

# ENERGY STAR COMPUTERS V6 DRAFT 2 - NRDC INPUT

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# POWER SUPPLY EFFICIENCY INCENTIVE

# Power Supply Incentive Proposal

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## ❑ Objective:

- Encourage higher efficiency power supplies, without mandatory requirement in Energy Star

## ❑ Content:

- Why incentivize higher efficiency power supplies
- What efficiency characteristics to encourage
- Impact of DOE NOPR
- How: proposed incentive mechanism

# Why a Power Supply Premium Efficiency Incentive?

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- Why encourage incremental PSU efficiency instead of letting designers determine the most cost-effective ways to meet E\* levels?

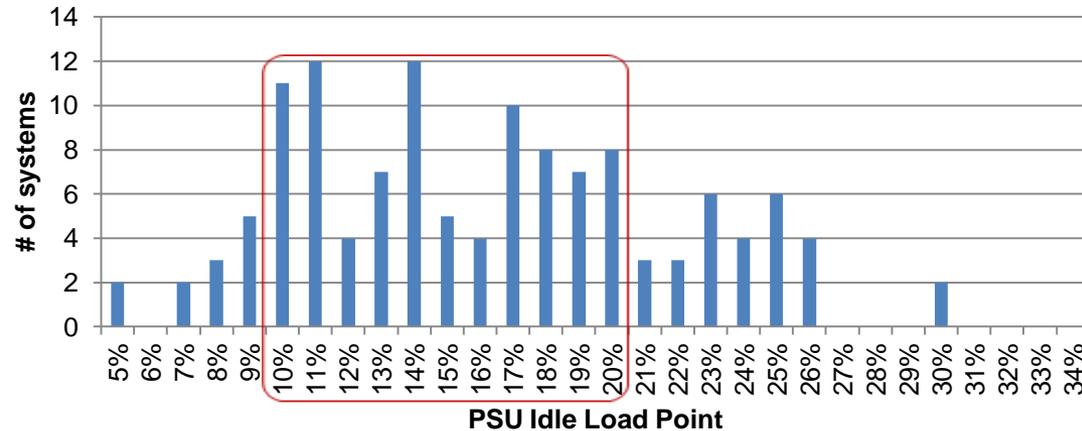
Because:

1. PSUs remain one of the largest sources of energy use within computers
2. Drive scale, affordability and innovation in high-efficiency PSU market
3. Next step on journey towards highly efficient computers, in support of GHG reduction targets

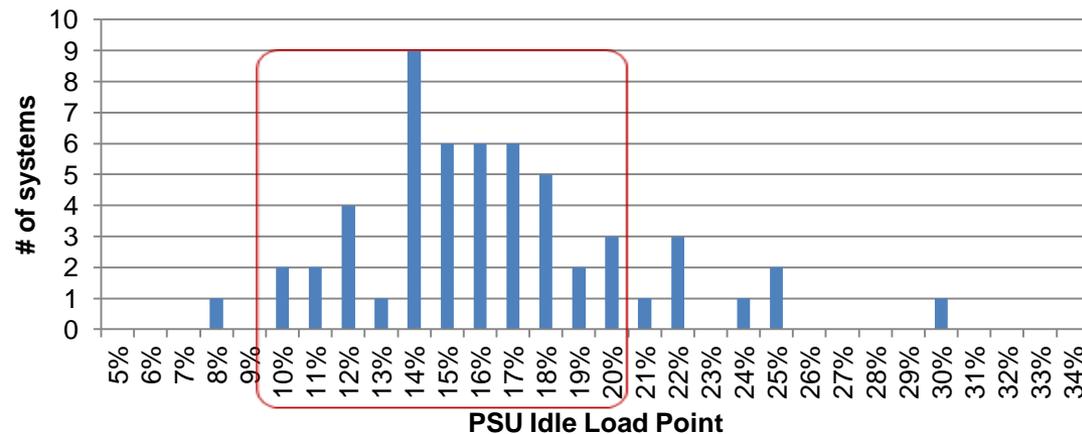
# What Efficiency Characteristics to Incentivize?

- The vast majority of desktops and notebooks idle in the 10%-20% PSU load range
- The standard EPS efficiency metric, average (25%, 50%, 75%, 100%) is not optimized for computers, but still relevant for active and charging loads
- Proposal:
  - Average efficiency metric AND
  - 10% efficiency

Desktops - Distribution of PSU Load Points at Idle\*



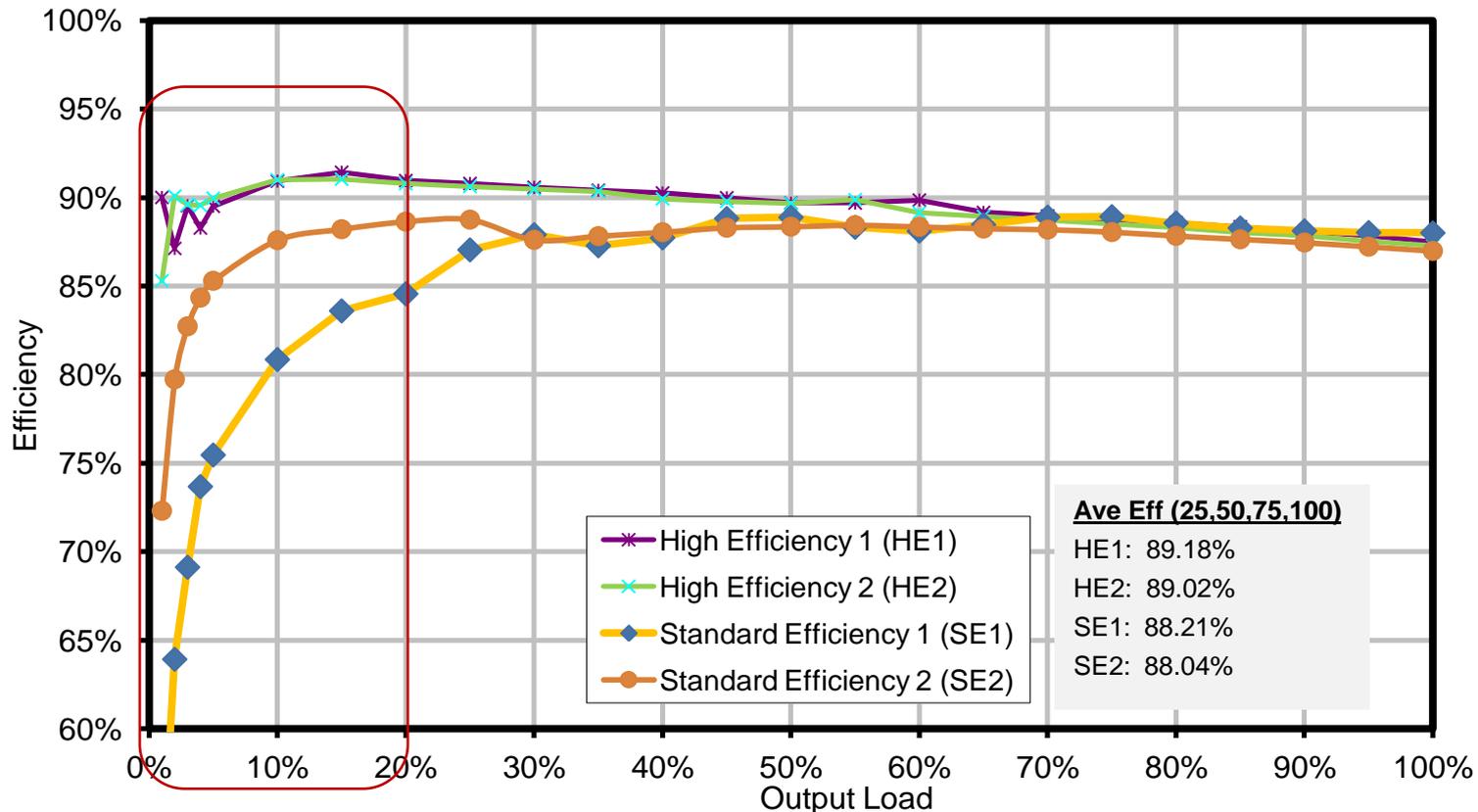
Notebooks - Distribution of PSU Load Points at Idle\*



(\* v6 Dataset Data Collection Units, weighted short/long idle)

# EPS Sample Shows Large Differences in Low-Load Efficiency

External Power Supply Efficiency Curves (115 VAC/60 Hz)



- These 4 sample units have almost the same efficiency (88%-89%) per the average efficiency metric, but very different efficiencies in the 0-20% load range.
- 10% load efficiency is a better predictor of efficiency in the 0%-20% range.

# 10%-Load Test Method and Market Data

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	IPS	EPS
Test Method	Same as 80-PLUS	DOE Test Method
Market Data	80-PLUS has been testing IPS at 10% load since Jan 2012	Anecdotal test results, manufacturer data

- More test data of EPS efficiency at 10% load would help set appropriate 10%-load efficiency requirements

# Impact of DOE Proposed Federal Rule

	Single Output	Multi-Output
Internal	<u>DOE</u> : Not covered <u>Energy Star Requirement</u> : • 80-PLUS Bronze (82, 85,82)	<u>DOE</u> : Not covered <u>Energy Star Requirement</u> : • 80-PLUS Bronze (82, 85,82)
	<u>Energy Star Incentive Opportunities</u> : • Higher 80-PLUS level • 10%-load efficiency	<u>Energy Star Incentive Opportunities</u> : • Higher 80-PLUS level • 10%-load efficiency
External	<u>DOE proposed</u> : Level “VI”: • 50-250W: 88% • > 250W: 87.5%	N/A for computers (Xbox 360) <u>DOE proposed</u> : Level “VI” • > 50W: 86%
	<u>Energy Star Incentive Opportunities</u> : • Higher average efficiency • 10% load efficiency • PFC?	<u>Energy Star Incentive Opportunities</u> : N/A

- Caution: DOE proposed standard can still be changed in final rule.
- IPS opportunity unchanged by DOE standard.
- EPS opportunity adapted to account for DOE BCEPS NOPR.

# Proposed Incentive – To Be Refined

		Criteria	Allowance
Internal	Silver +	80-PLUS Silver AND 10% load efficiency: 82%*	2%* TEC
	Gold +	80-PLUS Gold AND 10% load efficiency: 83%*	4%*TEC
External	88% +	(10% load efficiency without PFC: 88%, 10% load efficiency with PFC: 86%), AND TBD PFC requirements at 10, 25, 50, 75, 100 load	2%* TEC
	89% +	89% average efficiency, AND (10% load efficiency without PFC: 89%, 10% load efficiency with PFC: 87%), AND TBD PFC requirements at 10 ,25, 50, 75, 100 load	4%* TEC

## 10%-load efficiency requirements:

- Aim for median of market per category

(\* ) Initial level proposals to be refined

## 2% and 4% TEC incentives:

- Proportional incentive rather than set value, to reflect the proportional impact of PSU efficiency and ensure scalability across computers
- Can be adjusted to achieve a reasonable effect, e.g. 10% impact on qualification rates.

# Conclusion

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- ❑ Incentive approach allows to continue to transform PSU efficiency without increasing cost of Energy Star compliance

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# MODE WEIGHTINGS

# Computer Duty Cycle and Energy Star Mode Weightings

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- ❑ Energy Star TEC and aggregate computer energy use estimates depend heavily on computer duty cycle assumptions.
- ❑ The next two slides review known studies/ data on computer duty cycle.

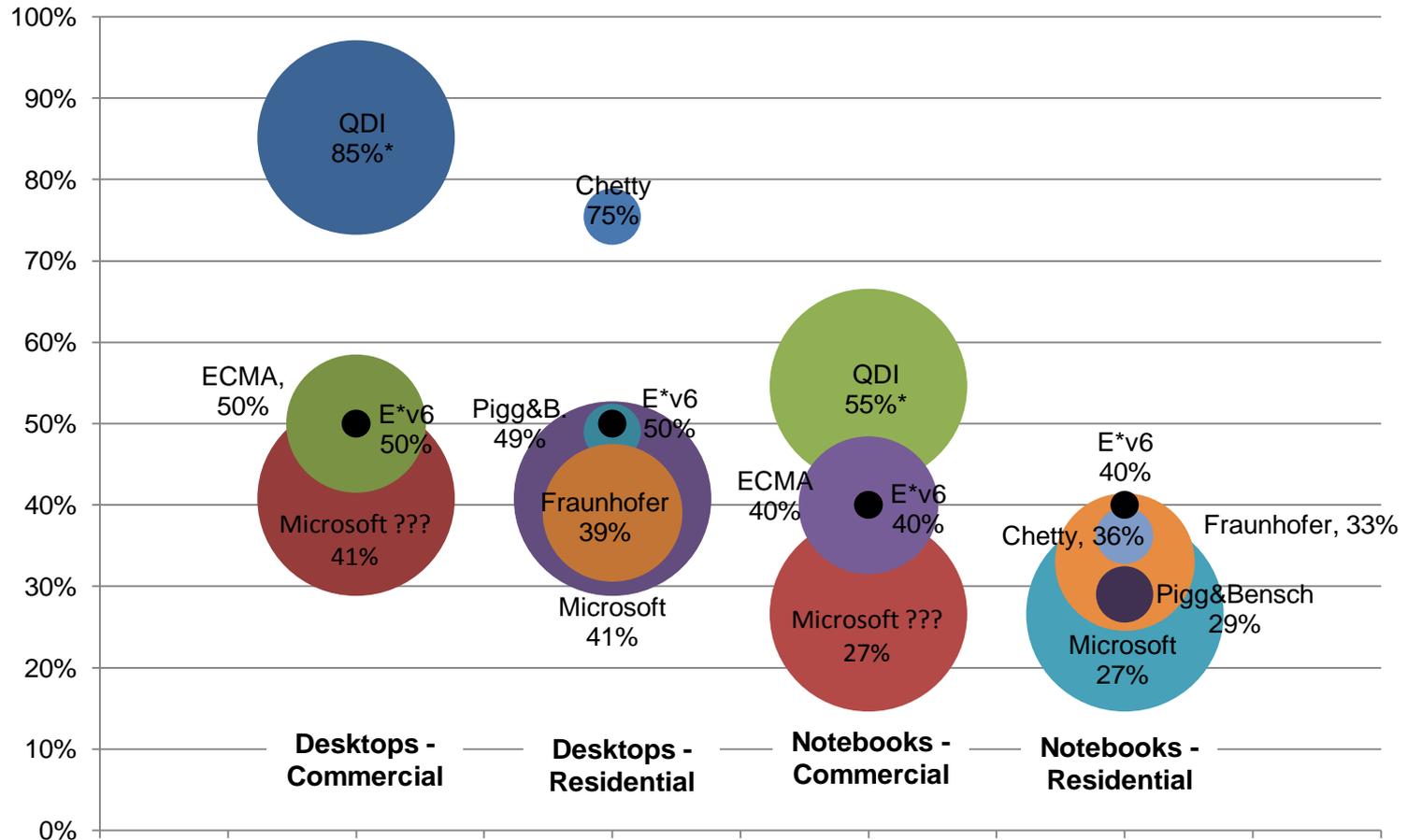
# Known Studies on Computer Duty Cycle

	Desktop			Notebook			Date	Segment	Sample size	Methodology
	Active-idle	Sleep	Off	Active-idle	Sleep	Off				
<b>Ecma-383, 3rd Edition, Annex B</b>	50%	5%	45%	40%	35%	25%	2010	Enterprise	500	Tech sector corporations only.
<b>Microsoft customer experience report</b>	41%	5%	54%	27%	9%	6%	2008	Uncertain, likely mostly consumer and SMB	75,000	Automated tracking and collection. <b>Unknown segmentation. Seems more aligned with residential than commercial, TBD</b>
<b>Barr et al., QDI</b>	85%	15%		55%	37%		2010	Commercial and Enterprise.	110,000	Automated tracking and collection. <b>Corporate power management implementation rates?</b>
<b>Pigg &amp; Bensch 2010</b>	49%	51%		29%	71%		2010	Residential	81 computers in 50 homes	Automated tracking and collection.
<b>Fraunhofer / CEA 2010</b>	39%	25%	36%	33%	25%	42%	2010	Residential	1,000 homes	Phone survey
<b>Chetty et al.</b>	75%	25%		36%	64%		2009	Residential	59 computers in 20 homes	Logging, surveys, interviews
<b>For Reference</b>										
<b>Energy Star v5</b>	40%	5%	55%	30%	10%	60%	2008	All		
<b>Energy Star v6</b>	35% short+ 15% long	5%	45%	25% short +35% long	10%	30%	2012	All		

Open questions in **bold**.

# Robust Study Suggest Significantly Higher On Mode Than Current Estimates

Duty Cycle Studies: % On Modes Estimates



Size of bubble indicates study sample size (H/M/L).

(\*) Weighted average of QDI data based on 20% comm. computers with corp. power management, 80% without.

