

# Green IT: Making the Business Case

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# Executive Summary

The business case for green information technology is often an easy one to make. Not only is there a great deal of low-hanging fruit – usually in the form of conserved energy – but there are also several dimensions of return on investment that can yield high, short-term rewards.

Businesses often gain new operational efficiencies through green IT, including reducing capital costs, improving regulatory compliance and greening their marketable image with stakeholders, including investors, employees and the public at large, at a time when environmental problems are of utmost concern.

But where is an appropriate starting point? How should one proceed from what has already been done? How can the viable alternatives be evaluated?

These questions are being asked by companies every day as the pressure mounts to reduce costs and improve environmental performance.

In this paper, we'll explain:

- The vital role of IT in sustainability and how the CIO is pivotal.
- Starting with a green readiness assessment.
- The large potential savings in infrastructure and energy.
- Major supply chain opportunities.
- Achieving the paperless office through business process management.
- The new wave in travel reduction and telecommuting.

## What is “Green IT”?

When it comes to environmental performance, information technology is one of the prime enablers of improvement. Through IT, companies can reduce their environmental footprint in a multitude of ways – through reduced energy consumption of infrastructure and cooling equipment, smarter purchasing and supply chain strategies, facilities optimization and reduced corporate travel.

A common example: By creating an internal private cloud and creating a virtualized IT infrastructure, businesses can slash operational costs of energy and maintenance, while drastically reducing the time and capital cost of deploying new servers over time.

In the past, the green IT agenda was largely set by equipment manufacturers. As energy-efficient technologies were introduced, vendors were quick to show the energy savings and recommend replacement. But that focus is too narrow, and it mainly concerns the data center. Yes, blade servers<sup>1</sup> – designed to consume less space and energy – can radically conserve energy while offering the same level of processing power as older rack servers. That's an obvious part of any company's energy conservation plan. But the opportunities are much broader.

## What's Driving Green in IT?

Today, the need to find new green efficiencies is being driven by a number of factors, including a weak economy, the growing cost and limited supply of energy, the insatiable demand for more processing power and storage, and pressure to reduce environmental impact from shareholders, customers and employees.

Cost savings have been squeezed from IT departments for years, and they have learned to run leaner and leaner. Yet executives are still being asked to hunt for new ways to reduce costs. Green IT provides an excellent opportunity, particularly through business process management (BPM) and IT-managed efficiencies found across the supply chain.

Electricity consumption is a major concern for many IT organizations. According to a study<sup>2</sup> conducted in 2007 by the U.S. Environmental Protection Agency (EPA), energy usage at data centers doubled between 2000 and 2006 and was set to double again by 2011 if the same level of growth continued. Data centers, according to EPA estimates, consume approximately 1.5% of all U.S. electricity used.

On the bright side, server efficiency has improved dramatically – 75 times more performance in the eight years between 1999 and 2007, according to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) – roughly doubling every two years. The problem: Business application needs and mission-critical data center designs are outstripping the efficiency gains.

As energy costs rise, they become a major expense because data centers pay twice for power – once to run the servers and again to cool them. ASHRAE says energy costs alone exceeded the cost of the servers its members powered in 2008, and by 2014, infrastructure and energy cost will be 75% of total operational cost, with IT accounting for only 25%.

Processing and storage demand are soaring. In a 2009 white paper,<sup>3</sup> IDC concluded the following:

- Between 2006 and 2010, the data added annually to the digital universe will have increased more than six-fold, from 161 exabytes to 988 exabytes.
- Three major analog-to-digital conversions are causing the escalation in demand: film-to-digital image capture, analog-to-digital voice and analog-to-digital TV.

- Images captured by more than one billion devices in the world – from digital cameras and camera phones, to medical scanners and security cameras – are now the single largest data category in the digital universe.
- This rapidly expanding need for storage and processing will drive organizations to develop more information-centric computing architectures.
- The pace of digital growth in emerging economies will quicken. In 2009, Asia Pacific (without Japan) and the rest of the world outside North America and Western Europe accounted for approximately 10% of the digital universe but will grow 30% to 40% faster than mature economies.

According to a 2007 study by TheInfoPro, Inc. in New York, data growth (and hence storage needs) in Fortune 1000 companies increased fifty-fold over the preceding three years, from 190 terabytes in 2003 to approximately one petabyte in 2006, caused mainly by application data.<sup>4</sup>

New storage means significant added capital costs because existing server rooms simply cannot handle the load. Add to that ongoing energy costs to operate servers and drives, as well as the associated cooling and maintenance costs, and a seemingly affordable investment in storage skyrockets.

In addition to saving money by reducing the demand for energy and new facilities, green IT has other advantages. Enterprises that invest in green IT also tend to profit from organizational reform through BPM, a key green IT strategy. They also meet stakeholder demands for better environmental performance and are able to publicize authentic accomplishments. And they comply with environmental laws, often getting ahead of the curve as regulations tighten, which can be a competitive advantage.

## Starting Point: A Green IT Readiness Assessment

In the greening of IT, the timeless adage applies: You can't manage what you don't measure – nor can you make the business case. All enterprises serious about sustainability should first understand their current level of greenness through a green IT readiness assessment, so they can identify new opportunities for investment and measure progress to determine their return on investment.

A readiness assessment provides senior management with a clear business case to justify green investments. Such an assessment will enable your organization to:

- Identify opportunities to potentially reduce total annual energy consumption by 20% to 30%.
- Set an annual carbon emissions reduction target to be achieved by adopting various green initiatives.
- Realize gains, both financial and from a sustainability perspective, with a low average payback period of two years for various green improvement projects.
- Monitor progress on a continuous basis, using a set of assessment metrics defined for each focus area.

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## A green readiness assessment will identify quick wins for infrastructure footprint rationalization opportunities.

A comprehensive green IT assessment will cover at least six key dimensions:

- 1. Corporate strategy:** It is vital to get clarity on the environmental goals set by senior management, as well as the intent of the enterprise's green practices to date (cost reduction, regulatory compliance, corporate social responsibility).
- 2. IT infrastructure:** The overall carbon footprint of data centers and IT equipment need to be assessed from a direct energy usage standpoint in order to recommend measures for optimization. A green readiness assessment will identify quick wins for infrastructure footprint rationalization opportunities.
- 3. Energy and carbon management:** It is necessary to benchmark energy consumption of IT facilities to identify ways to make them greener by adopting modern building standards laid out by organizations such as the U.S. Green Building Council.
- 4. Business process improvement:** Companies can overcome paper over-consumption and offset their carbon emissions by automating paper-intensive processes.
- 5. Green supply chain:** Supply chain optimization involves the evaluation of green procurement policies, such as vendor selection criteria, e-waste management and CO<sup>2</sup> emission from transportation, to help develop a more energy-efficient supply chain.
- 6. Application portfolio rationalization:** Applications sprawl, causing bloated server utilization, which results in a larger carbon footprint.

In any green readiness assessment, cost and yield should be illustrated. This is the difference between the current state of green IT and a proposed future state (a minimized carbon footprint) at a cost that will yield maximum gains in efficiency.

### The Cognizant Approach

Typically our green IT readiness assessments take eight to 12 weeks. They begin with a baseline evaluation of the current state of emissions and consumption, followed by a benchmarking assessment using industry standards. A business case is developed to justify recommended improvements. This is followed with a phase-by-phase implementation roadmap to reduce the client's carbon footprint. Deliverables include a green maturity scorecard, a benchmark report on key green metrics, the business case and a roadmap.

In a recent green IT readiness assessment study for a leading technology company, we found the following potential savings:

- Approximately 20.5% savings from workstation energy consumption (desktop/laptop).
- 20% to 25% savings from a reduction in IT infrastructure energy consumption through improved data center efficiency.
- Approximately 15% savings from reductions in transportation, logistics and administrative expenses.
- Approximately 20% reduction in paper usage.

## Infrastructure & Energy: The Big Gains

Much of the business case for green IT is made by new efficiencies in energy consumption related to servers and desktop computers. Many server rooms are overcrowded, overheated and underutilized. A surprising number are verging on power shortages and equipment failures. Performance and cost efficiency are being threatened for these reasons:

- Capacities are being strained as the demand for computing and storage exceed expected growth rates.
- Infrastructure is aging, and the reliability of older equipment becomes suspect as it inches toward its mean time to failure.
- Maintenance and management costs are mounting.
- HVAC systems cannot keep pace.
- Real estate costs are becoming unacceptably high.

There are two choices: build new facilities or make the most of what you have. Green IT should certainly be built into any new facility, but the first line of attack should be to maximize existing capacity by doing more in less space.

Replacing traditional rack servers with blade servers is one strategy. Blade servers can achieve a significant reduction in hardware, plus commensurate reductions in energy for operating and cooling, as well as space to house the equipment. A typical computer uses up to a 250-watt power supply. A thin client uses a 4.8-watt power supply. Functionality is maintained, while electricity usage is reduced by as much as 97% – although thin clients do run much hotter. (Before the year 2000, servers on average drew about 50 watts of electricity. By 2008, they were averaging up to 250 watts.)<sup>5</sup>

On the horizon is a new generation of microprocessors that are more akin to the high-performance/low-power chips in mobile phones. (According to *Computerworld*,<sup>6</sup> the major players include Marvell Technology, Smooth-Stone and Agnilux, recently acquired by Google.)

## Virtualizing: The Great Compressor

The larger opportunity is to virtualize. On average, data center servers are utilized under 20% at any given time, yet they consume just as much energy as a 100%-utilized server. (We estimate that our clients on average utilize under 9% of available server capacity. We have seen cases where utilization for client servers is as low as 7%.)

Virtual servers<sup>7</sup> – which share resources with other servers, rather than being dedicated to one application – use less energy because they maximize utilization. And, of course, virtual servers consolidate host infrastructure, so all costs related to housing and maintaining all servers also come down.

Virtualization is well established. Most companies in the technology sector are well down that road, with a high percentage of their servers and desktops virtualized.

(NOTE: Before virtualization can meet its true potential, application rationalization is necessary. While not technically a green IT initiative, application sprawl reduction is a vital precursor to server sprawl reduction.)

## HVAC: More Cooling Needed Now

The largest consumer of power in a data center is HVAC. This is especially true of rack-and-blade rooms full of blade servers that are more compact but much hotter.

They produce massive amounts of heat and are likely to produce even more in the future. Unless an organization plans to virtualize, it pays to reduce energy demand by installing the latest cooling technologies, including water-cooled racks and doors and more efficient AC systems.

## The Cloud is Green (Sometimes)

The vast and growing array of Web-based shared computers known as the “cloud” is a priority destination for CIOs, according to Gartner,<sup>8</sup> because of its “lightness” (which enables greater flexibility) and greenness. In January 2010, Gartner analyst Mark MacDonald identified three major “transitions” among more than 1,500 CIOs surveyed by his firm, including the technology transition from heavier-weight technologies to lighter-weight technologies, such as virtualization, cloud computing and Web 2.0.

In general, outsourcing IT services to third parties that manage their aggregated resources more efficiently is superior from a green standpoint than operating less efficient data centers of your own.

In general, outsourcing IT services to third parties that manage their aggregated resources more efficiently is superior from a green standpoint than operating less efficient data centers of your own. And cloud computing has been touted as an effective carbon-reduction strategy.

But some clouds are greener than others. Greenpeace points out<sup>9</sup> that eBay’s new flagship data center in South Jordan, Utah, is loaded with energy efficiency features, but Utah derives over 81% of its electricity from coal. The cloud, in that case, says Greenpeace, is brown. Alternatively, a major U.S. data center service provider has located all of its data centers near the Columbia River to take advantage of hydroelectric power. That’s a truly green cloud.

## The Cognizant Approach

Our green IT infrastructure service includes these steps:

- Assess the existing workload and growth requirements for the environment under study.
- Design a roadmap that incorporates the necessary changes to evolve virtual maturity.
- Build, configure or redeploy the virtual architecture.
- Classify, schedule and consolidate existing physical workloads onto deployed virtual infrastructure.
- Manage the environment using our Remote Infrastructure Management 2.0 methodology.

Some of the key deliverables across the assessment include:

- Virtual infrastructure roadmap and strategy.
- Cloud computing architecture and documentation.
- Detailed reports for purposed environment configuration changes, including:
  - Total cost of ownership.
  - Return on investment.
  - Carbon footprint reduction.

We have developed a proprietary virtualization maturity model that helps reduce the power consumption of IT data centers. Our clients are able to move from basic non-green infrastructure to green cloud computing data center operating models.

In a recent engagement, we created a private cloud deployment for a leading cable communications provider to develop a cost-optimized, virtualized infrastructure. The solution resulted in:

- Service to more than one million end users, with significant additional capacity for growth.
- A consolidated virtual infrastructure, with 100% new deployments as virtual machines.
- A turnkey solution that includes storage, networking and compute resources housed in only 14 server racks.
- Massive reduction in cabling, power and cooling requirements when compared with traditional data center deployment strategies.

## The Green Supply Chain: Four Ways IT Can Help

The green or sustainable supply chain has been with us in some form since the energy crisis of the 1970s. Companies long ago realized that efficiencies in energy usage, water usage and waste creation have a bottom-line impact.

Lately, as enterprises have assumed more responsibility for the environment, recycling and recycled content have entered the picture, as well as green procurement and supplier relationships that reflect green values.

The three most pressing factors for an organization to adopt a green supply chain strategy are:

1. Consolidation of lanes (the route of a product).
2. Consolidation of facilities.
3. Consolidation of suppliers and supply lines.

The four largest benefits are:

1. Fuel cost reduction.
2. Freight cost reduction.
3. Inventory and associated carrying cost reductions.
4. Reductions in overhead from facilities management efficiencies and lower labor costs (both direct and indirect).

IT is important because, as with most processes, leveraged technology can create alignment and synchronization in the supply chain, which in turn creates efficiencies in everything from logistics and fuel conservation, to intelligent packaging design and waste avoidance.

As with other green IT initiatives, supply chain performance must be measured, first to establish a baseline and then for monitoring over time to show progress.

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Sustainability measurements and metrics can initially be simple, based on energy efficiency, product and process quality. Eventually, the most sophisticated companies measure things like product lifecycle management (cradle-to-grave) and compliance with Design for the Environment, an EPA program to reduce environmental impact of manufactured goods. The associated metrics contain both an environmental element and an economic one.

Business process management can play an important role in reducing carbon footprint via process automation. BPM is especially powerful when automating and optimizing a workflow involving numerous participants (requestors, approvers, delegates) to accomplish a series of tasks, largely through the avoidance of paper handling. Also, BPM has great potential in decision-making around telecommuting, hence reducing fuels consumed in travel.

## The Cognizant Approach

Our green supply chain practice implements a five-step assessment process:

BPM is especially powerful when automating and optimizing a workflow involving numerous participants (requestors, approvers, delegates) to accomplish a series of tasks, largely through the avoidance of paper handling.

- 1. Scrutinize:** Based on a thorough understanding of the business, existing carbon data and supply chain management (SCM) metrics are collected, along with any other information needed to determine green performance.
- 2. Tag:** We explain the baseline results and then identify gaps between best practices and current SCM operation.
- 3. Establish:** The most advantageous opportunities for carbon optimization are identified, with an explanation of their likely impact.
- 4. Envision:** We evaluate the client's vision for a green supply chain and assist in determining target objectives. At this stage, different network configurations are considered for their carbon-reduction possibilities.
- 5. Realize:** A suitable solution is identified, including operational changes and functional requirements.

Large and medium-sized companies commonly achieve green supply chain efficiencies in the following range:

- Overall fuel savings: 7.5%.
- Inbound freight savings: 13% to 18%.
- Outbound freight savings: 19% to 25%.
- Inventory carrying costs reductions: Up to 25%.

## The Paperless Office

Working toward the "paperless office" is another green goal with a proven return on investment. Paper exacts a heavy toll on the environment. In a 2007 presentation, "The Green PDF: Reducing Greenhouse Gas Emissions One Ream at a Time," James DeRosa of the North Carolina-based consulting firm Global Warming Initiatives cited the following statistics:

- The world's average paper consumption per person is 128 pounds per year.
- Approximately 28% is used in printing documents.

- Every year, about 1.1 billion trees are cut down to supply office workers with paper.
- For the past 15 years, paper consumption has increased by approximately 3% per year.
- Each tree used in paper-making removes about one metric ton of carbon dioxide from the atmosphere every year.

In addition, the average U.S. office worker is estimated to use a sheet of paper every 12 minutes and to dispose of 100 to 200 pounds of paper every year.<sup>10</sup>

Factoring in the energy, chemicals and water used to make paper, conserving is both environmental and economical, especially when accomplished through the automation offered by BPM. Paper handling in enterprises is surprisingly costly because of the time and effort required. According to a recent study from a prominent IT market researcher:

- 15% of an organization's revenues are spent creating, managing and distributing paper documents.
- 60% of employee time is spent working with these documents.
- 85% of business documents are in paper form.
- The average document is copied five times.
- 90% of a business's information is in paper documents.
- At \$30 per hour, knowledge workers waste \$4,500 a year working with paper.

Many companies today are drastically reducing paper-intensive processes – with online forms and scanned documents – through process automation.

BPM – or what used to be called “workflow automation” – is a set of technologies that allow a business to continuously improve process efficiency. Many companies today are drastically reducing paper-intensive processes – with online forms and scanned documents – through process automation.

## The Cognizant Approach

Our paperless office practice focuses on five key areas that offer the greatest opportunities for paper reduction:

- 1. Inbound communication** (fax, mail): By integrating computer telephony, optical character recognition (OCR) and scanning, many inbound communications can be routed digitally to recipients.
- 2. Workflow** (approval assignment, escalation, delegation, routing, etc.): Document management systems can handle the management and archiving of documents electronically. BPM workflow takes care of work assignment and escalation.
- 3. Analysis** (for review, workload management, etc.): For documents normally printed and copied for review and distribution, business rules can be configured with BPM to intelligently distribute work and embed proactive reviews.
- 4. Document archival:** Many enterprises routinely archive physical documents, often due to compliance and regulations and the perceived need for a signature. Digitized documents can be securely stored and retrieved using a document management solution. The Electronic Signatures in Global and National Commerce Act of 2000 made digital signatures acceptable.

**5. Outbound communications** (fax, mail): Reports can be a major waste of paper. Auto-generated correspondence issued through a BPM solution can issue reports, notifications and status updates. BPM dashboards provide intelligence for decision making, avoiding some reports used only for a quick review.

Our approach for tracking paper consumption through BPM includes proactive measures, such as:

- Continuous tracking of printouts triggered from each terminal (classified per employee, per process, per day, etc.).
- Automatic computing of Certified Emission Reduction, carbon credits earned or equivalent tree saving by means of process automation or reduction of paper usage.
- Manager notifications, with alerts, whenever paper consumption exceeds organizational targets.

During a recent engagement, we helped a large insurance company reduce its annual paper costs from \$3 million to \$1.5 million by building an end-to-end BPM solution around online forms. The company's carbon footprint was reduced by approximately 21,500 kilograms annually. Employees were much more satisfied with faster processing, less paper handling and the elimination of paper storage.

## Staying Grounded: Shrinking Travel

The business case for business travel is getting increasingly tougher to make due to the proliferation of standard voice teleconferencing, videoconferencing and telecommuting.

Every business that still habitually puts hundreds or thousands of employees on aircraft every year should consider the digital alternatives. The savings – economic and environmental – of connecting via the global network are potentially large.

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In a 2009 report from Info-Tech Research Group,<sup>11</sup> which surveyed 1,047 IT and business professionals, one CTO put it this way: "The first time we ever had a board meeting where we decided not to send West Coast folks to the East, we bought a \$17,000 system, but it paid for itself in having everybody on a videoconference for just that session."

If economic and environmental savings aren't incentive enough to break the travel habit, employee satisfaction also tends to be very high. Telecommuting employees who work productively from home avoid traffic, fuel costs, automobile wear and the time wasted during the commute. They report high satisfaction with the flexibility, and organizations seem happy with the arrangement, as well. In 2009, Cisco conducted an in-depth survey of 2,000 company employees who worked remotely. According to Cisco's Internet Business Services Group, the company's global consulting arm, the company has generated an estimated annual savings of \$277 million in productivity by allowing employees to telecommute and telework.<sup>12</sup> Plus, organizations are gaining access to remote talent they otherwise would not have if physical presence in the office was a condition of the job.

All of these benefits are conferred by our networked world. Taking advantage of it is all that's left to do.

Is there a business case for green IT? Absolutely. The best way to find out is to invite a third-party to show you the potential that resides in the technologies you already own. That first investment in good advice will pay multiple returns thereafter.

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## Footnotes

- <sup>1</sup> Wikipedia: A blade server is a stripped-down server computer with a modular design optimized to minimize the use of physical space and energy. Whereas a standard rack mount server can function with (at least) a power cord and network cable, blade servers have many components removed to save space, minimize power consumption and other considerations, while still having all the functional components to be considered a computer.
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- <sup>3</sup> "The Expanding Digital Universe: A Forecast of Worldwide Information Growth Through 2010," International Data Corp, November 2009.
- <sup>4</sup> Lucas Mearian, "A Zettabyte by 2010: Corporate Data Grows Fiftyfold in Three Years," Computerworld, March 2007, [http://www.computerworld.com/s/article/9012364/A\\_zetta-byte\\_by\\_2010\\_Corporate\\_data\\_grows\\_fiftyfold\\_in\\_three\\_years](http://www.computerworld.com/s/article/9012364/A_zetta-byte_by_2010_Corporate_data_grows_fiftyfold_in_three_years)
- <sup>5</sup> Lauri Minas, Brad Ellison, "The Problem of Power Consumption in Servers," Dr. Dobb's Go Parallel, March 2009, <http://www.drdoobs.com/go-parallel/article/showArticle.jhtml;jsessionid=ZXEYXHOJCYF35QE1GHOSKHWATMY32JVN?articleID=215800830>
- <sup>6</sup> Dan Nystedt, "Chip startup seeks to lower electric bills in data centers," *Computerworld*, August 2010, [http://www.computerworld.com/s/article/9180761/Chip\\_startup\\_seeks\\_to\\_lower\\_electric\\_bills\\_in\\_data\\_centers](http://www.computerworld.com/s/article/9180761/Chip_startup_seeks_to_lower_electric_bills_in_data_centers)
- <sup>7</sup> Webopedia: Virtual server: A server, usually a Web server, that shares computer resources with other virtual servers. In this context, the virtual part simply means that it is not a dedicated server – that is, the entire computer is not dedicated to running the server software.
- <sup>8</sup> Mark MacDonald, "Leading in Times of Transition: The 2010 CIO Agenda," Gartner, blog post, January 2010, [http://blogs.gartner.com/mark\\_mcdonald/2010/03/09/leading-in-times-of-transition/](http://blogs.gartner.com/mark_mcdonald/2010/03/09/leading-in-times-of-transition/)
- <sup>9</sup> Jodie Van Horn, "Hey! Coal! Get off of My Cloud!" Greenpeace International, blog post, May 2010, <http://www.greenpeace.org/international/en/news/Blogs/Cool-IT/hey-coal-get-off-of-my-cloud/blog/11961>
- <sup>10</sup> Amory Lovins, Hunter Lovins and Paul Hawken, *Natural Capitalism*, New York: Little, Brown and Company, 1999. Page 174.
- <sup>11</sup> "Green IT: Why Mid-Size Companies Are Investing Now," Info-Tech Research Group, March 2009.
- <sup>12</sup> "Cisco Study Finds Telecommuting Significantly Increases Employee Productivity, Work-Life Flexibility and Job Satisfaction," Cisco, press release, June 2009

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