SUSTAINABILITY: HELPING MAKE THE DATA CENTER MORE GREEN AND ENERGY EFFICIENT

Data centers consume enormous amounts of energy to run and maintain servers, computer systems and other high-performance networking equipment. In the U.S., data centers account for 1.5 percent of all power used—roughly equal to all the television use in the nation and more than the entire state of Mississippi—and demand is expected to double by 2011.[1] This rising demand is posing a serious threat to the already strained U.S. electric grid and to data center reliability, with data centers experiencing at least one serious power outage per year.[2] To protect a data center and reduce its energy consumption, Anixter recommends adhering to the following best practices to create efficiencies and optimize performance.

Power Site Infrastructure Equipment

Site infrastructure equipment may on average account for more than 50 percent of a data center's energy consumption (see Figure 1 for a typical data center's power consumption). Upgrading to a more efficient UPS system and transformer can drastically reduce the amount of energy a data center consumes. Other improvement areas are within the cooling system, such as improving airflow, optimizing temperature and humidity set points, and using variable speed fans, pumps, and chillers. Improving airflow, optimizing temperature and humidity set points, and using variable speed fans, pumps and chillers will lessen the energy needs of a data center.

Rightsizing Infrastructure Systems

Rightsizing the site infrastructure in relation to its IT load can potentially save 50 percent of its energy consumption. Fixed losses and power consumption exist in the power or cooling pathway whether an IT load exists or not. When oversized, these fixed loses become a larger percentage of the overall power consumption and increase operational costs. Moving toward a modular, scalable site infrastructure solution will reduce fixed losses.

Cooling and Airflow Optimization

The cooling infrastructure consumes the highest percentage of energy and represents the area for greatest efficiency improvements. Implementing best practices and developing a long-term air-management strategy is key to understanding a data center's airflow characteristics. Air will follow the natural dynamics of a facility's layout and the IT and cooling equipment's positioning and characteristics. Understanding the current airflow will provide the needed information to maximize efficiency gains and minimize energy losses.

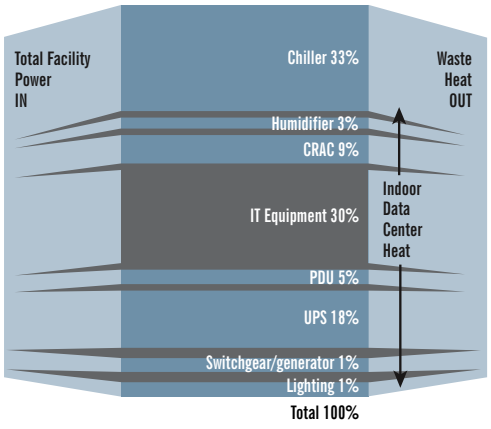
Energy Savings at the IT Server Level

Reducing energy at the server reduces load on the power and cooling facilities, which helps to reduce energy in its own right. Measuring power of IT equipment is crucial and helps to identify underutilized equipment and calculate Power Usage Effectiveness (PUE) or Data Center infrastructure Efficiency (DCiE).

Conclusion

Even though measuring actual power consumption at the IT level will help calculate a data center's PUE or DCiE, it is not the only data center optimization metric. From energy production to consumption at the server, every stage of the power distribution system is being analyzed for efficiency gains. Even though significant energy efficiency gains can be made within the power and cooling pathways, it is important to look at what can be gained at the IT level. Whether it is through consolidation or virtualization efforts, it is important to establish consistent operations and deployment procedures that maximize energy efficiency within the data center.

Figure 1 – Energy Consumption in a Data Center
Image Source: The Green Grid, 2007



$$\text{Power usage Effectiveness (PUE)} = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

$$\text{Data Center infrastructure Efficiency (DCiE)} = \frac{\text{IT Equipment Power}}{\text{Total Facility Power}}$$

Sources
[1] Gartner Group
[2] U.S. Department of Energy

For more information, contact your local Anixter representative at 1.800.ANIXTER.

TECHbrief℠