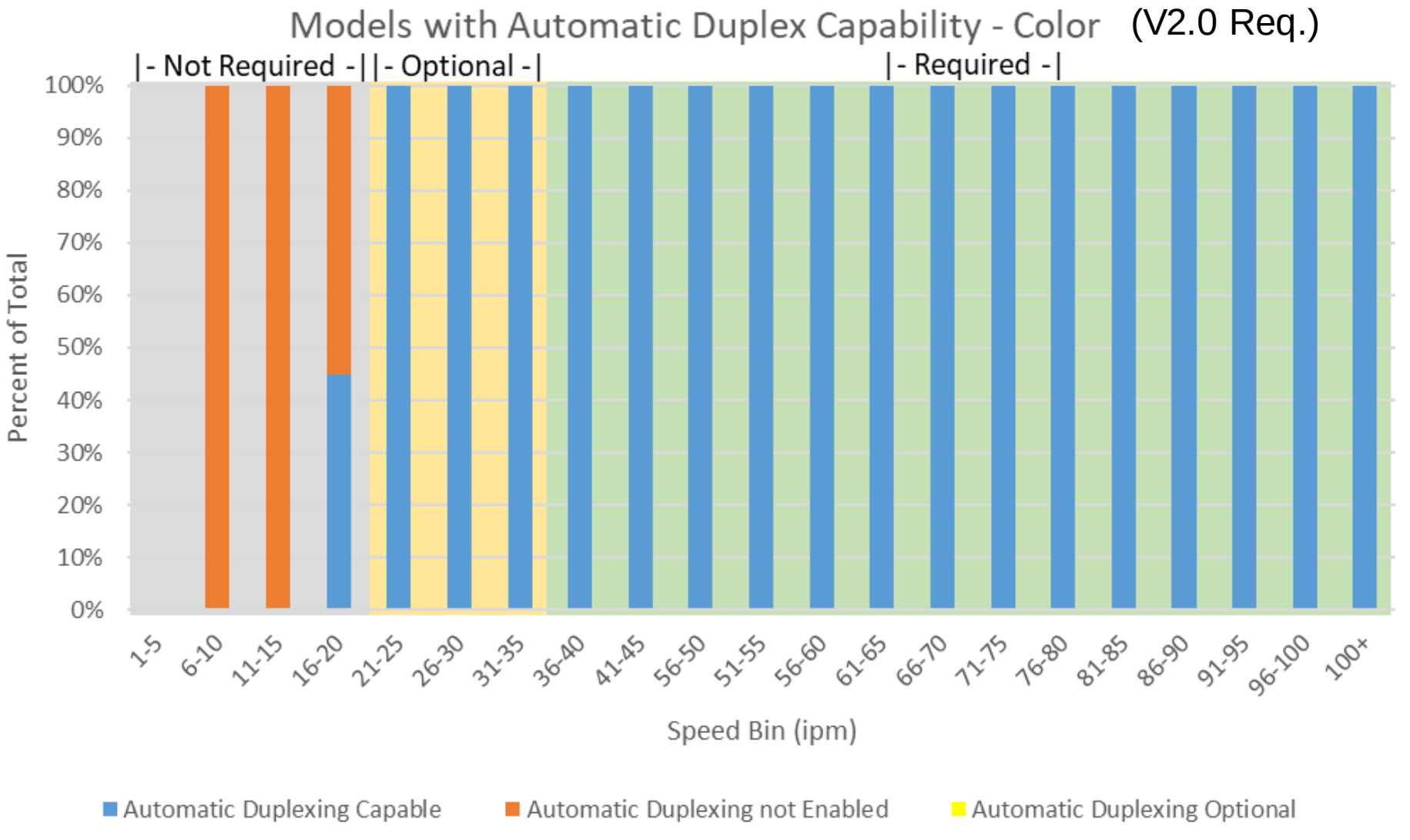
Table 4: Automatic Duplexing Requirements for all Monochrome TEC Copiers, MFDs, and Printers

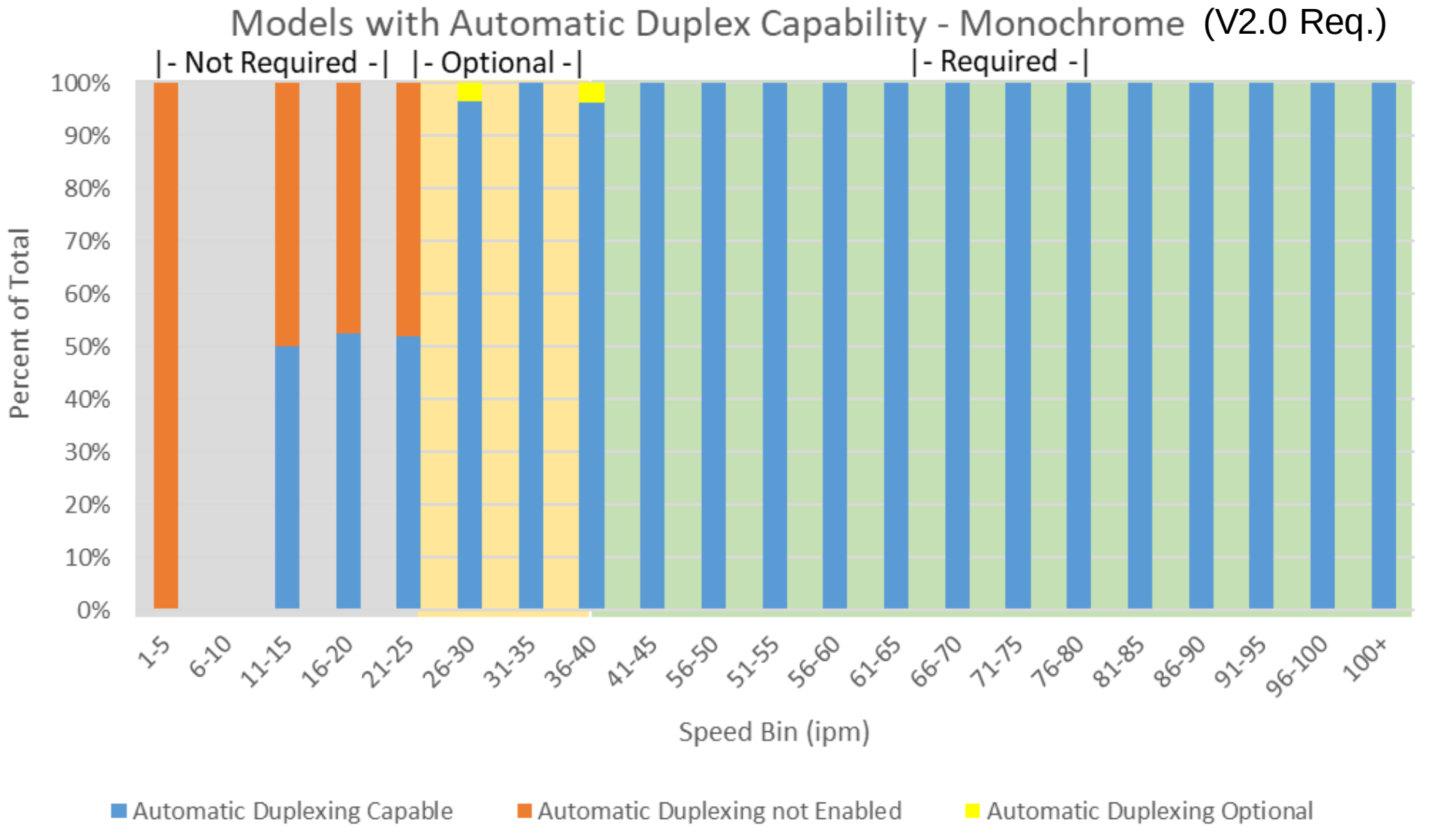
Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm)	Automatic Duplexing Requirement
$s \leq 24$	None
$24 < s < 37$	Integral to the base product or optional accessory
$s \geq 37$	Integral to the base product

Proposed Version 3.0 Requirement

Table 5: Automatic Duplexing Requirements for all TEC MFDs and Printers

Product Type	Product Speed (ipm)
Color	16
Monochrome	11


Models with Automatic Duplex Capability - Color
(V2.0 Req.)
|- Not Required -||- Optional -|
|- Required -|
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent of Total
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
56-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
86-90
91-95
96-100
100+
Speed Bin (ipm)
Automatic Duplexing Capable
Automatic Duplexing not Enabled
Automatic Duplexing Optional


Models with Automatic Duplex Capability - Monochrome (V2.0 Req.)
|- Not Required -|
|- Optional -|
|- Required -|
Percent of Total
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-45
56-50
51-55
56-60
61-65
66-70
71-75
76-80
81-85
86-90
91-95
96-100
100+
Speed Bin (ipm)
Automatic Duplexing Capable
Automatic Duplexing not Enabled
Automatic Duplexing Optional

Introduction: OM Requirements

- After review, EPA has decided not to propose new ENERGY STAR Sleep Mode levels for OM products.
  - EPA found limited savings from potential new, more rigorous levels.
- Other changes to OM requirements:
  - Consolidated scanner adder into base allowance for MFDs.
  - Changed Standby requirement to Off Mode
  - Harmonized with EU Lot 6 (Standby) for the Off Mode requirement level.

Summary of Feedback – OM Requirements

- EPA was asked by some stakeholders to harmonize OM sleep mode power requirements with EU Lot 26 (network standby).
- EPA encourages stakeholders to provide additional feedback on harmonizing with EU Lot 26.

EU Lot 26 Requirement on Network Standby (Sleep Mode) Power

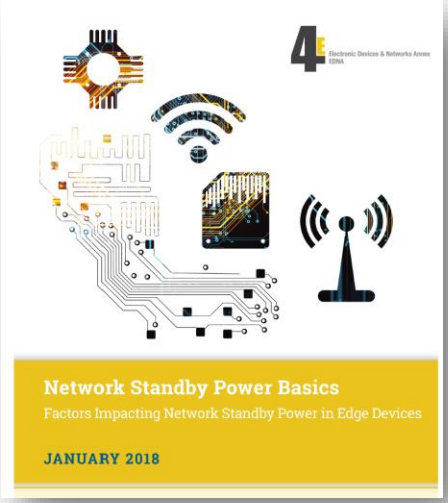
Maximum Power Consumption W in networked standby (max. 20 min)	Tier 1 (1 Jan 2015)	Tier 2 (1 Jan 2017)	Tier 3 (1 Jan 2019, currently under review)
Equipment without High Network Availability	6 W	3 W	2 W

Discussion – OM Requirements

- As an alternative, EPA is considering reducing adder allowances to reflect improvements in technology
- E.g., a new IEA report lists typical power values listed for network interfaces

Table 3: Dc and ac power draw ranges for network standby function based on network interface used.

	DC Component Power (mWdc)		DC-DC Conversion Losses (mWdc)[1]		AC-DC Conversion Losses (mWdc)[2]		Total Network Standby Component Impact (Wac)	
Network Interface	Low	High	Low	High	Low	High	Low	High
Fast Ethernet port	252	977	13	49	10	30	0.3	1.1
Gigabit Ethernet Port @ 10 M	30	798	2	40			0.04	0.9
Gigabit Ethernet Port @ 100 M	107	790	5	40			0.1	0.9
Gigabit Ethernet Port @100 M (EEE)	40	790	2	40			0.05	0.9
Gigabit Ethernet Port @ 1000 M	256	1029	13	51			0.3	1.1
Gigabit Ethernet Port @ 1000 M (EEE)	41	1029	2	51			0.05	1.1
IEEE 802.11n radio Wi-Fi	3	1478	0.2	74			0.01	1.6



Definition Change of Standby to Off Mode

- To avoid confusion relating to the Standby power requirement and definition, EPA has redefined Standby as an Off Mode power requirement and proposes to remove the Standby definition.
  - Products that do not have an Off Mode shall meet the Off requirement in Sleep Mode, and
  - Those that do not have Off Mode or Sleep Mode shall meet the Off requirements in Ready State.

Off Mode Requirement

Table 10: Maximum Off Mode Power Requirement

Product Type	Maximum Off Mode Power (watts)
All OM Products	0.3

- 0.3 Watts harmonizes with the currently proposed EU Lot 6 (Standby), which would take effect in 2019.
- The European Commission is conducting a review of this requirement (http://www.ecostandbyreview.eu), and the draft conclusion is that a 0.3 W requirement is feasible.

Other Changes

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	General Requirements
1:45–2:15	TEC and OM Requirements
2:15–2:45	**Other Changes**
2:45–3:00	Network Activity Test Method
3:00–3:15	Other Test Method Issues
3:15–3:40	Professional Imaging Products
3:40–4:00	Timeline and Open Discussion

Introduction

- Maximum TEC_{DFE} Requirements
- Scope: Exclusion of Copiers and Fax Machines
- New MFD Definition

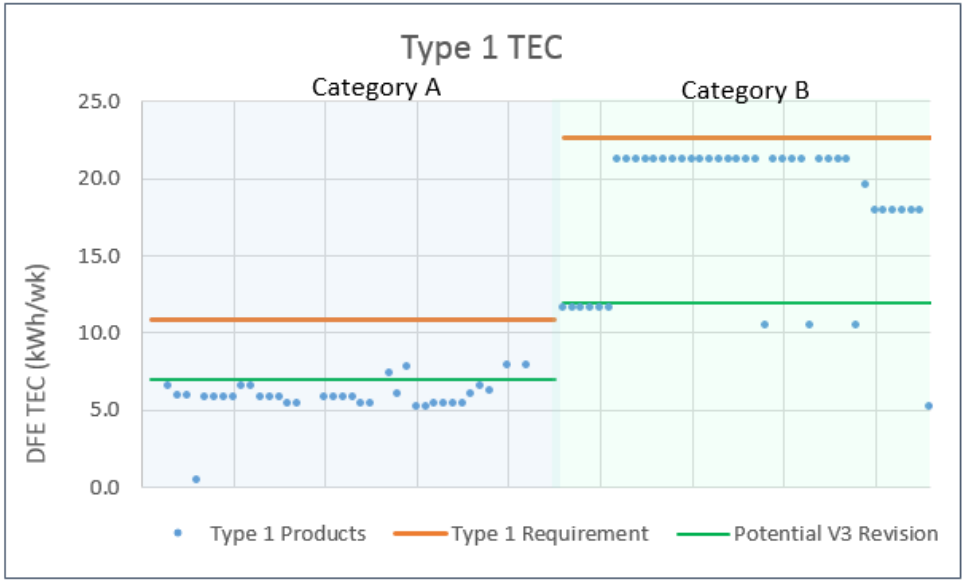
Proposal: Maximum TEC_{DFE} Requirements

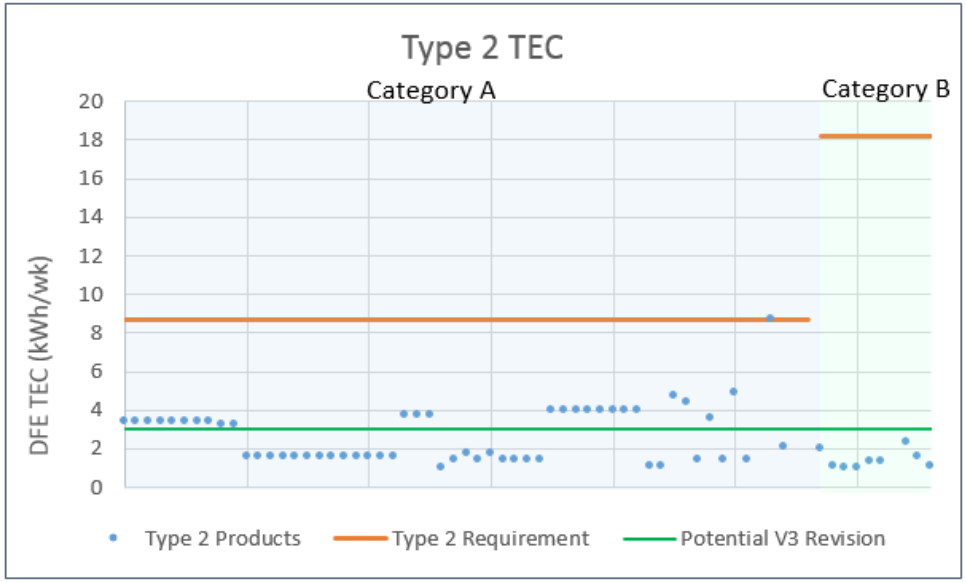
- EPA has proposed more stringent requirements for Imaging Equipment products that are shipped with a Digital Front End (DFE).

Table 2: Maximum TEC_{DFE} Requirements for Type 1 and Type 2 DFEs

DFE Category	Category Description	Maximum TEC_{DFE} (kWh/year)	
		Type 1 DFE	Type 2 DFE
A	All DFEs that do not meet the definition of Category B will be considered under Category A for ENERGY STAR qualification.	364	156
B	To qualify under Category B DFEs must have: 2 or more physical CPUs or 1 CPU and ≥ 1 discrete Auxiliary Processing Accelerators (APAs)	624	156

Proposal: Maximum TEC_{DFE} Requirements





Summary of Feedback and Proposal - Scope

- EPA noted that there has been a drop in copier and fax shipments.
  - The Agency believes this has reduced the incentive for manufacturers to invest in efficiency in these product categories.
  - Currently, there are only 16 total copiers and fax machines on the QPL. These products were certified more than six years ago.

- EPA therefore proposes to remove copiers and fax machines from the scope of the specification.

Proposal – New Multifunction Device (MFD) Definition

- EPA proposes a simplified definition for MFDs as a combination of Printer and Scanner to reflect the disappearance of standalone copiers from the market.
- Also, as stated earlier, EPA proposes to include the OM scanner adder allowance directly in the MFD base allowance.

5) Multifunction Device (MFD): A product that performs the core functions of a Printer and Scanner. An MFD may have a physically integrated form factor, or it may consist of a combination of functionally integrated components. MFD copy functionality is considered to be distinct from single-sheet convenience copying functionality sometimes offered by fax machines. This definition includes products marketed as MFDs and "multi-function products" (MFPs).

Discussion

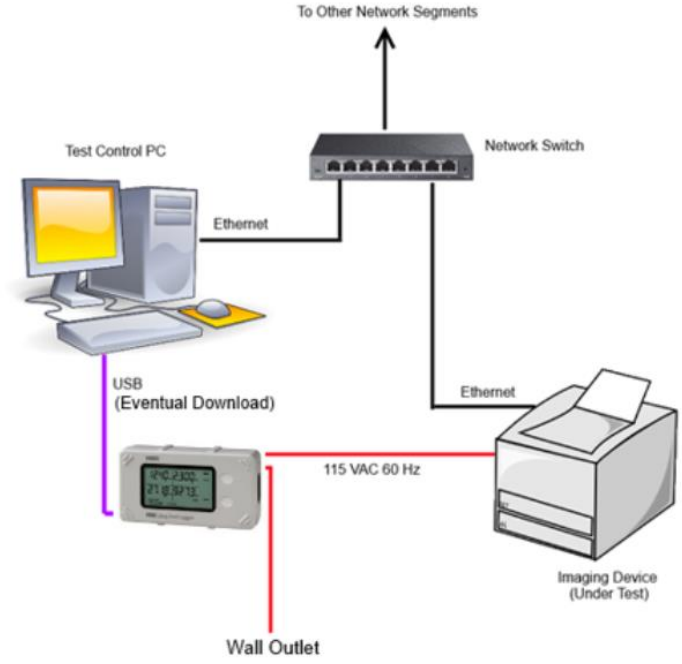
- EPA welcomes feedback on these issues
  - TEC_{DFE}
  - Scope
  - MFD Definition

Network Activity Test Method

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	General Requirements
1:45–2:15	TEC and OM Requirements
2:15–2:45	Other Changes
2:45–3:00	**Network Activity Test Method**
3:00–3:15	Other Test Method Issues
3:15–3:40	Professional Imaging Products
3:40–4:00	Timeline and Open Discussion

Introduction

- The network activity test proposed in Draft 1 was validated in the field with the help of the California Plug Load Research Center (CalPlug).



9 Tests Conducted

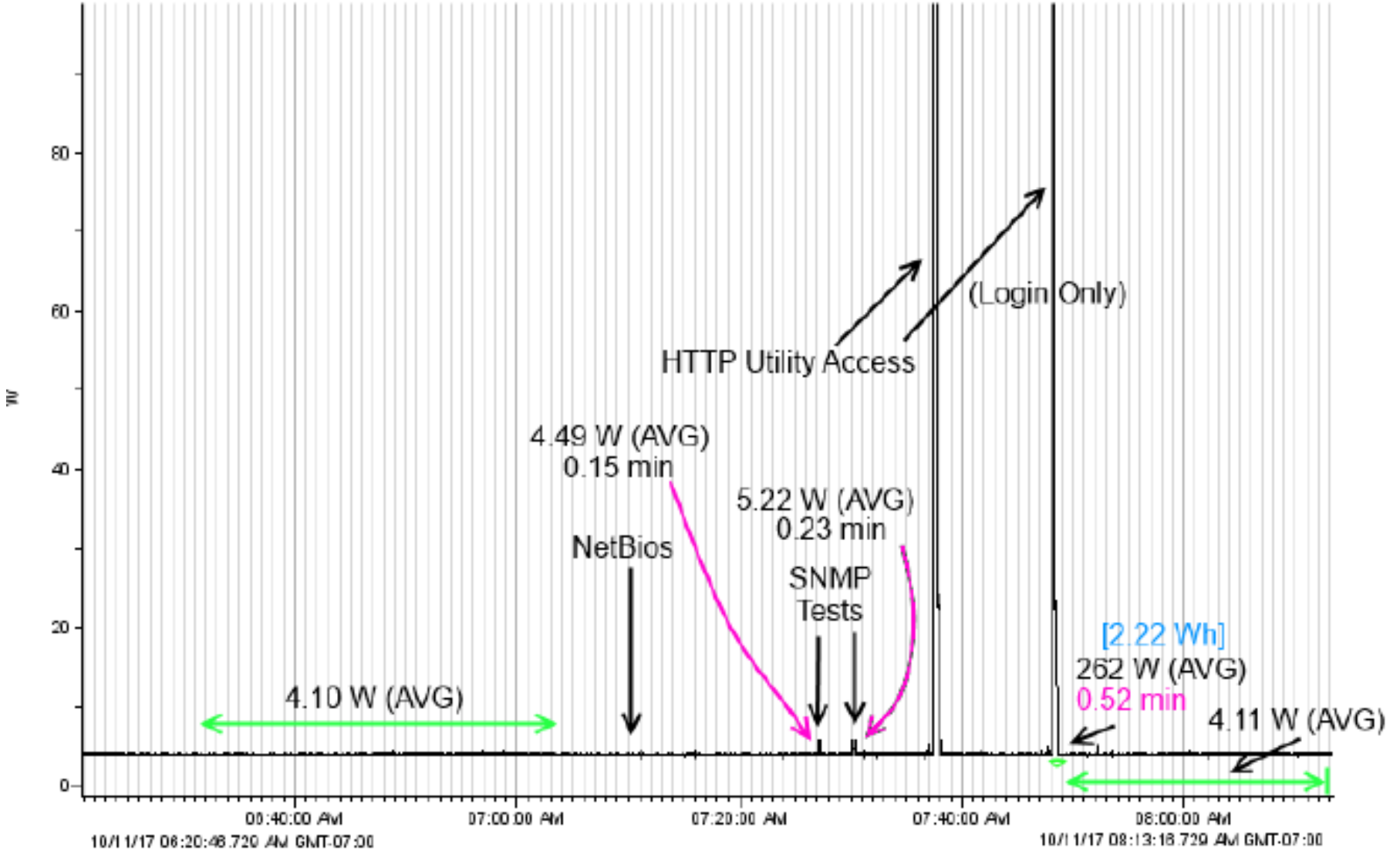
- Office printers and MFDs
- CalPlug was unable to replicate the network wakeup behavior that prompted examination of the issue.
  - Models returned to sleep promptly.
  - Exception: specific user-initiated requested, like print jobs or HTTP access to the device; these are expected to be infrequent.

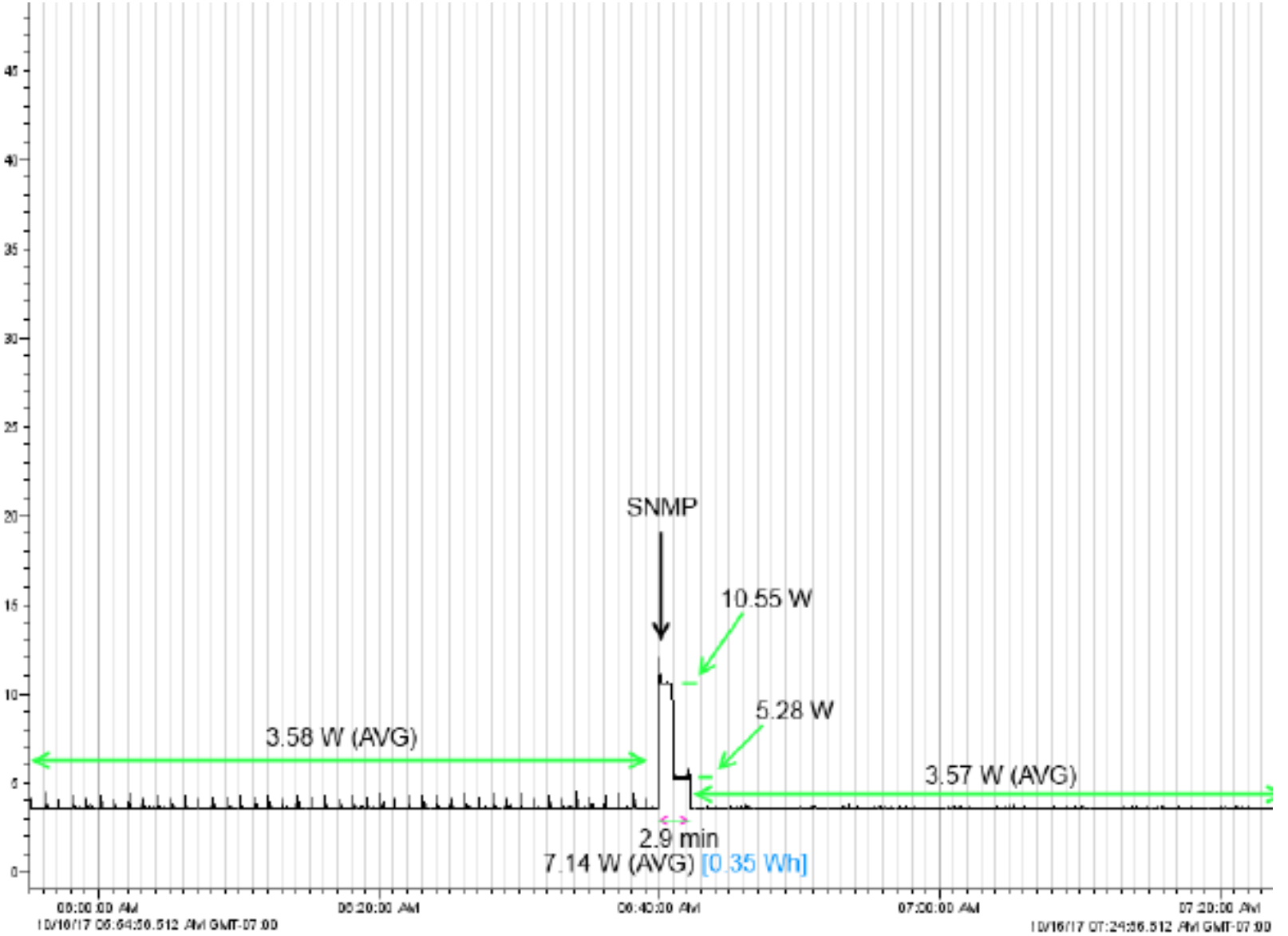
Protocol / Action	Evaluation Method
SNMP†	MIB Walker Utility
NetBIOS / NBNS†	NBTSTAT command: "nbtstat –A IP_addr"
PING/ICMP echo	PING command
ARP Request	ARP Command: "arp IP_addr", "arp-a"
WOL (Wake on Lan)	"WOL - Magic Packet Sender" Utility
Bonjour/Zeroconf protocol	"Bonjour Browser for Windows"
HTTP to access admin utility	Web Browser
TCP/UDP Port Scan*	"ZenMap" for Windows Utility, Intense Scan
HTTP to port 9100 (force print HTTP headers)*	Web Browser
Windows Driver Print*	Print Spooler

Results

- Power increased slightly (0.004—3.83 Wh) during the SNMP test.
  - Wakeups ranged from 0.2 to 11.5 minutes
  - Result of walking through entirety of device's management information base (MIB)
- However, this response was only present during test, not due to background network traffic, which was significant:

Network Traffic	Rate	Comments
ARP	2 packets/min	Specific device as target
SNMP	10 packets/min	Specific device as target


W
80
60
40
20
0
HTTP Utility Access
(Login Only)
4.49 W (AVG)
0.15 min
5.22 W (AVG)
0.23 min
NetBios
SNMP
Tests
[2.22 Wh]
262 W (AVG)
0.52 min
4.10 W (AVG)
4.11 W (AVG)
06:40:00 AM
07:00:00 AM
07:20:00 AM
07:40:00 AM
08:00:00 AM
10/11/17 06:20:48.720 AM GMT-07:00
10/11/17 08:13:18.729 AM GMT-07:00


SNMP
10.55 W
5.28 W
3.58 W (AVG)
3.57 W (AVG)
2.9 min
7.14 W (AVG) [0.35 Wh]
06:00:00 AM
06:20:00 AM
06:40:00 AM
07:00:00 AM
07:20:00 AM

Proposal and Discussion

- EPA is withdrawing the network activity test method from the proposal, pending additional information on models or protocols that may be affected by unnecessary wakeups.

- EPA welcomes feedback on this proposal.

Other Test Method Issues

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	General Requirements
1:45–2:15	TEC and OM Requirements
2:15–2:45	Other Changes
2:45–3:00	Network Activity Test Method
3:00–3:15	**Other Test Method Issues**
3:15–3:40	Professional Imaging Products
3:40–4:00	Timeline and Open Discussion

Introduction

- ISO Standards for Print Speed
- Replacement of dc test
- DFE Test Procedure

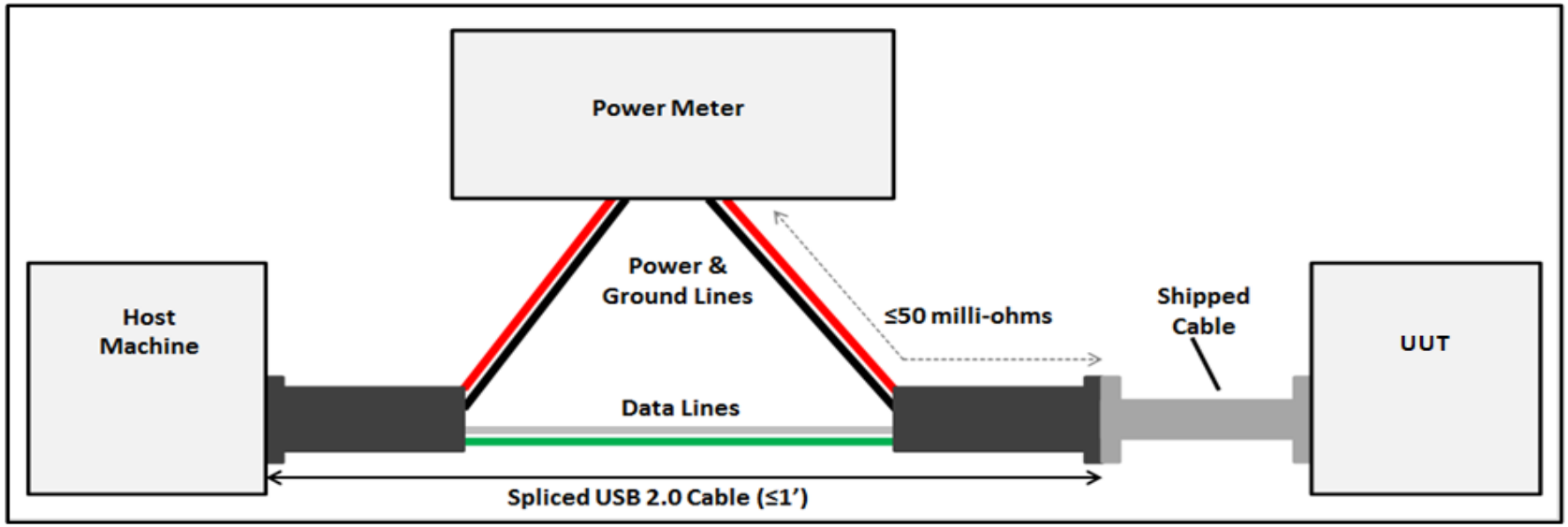
Summary – ISO Standards for Print Speed

- After further research and stakeholder feedback, EPA proposes to drop requirement to report print speed to ISO/IEC 24734:2014 .
  - Standard does not apply to all of the different types of Imaging Equipment ENERGY STAR certifies.
  - Most manufacturers that can, already use this.

- EPA has therefore replaced the requirement with a recommendation.

Proposal – Replacement of dc test

- Current dc test consists of measuring the ac power of a dc source with and without the unit under test (UUT) connected.
- EPA proposes to replace with a direct dc measurement.



DFE Test Procedure

- In the Ready Mode DFE Test, EPA proposes to:
  - Remove the previous 10 minute power measurement requirement of each dc input to calculate an average power.
  - Allow testing of instantaneous dc power on each dc input into the DFE to be summed to report the total DFE dc ready mode power.
- Stakeholders have shared that this will reduce testing burden and required equipment while yielding an accurate result.
- EPA welcomes feedback on this proposed change.

Discussion

- EPA welcomes feedback on these proposals:
  - ISO Standards for Print Speed
  - Replacement of dc test
  - DFE Test Procedure

Professional Imaging Products

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–1:45	General Requirements
1:45–2:15	TEC and OM Requirements
2:15–2:45	Other Changes
2:45–3:00	Network Activity Test Method
3:00–3:15	Other Test Method Issues
3:15–3:40	**Professional Imaging Products**
3:40–4:00	Timeline and Open Discussion

Summary – Professional Imaging Products

- **EPA has proposed a definition for Professional Imaging Products.**
  - EPA further clarified the industry definition by listing examples of color certification and expressing the memory requirement in terms of megabytes.
  - More than 81% of known ENERGY STAR Professional Imaging Products have internal memory greater than 1,024 MB, compared to 22% of all Imaging Equipment.

Summary – Professional Imaging Products

- EPA proposes to add Professional Imaging Products to the scope of the test method.
- The proposed test references International Organization for Standardization (ISO) Standard 21632 "Graphic technology -- Determination of the energy consumption of digital printing devices including transitional and related modes".
- Draft version of ISO 21632
  - Provides flexibility to test a variety of Printers and MFDs with print capability.
  - Specifies the setup and test of each mode.
  - The results obtained through ISO 21632 can be combined with a job structure specific to Professional Imaging Products to ensure that the result is representative of the application.

Summary – Professional Imaging Products

- EPA is proposing language referencing the standard in key places with the intention of seeking feedback regarding its use and will verify and update all references once the final standard is published later in 2018.

- Harmonizing with the current draft of ISO 21632 would require changes in the following areas:
  - Test Setup
  - Pre-test UUT Configuration
  - Pre-test UUT Initialization
  - Test

General Test Setup

- AC Input Power: Any voltage, 1- or 3-phase, 50–60 Hz, and 100–650 V.
- Temperature and Relative Humidity: 20–25 °C and 45–60%
  - Any tests conducted in accordance with ISO 21632 would still be in compliance with ENERGY STAR.
  - ISO 21632 factors in the energy consumption of any air conditioning equipment required for Professional Imaging Equipment operation.
  - However, EPA proposes to leave this unspecified so as to focus on the efficiency of the Imaging Equipment.

General Test Setup

- Power Meter: 5 kHz
- Minimum Resolution:
  - Reporting should be to four significant figures, which would require minimum resolution of 0.001 W for measurement values from 1 W to 10 W, 0.01 for measurement values from 10 W to 100 W and so on.
- Measurement Uncertainty: ±3%
- Paper Specifications:
  - Paper weight will vary.
  - Compatible paper size, including A4, letter, A3, or even larger.

Pre-Test UUT Configuration

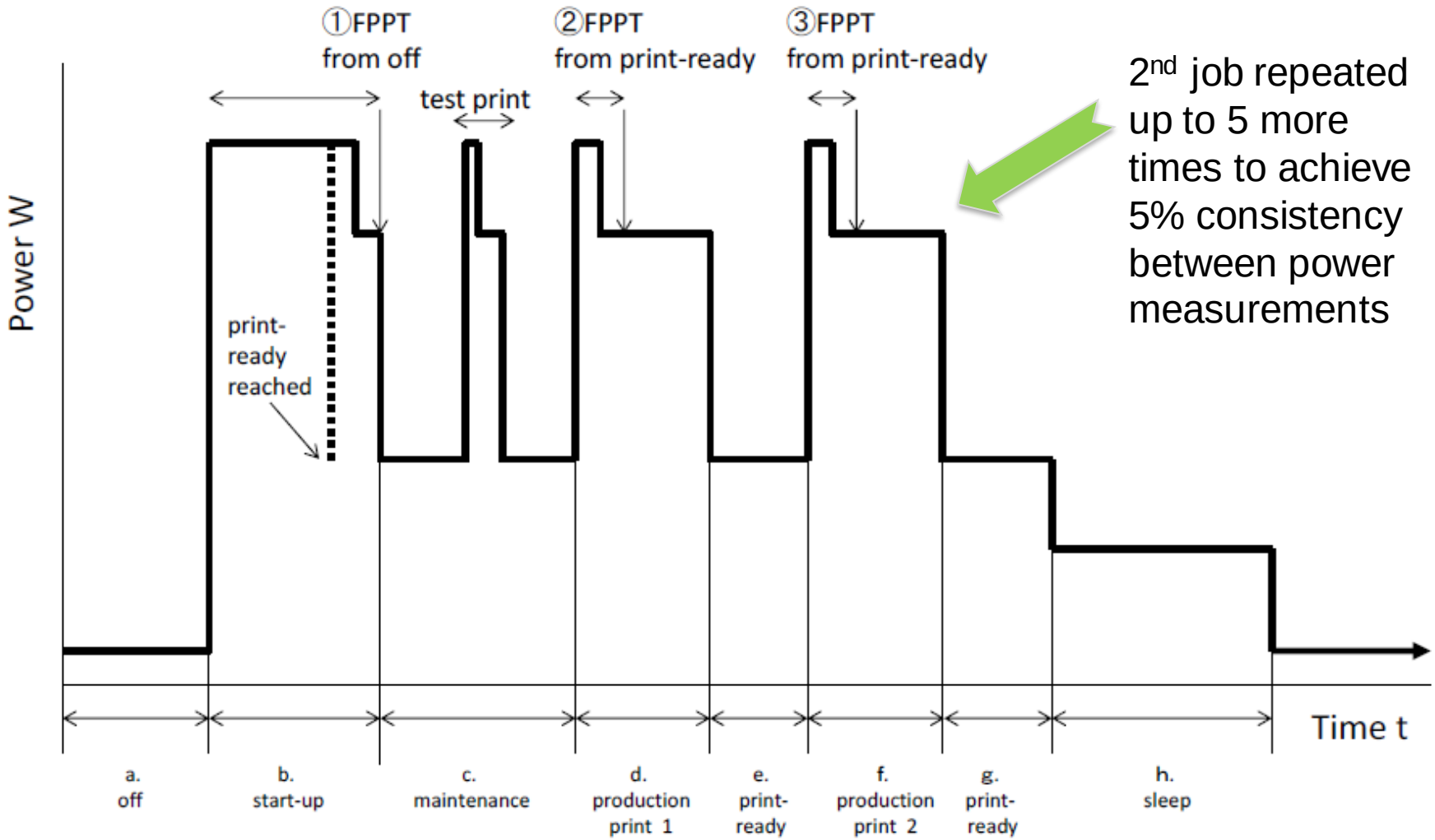
- Network Connections:
  - ISO 21632 does not provide any requirements relating to network configuration.
  - To ensure further repeatability, EPA proposes to supplement with existing Network Requirements.
- Service/Maintenance Modes:
  - ISO 21632 includes a test for energy consumption during maintenance and requires it for models with daily maintenance needs.
  - EPA is therefore proposing that Service/Maintenance Modes <u>not be</u> excluded for Professional Imaging Products.

Pre-Test UUT Initialization

- Product Speed for Testing:
  - ISO 21632 for Professional Imaging Products requires testing in two configurations: best quality and best productivity, unless no difference.
- Pre-conditioning
  - ISO 21632 requires a pre-conditioning/acclimation period of 1 hour or more, compared to ENERGY STAR requirement of 2 hours or more of Electrophotographic (EP) products.
  - EPA welcomes feedback whether a 1 hour acclimation is sufficient for Professional Imaging Products and for TEC products.

Test

- EPA proposes to reference the following Sections of ISO 21632:
  - 4.3.2 (Definitions of Off, Sleep, Print-ready, Best Quality, and Best Productivity Modes for testing),
  - 4.3.3 (Definitions of Maintenance and transitions (recovery times) for test),
  - 4.4 (Measurement Conditions described above), and
  - 4.5 (Detailed Instructions, next slide):



2nd job repeated up to 5 more times to achieve 5% consistency between power measurements

notation	mode name	power measurement duration	start time	end time	N.B.
a	Off	5 minutes	arbitrary time point	5 minutes after start time	Keep UUT in Off mode as long as manufacturer's recommendation. In case no information is available, wait at least 1 hour before measurement.
b	Start-up (transition)	FPPT from Off	main power switch on + Print order (1page)	Trailing edge of first page(s) reaches exit point.	
c	Maintenance	duration T minutes as specified in user's manual	end of b	T minutes after start time	This mode may be skipped for UUT, for which specific maintenance is not required.
d-1	Production 1 (transition)	FPPT from Print-Ready	print order initiated	trailing edge of first page(s) reaches exit point.	Print order shall include number of pages, which corresponds to at least 5 mimute continuous printing excluding 1st page(s).
d-2	Production 1	at least 5 minutes after 1st page(s)	trailing edge of first image(s) reaches exit point.	trailing edge of last page(s) reaches exit point.	In some case, Production 1 may represent cold-start data, which is not used for nominal energy efficiency calculation but used for conprehensive energy consumption calculation. In such a case, Production 3 needs to be conducted. See 4.5.2.2 9).
d-3	Production 1 (transition)	measurement needed for UUT, whose power gradually levels off to Ready	trailing edge of last page(s) reaches exit point.	additional mechanical movement stops, e.g. transportation rollers, cooling fans etc.	After the last page has exited from UUT, it may need some time to level off to stable Ready mode, e.g. cooling fan may continue rotation after exit of the last page.

e	Print=Ready	5 minutes	arbitrary time point after reaching stable Ready mode	5 minutes after start time	In general digital presses need considerable time for the fuser (heater) to cool down to ambient temperature. As test procedure requires, Production 2 starts from 10-minute Print Ready duration after Production 1. Therefore, Production 2 may be considered to start under warmed-up condition.
f-1	Production 2 (transition)	same as d-1	same as d-1	same as d-1	This is considered to be a repeat of d-1. If Production 1 is cold-start case, Production 2 may give significantly different data. See 4.5.2.2 9).
f-2	Production 2	same as d-2	same as d-2	same as d-1	This is considered to be a repeat of d-2. If Production 1 is cold-start case, Production 2 may give significantly different data. See 4.5.2.2 9).
f-3	Production 2 (transition)	same as d-3	same as d-3	same as d-3	
g	Print=Ready	No measurement required	End of Production 2	Start of Sleep mode after default delay time	
h	Sleep	5 minutes	arbitrary time point after the UUT enters Sleep mode	5 minutes after start time	This mode may be skipped for UUT without Sleep mode. For UUT with Sleep mode, it will enter Sleep mode after residing in Print-Ready mode for a specified delay time.

Timeline and Open Discussion

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Timeline

- Q2 2018: Version 3.0 Draft 2 Specification and Draft 3 Test Method (as needed)
- Q3/Q4 2018: Final Version 3.0 Test Method and Specification
  - Potential V3.1 to include Professional Imaging Products
- Q2/Q3 2019: Version 3.0 specification effective

Final Questions or Comments

Written Comment Submission

Please send any data and written feedback on the drafts to imagingequipment@energystar.gov no later than **April 10, 2018.**

Unless marked as confidential, comments will be posted on the Imaging Equipment Version 3.0 product development page at https://www.energystar.gov/products/spec/imaging_equipment_specification_version_3_0_pd.

Also accessible through www.energystar.gov/revisedspecs.

Thank You!

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