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# Optimization: The Next Step for Server Consolidation & Virtualization

A Power Assure White Paper

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Data centers consume an enormous amount of energy. According to a detailed study conducted by the US Environmental Protection Agency (EPA), data centers in the United States consumed 61 billion kilowatt-hours or 1.5 percent of the nation's total electricity in 2006, adding some 40 million tons of CO2 to the atmosphere. This is twice the power consumed just six years earlier, and the EPA predicts that data center power consumption will double again by 2012.

This might all be fine if all that power were being put to productive work. But it's not. There is substantial waste in data centers caused mostly by underutilized servers. These underutilized servers do little real work while continuing to consume power and generate heat, the removal of which consumes even more power.

Because electricity accounts for between 25% and 40% of the operating costs in modern data centers, most CIOs are now taking steps to reduce power consumption. This white paper highlights three such steps—consolidation, virtualization and optimization—that taken together, can maximize server utilization and reduce energy consumption by 50%.

## Consolidation and Virtualization—Necessary But Not Sufficient

According to a recent survey by InformationWeek, 94% of organizations already have or are now planning to consolidate and virtualize at least some of the servers in their data centers. About half plan to take these steps for more than half of their servers. The reasons for this growing trend are indeed quite compelling. Respondents report improvements in availability, enhanced disaster recovery preparedness, faster prototyping and deployment of new applications, and, of course, significant reductions in operating costs, rackspace and energy consumption.

The reason behind these and other benefits is that consolidation, combined with either load-balancing or virtualization, dramatically improves overall server utilization. Dedicated servers can experience average utilization rates as low as 10%. With consolidation and virtualization, average server utilization can increase to between 20% and 60%, depending on the extent of the effort, and the type and age of the servers involved. But despite the wild successes hyped in the industry, most organizations only achieve average utilization rates in the range of 20% to 30%.

This is a respectable improvement, but organizations can—and should—do better. Why? Because a substantial (and some would contend an unacceptable) amount of energy is still being wasted to power and cool server capacity that is not being utilized. Is it realistic to go beyond the improvements that consolidation and virtualization alone are capable of delivering and further reduce power consumption? Yes. And that is the next step in improving data center energy efficiency.

## Taking the Next Step: Dynamic Data Center Optimization

The rationale for optimization is as simple as it is profound: server load is variable. Every data center experiences a peak demand, whether daily, weekly, monthly or annually. And every data center is configured with the server capacity needed to accommodate that peak demand with an acceptable level of

performance. But the only thing all those servers are doing during all of the non-peak periods, when demand can be as much as 80% lower, is wasting power—and money.

Data center optimization solutions work in cooperation with load-balancing or virtualization systems to dynamically match server capacity with demand. In effect, optimization changes the mode of operating servers from “always on” to “on demand” without adversely impacting on performance. The change results in a typical savings of 50% or more in power consumption based on the improvement in overall server utilization.

Dynamic data center optimization (DDCO) is a new capability found in some data center infrastructure management (DCIM) solutions. DDCO employs a real-time calculation engine that continuously assesses server demand, taking into account both current demand and trends (the increase or decrease and at what rate), along with historical or anticipated patterns. When the engine detects an impending mismatch between anticipated demand and current capacity (whether too little or too much), it automatically informs the virtualization system to make the appropriate adjustments by either powering up or powering down some number of servers, respectively. This process can be further automated using runbooks that outline the specific steps involved, from migrating applications to/from available virtual machines to adjusting cooling capacity.


*The effect of dynamic data center optimization is shown in the dashboard views above. The top half depicts power consumption for “always on” server operation; the lower half depicts the improvement in server utilization and the resulting power savings for “on demand” operation.*

By reducing power consumption by 50% or more (depending on existing overall server utilization), dynamic data center optimization solutions offer a high return on investment, and those that are offered via Software-as-a-Service (SaaS) can pay for themselves in the first month. But there are even greater savings available from those solutions that also offer the ability to perform what-if analyses for optimizing capacity planning, hardware refresh cycles, equipment placement and environmental controls. Measuring improvements against a baseline may also make the organization eligible for rebates and/or offsets.

## Conclusion

Dedicated servers have average utilization rates as low as 10%. Consolidation and virtualization typically improve overall server utilization to between 20% and 30%. Better, but still not good enough in today's energy-conscious world. The only way to achieve even greater utilization, and reduce energy consumption even further, is to migrate from the wasteful "always on" mode of operating servers to an efficient "on demand" mode.

Rising energy costs and "green" initiatives at organizations across all sectors and continents have made dynamic optimization the next step in energy efficiency for data centers. To learn more about how your organization can benefit from dynamic data center optimization, and discover just how easy it is to take this next beneficial step, visit Power Assure on the Web at www.powerassure.com.

## Contact Power Assure to get started

Let us demonstrate how Power Assure can help you reduce your energy costs. Contact us at sales@powerassure.com



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