



Reducing Data Center Energy Bills

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The two main causes of power consumption in data centers are IT equipment and the physical infrastructure including power, cooling and lighting equipment. In a typical data center, less than half the electricity coming in actually makes it to the computer loads. The rest is consumed by the physical infrastructure.

There are two approaches that have a great impact on reducing electrical consumption in the data center: IT load reduction and physical infrastructure rightsizing. Execution of the first approach can, by itself, positively impact the goal of the second. The idea is that a lower computer load requires less power and cooling to support it.

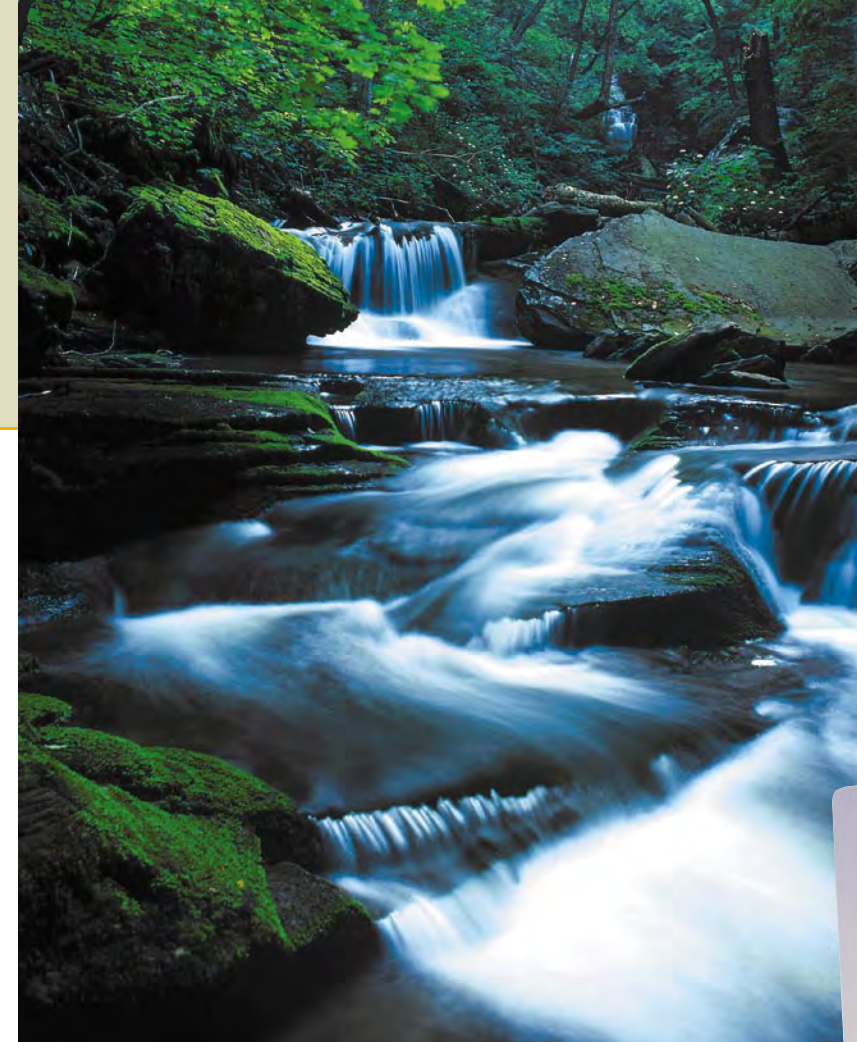
Sensible IT Load Reductions

Most data centers have old IT systems that remain operational for archival or research purposes. In fact, some operating application servers have no users. It's useful to inventory these systems and create retirement plans for them. These systems can be taken off line and powered down. Use of server power management tools will allow a server to operate in a low energy "sleep" mode even if the server is not physically retired. If the data center requirements change, these systems can be brought back online with minimal effort. A power consumption reduction of up to 20% is possible in such a "retirement" scenario.

The major way that new server technologies can help reduce power consumption is through consolidation of applications on servers that are used to reduce the total server count, known as virtualization. This results in a dramatic reduction of IT power requirements. The savings from avoided electrical consumption through virtualization over a 10 year period can be substantially greater than the cost of the server itself.

Physical Infrastructure Rightsizing

The second heavy hitter in terms of energy savings is the rightsizing of the physical infrastructure systems. Most users do not understand that fixed losses are present in the power and cooling systems whether the IT load is existent or not. The bigger the physical infrastructure install base, the bigger the fixed losses.



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Installations with light IT loads often experience physical infrastructure fixed losses that exceed the IT load. Whenever the physical infrastructure system is oversized, the fixed losses become a larger percentage of the total electrical bill. For a typical system that is loaded at 30% of rating, the electrical cost is approximately \$2,300 per kW of IT load per year.

If the system were properly rightsized to the load, the electrical cost falls to approximately \$1,440 per kW of IT per year, which is a 38% savings in

electrical costs. These are the potential savings for a specific example; actual savings will vary and will be less for non-redundant systems.

The compelling economic advantages of IT load reduction and physical infrastructure rightsizing can also serve as a basis for calculating overall data center efficiency. Data center infrastructure efficiency (DCiE) can be expressed as a ratio of watts to the IT load divided by watts to the data center. If 100 watts of power enter the data center and only 60 of those watts

make it to the IT load, then that data center is 60% efficient (60/100 = .6 or 60%). Reductions in IT load via retirement and virtualization and rightsizing of physical infrastructure via scalable, modular systems are the two biggest ways to increase the data center efficiency percentage.

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