

Going green in the public sector

Virtualization for greener IT in government, education and healthcare



Executive summary

Going green has become an imperative—not an option—for government agencies, educational institutions and healthcare systems at every level. The public sector is faced with the new reality of balancing business objectives with organizational mandates intended to mitigate the problem of dwindling environmental resources. Limited supplies and skyrocketing costs of energy, in particular, are compelling these groups to take radical measures to reduce their carbon footprints.

IT is perhaps taking the biggest hit, with energy consumption in the datacenter reaching all-time highs and mountains of computer hardware fated to become e-waste. As administrators seek to adopt a sustainable approach to IT, conservation of electricity, space and equipment threatens to work at cross-purposes with the essential functions and missions of:

- Federal government agencies and departments
- State and local government entities
- Colleges and universities
- K-12 school systems
- Hospitals
- Regional healthcare systems
- Clinics and long-term care facilities

The federal government, for example, is already moving to mandate green IT initiatives on several fronts. The White House challenged government to bring power consumption under control and cut expenditures associated with federal real property—including energy costs as a central target. With the rollout of the Federal Data Center Consolidation Initiative (FDCCI), Washington has laid out an aggressive program to close 40 percent of the 3,000 or so federal datacenters currently in use by 2015, with the goal of saving \$3 billion annually.

State governments are making similar moves to mandate green IT responsibility. An executive order from the governor of California is requiring state agencies to “reduce grid-based energy purchases for state-owned buildings by 20 percent by 2015, through cost-effective efficiency measures and distributed generation technologies.” Other states are following in California’s footsteps, with more mandates to come in the months and years ahead.

Savvy CIOs are preparing now by developing IT strategies that can support green initiatives while still supporting mission-critical activities. To be sure, green IT can be achieved without compromise to performance. Citrix virtualization—in which applications that are run independent of platform, server and desktop operating systems run virtualized on device hardware—enables IT departments to achieve their missions while minimizing energy consumption and waste.

Read on to learn how Citrix solutions bring public-sector business objectives and environmental stewardship into alignment by alleviating the energy

impact of equipment needed to serve both the datacenter and the desktop.

Introduction

Energy fuels today's business world—but diminishing resources along with rising costs are compelling government, education and healthcare to go green. Keeping up with expanding services and end-user needs has traditionally translated into more offices, equipment and resources, which in turn require more energy to support and maintain growth.

Gone are the days of "one employee, one computer." Now, laptops, home office PCs, tablets and even smart phones are the norm, spurring an explosion of computing devices—all of which incur a carbon footprint whether in use or rendered obsolete. Meanwhile, the datacenter has become IT central, picking up the slack of consolidation and bearing the energy burden in the process.

Yet supply is decreasing as the demand for energy increases, with the planet, and its power suppliers, feeling the crunch. Seeking to hedge against an uncertain environmental future and offset soaring energy costs, the public sector is looking for ways to go green and reduce its carbon footprint. The new bottom line—adding social responsibility and environmental impact to economic viability—calls for unprecedented energy efficiency and cutbacks.

IT is now the largest energy consumer. The pressure is especially on for IT, now often responsible for consuming the lion's share of an organization's power bill—with computing now accounting for over two percent of worldwide energy usage. Energy costs are the fastest-rising cost element in the datacenter. Also consider that over the course of a year, a large organization's IT infrastructure may consume as much as the energy produced by five power plants over the same time period. With supply dwindling and more mandates looming, this level of consumption is simply not sustainable.

Datacenters: the SUVs of the enterprise. The move toward IT centralization has created a power surge in the datacenter, with energy costs more than doubling in some cases. The bulk of energy consumption is in running the servers, air conditioning and peripherals at the heart of the IT infrastructure. Estimates show that for every kilowatt of energy consumed by a server, roughly another kilowatt is used to cool that same server. When multiplied by the growing number of servers needed to accommodate IT expansion, the impact can be staggering.

The key to carbon footprint reduction in the datacenter lies not only in reducing the number of physical servers, but also in optimizing server utilization. Consider the amount of energy needed to support e-mail. If it takes four dedicated servers to handle e-mail traffic, failover and redundancy in a government facility, in any modern datacenter these servers would most likely only exhibit an average of 50 percent utilization or less. Even at this level of utilization, however, each server still consumes 100 percent of power. This inefficiency compounds exponentially for each function supported by a dedicated server farm.

The desktop: potentially a larger problem. The desktop—all those networked computing devices, printers, copiers, etc. hard at work in government, education

and healthcare organizations—may turn out to be the bigger green IT challenge. With a single network server supporting only about 200 devices, energy consumption in the datacenter will escalate as these machines continue to proliferate. Furthermore, each device draws a lot of power on its own, even when in sleep or standby mode—with the more powerful machines consuming yet more energy. When scaled to thousands of users, power costs—destined to become an IT budget line item by itself – really adds up.

The cradle-to-grave environmental impact of these devices poses yet another concern, especially when it comes to replacing and disposing of obsolete machines—some yielding only a two-year refresh cycle. Hazardous materials found in these devices, such as lead, cadmium and mercury, require special handling for disposal, which may end up costing as much as \$200 per device in aggregate disposal costs. A better approach would be to standardize on machines that pose less of a toxic threat and promise a significantly longer life cycle.

Leasing fails to circumvent this problem. Organizations may expect to escape disposal costs through leasing when in fact they actually absorb this expense. Furthermore, leased machines are not considered assets and thus do not qualify for full depreciation benefits. A more appealing option would be to purchase devices and extend their shelf life far beyond the current two-year cycle.

Power IT Down Day: protecting the planet, one device at a time

The federal government is the single largest energy consumer in the US. With fewer tax dollars from the economic downturn and a growing need to power the IT tools in use every day, Citrix recognized the need to make a statement on energy conservation.

Citrix and its industry partners created Power IT Down Day in 2008 to highlight the power of the individual when it comes to responsible energy consumption. Each August—when summer’s heat creates one of the highest energy-usage months of the year—Power IT Down Day urges individuals in government and industry to power down their computers, monitors, printers and other IT equipment before leaving work for the day.

One person can save just a few kilowatt hours (kWh) over a weekend of powering down. Together, government’s more than one million employees can save hundreds of thousands of kWh simply by powering down on a single Friday afternoon.

Power IT Down Day helps create healthy, cost-saving energy habits where they can make the biggest difference: At the individual level. Learn more and sign up at www.powerITdown.org, and be sure to power down before leaving the office today... and every day from now on.

Imposing constraints only hinders green initiative effectiveness

The race is on to find the best way to reduce carbon footprint without negatively impacting IT performance and capacity. Most IT departments realize that simply

putting constraints on datacenter space, power and cooling abilities to save energy is not a viable option as it will only hinder—and not help—future growth and effectiveness. Some options include:

Larger servers. Big servers that can support multiple services are useful for consolidating some services. Unfortunately, this would provide only limited relief, as some organizations specifically require separation of services provided to various units within the entity.

More efficient servers. It's tempting to try and get more out of existing servers, especially those that may not have reached full depreciation. However, increasing server efficiency requires significant re-tooling of the datacenter and wouldn't decrease the actual number of servers in use. These servers will also still be underutilized and consuming more energy than necessary—as much as 30 percent utilization with 50 percent power consumption, for example. Utilization increase must go hand-in-hand with decreased power consumption to net real results.

Next-gen zero carbon datacenters. Some large organizations are building zero-carbon datacenters fed by clean hydroelectric power. While this option is not cost-effective for smaller facilities with mid-sized datacenters, it is particularly attractive to high-density computing installations featuring thousands of servers and requiring enormous amounts of power.

Green hardware initiatives. Many organizations are turning to energy-efficient hardware and improved device disposal. Initiatives such as Energy Star, a voluntary labeling program launched by the Environmental Protection Agency (EPA) in 1992, as well as EPEAT, an environmental procurement tool designed to help companies evaluate, compare and select computing hardware, are picking up momentum—and even appearing in government mandates. However, this alone is not enough to adequately offset the massive carbon footprints created by government, academic and healthcare entities.

Going green with Citrix

Unlike the previous options, Citrix virtualization technologies optimize carbon footprint reduction without forcing a compromise on performance. Virtualization does double duty, and then some—minimizing the number of running servers in the datacenter while maximizing their utilization as well as extending the life of the desktop and curbing e-waste. By separating the physical from the logical, virtualization frees computing resources from their previous hard-coded linkages, allowing them to be assembled and managed in the most efficient and flexible way possible. Citrix XenServer™, Citrix XenApp™ and Citrix XenDesktop™ work independently, and in concert, to dramatically reduce carbon footprint as well as power costs.

Citrix at the datacenter: XenServer. Server virtualization, provided by Citrix XenServer, transforms the datacenter from a set of sprawling server farms into an energy-efficient hub and can help organizations meet datacenter consolidation goals. By using one server to process multiple VMs handling different applications, IT departments can increase their server utilization rates while running far fewer servers. Server virtualization cuts down on the power needed to operate, cool and

maintain equipment by as much as 75 percent and multiplies efficiency tenfold.

In a scenario similar to the four e-mail servers discussed earlier, assume that two are dedicated to operation and another two to redundancy—each running at only 10 percent capacity. Instead, XenServer can virtualize each machine and then run two VMs on a single physical server, reducing the total number of physical servers from four to two while increasing capacity from 10 percent to 20 percent. In addition, XenServer can virtualize another four servers, maybe for Oracle E-Business Suite Financials as an example, and operate these VMs on the physical servers running e-mail. Now those original two physical servers are each running four VMs and operating at 40 percent capacity. If one server fails, the other physical machine, still with 60 percent available capacity, can take over and handle the additional workload.

Fewer physical servers operating at peak utilization translates into less energy to power and cool equipment. XenServer also enables you to quickly and easily deploy (and copy) a new virtual server—in under 10 minutes—in contrast to the manual work required without virtualization. It simplifies maintenance, making it an attractive IT solution as well as a great way to improve sustainability.

In addition to its green benefits, the use of XenServer for server virtualization:

- **Increases IT agility and efficiency.** IT departments can easily adapt to changing datacenter and computing needs by dynamically flexing capacity, optimizing VM placement, and automating repetitive management tasks.
- **Improves performance and user productivity.** By enabling “zero-downtime” maintenance, automatically recovering from hardware failure, and providing failover capabilities in disaster situations, an organization’s end users are ensured access to mission-critical application in all scenarios.
- **Reduces unplanned downtime.** With server virtualization, servers are separated from underlying hardware and delivered as virtual machines (VM), making the protection of VMs and associated data easier than in a physical infrastructure; this makes virtual computing a key strategy to protect IT infrastructure against all types of natural and man-made disruptions, helping to reduce downtime and increase productivity.

Citrix on the desktop: XenApp and XenDesktop. Citrix XenApp and XenDesktop leverage virtualization to reduce the computing power needed on the desktop and to broaden options when purchasing new client devices, such as new low-power alternatives. This has significant implications for both the type of device used and its longevity.

Together, the sum is more (for less) than the parts. Independently, XenServer, XenApp and XenDesktop work their magic to make IT greener in the datacenter and on the desktop. However, together they synergize to forge a comprehensive solution to dramatically reduce an IT department’s overall carbon footprint.

With XenServer’s unparalleled ability to consolidate servers and maximize resource utilization, it only makes sense to concentrate power in the datacenter. Use XenApp and XenDesktop to shift the need for computing power away from the desktop and toward the datacenter where it can be optimized for energy efficiency

and to achieve compliance with key federal mandates such as the OMB 25-Point Plan to Reform Federal IT.

XenApp, running on XenServer VMs in the datacenter, virtualizes applications and delivers them to desktops or power-sufficient client devices. Meanwhile, XenDesktop minimizes the computing power needed at the client device by centralizing desktop execution, delivery and management in the datacenter and using XenApp virtualization to remotely display the desktop on any device—loaner laptops, thin clients, etc.

Ultimately, this synergy enables IT to provide the most efficient and sustainable technology infrastructure regardless of desired computing devices, performance demands or scalability requirements.

Ten steps toward greener IT

1. Use Citrix XenServer server virtualization to minimize hardware footprint and power requirements
2. Let Citrix XenDesktop virtualization reduce client device computing power
3. Leverage Citrix XenApp application virtualization to broaden client device options to include more low power alternatives
4. Replace old power supplies with new, more efficient models
5. Employ 64-bit processor architecture and Intel VT and AMD-V processor architecture to improve server density
6. Standardize on Energy Star and EPEAT-compliant servers and client devices
7. Turn to liquid cooling within servers to reduce cooling costs
8. Try solid-state user devices such as thin clients for longer life
9. Manage power cycling of desktops, servers and peripherals during off-peak hours
10. Review datacenter layout design and consolidate for space savings

Going green is good for the public sector and the environment

Organizational initiatives in response to the soaring costs and dwindling supply of energy are driving a new era of green IT, in which the greatest challenge is to shrink power consumption, yet still support mission and performance.

Citrix virtualization delivers a truly green IT solution, providing a comprehensive approach to dramatically reducing the overall eco-footprint—from the datacenter to the desktop. With Citrix, new levels of efficiency are gained across the entire organization, well beyond energy conservation, that will resonate in every facet of your organization. With Citrix:

- Virtualization allows IT departments to do more with less
- VMs require fewer servers at the datacenter
- Application virtualization enables the use of the most efficient client devices
- Greening both the datacenter and the desktop dramatically reduces carbon footprint

Growing even greener—with Citrix PowerSmart

The Citrix PowerSmart utility for XenApp integrates with HP technology to intelligently focus workload and power down idle servers—with initial power cost savings potentially as high as 50 percent. Seamlessly integrating with the HP ProLiant server “lights-out” remote management solution, PowerSmart optimizes utilization of existing hardware while lowering power and cooling requirements.

Citrix virtual computing solutions help public sector entities build simpler and more cost-effective environments that deliver IT as a service and make it easy for staff to work in the most optimal way—anytime, anywhere and on any device.

Citrix® XenDesktop™ is a desktop virtualization solution that delivers Windows™ desktops as an on-demand service to any user, anywhere.

Citrix® XenApp™ is an on-demand application delivery solution that enables applications to be centralized and managed in the datacenter and instantly delivered as a service to users anywhere.

Citrix® XenServer™ is an enterprise-ready, cloud-proven virtualization platform with all the capabilities needed to create and manage a virtual infrastructure at half the cost of other solutions.

Citrix® NetScaler®, available as a network device or as a virtualized appliance, makes web applications run 5x better by accelerating application performance, optimizing application availability, and enhancing web application security while substantially lowering costs.

Citrix® Access Gateway™ is a secure desktop and application access solution that provides administrators granular application-level control while empowering users with access from anywhere.

Citrix® Branch Repeater™ is a branch optimization solution that provides a high-definition desktop and application experience to branch and mobile users while dramatically reducing bandwidth costs and simplifying branch infrastructure.

Citrix Receiver™ is a high performance, universal client technology that enables on-demand delivery of virtual desktops, Windows, web and SaaS applications and IT services to any device.



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