



# STRATEGIES FOR REDUCING DATACENTER POWER CONSUMPTION

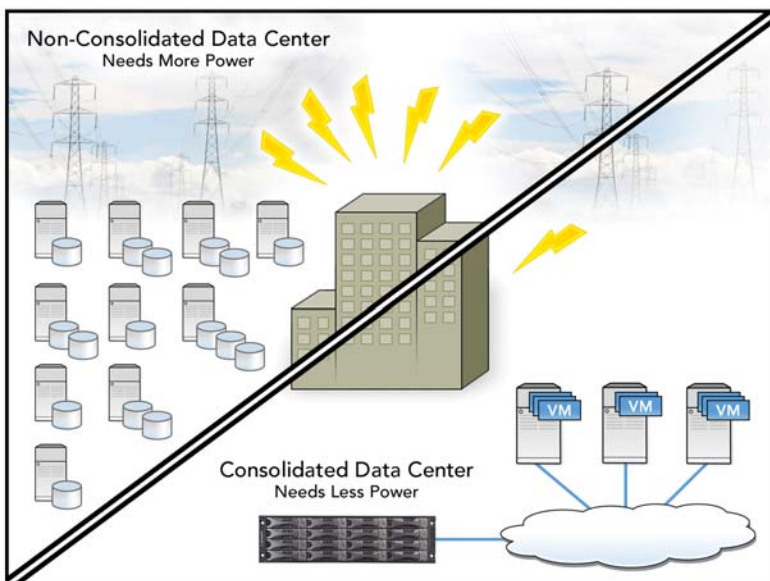
Consolidation and virtualization of storage and servers can dramatically increase utilization rates, reducing power consumption and forming a foundation for sustainable, energy-efficient data centers.

With concerns about power consumption and energy costs growing, efforts are underway to make data centers more “green” (energy efficient) and sustainable (reducing the use of non-renewable resources). In most data centers, servers draw more energy than storage devices; still, it has been estimated that all of the disk drives spinning around the world today generate emissions equivalent to 9 million cars annually. Some analysts suggest that in 2008 half of all data centers won’t have the power they need – and yet, many data centers waste as much as 60% of their energy on inefficient server and storage infrastructures. To encourage power reductions some utility companies and state energy auditors are offering rebate programs; consultants have developed new services to analyze power profiles and suggest improvement strategies.

Strategies such as storage tiering, thin provisioning, and automated load balancing improve efficiency and utilization resulting in reduced power consumption.

## ENERGY USE BY DATA CENTER OPERATIONS

Data center power requirements have skyrocketed due to the number of servers and storage devices in use today – and since operating devices generate heat, every watt of power used requires an additional watt or more for cooling. Adding servers is a common solution for scaling IT workloads, but consumes a lot of energy; with both server and storage utilization rates in distributed environments generally less than 50%, significant amounts of power are being consumed unnecessarily. However, the steps outlined below can dramatically reduce power consumption.



### STEP 1: IMPROVE EFFICIENCY – DO MORE WITH LESS

The simplest way to reduce energy consumption is to improve resource utilization rates – that is, do more with less. Once a server is powered on or a disk is spinning, increasing its utilization costs virtually nothing from an energy standpoint, so consolidating onto fewer resources saves energy and money. Consolidation allows you to share resources, so you use less equipment and less power. When storage is housed within server cabinets (DAS), disks are under-utilized – yet each one spins, consuming power and requiring cooling. In contrast, with consolidated storage disks are shared and utilization rates can be increased dramatically.

Storage consolidation is important for server consolidation, and the overall result reduces the number of energy-con-

suming components. Server consolidation and virtualization can increase utilization and save power by reducing the number of physical machines required – for example, instead of running 100 physical machines, run 10 physical servers, each hosting 10 virtual servers. Some virtualization companies have developed ways to dynamically allocate workloads across a pool of servers and then automatically power those servers up and down as workload needs change. Server virtualization works most effectively with a SAN, since with shared storage can you move virtual servers among physical machines efficiently. (See EqualLogic Coffee Break “*Virtual Servers Need Virtual Storage*”.) In addition to reduced power consumption, the benefits of consolidated storage are better management of both servers and storage, and improved service levels.

#### STEP 2: INCREASE UTILIZATION WITH VIRTUALIZED STORAGE STRATEGIES

Once you have consolidated resources, several strategies enable you to improve utilization further. A key consideration in consolidation is having the flexibility to move running workloads for load balancing; automation of load balancing enables better resource utilization without adding management overhead.

You can also save power by dividing up your data into storage tiers. The concept is simple – store data on the fewest and most cost effective storage devices. Not only does this reduce power consumption, it also reduces capital expenses. The more data you store on a fixed number of disks, the greater the power efficiency – so use the largest disks that your performance needs can tolerate. It is important to understand the management aspects of tiering – automation is crucial to achieving optimal results. Drive selection is also important; 7200 and 10K RPM drives consume less power with higher capacity and lower performance than 15K RPM drives. A good way to optimize capacity, performance, and power consumption is by mixing SAS and SATA drives as well as various RAID types. (See EqualLogic Coffee Break “*Application Tiering and Tiered Storage*”.)

Thin provisioning is another energy-reducing configuration that increases efficiency by reducing storage over-provisioning/under-utilization. Thin provisioning involves dynamically pooling storage capacity and sharing it with multiple applications – but storage is not physically allocated until data is written. Unused storage remains unallocated, yet capacity can be expanded on-demand – resulting in increased utilization and improved energy efficiency. (See EqualLogic Coffee Break “*Thin Provisioning: Advanced Storage Allocation for Growing Applications*”.)

Other methods to improve energy efficiency include archiving unused data (moving it to less power-consuming technologies) and single instance storage (SIS) and de-duplication technologies that result in storing a single copy of data.

#### STEP 3: BE PREPARED FOR COMING ADVANCEMENTS

Technology improvements are in development – not only continuing advances in performance and capacity, but also low-power server and storage components and systems. The ability to easily incorporate these new technologies will be important – that’s where properly implemented server and storage virtualization offer great benefits, enabling online technology enhancements and upgrades as part of natural data center scaling – without complete swap-outs. (See EqualLogic Coffee Break “*Breaking Free of the Hardware Lifecycle*”.)

These strategies can immediately improve your storage utilization and enable further data center consolidation that results in reduced power consumption. Of course, energy consumption must be balanced with other IT objectives – e.g., providing users with the levels of performance, availability, and capacity they need while meeting compliance and disaster protection goals. Virtualization is core to meeting all these objectives. With an EqualLogic iSCSI SAN, the effort you spend implementing many of these “green” implementations will pay off not only in power savings, but also in better service levels, less management, and lower costs.



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