Better Manage Your Data Center's Energy Costs

It is estimated that data centers are responsible for between one and three percent of the world's energy consumption. They are mindful of their responsibility to use this energy wisely and incorporate measures such as power usage effectiveness (PUE) to ascertain their energy efficiency. PUE is a ratio derived from comparing the amount of energy used by the data center with the amount used by the data center's IT equipment. The closer the resultant ratio gets to 1.0, the more energy efficient the data center is.

With so much energy being consumed, it is not surprising that paying for energy is one of a data center's biggest expenses.[i] In order to save money, the data center needs to reduce their energy consumption where possible. Since the energy used by the IT equipment is not something that can be reduced as it powers the data center center's ability to do its "job," the method to decrease energy usage in a data center is to lower the usage of other energy consuming equipment, such as coolers, lighting, and storage. In the Center of Expertise (COE) for Energy Efficiency in Data Centers' Master List, the first step in improving energy efficiency is to perform an energy audit.[ii] Before addressing the issue of energy reduction, it is imperative to determine how much energy is being used, and by what equipment and processes. This is where power monitoring can help a data center work toward decreased consumption and costs.

Advanced power and energy meters monitor voltage, current, demand, frequency, and many other aspects of electrical energy. The same way that submetering helps a building owner or college campus determine the exact energy usage of different areas in their facilities, placing meters on non-IT equipment and data center areas that use energy, helps a data center determine their usage throughout their facility. Once they are aware of that usage, they can take steps to lower energy consumption in inefficient areas. For example, they can institute alternative cooling methods that use less energy. They can also install lighting equipment that will power down when no one is in the area. Lowering the energy usage in non-IT equipment areas lowers the data centers' monthly electrical bill.

Another benefit of power monitoring is the ability to troubleshoot equipment problems. If energy usage is increasing in cooling equipment, the equipment may be faulty. Performing equipment maintenance or installing newer, more energy efficient cooling equipment can lower the data center's energy consumption and costs for cooling. Monitoring demand has an additional advantage for a data center. If they find that the demand from one of their servers has dropped significantly, it can indicate that the server is offline or failing. This information allows them to quickly address the problem and avoid outage and loss of revenue. Even more importantly, it can prevent data loss, which can be catastrophic for a data center.

When submeters are installed along with an energy management system, even greater information and control is available to the data center. Dashboard comparisons of usage for current and prior periods make changes in energy use easy to determine. Limits and alarms set on increasing current and energy demand in non-IT equipment can allow the data center operator to address equipment and circuit problems before they escalate. An energy management system with machine learning and AI can enable operators to be proactive by predicting periods of increased usage and demand. Reports on energy consumption, costs, and reliability can be generated for upper management. This data can help the facility operator to gain buy-in for needed equipment and process improvements.

In conclusion, power monitoring coupled with energy management systems consisting of power, energy, and power quality monitoring can assist data center operators in understanding and controlling their energy usage. The data management and analysis capabilities of the software helps them lower their energy consumption and costs and ensures that energy is used efficiently by their facility. Power quality analysis can provide alarms on out of limit conditions and waveform captures of events, allowing the facility operator to respond to problems before they escalate. And reporting functions ensure that all levels of management have the information necessary to lower data center energy usage and costs.

EIG offers a full line of power and energy meters with advanced power quality analysis, as well as energy management software. To learn more about how EIG's products can help you better manage your data center's energy costs, visit us at: https://www.electroind.com/multifunction-metering-solutions/

[i] "Understanding Data Centers and How They Compare to the Cloud," Alon Berger, accessed from https://granulate.io/blog/understanding-data-center-costs-and-how-they-compare-to-the-cloud/#:~:text=Power%20consumption%20is%20one%20of,major%20portion%20of%20operational%20expenses. on 9/10/2004.

[ii] "Data Center Master List of Energy Efficiency Actions," accessed from https://datacenters.lbl.gov/sites/default/files/DCProMasterList02112016.pdf on 9/10/2024.