ENERGY STAR® for UPS - APC Comments on Metering

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Thank you for the opportunity to comment!

- The UPS spec development process continues to work well
- We look forward to continued dialog and cooperation with EPA
- We will submit more detailed written comments on Draft 2 by August 11
Measuring PUE is Important

- We agree that measuring PUE, and working to lower it are universally beneficial and that both should be encouraged by EPA.
- We recognize that building managers do not necessarily work in the company or organization as data center operators.
- We believe that stand alone meters are simpler, lower cost, easier to retrofit and more effective than UPS based metering.
UPS Metering Philosophy and Locations

- UPSs measure only the electrical parameters that they need to operate and protect themselves
  - Typically voltage, current and power; but rarely energy

- Typical Accuracy (at > 10% load)
  - Voltage 1-2%, Current 2-5%, Power ~5%

- Output Power may not be measured in all modes
  - Static bypass and/or Maintenance bypass
Typical Data Center Power Distribution

*Simplified parallel UPSs – Single power path*

![Diagram of data center power distribution with simplified parallel UPSs and single power path]
Complexity of Multiple Meters

- If each UPS measured energy, users with multiple UPSs and/or separately metered bypass paths would need to manually or programmatically read and add multiple meter readings to measure IT Load
  - Readings would need to be nearly simultaneous to be accurate
- Data center operators with non-IT load on their UPSs (e.g.: lights, CRACs, CRAHs) will have to sub meter and manually or programmatically subtract these loads
- Conversely, data centers with one meter per feed, placed after break out of non-IT loads, would only need to read 1 or 2 meters to determine IT Load
Accuracy Is Expensive

- Customers will expect (and PE’s certifying PUE will demand) revenue grade meters

- Typical revenue grade meters and transducers are 0.1-0.5% accurate (vs. ~5% internal UPS metering)

- A 500kVA 480V UPS, measuring 3 phases in 3 places requires 3 meters and 9 current transformers, each rated at 600A
Security Concerns

● Meters built into UPSs are accessed via the same network interfaces as UPS Controls

● Data center operators are unlikely to allow building managers access
  ● Could read confidential (non-energy) data
  ● Could potentially change a setting or control the UPS

● Feeding meter data into independent systems (data center console and building management system) difficult
  ● Modbus typically communicates only with a single master
  ● Securely sharing data across data center and building LANs is difficult
Stand Alone Meters Make More Sense

● Easily and cost effectively retrofitted
  ● Can be installed ‘hot’ with flexible or split core transducers
  ● No need to buy and install a new UPS to comply with ENERGY STAR for Data Centers

● Fewer meters needed
  ● ≥6x reduction possible with optimal placement
  ● Saves money
  ● Simplifies data collection
  ● Inherently more accurate (fewer sources of error)

● Typically provide revenue grade accuracy

● Independent of UPS
  ● No security concerns

● Additional functionality available
  ● Power quality measurement (harmonics, swells, sags, flicker, etc.)
  ● Forensics/fault propagation
  ● Waveform capture
Conclusion

• Output energy metering should not be required by ENERGY STAR for UPSs Version 1

• Requiring it would exclude the vast majority of products

• Metering capabilities could be declared on PPDS
Thanks for the opportunity to comment!