BEST PRACTICES FOR TRANSITIONING TO A MORE ENERGY EFFICIENT, GREEN DATA CENTER

As data-intensive applications continue to grow and integrate with daily business, users expect information to be readily accessible and quickly retrievable. To maintain constant availability, data centers require uninterrupted power that allows for minimal downtime. In a 2007 report on data center efficiency, the Environmental Protection Agency estimated that by the end of 2008 data centers will consume 61 billion kilowatt hours or approximately $4.6 billion in electricity costs. As data centers continue to consume more power, the more costs they expend and the more heat they produce, which threatens IT equipment reliability and longevity. If best practices and state-of-the-art scenarios are not followed, power consumption and thermal management will continue to threaten data center reliability, availability and cost.

The most effective solution is to implement a data center infrastructure that reduces power consumption and provides effective thermal management of the data center's airflow dynamics. According to the Green Grid, a consortium dedicated to advancing data center efficiency, several infrastructure design issues commonly affect a data center's power usage effectiveness (PUE), which is defined as the total facility power measured at the utility meter (dedicated solely to the data center) divided by the IT equipment power. For a PUE of 3.0, a data center demands three times more power than actually needed for the IT equipment. If a server requires 400 watts to operate and the PUE for the data center is 3.0, then the power needed from the utility grid to deliver 400 watts to the server is 1,200 watts. A PUE of 1.0 indicates 100 percent efficiency where the IT equipment consumes all of the power allocated for the data center.

Addressing the following power and thermal management infrastructure concerns when deploying a data center will help determine and lower a data center's PUE to improve operational efficiency and repurpose energy for additional IT equipment.

UPS Systems

Upgrading legacy UPS systems offers an immediate impact on energy savings. According to recent studies, the efficiency levels of legacy UPS equipment are between 60 and 80 percent. By installing new technologies such as double-conversion or flywheel UPS systems, a data center can eliminate the electrical inefficiencies associated with the older UPS technology.

Transformers and PDUs

Legacy transformers generally have an operating efficiency near 80 percent with state-of-the-art transformers providing 98 percent, resulting in less energy loss (represented as heat) and wasted cooling resources.

Cooling Infrastructure and Pathways

Close-coupled cooling, liquid-cooled racks and hot- and cold-aisle containments optimize airflow management by reducing air-path distances, requiring less fan energy and removing heat at the source. This approach greatly increases the level of cool air distribution and hot air removal. Integrating airside and waterside economizers or variable frequency speed drives for fans and pumps can further lower PUE.

Right-Sized and Infrastructure Components

Many data centers overcompensate their site infrastructure equipment for future expansion considerations. These operating inefficiencies are adding to the overall energy consumed. Rightsizing the infrastructure can lower power consumed and costs.

Summary, Environmental Impacts

By adopting these strategies, data centers can save a significant amount of energy and cost during a facility's life cycle. Even though data centers will still consume large amounts of energy, these improvements can save up to 68.9 billion kWh and $4.8 billion annually. When it comes to the site infrastructure, it is important to realize even small modifications can have large and lasting results. Over a 10 years life span, these improvements can result in savings on average of 25,000,000 kWh or greater.

For more information on how to make your data center more green and energy efficient, contact your local Anixter representative at 1.800.ANIXTER.

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