

**ENERGY STAR Uninterruptible Power Supply
Specification Framework
February 16, 2010**

Comments from Uptime Institute

Building Block #1

Definitions, c. e. 3

In this state, the load is fully supplied by utility or engine generator power...

Questions, c. d. 4

Uptime Institute's Site Uptime Network, representing approximately 100 companies in North America and EMEA track the installed capacity of UPS and the UPS demand. A sampling of 96 sites yielded an aggregate installed UPS capacity of 390,838 kW (including redundant capacity) and a load of 145,001 kW. The load as a percent of installed capacity averaged 37% with a range of 9%-100%.

5. Right sizing

For data centers that have a crisply defined requirement for fixed UPS capacity, a 'right sized' UPS solution is straightforward. However, for the majority of sites, the need to be able to respond to future growth or unstated business needs drives them to have a 'shelf stock' of available capacity. This is fundamentally at tension with the concept of right sizing.

Sites with 'small' increments of growth, necessary for right sizing with just in time capacity addition, will be faced with more frequent addition or installation of capacity to keep up with business requirements. These installation activities create risk of disruption to data centers and are not consistent with high availability/low risk requirements of many businesses. These high availability data centers include enterprise sites as well as host sites and third party data center providers.

One feature that would benefit the market is the ability to turn off one or more UPS modules in engineered systems but still be able to keep the batteries properly charged. (With the current designs, turning off the rectifier also turns off the source of the float charge.) Institute is aware of large numbers of sites who operate more UPS modules than strictly required to meet the load, even considering the desired number of redundant modules. These 'excess' UPS modules are installed to improve the business response to future load growth and to reduce installation risk. They are left operational to reduce the re-configuration risk in an operating data center.

The current UPS industry product offerings do not present a 'hibernate' option. If the module is turned off, the battery charge is lost and, over time, the batteries are at risk of deterioration.

A 'hibernate' option would shut down the production inverter and rectifier but permit sufficient DC current to maintain the trickle charge on the batteries. This feature would permit quick restart of the UPS modules when business requirements demanded. This would avoid the stranded (uncharged) UPS battery string risks, the operational risks of constantly reconfiguring UPS modules in or out of the system to keep the batteries charged, and to the installation risks evident with just in time capacity addition.

6 Battery disposal

UPS manufacturers do not make batteries, but they buy them from specialty producers. In an ideal world, battery vendors would need to have established and validated processes for the manufacture of batteries. That addresses the supply side of the equation.

However, the disposal of used batteries is more often controlled by the end use company.

Building block #2

d. 1.

One criterion would be 'engineered solutions' as opposed to 'off the shelf solutions.' Engineered solutions would include those where multiple modules are paralleled, where modules are custom built, or where a professional engineer's stamp is typically required for installation. Off the shelf solutions would include units that plug into receptacles, regardless of size or type.

A second criterion is one phase as opposed to three phase power.

Building block #3

b Test protocols

These test protocols are acceptable, but the efficiencies need to be measured and documented at multiple part load steps. Recommend efficiencies be documented at 20%, 40%, 60%, 80%, and 100% of the module nameplate kW.

Focus the test protocols on kW. Ignore kVA.

c 1 Operating mode

The UPS units should be tested in the expected normal operating state: Input power is available and it is within tolerance. Other operating states are encountered infrequently and it is not relevant to measure efficiency in those states. In the bypass state, the unit may be in maintenance or repair and the energy efficiency is moot.

c 3 Over sized vs under loaded.

For data centers that have a crisply defined requirement for capacity, a 'right sized' UPS solution can be straightforward. However, for the majority of sites, the need to be able to respond to future or unstated business needs drives them to have a 'shelf stock' of available capacity. This is fundamentally at tension with the concept of right sizing.

c 4 Modularity

All UPS systems are modular, but the granularity of the increment may not be small. UPS systems come in increments up to 2,500 or more kW. Individual UPS modules come in sizes up to 1,200 kW. These are modular, but in large blocks of capacity.

The opportunity is to create the ability to grow the capacity in smaller increments, understanding that this growth must be transparent or risk free to the operation being supported.

Recommend that the EPA focus on the efficiency of individual UPS units or modules and do not attempt to create efficiency metrics for engineered systems. In these engineered systems, the integrated system efficiency will be influenced by the unit efficiency. This leaves the individual businesses free to select a configuration that is responsive to their business requirements but have the resulting systems built from more efficient components.

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