

## **Select the right power system to optimize availability and efficiency needs**

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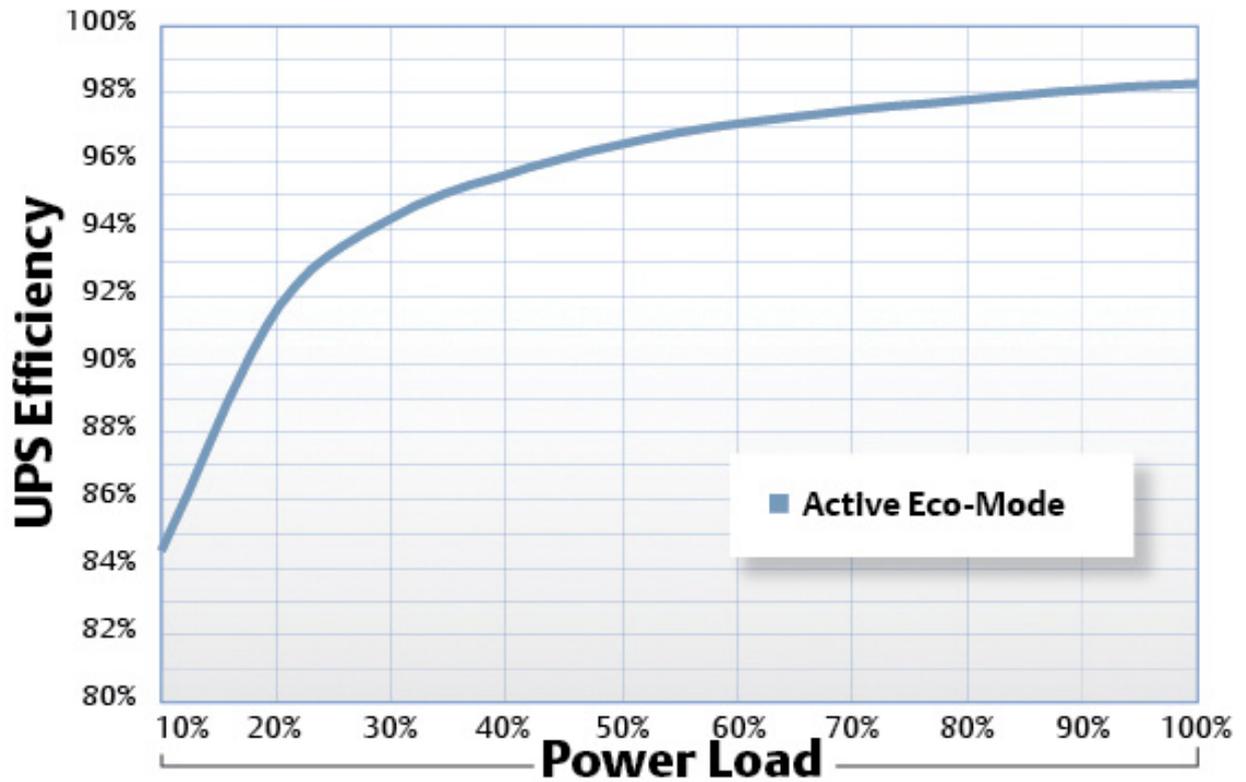
***The data center is directly dependent on the critical power system***



When it comes to power system design, there are many options to consider that affect efficiency, availability and scalability. In most cases availability and scalability are the primary considerations for data centers. The data center is directly dependent on the critical power system, and electrical disturbances can have disastrous consequences in the form of increased downtime. In addition, a poorly designed system can limit expansion. Relative to other infrastructure systems, the power system consumes significantly less energy, and efficiency can be enhanced through new control options.

Data center professionals have long recognized that while every data center aspires to 100 percent availability, not every business is positioned to make the investments required to achieve that goal. The Uptime Institute defined four tiers of data center availability (which encompass the entire data center infrastructure of power and cooling) to help guide decisions in this area. Factors to consider related specifically to AC Power include UPS design, module-level redundancy, concurrent maintainability and power distribution design.

The best power practices presented below provide enterprise data center planners and operators with a roadmap for optimizing the efficiency, availability and capacity of new and existing facilities.



*Figures 1a and 1b. A UPS with Active Eco-Mode and Double Conversion Mode with high efficiency at the desired power load can provide reliable power protection and flexibility for the data center.*

## **UPS design**

There is growing interest in using non-isolated transformer-free UPS modules in three-phase critical power applications. Transformer-free UPS systems are typically constructed of smaller, modular building blocks that deliver high power in a lighter weight with a smaller footprint and higher full load efficiency. Isolated transformer based UPSs provide “Maximum Protection.” Non-isolated transformer-free UPSs provide “Maximum Efficiency.”

## **UPS system configurations**

A variety of UPS system configurations are available that provide high utilization rates in addition to high availability.

## **UPS efficiency options**

Today’s high-availability, double-conversion UPS systems can achieve efficiency levels similar to less robust designs without the risk of downtime through the use of advanced efficiency controls.

## **High-voltage distribution**

There may also be opportunities to increase efficiency in the distribution system and switchgear use by distributing higher voltage power to IT equipment. A step down from 480 V to 208 V in the traditional power distribution architecture introduces minimal losses. Using 575-V critical bus with a 575-V to 240-V PDU improves gear utilization, improves efficiency and keeps fault currents in check.

## **Design for flexibility using scalable architectures that minimizes footprint**

One of the most important challenges that must be addressed in any data center design project is configuring systems to meet current requirements while ensuring the ability to adapt to future demands. In the past, this was accomplished by over-sizing systems and letting the data center grow into its infrastructure over time. That no longer works because it is inefficient in terms of capital and energy costs. The new generation of infrastructure systems is designed for greater scalability, enabling systems to be right-sized during the design phase without risk.

## **Enable data center infrastructure management and monitoring to improve capacity, efficiency and availability**

Data center managers tend to fly blind, as they lack visibility into the real-time system performance required to optimize efficiency, capacity and availability. Availability monitoring and control has historically been used by leading organizations, but managing the holistic operations of IT and facilities has lagged. This is changing as new data center management platforms emerge that bring together operating data from IT, power and cooling systems to provide unparalleled real-time visibility into operations.

## **Utilize local design and service expertise to extend equipment life, reduce**

## **costs and address a data center's unique challenges**

While best practices in optimizing availability, efficiency and capacity have emerged, there are significant differences in how these practices should be applied based on specific site conditions, budgets and business requirements.

In an enterprise data center power system, high-efficiency options work within proven system configurations to enhance efficiency while maintaining availability. Power distribution technologies provide increased flexibility to accommodate new equipment, while delivering the visibility into power consumption required to measure efficiency.

Most importantly, a new generation of infrastructure management technologies is emerging that bridges the gap between facilities and IT systems, and provides centralized control of the data center.

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