CITRIX®

The Greening of our Government

How Citrix can Reduce your Agency's Overall Carbon Footprint

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Executive Summary

Going green has become an imperative, not an option, for government agencies at every level. Government is faced with the new reality of balancing mission objectives with dwindling environmental resources and the federal and state government mandates intended to mitigate the problem. Limited energy supply and skyrocketing costs are compelling government to take radical measures to reduce its carbon footprint.

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

Government is already moving to mandate green IT initiatives on several fronts. A January 2007 Presidential Executive Order states that "it is the policy of the United States that Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner[1]." This order sets specific green IT goals, such as the call to ensure that at least 95% of all new computers qualify under the Electronic Product Environmental Assessment Tool (EPEAT) green computer purchasing standard[2].

State governments are making similar moves to mandate green IT responsibility. For example, an executive order from the governor of California requires state agencies to "reduce grid-based energy purchases for state-owned buildings by 20% by 2015, through cost-effective efficiency measures and distributed generation technologies[3]." Other states are following in California's footsteps, with more mandates to come in the months and years ahead.

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

Read on to learn how Citrix products can help bring objectives for government and environment into alignment by alleviating the energy impact of equipment needed to serve both the datacenter and the desktop. You'll discover how Citrix XenServer™, Citrix XenApp™ and Citrix XenDesktop™ work independently, and in concert, to dramatically reduce your carbon footprint as well as your power costs.

Introduction

Diminishing resources and rising costs are compelling government to go green.

Energy fuels today's world. Keeping up with expanding services and citizen needs translates into more offices, equipment and resources, which, in turn, need more and more energy to support and maintain growth.

[1]Office of the Press Secretary, "Executive Order: Strengthening Federal Environmental, Energy, and Transportation Management", news release, January 24, 2007
[2]Green Electronics Council, "US Federal Government Commitment to EPEAT Increased Again" news release January 10, 2008
[3]Executive Department for the State of California, "Executive Order S-20-04-Energy Conservation Program", July 27, 2004

Gone are the days of one employee = one computer. Now, laptops, handhelds, home office PCs and so forth 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 IT consolidation and bearing the energy burden in the process.

Yet as the demand for energy increases, the supply is decreasing, with the planet, and power companies, nearing the tipping point. Seeking to hedge against an uncertain environmental future and to offset soaring energy costs, both the public and private sectors are looking for ways to go green and reduce their carbon footprint. The new bottom line – adding social responsibility and environmental impact to economic viability – calls for unprecedented energy efficiency and cutbacks.

“Estimates ascertain that for every kilowatt of energy consumed by a server, roughly another kilowatt is used to cool that same server.”

IT has become the largest energy consumer.

The pressure is especially on for IT, now often responsible for consuming the lion's share of the an organization's power bill – with computing now accounting for over 2% of worldwide energy usage. By the end of 2008, according to Gartner, half of the world's datacenters won't have enough energy capacity to meet the power and cooling requirements of the latest high-density computing equipment, such as blade servers.[4] Also consider that over the course of a year, a large organization's IT infrastructure, for example, may consume as much as the energy produced by five power plants over the same time period. With supply dwindling and government regulation looming, this level of consumption is simply not sustainable.

Datacenters: The SUVs of the Enterprise

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

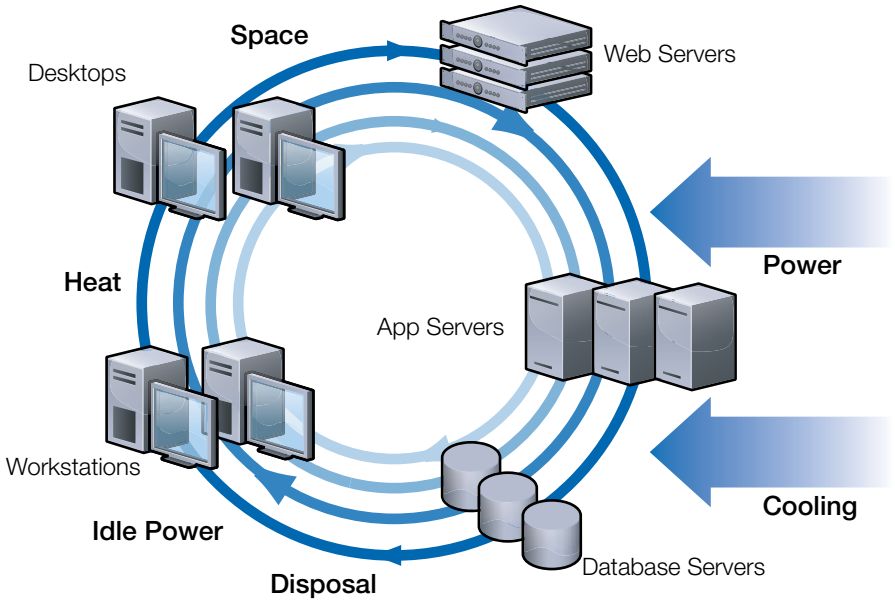
The key to carbon footprint reduction in the datacenter lies not only in reducing the number of physical servers, but also in optimizing server utilization. Consider the amount of energy needed to support email, for example. Let's say that it takes four dedicated servers to handle email traffic, failover and redundancy in a government facility. In any modern data center, these servers would most likely only exhibit an average of 50% utilization or less. Even at this utilization, however, each server still consumes 100% of power. This inefficiency compounds exponentially for each company 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 the enterprise – 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, the power bill – destined to become entirely an IT budget line item – 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 life span. 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. Better yet, would be to standardize on machines that pose less of a toxic threat and promise a significantly longer life.

[4]**The Green Grid Opportunity – Decreasing Datacenter and Other IT Energy Usage Patterns', The Green Grid 2007**



Green computing IT challenge: Server sprawl and over-powered PCs create a negative ecological impact

Leasing fails to circumvent this problem. Organizations may think they can escape disposal costs through leasing when in fact they actually absorb this expense. Furthermore, since leased machines are not considered assets and thus do not qualify for full depreciation benefits. Much preferable would be to purchase these machines and extend their lives far beyond the current two-year cycle.

Imposing constraints will only serve to hinder government's effectiveness.

Not surprisingly, the race is on to find the best way to reduce carbon footprint without negatively impacting performance. Most government IT departments realize that simply putting constraints on datacenter space, power and cooling abilities is not a viable option as it will only hinder, not help, future growth and effectiveness. Let's take a look at some other IT options:

Bigger Servers
Large servers that can support multiple services are useful for consolidating some services Unfortunately, this would provide limited relief, as many SLAs specifically require separation of services provided to various units within the agency or department.

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 would require significant re-tooling of the data center and wouldn't decrease the actual number of servers in use. Also consider that these servers will still be underutilized and consuming more energy than necessary – as much as 30% utilization with 50% 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 toward energy efficient hardware and improved disposal of electronic (e-waste). Initiatives such as Energy Start, a voluntary labeling program conceived by the Environmental Protection Agency (EPA) in 1992, as well as the 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 government's carbon footprint.

Going Green with Citrix

Citrix virtualization optimizes carbon footprint reduction without compromise to performance.

Virtualization is fast emerging as the solution of choice for going green without compromising performance. Citrix 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. Let's take a closer look.

Citrix At The Datacenter - XenServer
Server virtualization, provided by Citrix XenServer, transforms the datacenter from sprawling server farms into an energy-efficient hub. By using one server to process multiple VMs handling different applications, government entities can increase their server utilization rates while running far fewer servers. This cuts down on the power needed to operate, cool and maintain equipment by as much as 75% and multiplies efficiency ten fold.

Take a typical scenario, for example, those four email servers discussed earlier. Let's say that two are dedicated to operation and another two toward redundancy – each running at only 10% capacity. Instead, use XenServer to 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% to 20%. Next, use XenServer to virtualize another four servers, maybe for Oracle Financial, for example, and operate these VMs on the physical servers running email. Now those original two physical servers are each running four VMs and operating at 40% capacity. If one server fails, the other physical machine, still with 60% available capacity, can take over and handle the additional workload.

Fewer physical servers operating at peak utilization translate into less energy to power and cool equipment. XenServer also enables you to quickly and easily deploy (and copy) a new server – in under 10 minutes – in contrast to the manual work required without virtualization. It's easier to maintain, making it a great green and overall IT solution.

Citrix On The Desktop – XenApp and XenDesktop
Citrix XenApp (the new name for Citrix Presentation Server™) and XenDesktop leverage virtualization to reduce the computing power needed on the desktop and to broaden your 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.

Cox Communications
Large U.S. Cable Provider

"Cox Connect supports our goal of being a leading environmental advocate. Application delivery to home-based agents enables workers to use their own computers and leverage on line services, while reducing transportation costs and emissions. We gain annual savings of 84% per agent and retain more satisfied workers."

– Josh Nelson,
Vice President of
Information & Technology

Cox deployed a green solution based on Citrix technology. Cox Connect gives employees application and telephony access at their homes to reduce fuel consumption, emissions and overhead.

Auto-Teile-Inger Handels GmbH & Co. (ATU)
Germany's Leading Car Parts Retailer

"Citrix enabled us to streamline delivery of our Oracle ERP and productivity applications, allowing users to access all applications from a thin client and lowering energy consumption. The security features of a centralized architecture relieved concerns about threats to the network."

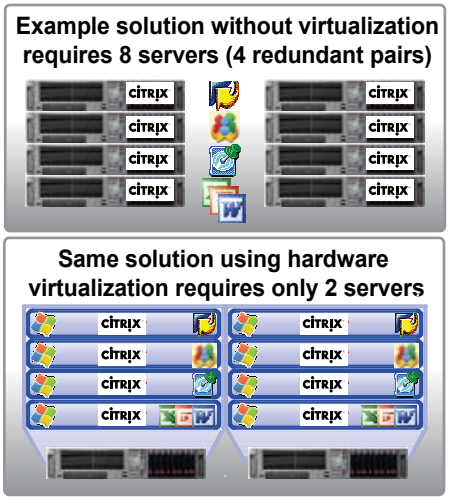
– Manfred Gerlach
CIO

Strict segregation between ATU's intranet and the internet forced some users to work with three of four PCs – one for each network. A Citrix solution and thin clients simplified application access and reduced energy consumption.

With XenApp application virtualization, applications run independent of the operating system, taking the actual computing device out of the equation. Applications are delivered, not installed, sending only what's needed for interaction with the application and diverting all the processing power back to the datacenter for optimal energy efficiency.

XenDesktop, alternatively, connects to a session-based device, such as a blade PC, making it easy to cycle remote desktops to make the most of available power at the branch office. Keep in mind that computing devices still draw a lot of power even in sleep or standby mode. With XenDesktop, devices can be automatically powered down when the office is closed, for example. User desktop sessions still remain actively running on servers in the datacenter while devices stand ready to power up during business hours.

Less powerful machines, like thin clients, can be used to run new and even larger applications without harm to performance. Additionally, these machines enjoy a longer life – from the average two years to five or more – simply because they endure less impact and typically have no moving parts. Longer life means less equipment to purchase and dispose of, leading to less e-waste and disposal costs, and a greener organization.



The Benefits of Virtualizing Citrix XenApp with Citrix XenServer

Together, the sum is more (for less) than the parts.

Independently, XenServer, XenApp and XenDesktop work their magic to green IT in the datacenter and on the desktop. However, together they synergize to forge a comprehensive solution to dramatically reduce your IT department's overall carbon footprint.

With XenServer's superb 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.

XenApp virtualizes applications and delivers them to desktops running from XenServer VMs back at the datacenter or on power-sufficient client devices – whichever provides the best performance. Meanwhile, XenDesktop minimizes the computing power needed at the client device by centralizing the desktop into the datacenter and using XenApp virtualization to remotely display the desktop to any device – loaner laptops, thin clients, etc.

10 Steps Toward Greener IT

1. Use Citrix XenServer server virtualization to minimize hardware footprint and power requirements
2. Leverage Citrix XenApp application virtualization to broaden client device options to include more low power alternatives
3. Let Citrix XenDesktop desktop virtualization reduce client device computing power
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

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

For more information about XenServer, XenApp and XenDesktop visit our Web site at: www.citrix.com

Conclusion

Going green is good for business as well as the environment.

Government mandates in response to soaring costs and dwindling energy supply 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 true green IT solution, proving a comprehensive approach to dramatically reducing government's overall footprint – from the datacenter to the desktop. With Citrix, you'll gain new levels of efficiency across the entire agency, well beyond energy conservation, that will resonate in every facet of your organization. Remember, with Citrix:

- Virtualization let's you 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 – Citrix PowerSmart for HP

Look out for the PowerSmart feature for XenApp. PowerSmart is designed to intelligently focus workload and power-off idle servers – with initial power cost savings expected to be reduced by as much as 50%. Seamlessly integrating with HP Proliant server "lights-out" remote management solution, PowerSmart optimizes utilization of existing hardware as well as lowers power and cooling requirements.

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About Citrix
Citrix Systems, Inc. (NASDAQ:CTXS) is a leading provider of virtual computing solutions that help companies deliver IT as an on-demand service. Founded in 1989, Citrix combines virtualization, networking, and cloud computing technologies into a full portfolio of products that enable virtual workstyles for users and virtual datacenters for IT. More than 230,000 organizations worldwide rely on Citrix to help them build simpler and more cost-effective IT environments. Citrix partners with over 10,000 companies in more than 100 countries. Annual revenue in 2009 was $1.61 billion.