IT ENERGY-SAVING METHODS

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Thus far, this series has focused on Heating, Ventilation and Air Conditioning (HVAC) energy savings method for data centers. In this article we will shift our attention to non-HVAC related energy savings methods that can be performed in the white space. More specifically, we will be looking at IT related energy savings methods. Though admittedly I am not an IT professional, I have been performing energy conservation assessments for a number of years had have seen these methods be successful.

Often the focus of energy savings in a data center is on the systems that support data center operation. This is because as an industry we have spent a great deal of time looking at how we can reduce data center PUE (Power Usage Effectiveness). The thinking has been, if we can reduce the infrastructure load through increased energy efficiency, then we can reduce the PUE. It's almost as though the energy being consumed by the IT equipment is a given and therefore accepted. With recent innovations of the IT equipment and its operation, energy consumption isn't necessarily a given and can be reduced.

In fact, energy saved at the IT equipment and system level can actually be more impactful than that which is saved at the support system level. Energy saved at the IT equipment and system level has a cascade effect. Not only is less power needed to operate the IT equipment, but less energy is needed for cooling and power distribution. The typical well run, mid-sized legacy data center operates at a PUE of around 1.8. That means for every 1 watt saved another 0.8 watts will be saved from the support systems. This is because the 0.8 additional watts represent the inefficiencies of the cooling and electrical distribution systems that support the IT equipment operation. If the 1 watt saved isn't required, then neither is the 0.8 watts, so 1.8 watts is saved.

By comparison, in recent years the industry has made tremendous strides in the energy efficiency of the cooling and electrical systems. It is not uncommon to see a new modern mid-size data center be able to operate at a PUE of 1.5. That's 0.3 less than the mid-sized legacy data center and considered pretty efficient. However, the 0.3 PUE efficiency increase of the modern system doesn't come close to matching the impact of the IT equipment energy reduction of 1.8 on a watt for watt basis.

It is important that the IT professional and the facility operators work together to maximize the applications of these methods. Some of the more common IT equipment and systems energy savings methods:

VIRTUALIZATION

In simple terms, virtualization is the consolidation of workloads from low utilization servers onto a single or fewer servers. Server virtualization has been around for quite some time, with recent statistics indicating that approximately 80% of data center operators have implemented some level of virtualization. It is quite surprising, but we sometimes still run into facilities that have done very limited to no virtualization. Where it has been implemented, often the focus has been on IT operational benefits and the energy savings are an additional benefit. Even where virtualization has been implemented, many facilities can benefit from a more vigorous focus on energy savings through continued virtualization programs.

DECOMMISSION UNUSED OR LIGHTLY USED SERVERS

In many data centers there exist servers that are unused or lightly used. It is estimated that 25 – 30% of the average data center's servers are unused or lightly used. These servers are often called zombie servers.

They can come about as result of a virtualization process or because they supported legacy applications. These servers tend to be older and less energy efficient than modern servers. They consume nearly the same power whether they are operating or are idle. The removal of these servers can provide significant energy savings.

ENERGY EFFICIENT EQUIPMENT

In recent years IT equipment manufacturers have been under increasing pressure to develop more energy efficient equipment. The pressure has been due to the recognition that data center operation has a major impact on worldwide energy consumption. IT equipment energy savings features can be found throughout the data center floor. Some examples include: servers that are now able to vary their cooling fan speed to match the load on the machine, state of the art power supplies that provide power to the servers, can be up to 96% efficient, as well as solid state drives that are available for data storage. The ability of the devices to provide energy savings can be verified prior to their purchase by looking for a US Department of Energy: Energy Star rating.

When initially placing the energy savings devices into service the operators should verify that the power savings features are in operation. For example, most energy efficient servers have power management control features that need to be initiated by the operator. We are aware of a number of operators who have purchased energy efficient servers but failed to initiate the power management functions. This has limited their energy savings opportunities.

CLOUD AND CO-LOCATION

Small to mid-sized data centers can benefit by moving lightly used applications and data storage outside of the data center. There are generally two options available to the data center operator: Co-location, use of the Cloud or even a hybrid model utilizing both. The choice of which direction to take is highly dependent on the operator's needs. Highly regulated operators like financial institutions and operators handling medical records may be limited to the amount of cloud or co-location they will able to utilize. Other less regulated operators may be able to heavily utilize the cloud or co-location.

Some savvy operators have asked, "how is the use of the cloud or co-location saving energy? Aren't we really just moving our work to another data center?"

TRUE STORY

We have a financial institution client who we were helping move from a legacy data center to a modern, energy efficient data center. At the time the project began they were consuming more than 750 kW of electricity to operate their data center. Based on their growth projections, they were looking at doubling that load in less than 7 years. As a result, the facility was designed to handle the future load with the ability to scale up in the future.

Concurrent with the design and construction, the operator planned and implemented many of the above IT energy savings methods, including an aggressive virtualization process. At the completion of the construction they migrated to the new facility with a load that was 50% of that which they had at the legacy data center. The load was so low that it dipped below the optimal operating loads of some of the support equipment. Some that equipment was then de-energized to allow optimal operation of the devices. To date, through close monitoring of their device efficiency, they have yet to exceed the original legacy data center load.

This is true, you are moving that work to another data center; however, the Enterprise and Hyperscale data centers that are utilized for the cloud and co-location are typically more efficient than the small to mid-sized data center.

As a result, you're moving the power consumption out of your data center to a data center that is better equipped to handle it.

If you have questions regarding this or other data center topics, please don't hesitate to contact us.