



Going Green is Good Business

Q&A with Rich Lechner, Vice President, Marketing & Strategy, Enterprise Systems, IBM



1. What is the reason why organizations should go green? Is it only to cut costs?

The reason organizations today should go green often varies on an organization's goals, itself, whether it is most interested in financial gains, operational enhancements, or global/environmental issues. Many clients tell us that going green is simply good business. On one hand, monitoring and managing energy consumption throughout a business can lower its utility expenses. But it's not just about cutting costs. By going green and conserving energy, businesses can improve their operational efficiencies, themselves, striking a more optimal balance between what technology can do and what people can do. This often results in greater productivity internally, and enhanced business services for customers. But more important, as the business realizes these benefits from going green, its image within the company and beyond it are also often improved. From better employee morale in the office to increased brand awareness in the marketplace, the business benefits of energy conservation can be far-reaching.

2. What are the major issues involved in creating a green datacenter?



CIOs and IT Managers usually become involved with creating a green datacenter because they find themselves in a situation where their datacenter is at maximum capacity, where they are running out of floor space or power or both! As they move toward a green datacenter, they need to maintain the quality and performance of the business services their datacenter is delivering to the business, itself, and to its customers. In many cases, their IT services really need to be available without disruption 24 x 7, and yet, they are unsure how to face growing demands with less power and floorspace. At the same time, many datacenters are old (re: Gartner study reporting that datacenters built before 2001 are considered obsolete...87% of them!) and ill-equipped to conserve energy (less than 10 kw per sq foot) so the issue of better asset utilization, management and replacement surfaces. The average utilization rate of servers is 10% so why not consolidate, virtualize, and move workloads more optimally around the datacenter? Are their systems generating excessive heat that could otherwise be dissipated significantly by going green? Chillers, alone, are perhaps the largest energy consumers in datacenters, at 30-35%. How much energy could be reduced if the typical air conditioning requirements could be offloaded by repositioning IT equipment into hot aisles, cool aisles, closer to the outside air? Is their infrastructure set up so IT staff can easily and quickly identify, isolate, and manage "hot" spots, where significant amounts of energy are expended due to system performance spikes during peak end-user traffic?

3. What impact does greening a datacenter have on TCO?

When we think about TCO and a green datacenter, we think of impacting not only the total cost of ownership but also the total cost of operations.

These days, energy-conserving technology, applications, and services for greening a datacenter are available to help lower TCO. Tools for measuring and managing energy use automatically are becoming much more prevalent. Our Active Energy Manager, for example, makes it possible to meter actual power usage and produce trend data across multiple systems automatically. It also can cap power use based on workloads and business trends to optimize energy use and application performance without sacrificing productivity. It can either prompt an IT staff person to take corrective action, or automatically make the correction itself, based on policies previously set up, thereby streamlining energy management operations and related costs. These kinds of proactive energy monitoring capabilities, along with automated IT asset identification and management from Tivoli, help automatically alert IT staff to "hotspots" not only in a datacenter but beyond it, too. In addition, when you combine these kinds of tools with live partition mobility of Power6, you can gain the ability to migrate workloads and eliminate hotspots while moving work off underutilized systems to conserve power. All in all, TCO can really look good when growing IT applications and services from the datacenter can be maximized without hitting power and cooling limitations. Leveraging energy efficient IT provisioning and facility efficiency improvements can increase the amount of computing that can be done within an existing datacenter, thereby delaying or possibly eliminating the need to invest in an entirely new datacenter.

4. What are the challenges that CIOs face when they try to green their datacenter? How should they address these challenges?

See question 2 about some challenges CIOs face when trying to green their datacenters. There are numerous ways to address these challenges.

Generally, I might offer the following considerations, for starters...

1. Begin by having an enterprise-wide goal in mind, in which the entire datacenter is positioned for energy conservation, not just one area of the infrastructure. With energy conservation, it's important to look at optimizing energy consumption at the server, storage, and application levels to ensure that business services (SLAs) are met or exceeded while lowering overall energy consumption.
2. At the datacenter level, consider energy-saving improvements for chillers, air conditioning, lighting, and more.
3. At the IT systems and storage asset level, replace or upgrade older systems with newer, more energy-saving systems.
4. Improve the overall utilization of IT assets by measuring how much of them are actually being used, then consolidating them through virtualization and provisioning to offset otherwise high energy consumption. Drive to high utilization rates, consolidate on large servers, which often have power supplies that are capable of operating at very high efficiencies (+90%).
5. Automate measuring and billing of energy use to manage energy consumption more optimally and autonomically, allowing the infrastructure to become more self-regulating and facilitate the administration of energy-saving actions.

5. Cooling and electrical costs represent up to 44 percent of a data center's total cost of ownership. What is the best way to reduce these costs?

Today much of the electrical utility expense incurred in datacenters comes from chillers and air conditioners. These costs can be reduced in a variety of ways. For one thing, IT systems can be moved into position so they can leverage outside air to cool them. Likewise, open ceiling areas, row air curtains, and plugging openings (cables, power) can be implemented to prevent hot air from escaping into cooler aisles and cold air losses. Use of high efficiency pumps, chillers, and fans for cooling towers are also available. And perhaps the best alternative is to leverage the water supply on hand, using liquid cooling for hot equipment via rear door heat exchanger technology, which cools hot exhaust air from servers by utilizing chilled water supplies for air conditioning. All in all, IBM cooling technologies can cool not only the inflow of air into units, but also help lower the heat output of exhaust air exiting from the back of systems, realizing a potential of up to 60% drop in heat output.

6. For green datacenters to become successful, who is the best driver? Is it the CEO with his vision, the CFO with his cost-consciousness, or the CIO with his technology knowledge?

No doubt that objectives for going green vary among C-level executives. CIOs are often motivated by operational cost savings and performance considerations; CFOs want to free up capital for other investments; and CEOs continually seek ways to build brand equity and corporate citizenship around global environmental affairs. For green datacenters to become successful, perhaps the best driver is agreement among the C-levels that going green is good business all the way around. When agreement is reached at this level, the business can really benefit. When it comes to energy conservation in business, just as at home, small scale application of energy conservation can yield small results, but large scale actions can yield much larger results. Often every project looks ripe for green activity, by itself, but if energy is conserved in only one area and not in another, the entire system can become sub-optimal and more complex in the longrun. Instead, taking a broader, enterprise view

of the business in which all parties collaborate to identify, monitor, and manage energy consumption proactively -- from the data center to facilities -- can garner improved social and regulatory compliance, not to mention streamlined operational costs, enhanced business performance and flexibility to sustain growth without draining resources.

7. Experts believe that the most productive first step for CIOs is to conduct a best practices assessment and energy audit. What steps are involved?

Yes, it's true that diagnosing present needs and challenges is often the first step to understanding the extent that an IT environment is optimized for energy efficiency. This usually involves using an overall energy assessment, maybe also virtual 3-D power management and thermal analytics, to show how much power is being consumed, conserved, or wasted. A solid starting point is an IBM Server and Storage Power / Cooling Trends and Data Center Best Practices Assessment. It offers information about best practices involved with optimizing energy consumption in the datacenter, provides insight into the future direction of computing with energy consumption, and reviews results and roadmaps to help facilitate and accelerate adoption of energy-efficient solutions and capabilities for the datacenter.

For datacenter energy upgrades, the IBM Data Center Energy Efficiency Assessment can help clients compare datacenter energy efficiency to industry standards and discover opportunities for improving efficiency accordingly throughout a facility's ecosystem. For help deploying new, high-density technologies unencumbered by limited power availability and cooling capacity, IBM also offers an IT Systems Energy Efficiency Assessment that analyzes existing IT assets to achieve workload and performance requirements with less power, cooling, and space requirements. This audit can lead to a full, 2-3 week Data Center Health Audit, which evaluates the overall health and readiness of the IT infrastructure and recommends actions to reduce risks and improve availability.

All in all, these, and a variety of additional green-related assessments, are available to help chart a course of action to follow that is tailor-made to the business for whom the assessment is being conducted, and to help minimize steps needed to maximize energy- saving benefits across the board.

8. What role do virtualization and consolidation play in a green datacenter?

It's a fact that servers use energy and give off excessive heat. It's also a fact that a server that is only 15% utilized costs just as much to run as a server that is 100% utilized. Virtualization can help by reducing heat and expense. Virtualization lets you can use fewer servers and expend less power. In fact, it's been said that perhaps the greenest server and storage devices in the datacenter are the ones that don't exist! By consolidating and virtualizing servers and storage devices, you can:

- Manage multiple workloads from a single location and, in the process, reduce server sprawl, increase floorspace and power availability

- Consolidate workloads from underutilized devices onto fewer, more efficient systems

- Increase the total amount of available disk space and optimize utilization rates, and

- Improve availability of applications by insulating host storage applications from changes made to the physical storage infrastructure.

In IBM we are consolidating 3900 Intel and Unix servers onto 33 energy-efficient

mainframes and virtualizing things -- saving \$25M in energy costs, alone, or \$450M overall in 5 years. With storage, it is estimated that data grows 40-70%, compounded annually, with an average utilization of storage devices at 25%. Virtualized storage can increase use 60%. With tiered storage for lifecycle management, especially for long-term compliance data, you can use tape and cut energy consumption on storage devices dramatically.

9. According to Wayne Balta, VP, Corporate Environmental Affairs and Product Safety, IBM, energy efficiency solutions have saved IBM an annual average of US\$15.8 million. Can you tell us how IBM achieved this?

Essentially, last May, when we launched Project Big Green and assembled a "green team" across the entire IBM company, we set out to reduce power consumption across the board significantly. Let's face it, when you combine all of IBM's datacenters including those we run for other companies, we have over 8 million square feet of datacenter operations. That's about 5 billion kilowatt hours per year. In the next few years we plan to double our computing power and data capacity without increasing our energy consumption or carbon footprint. We are consolidating 3900 Intel and Unix servers onto 33 energy-efficient IBM System z mainframes and virtualizing things --- saving \$25M in energy costs, or \$450M overall in 5 years. Our actions will also result in the avoidance of 2.5M tons of CO2 per year, which equates to taking 1M cars off the road. But Project Big Green doesn't mark IBM's entry into the green environment.

IBM has been in the energy efficient systems business for over 50 years now. When we introduced the mainframe back in the 60s, it was the first virtualized machine. We've also been developing hybrid cooling technology, leveraging air and liquid, for decades now. You may also have heard about the innovations coming out of our research labs around the next generation cell processors and the idea of air gap technology, injecting layers of vacuum between the layers of silicon and processors that allow them to run more coolly. Between 1990 and 2006, IBM's global energy conservation actions reduced or avoided CO2 emissions by an amount equal to 44% of its 1990 emissions, resulting in \$250 billion in energy savings. And the company is committed to an additional 12% of CO2 savings by 2012. So when you combine the savings derived annually from our past innovations, with the annual savings we're currently realizing, you start to see the enormous benefit that going green has for IBM and our clients around the world