

lean &
green leadership

Reducing IT Energy Drain for Business Gain

BPM
Forum

GREEN
GLOBAL RENEWABLE ENERGY
& ENVIRONMENTAL NETWORK



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Introduction

The crisis of mass power consumption in the corporate data center has come to a head. Power required to run data centers in the U.S. is estimated to be as much as that produced by five power plants in a year. Energy expenditures and requirements have doubled in the last five years, and computer disposal is the fastest growing type of waste in the world, according to top Stanford researchers and Greenpeace.

Adding to the concern are multiple industries that are requiring more and more data processing power to drive their business, such as oil and gas exploration, financial services, life sciences, entertainment, education, and many others. These vertical segments are particularly feeling the crunch as space, storage and energy requirements are endangering not only the environment but their financial outlook.

As a result of these concerns, green computing and energy efficiency are starting to assume a front-seat position on the priority list of IT departments. Most see the need for better utilization and consolidation of systems as important in combating soaring energy costs and the staggering expenses of lighting, power and cooling that data centers are incurring as they handle more data and transactions than ever before.

But concern and action are two different things. Most IT professionals say green computing is at least somewhat of a priority, but relatively few have any specific plans in place and even fewer have actually done anything about it.

These are just a few of the findings of Lean & Green: Reducing IT Energy Drain for Business Gain, a study completed by The Business Performance Management (BPM) Forum™, in partnership with BlueArc Corporation. The initiative focuses on educating CIOs about ways IT organizations can benefit the environment, reduce power usage and lower costs through more efficient computing and data storage practices.

The Lean & Green program commissioned a comprehensive online survey of more than 150 IT professionals and executives along with executive advisory board dialogs completed in February, 2008 to measure and quantify their current needs, obstacles and attitudes as they weigh decisions about investing in green technology and downsizing

the data center. The survey examines challenges and success scenarios in creating lean computing and storage infrastructures that deliver exceptional performance in an environmentally sound IT setting.

Guided by an advisory board of noted environmental, business, and technology authorities, Lean & Green is creating a body of intellectual capital around the issues and opportunities presented by green computing along with ways to address the accelerating energy demands and rampant waste of the data center and methods to increase IT yield and data productivity.

The study shows that despite rising costs of data center energy, and the increasing environmental concern over global warming, IT energy consumption continues to rise within a large percentage of organizations. In fact, nearly half of these companies have consumed to the point of running out of space, power, or cooling.

IT professionals by and large realize that improvements must be made. Most are giving their companies poor or failing grades in green achievement in IT, and can only consistently cite a few big companies as leading the way in green computing practices.

Organizations on the leading edge of environmental and efficient data storage and processing practices are, however, realizing an important truth – that they can save green and be green at the same time. In other words, it's not cost prohibitive to be environmentally sound, but rather helps save substantial sums of money – to the tune of hundreds of thousands to millions of dollars annually– in the long term. More than 20 percent of respondents thought their organizations could save \$100,000 or more per year by reducing server and network storage energy consumption. Six percent could save more than \$10 million annually. It's this cost savings that accompanies green computing that is driving the train, even more than a sense of environmental responsibility or corporate showmanship.

Not only are there cost savings involved, but also business performance advantages as well. Along with the push for

Introduction

a more eco-friendly computing environment comes the potential to drive much more efficient and effective systems that are processing data at faster rates with less power, space and cooling required. As a Business Advisor with a leading energy company shared in his executive dialog, significant improvements in storage performance will lead to dramatic business benefits and revenue growth. These improvements will lower both the environmental and cost impact of IT systems. With the proper tools, power efficiency will increase as power consumption decreases. These results will eventually lead to a better bottom line for companies.

The fact is, green computing has become a key factor in storage purchases at most companies according to the survey. And new technologies exist to make real lean and green improvements a reality in the short term. Just how quickly these technologies and practices are adopted is a factor of additional education and awareness as well as overcoming the inertia to make change.

The Need for a New Computing Model—Lean & Green

In an increasingly data-intensive environment, the volume of data that we store is growing exponentially. Particularly in industries where data storage performance is critical to the success of business, such as legal discovery, entertainment, pharmaceuticals, energy and minerals exploration, and services providers, there is a need to better address this need for performance and also manage environmental and cost concerns.

Enterprises are going to have to deal with the looming data center environmental crisis in the short term, particularly with increasing server sprawl and power consumption

spiraling out of control. Companies must decide the best way to do this in terms of cost and environmental benefits.

A new model is required in the data center to take into account the environmental and cost concerns while meeting massive processing and performance needs. It is the responsibility of IT professionals to address these issues through exploring alternatives, updating traditional inefficient systems, and looking at the resources available.

The benefits of going LEAN & GREEN are both environmental and financial, as efficiency gains reflect across power and operational costs, revenue, and future capital investment needs—when each server is truly pulling its weight, fewer are needed. As the survey results and executive dialogs in this report suggest, profitability and environmental responsibility are not conflicting goals but rather the only possible future strategy.

More and more, an organization's viability depends on how that entity addresses environmental sustainability.

The good news is that companies in the short term can lower their power usage and costs dramatically while increasing data center productivity. It's possible both to meet growing data storage needs and reduce server sprawl and power consumption. And as a data center shrinks, so does the environmental impact and the cost of maintaining it.

The following section summarizes the top-level findings of the Lean & Green survey, followed by a detailed breakdown and analysis of responses to each question.

Top-Level Survey Findings

Energy efficiency and green computing are a top concern

- Nearly 75 percent say green computing is at least somewhat of a priority
- Almost half say it is very important or essential

Few have done anything about the problem

- A disappointing minority (41 percent) have any specific green plans in place
- About the same amount (42 percent) have failed to set any specific goals, and those that have, set moderate ones at best
- Nearly 20 percent set goals of 5 percent reduction or less, and almost $\frac{2}{3}$ had set goals of 25 percent or less reduction

Companies are shirking their responsibility

- An overwhelming majority of respondents (86 percent) feel that IT organizations have a responsibility to substantially improve efficiency and green activities

Yet, significant business gains and cost savings can be achieved by going green. Costs far outweigh any sense of environmental concern, corporate responsibility, or regulations

- Soaring energy costs (64 percent), which are out of IT's control by far topped the list – nearly double the respondents that said corporate responsibility (29 percent) or regulations (27 percent) were drivers
- More specifically, lighting, power, and cooling costs (44 percent), which are in IT's control, ranked second in importance, followed closely by concern over global warming (37 percent)
- Nearly 20 percent of those polled spend more than \$1 million per year on IT energy consumption, and 8 percent spend more than \$10 million
- Advantages associated with newer, more efficient processing and data performance that accompany green computing can significantly boost revenue opportunities

Despite these daunting costs, consumption is rising

- Almost half said IT energy consumption increased in their organization last year, even in the midst of energy inflation
- Forty-six percent have consumed so much that they have run out of space, power, or cooling to handle the consumption

Top-Level Survey Findings

Corporations are getting passing grades at best in green achievement

- Fewer than 10 percent of respondents gave their organization an A in their ability to control IT consumption to date. Even fewer (7 percent) gave their overall industry top marks
- Some 3/4 gave themselves and their industry a C or much worse
- Only a handful of companies were cited by more than one respondent as having done a good job to date at green computing: Google, Sun, IBM, HP, and Dell

In fact, savings that can be achieved through efficiencies are substantial

- More than 20 percent of respondents thought their organizations could save \$100,000 or more per year by reducing server and network storage energy consumption. 6 percent could save more than \$10 million annually

And there are even top-line benefits from going green in the datacenter

- Executive dialog comments confirm that lean and green practices can lead to better performance and revenue outcomes. A Business Advisor a leading energy company shared that significant improvements in storage performance will lead to dramatic business benefits and revenue growth.
- Another executive suggested that environmental initiatives be treated as a line item on financial forecasts based on the revenues generated and costs saved. IT managers should be rewarded appropriately for contributing to these business gains that result from their efforts, he said.

Green computing has become a key factor in storage buying at most organizations

- Nearly 60 percent said energy efficiency has become a significant criterion in selection of data processing or storage equipment

Efficiency is everything

- More efficient use of existing systems was number one (19 percent) priority when it comes to efficiency
- Tied for second were server consolidation, energy efficient PCs, and better facilities management (lighting, cooling, power)

Top-Level Survey Findings

Executives still need to push for green computing

- 62 percent said their upper management has made green computing only somewhat, slightly, or not at all important in the organization

A little less conversation, a little more action needed

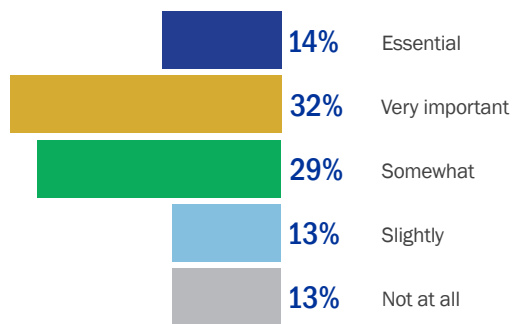
- Excuses were flowing for not pushing green initiatives forward. The number one reason was no policies are in place to guide the process (15 percent), followed closely by too much time is required (12 percent) and organizations are too busy to formulate a program (12 percent)

A healthy cross-section of executives, industries and businesses was represented

- 70 percent of respondents were VP level or above
- More than 20 different industries made up the pool, with information technology, professional services, and financial services the largest concentrations
- 60 percent of companies were mid-sized or large businesses

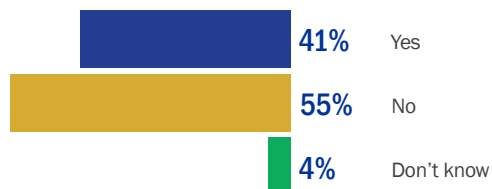
Detailed Survey Findings

To what degree are energy efficiency and green computing a priority in your organization?



Nearly three fourths of respondents said that energy efficiency and green computing is at least somewhat of a priority. Forty-six percent of those surveyed believe that it is either very important or absolutely essential to their organizations. Less than thirteen percent said that energy efficiency and green computing are not priorities for their organizations. This is consistent with our findings that these issues have risen to top level concerns among survey participants.

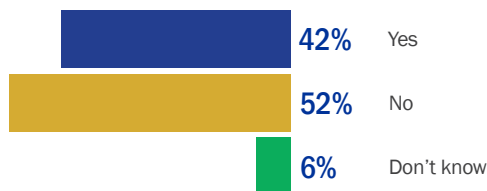
Does your company have specific policies and initiatives in place to address green IT concerns?



Fifty-five percent of respondents said their companies have no specific plans in place, nor have they succeeded in doing anything about the problem to date. Slightly more than forty percent confirmed that there are policies and initiatives in place. Although most respondents indicated that green computing is a priority for their organizations, a disappointing minority of respondents know of any green policies or initiatives within their IT departments. This seems to signal that IT needs to not only set policies and plans in place but also follow through on them and get it done.

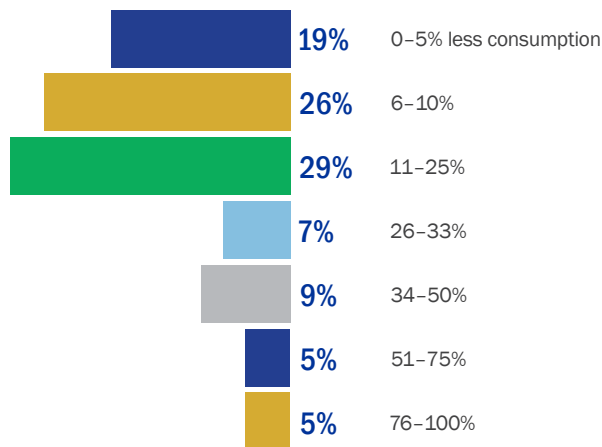
Detailed Survey Findings

Has your company set specific goals for reducing IT energy consumption?



Forty-two percent of respondents said that their companies have set specific goals. However, they are in the minority. Fifty-one percent of respondents claim to have no knowledge of policies or initiatives within their organizations. Clearly there seems to be a disconnect between the importance of being green and planned and executed activity towards those priorities. In addition, the level of awareness within companies of policies and goals for energy efficiency seems to be low.

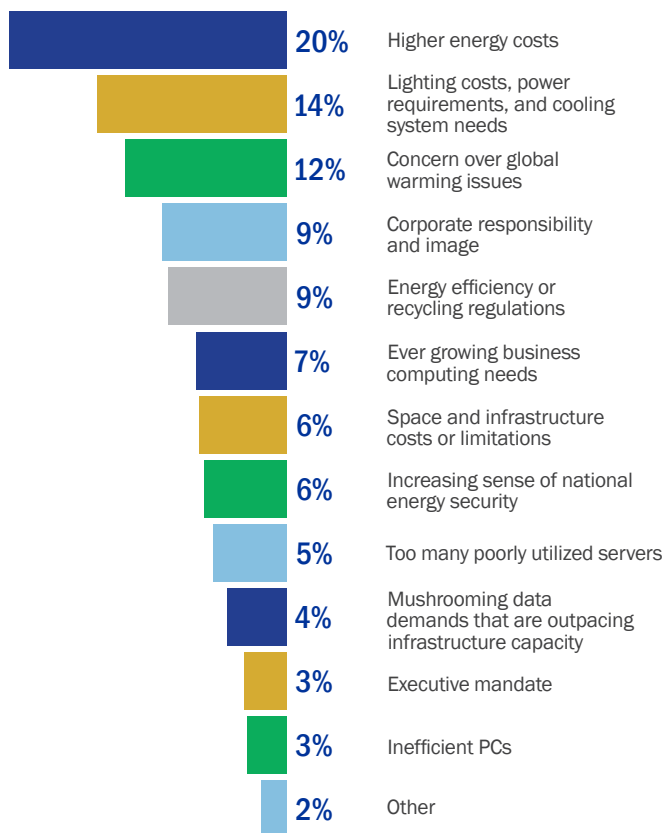
If yes to the prior question, what consumption reduction goal is there over the next year?



Of the respondents who say that their organizations have set goals, almost all of them say that these goals are very moderate. Of those who said that they had set goals, almost three quarters said that they were aiming to reduce energy consumption by twenty five percent or less. Less than ten percent of respondents say that consumption reduction goals have been set for fifty percent or more. This is also consistent with the notion that most companies may be taking too conservative of an approach to green computing—particularly in light of an estimated 25-30 percent energy reductions that can be achieved by simply adopting significantly more efficient computing processors available today.

Detailed Survey Findings

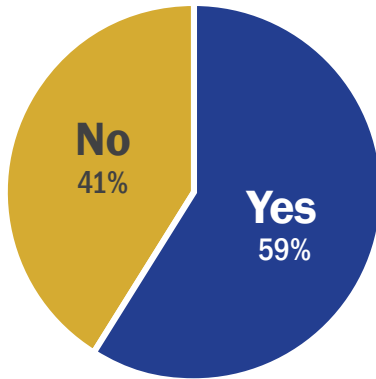
What are the most important drivers for green computing in your organization?



Nearly one-fifth of those surveyed think that higher energy costs are paramount. Fourteen percent said that lighting, power, and cooling costs are the important drivers. Twelve percent cited global warming as an important concern. Respondents also felt that corporate responsibility and perception, environmental regulations, rising computing needs, increasing limitations on money and physical space, and national concern over energy security are all contributing to the momentum behind green computing. Consistent with our top level findings, costs far outweigh any sense of environmental concern, corporate responsibility, or regulations.

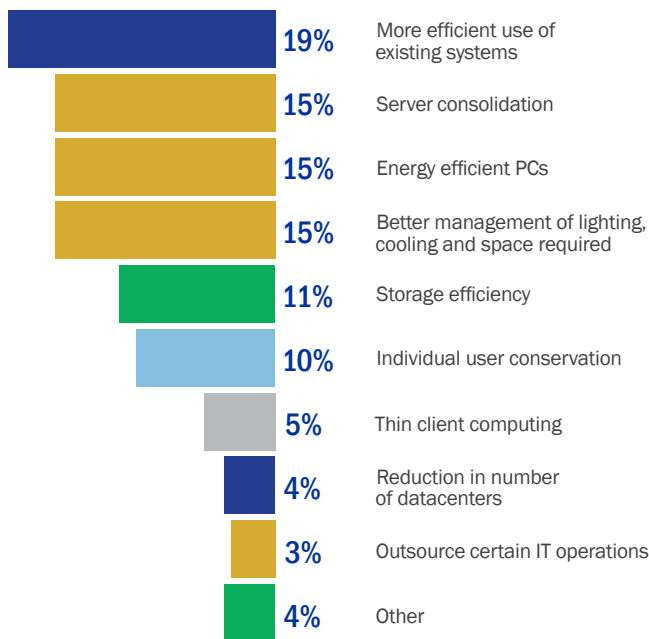
Detailed Survey Findings

Are energy efficiency and green computing significant criteria in your selection of data processing and storage purchasing decisions?



The majority of survey respondents say that green computing and energy efficiency are having a major influence on purchasing—approximately sixty percent of participants replied that energy efficiency and green computing have become significant criteria for buying data processing and storage solutions. This is even more pronounced at the executive level; seventy three percent of CIO and CEO level respondents said that energy efficiency and green computing are significant criteria in the selection of data processing and storage purchasing decisions. This supports the idea that energy conservation and environmental concerns are having an impact on data processing and storage technology decisions.

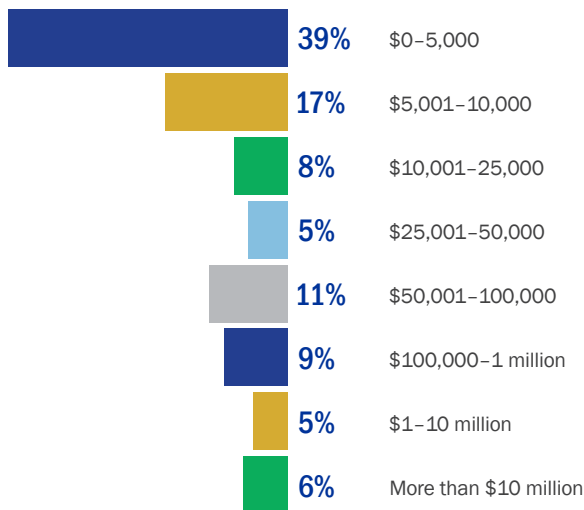
What are your top priorities for improved energy efficiency within your IT environment?



The top priority for most survey participants, accounting for one fifth of the total number of responses, was improving the efficient use of existing systems. Server consolidation, energy saving computers, better management of lighting and cooling, and more efficient use of space were all tied for second place, each accounting for 15 percent of the total responses received. Interestingly enough, space and infrastructure limitations ranked as one of the least important drivers for green computing, yet server consolidation is one of the top energy efficiency priorities for IT. About 10 percent of responses indicated that storage efficiency is a priority—lower in importance than consolidation. Perhaps companies are not connecting the two as they should be. Slightly less than 10 percent of responses identified individual user conservation as a top priority. These findings suggest that there is not one single way, but rather multiple, diverse avenues that companies can improve upon green efficiency that combined can generate significant improvements.

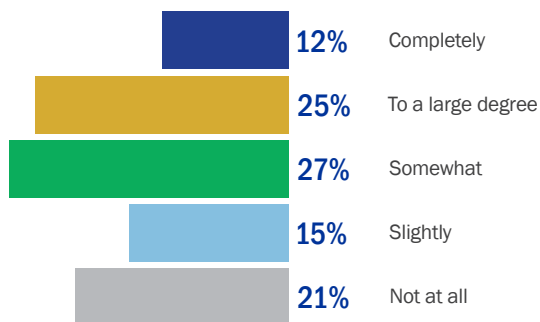
Detailed Survey Findings

If you could reduce energy consumption associated with server-based and network storage, what amount of money do you think your company could potentially save per year?



More than 20 percent of respondents thought their organizations could save \$100,000 or more per year by reducing server and network storage energy consumption. Six percent could save more than \$10 million annually. Others were more conservative—suggesting that their savings may be due to a lack of activity or more conservative approaches to green initiatives that hinder possible substantial savings.

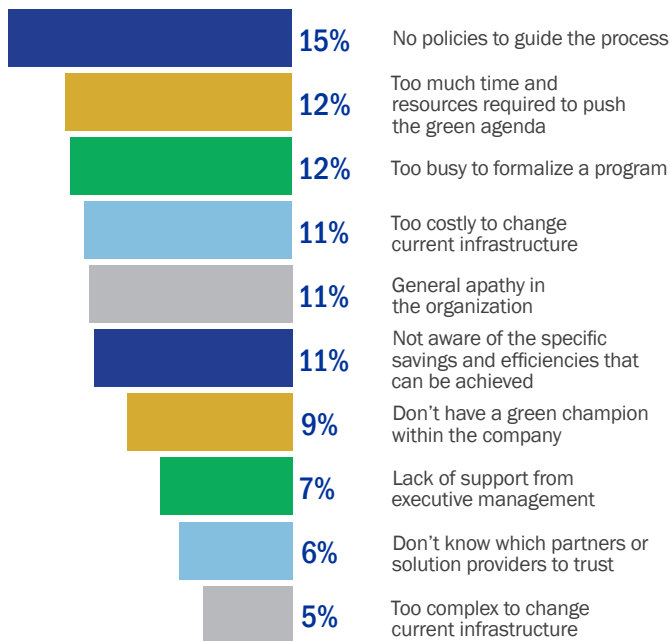
To what degree has upper management recognized green computing as a priority?



Results on this question were mixed. More than one fifth of respondents said that upper management had completely disregarded environmental considerations. And another twenty seven percent of respondents indicate that executives are somewhat interested. CIO and CEO respondents indicated a bit higher level of focus, saying that twenty seven percent of their executives completely recognize green computing as a priority. Nearly two fifths of respondents said that their executives had placed a high level of attention on green computing. As our executive dialogs support, more focus and direct measurement is necessary at the executive level for lean and green activities to be fully successful.

Detailed Survey Findings

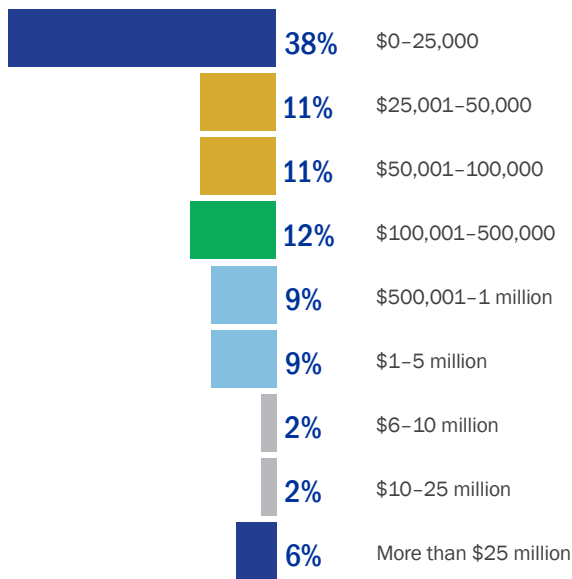
What are the biggest challenges and obstacles that your company faces in pushing green IT initiatives forward?



The number one challenge, according to the survey, is a lack of effective policies. Fifteen percent said that putting policies in place to drive the process would make a difference. The second biggest challenge was a tie between time and availability. Twelve percent of responses indicated that too much time is required to develop green IT initiatives, and twelve percent of respondents said that employees are too busy to formulate a program. Third place was almost evenly split between general apathy, insufficient awareness of potential cost and energy savings, and expenses required to change the current infrastructure. No matter what the excuse, IT managers need help in the form of executive mandates and plans, the time and resources allocated to the task, and awareness as to the environmental and fiscal benefits if green improvements. Surprisingly, partner/solution provider trust and infrastructure complexities ranked lowest on the list of obstacles, suggesting that traditional objections to pushing green IT initiatives may not be an issue. IT professionals seem more comfortable to partner with others to get activities off the ground.

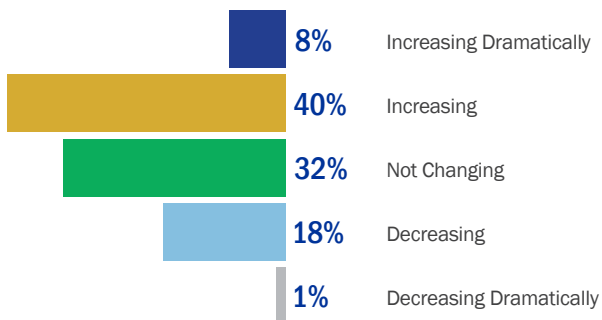
Detailed Survey Findings

How much do you estimate your company spends on energy consumption for IT per year?



IT energy consumption costs are substantial, particularly in light of rising energy prices, priorities for driving efficiencies, and environmental impacts. Eighteen percent said their companies spend more than a million dollars annually. 6 percent admitted to spending more than twenty five million per year. That means that even very small percentage gains in efficiencies for these companies can mean millions of dollars of cut costs annually.

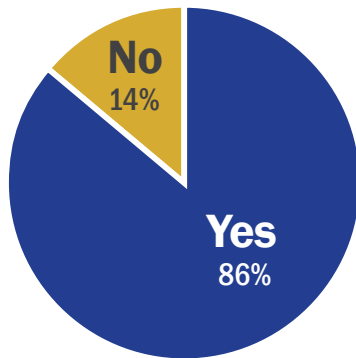
To what extent has IT energy consumption changed in your organization in the last year?



Despite daunting costs compounded by energy inflation, consumption is rising. Nearly half of respondents said IT energy consumption increased in their organization last year—more than double the number of organizations whose needs are abating. These shocking statistics suggest that data processing and storage needs continue to increase, compounding the requirements for processing and cost efficiencies in the near term.

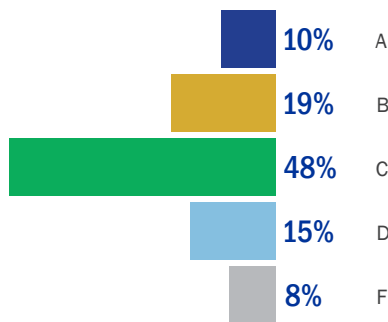
Detailed Survey Findings

Do you feel that IT organizations have the responsibility to substantially improve their efficiency and green activities?



Eighty six percent of respondents said IT organizations have a responsibility to substantially improve efficiency and take action. Yet, the findings from other survey questions state that this hasn't happened to a large extent. This means that an overwhelming majority of respondents feel that companies in their respective industries are shirking their corporate responsibility.

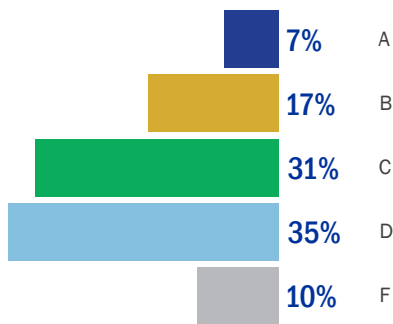
What grade would you give your company in its ability to control IT energy consumption to date?



Three quarters of companies gave themselves a C or much worse. Fewer than ten percent of respondents gave their organization an A for their ability to control IT consumption to date. And most companies gave their own organization a higher grade than they gave their industries. This is a poor overall report card, with highly damaging consequences to the environment and the bottom line.

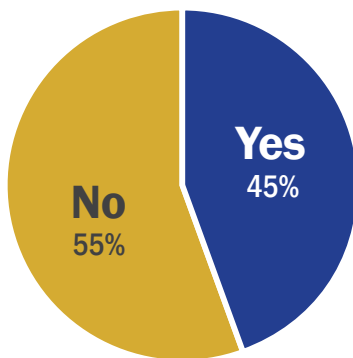
Detailed Survey Findings

What grade would you give your industry in its ability to control IT energy consumption to date?



Forty five percent of respondents gave their industry a failing grade (D or F). Two thirds of respondents gave their industry a grade of C or D. These results further indicate significant room for improvement in a wide range of industries.

Have you ever unexpectedly run out of space, power, or cooling in your data storage systems?





Forty-five percent acknowledged consuming so much, at some point, that they have run out of space, power, or cooling to handle the consumption. This is a scary thought not only from a cost standpoint but also in terms of business continuity and output as well as uptime planning and productivity. It also puts into the perspective the sense of urgency that many are feeling to consolidate systems to save on space, power, and cooling in order to be more environmental and maintain operational uptime.

Detailed Survey Findings

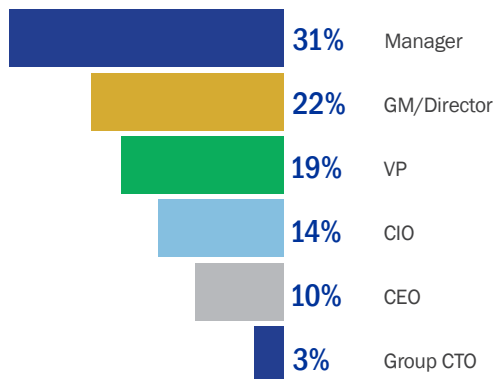
Are there any companies that come to mind as doing a particularly good job at implementing green computing?

Top five

	Google
Microsoft	Microsoft
	Sun Microsystems
	IBM
	Hewlett Packard

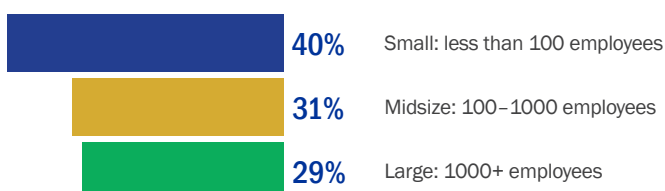
Most respondents were unable to think of an example. Less than five percent of respondents named companies who are doing a good job. Out of those responses, only a few companies were cited by more than one respondent – Google, Sun Microsystems, Microsoft, IBM, HP, and Dell were cited. Interestingly enough, competitors Google and Microsoft, perhaps recognized for embracing alternative energy, were the top two on the list. And companies like Sun, IBM, and HP have made efforts to position their products as energy efficient.

What is your title?



The survey included an encouraging proportion of executives. 70 percent of respondents were VP level or above, with nearly 30 percent C-level and 10 percent CEOs. All had some level of managerial authority. Clearly, company leaders were weighing in on these important subjects.

What is the size of your business?



Business size was roughly evenly distributed, with large, medium, and small business concerns represented in the survey.

Detailed Survey Findings

Which industry sector best describes your company's focus?

24%	Information Technology
8%	Professional Services
8%	Government
7%	Financial Services
7%	Education
5%	Media & Publishing
5%	Transportation
4%	Manufacturing
3%	Wholesale/distribution
3%	Telecommunications
2%	Construction
2%	Insurance
2%	Travel and Hospitality
1%	Retail
1%	Life Sciences
1%	Chemicals
1%	Aerospace & Defense
1%	Entertainment
1%	Electronics & misc. technology
1%	Food & Beverages
1%	Consumer Durables
1%	Automotive
1%	Energy
8%	Other

A broad spectrum of industries were represented. The largest vertical categories of respondents were technology, government, financial services, professional services, and education.

Executive Dialogs

The following section is a summary of dialogs the BPM Forum conducted with executives from a mix of IT operations and environmental organizations to offer more insight from the front lines on issues and predictions around greening the data center.

Brad Eno
Director of Systems Design & Integration,
External Initiatives
Lockheed Martin

Top environmental concerns being addressed by management at Lockheed Martin include energy consumption, disposal of hardware, and maximizing efficiency with respect to server and storage configurations in the enterprise. The cost, both in terms of dollars and environmental impact, of maintaining inefficient level of data performance is considerable. Brad Eno advocates several strategies for improving efficiency. He recommends the use of virtual servers, as well as the consolidation of servers, in order to optimize resource management. Eno predicts that, over the next five years, such improvements can cut down consumption levels by as much as thirty or forty percent.

According to Eno, green IT programs make sense from an ethical perspective, as well as from a cost-savings perspective. He states that aerospace manufacturers like Lockheed Martin need to tackle the challenge of going green now. In the last year, it has become clear that companies in this industry need to keep up with the latest green IT techniques just to maintain a competitive edge. Green initiatives not only benefit the environment, but they significantly reduce operating costs. Green solutions start with conservation and efficiency in every part of the data center: power systems, servers, storage, cooling systems etc. The Green IT track will teach you how to squeeze greater efficiency and improve your bottom line.

Consistent with our research, Eno agrees that green initiatives can significantly reduce operating costs. Key factors to consider include both conservation and efficiency. Eno

suggests to companies that the best way to implement a green program is to ensure that both of these factors optimized throughout every part of the data center. Server and storage capacity are crucial. Efficient use of power and cooling systems is also vital. Maximizing efficiency in these areas will serve to improve the bottom line in any organization.

When asked to grade the aerospace and defense industry, in terms of effectiveness for maintaining uptime performance during periods of heavy load, Eno suggested a grade of C-. He cited a lack of government pressure and a lack of interest in the industry as two reasons for the industry's slow progress. However, Eno believes that energy consumption costs are bringing the issue to the forefront, and that green initiatives will continue to gain momentum.

“ There are a lot of people out there operating old servers and old systems just because they don't have the capital to purchase new ones and they may not necessarily be stretched from a capacity perspective, but they would really experience substantial savings if they went to a more efficient kit. ”

“ I have a personal goal to try to reduce our energy footprint, but what my bosses are primarily interested in doing is reducing costs. And the costs of new data centers, the costs of running our existing data centers are very high and anything we can do to try to keep those costs down or reduce them is really critical to the business. ”

Executive Dialog Perspective

Gia Brazil
Environmental Scientist
Science Applications International Corporation (SAIC)

As a leading systems, solutions and technical services consulting firm, Science Applications International Corporation (SAIC) is devoted to environmental concerns, homeland security and technology integration. Ten percent of the company is devoted solely to environmental work and Gia Brazil's specific function as an environmental scientist is to provide guidance and assistance on governmental projects and on programs created for large entities. She has worked on projects ranging from energy efficiency to waste reduction to hazardous waste management projects.

Brazil believes the top environmental issue that concerns the IT industry is energy efficiency, and how energy consumption within organizations contributes to global warming. She believes that global warming itself is a very complicated issue and directly relates to other environmental concerns such as water scarcity, climate change and rising CO₂ emissions.

Despite these environmental concerns, Brazil is optimistic about energy consumption in the future and believes it is realistic to achieve a 20–25 percent increase in energy efficiency within the next five years due in part to education, technological advancements and to improved environmental regulations imposed on manufacturers to make more energy efficient products. She believes that it is achievable for companies to be environmentally conscious while cutting costs at the same time. This goal can be reached by calculating the savings associated with cutting garbage disposal costs, purchasing more sustainable products, and cutting back on energy consumption.

Consistent with a common theme in our key findings, Brazil states that most companies are focused on the bottom-line benefits of becoming Lean & Green. Whether a company decides to go Lean & Green for strategic marketing purposes or in response to consumer pressures to be more environmentally conscious, there are clear economical advantages to conserving energy in the datacenter. Brazil asserts that the primary obstacle to driving green

initiatives is execution. That a new way of thinking is vital to addressing a variety of different industries and different businesses because there is not an easy solution that fits all organizations and companies.

In rating enterprises overall about their effectiveness being Lean & Green, Brazil responded with the grade of "C-" stating that "there is a tremendous amount of wasted energy and resources that happen in business. Everything from the number of copies people are printing, to leaving lights on 24 hours a day, to inadequate recycling programs, to the time spent on the administration of inefficient filing and IT systems."

“ I would say that probably the primary, sort of umbrella issue that IT companies would be concerned with would be energy efficiency. I say this primarily because looking at kind of the top environmental issues we have, the topic de jour is global warming. Global warming is certainly affected by the way we currently create energy. Clearly there is continued legislation around cutting CO₂ emissions and that kind of thing but looking at alternative energy sources, will be really important. ”

“ I think it's a common myth that businesses believe that in order to become more green they have to spend more money. So I think that it's more often than not what my challenge and my industry's challenge, is to help businesses realize that by being green they will not only achieve more efficiency and better results environmentally and socially and also that it can lower their bottom line. ”

Executive Dialog Perspective

“E”

**Director of IT Production Support
A leading investment bank**

As would be expected of a large investment firm, E’s organization has made smart IT investments. “We own the production system, we own the applications, we manage all the releases, we manage the day-to-day operations of the systems. We currently have over 300 large UNIX servers in our inventory.” He says it is important to plan for rapid growth when designing datacenters for the financial industry. Because serious problems can result from datacenter overcrowding, it is necessary to restrict how much new equipment is installed. He recommends replacing inefficient technology with more energy efficient technology. “The real constraint isn’t space, the real constraint is power and cooling,” he advises. Using equipment that requires less power means that less energy is required to cool the data center. There’s an initiative throughout the firm to try to use less energy, and less dollars. His challenge is to make it as inexpensive as possible to deliver IT support.

E believes that two top environmental issues that should concern IT around the datacenter are energy consumption and waste associated with the old components. “The thing is that we can’t maintain the status quo with respect to energy consumption and waste because we’re just physically at the limits of our data centers,” he said. He also thinks that old, outdated fire suppressant systems, especially those with a fluorocarbon-based fire suppressant, can be a potential liability.

His organization is currently building three new datacenters throughout the world. This initiative is an expensive enterprise, so efficiency is of the utmost importance. “I can’t spend \$100 million every year to build new datacenters,” he explains. “I have to spend money to fill the datacenters and operate them, and that’s in addition to the ones I have now. So the idea is, in order to maintain some type of grasp on expenses, you have to be more efficient.”

It requires a lot of effort to make the enterprise Lean & Green. E recommends using virtualization to maximize performance. “We are seeing virtualization trends that allow us to share kit and still make the cycles available to the people who need them, and at priority levels.” By using virtual servers instead of dedicated servers, White can minimize the amount of idle time a server would have during a business cycle.

“ There are a lot of people out there operating old servers and old systems just because they don’t have the capital to purchase new ones and they may not necessarily be stretched from a capacity perspective, but they would really experience substantial savings if they went to a more efficient kit. ”

“ I have a personal goal to try to reduce our energy footprint, but what my bosses are primarily interested in doing is reducing costs. And the costs of new data centers, the costs of running our existing data centers are very high and anything we can do to try to keep those costs down or reduce them is really critical to the business. ”

Executive Dialog Perspective

Mark Thurn
Infrastructure Manager
Basin Electric Power Cooperative

According to Mark Thurn, the top environmental issue that concerns IT executives within the datacenter environment is managing the growth of a company. Basin Electric is a power generator and distribution cooperative that serves 9 Midwest states. Their server environment has doubled since 2004.

Currently, there are a number of factors accelerating the need for additional electricity in the Midwest, such as oil field development. The coal mining industry is also a factor that accelerates the need for power. Also, the demand for coal to be shipped by rail across the country has increased dramatically. Lastly, another factor is the growth of the ethanol industry which processes corn to produce ethanol.

Thurn believes that most companies will try to delay capital expenditure for as long as possible unless there is a persuasive argument for switching to more energy-efficient technologies. As indicated in our key findings, it may actually be more cost-effective to adopt Lean & Green initiatives. However, in many situations, it may be necessary to calculate the proposed cost-savings, and then present these findings to executive management for changes to come into effect.

He believes there are several things companies could do if they want to actively pursue being Lean & Green, yet Thurn thinks that many companies just depend on the natural progression of technology to lead them in this direction. In his 25 years of examining the company's power consumption patterns, enormous mainframes have been replaced with smaller, more efficient systems.

There also is a need to establish benchmarks measuring overall power efficiency, and for corporations to agree on a standard method for evaluating success. Thurn suggests this be done on a per-server-image basis or per-storage unit.

When suggesting new solutions, Thurn discusses server virtualization as an alternative. Virtualization has the potential to make better use of the available hardware by running

multiple applications and processes on one machine. From a cost standpoint, fewer resources are required. This translates to fewer dollars being spent.

When assessing the overall effectiveness of being Lean & Green in IT, Thurn gives IT professionals at large a grade of "C-". He adds that he believes, within five years, a 30-40% improvement is easily achievable just based on the current rate of technological advancement. If more companies become aggressive about being Lean & Green, 50-60 percent is in the realm of possibility.

“ Failing to pay attention to the opportunities available to reduce energy costs will certainly get the attention of management. That will hear that others are doing—or what others are doing and wonder why their shop hasn't changed or continues to increase in their energy usage. ”

“ The promise of virtualization is to make better use of the hardware that you have available to you, and being able to run more server images on that hardware, making the most efficient use of it. ”

Executive Dialog Perspective

“G”

Business Advisor

A leading energy company

This company is pioneering alternative solutions for reducing power and cooling requirements of its IT systems worldwide. G is looking at the problem from a global perspective, ensuring consistency of implementation and compliance across its global organization. G has been at this company for seven years, and he is based in the South Africa office. He is involved in the day-to-day assessment of environmental applications.

G must assess each project and investment before moving forward. Costs must be closely examined to determine whether a project is viable and to ensure that the company will get a return on the investment. G believes that the top three environmental issues concerning the data center are the cooling of air conditioning and fire suppression, decreasing power usage from each system, and power efficiency and air flow going into the data center. All IT executives should carefully evaluate their organization’s effectiveness in managing these issues. Because it is headquartered in the United States, the company must also pay particular attention to U.S. government regulatory issues. These issues include SOX and SA government compliance, as well as corporate U.S. regulations.

The ability to access and use data optimally is mission-critical to a vast majority of businesses today. Due to the increasing demand for consumer and enterprise applications, G predicts that the company will achieve an 80 percent datacenter utilization rate in five years. Several factors are driving the need for increased storage and data access performance. Strategic applications that use rich media files and messaging, ERP applications, increasing network traffic, research, product development, and other necessary business processes require high-performance data storage solutions.

The cost of maintaining the status quo of inefficient server and storage systems makes a huge impact on the enterprise. Wasted power makes the most significant impact in terms of dollars, and power outages are an even greater concern. Reducing cooling and power requirements is also essential. The company is moving toward larger servers because it offsets these costs.

Significant improvements in storage performance will lead to dramatic business benefits and revenue growth. These improvements will lower both the environmental and cost impact of IT systems. With the proper tools, power efficiency will increase as power consumption decreases. These results will eventually lead to a better bottom line for companies.

In rating enterprises overall about their effectiveness being Lean & Green, Matenhire responded with the grade of “C” stating that “current users of the system are not looking at it as a challenge from a global perspective. There is no consistency of compliance that exists across each and every country so it becomes an implementation issue.”

“**Reduced power consumption leads to a better bottom line for companies.**”

“**The top drivers for making the datacenter much more Lean & Green are the cost impact and the environmental impact.**”

Executive Dialog Perspective

Mark Gehrke
Manager of Datacenter Services
Public Service Company of New Mexico Resources

Being Lean & Green is one of the five high-level objectives for PNM Resources, a gas and electric utility provider serving New Mexico and a portion of Texas. Mark Gehrke manages all of the datacenter facilities and focuses on IT infrastructure.

Building a more energy-efficient datacenter has been on the forefront of Gehrke's mind because the company recently completed construction of a new datacenter facility that was given a silver certification from the Leadership through Engineering and Environmental Design (LEAD) Council. He was an integral member of the planning committee and one of their goals was to build the facility to allow for measured growth without allocating too much physical space and over-extending available resources.

During the transition process, one concern he raised was green or eco-friendly disposal practices when moving out of one facility into another. Putting all of the equipment that's been retired out to pasture in a way that's environmentally friendly is a lot harder than a lot of people would think.

In discussing the reasons why organizations have been slow to embracing these initiatives, Gehrke believes that IT managers have recently heard a lot of information but do know what to believe when addressing the Lean & Green question. He adds that capital budgets have been tight for a number of years and that any improvements will be incremental changes, not an overnight solution.

Aligned with our key findings, Gehrke believes that long-term cost-savings associated with making the datacenter Lean & Green is an incentive that entices companies to embrace this change. He adds, "It must be a responsibility for everyone in business, and clients who use services for

IT organizations, hold their feet to the fire and make them demonstrate on a real measurable basis that investment and that commitment."

As a whole, Gehrke would give IT professionals a C+ when evaluating overall effectiveness of being Lean & Green because he believes a lot of companies are still fighting with tight budgets and traditional spending patterns. They haven't had time to shift to widespread support for Lean & Green initiatives. He does add that things are improving and that now "there is so much awareness and it's increasing by orders of magnitude everyday."

“ One thing I would stress is right-sizing your data center. If you have the luxury of building a new facility, making sure that you build the facility to allow for the proper amount of growth, but not overbuild because overbuilding facility invites potential overuse of power and other resources. ”

“ It must be a responsibility for everyone in business, and clients who use services for IT organizations, hold their feet to the fire and make them demonstrate on a real measurable basis that investment and that commitment. ”

Executive Dialog Perspective

Carrie Levine

VP of Sales and Marketing

Asset Services & Liquidators Recycling

Asset Services & Liquidators (ASL) Recycling is a state authorized collector and recycler of electronic waste. The company started about ten years ago, originally remarketing high-tech equipment. In 2003, after California passed legislation on regulating electronic waste, they bought equipment and became an e-waste recycler. Now the largest e-waste recycler in Northern California, with another location in Los Angeles, ASL Recycling is looking to expand into Washington and Oregon, two states which recently passed e-waste legislation. ASL Recycling also has a large collection program that partners as a fundraising event for local schools. In total the company has helped Bay Area schools raise over a quarter of million dollars in the past two years, according to Carrie Levine, the VP of Sales and Marketing of ASL Recycling. They have recently established a strong partnership with Wal-Mart and began doing massive e-waste collection events with them.

According to Levine, the two biggest environmental issues that should concern IT executives around the datacenter environment are energy usage and recycling hardware, "I think that IT departments can be way more efficient when it comes to how they actually use their electronics. People aren't shutting down their machines at night. People aren't unplugging things. We're really draining a lot of energy when we use them."

Environmental responsibility, in terms of reducing power, is a really big issue for all IT professionals. According to Levine, companies are extremely interested in figuring out ways to reduce power. This environmental issue has become a business platform, "People are not only, number one, looking at how can we save money and be sustainable, but we can't afford not to. If our company isn't green then we'll start being less appealing to our customers," she said, "Being green now is kind of like having a college diploma."

Levine believes that enterprises could be more effective in being Lean & Green in IT. Overall she says she would give them a C or D, "I would give them that poor grade because I think that people are just starting to understand how they affect the environment in this regard and they're just starting to learn about how to be better at what they do when it comes to the environment and being more sustainable."

“ Can we be better about how we run them, meaning the power usage and utilizing them to their fullest potential? Yes. And can we also pay attention to how we dispose of them at their end of life and make sure we do it the right way and in a better way? Yes. And I think that would have a tremendous impact on the environment. I mean, if you just look at how much energy you save by shutting down your machine at night or unplugging a device, it's almost 50 percent of the energy. ”

“ Personally I'm glad to hear that we are trying to educate IT departments on becoming more responsible and sustainable. They are a critical part of a company's efforts toward becoming more sustainable. They're probably one of a handful of departments that really need to immediately implement programs that are going to help companies do better for the environment but also save money. ”

Executive Dialog Perspective

Angelina Galiteva

Chairperson

World Council for Renewable Energy

The World Council for Renewable Energy (WCRE) is a global nonprofit organization focused on developing policies and strategies for renewable energy. The organization works to identify dangers and hidden costs caused by conventional energy supply, and propose political and economic strategies for rapidly accelerating the adoption of renewable energy. According to Angelina Galiteva, information provides the primary means to improve worldwide understanding of renewable energy. In particular, Galiveta points out the massive and immediate need for the availability of renewable energy for all power demands.

Galiteva believes that the computer and IT technology industries are on the right track with respect to efficient power usage. She says, “You have computers running on low power mode. You’ve also have the natural scaling up and down of power usage. This is something very unique to the computer technology and IT industries, which I find fascinating and wish we could translate it over to the energy industry.”

Concerning the fact that data centers continue to have high energy demands, Galiteva thinks that companies should use solar energy or wind power to drive their data centers. There are several more ways that a CIO can make a difference, according to Galiteva. The simplest one is to buy green power. Although green power is more expensive than traditional power, a company can offset that cost by running an efficiency audit, which can quickly be done quickly by a consultant or third-party. Furthermore, green power has other benefits. Green power providers offer a higher quality of power delivery system which is flows more smoothly and efficiently than a traditional power grid system. This protects green power customers from planned rolling blackouts and unplanned outages.

“There’s a new family of energy distribution technologies emerging that I believe huge data centers would be ideal candidates for,” asserts Galiteva. These distributor generation technologies are highly efficient and can be used for small-scale power distribution. “Scaling down in this way reduces overall kilowatt-hour usage. You can take small cells, 75 kilowatts for instance, and scale them together in a modular way.”

“ The World Council for Renewable Energy basically focuses on ensuring that we’ve got a clean and green supply of energy resources powering everything in our lives. ”

“ Green power costs a little bit more, but, if companies want to offset harmful emissions, they can treat the cost as an investment. It’s more expensive, but you’re achieving green results without spending money upgrading your facility. And, that premium power is a higher quality power, bypassing the grid in a very efficient manner so you don’t have the danger of rolling blackouts. ”



Lean & Green—Taming the Data Center Colossus

HOW TO ACHIEVE DRAMATIC ENVIRONMENTAL *AND* BUSINESS BENEFITS

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When people think of global warming and environmental damage caused by inefficient power consumption, computing may not instantly spring to mind as a culprit. The common public perception is that computing is a relatively “clean” industry; one that uses comparatively little power to perform astounding feats of number crunching. As a polluter, the corporate data center is not a pervasive image, as are gridlocked SUVs and smoggy skylines. We see no headlines or news programs decrying “server sprawl.” Because this data center cauldron of wasteful heat and power consumption is hidden, the environmental threat has sneaked under the radar of public attention.

The Naked Facts: Computing Consumes

In truth, the corporate data center is a behemoth power consumer and a substantial contributor to global warming. For every dollar spent on hardware in a data center, another 50 cents is spent on the energy to power the system, according to recent estimates from IBM. Data center servers, air conditioning, and networking equipment sucked up 1.2 percent of U.S. power in 2005—the output of five major power plants. Not only that, the monster is growing: energy expenditures and requirements have actually doubled in the past five years. Industrial use is approximately one third of energy consumed in the U.S. (Dept of Energy). At the present rate, infrastructure and energy costs will exceed total it costs by 2014.

Unfortunately, “green” has not yet become a top priority for company officers focused on sales figures, competitive positioning, product development and other concerns. One would imagine that even if environmental issues don’t get the attention of companies, the financial drain that the IT

department inflicts on the corporate budget certainly will. But a custom of corporate bookkeeping often blinds one department to the excesses of another: At many companies, the power bill is reflected on one budget; but the cost of technology resides on another. “IT pros don’t pay much attention to power consumption when buying gear,” states scientist Jon Koomey of Stanford University and the Lawrence Berkeley National Laboratory. Without a comprehensive understanding of the problem, it’s no surprise that the data center juggernaut roars on.

The Server as Spoiler

How did we get ourselves into this crisis? The answer is actually a consequence of vigorous business growth, progress and success: As computing demands skyrocket, servers in data centers proliferate. And now, the equation is rapidly spinning out of control as environmental concerns and cost-efficiency are overwhelmed by server sprawl. Excessive energy consumption from servers running hot leads to high cooling costs, overuse of fossil fuels, pollution, depletion of natural resources and release of harmful CO₂ as waste. For every kilowatt of energy consumed by a server, roughly another kilowatt must be expended to cool that machine. By 2008, the power costs of a server are forecast to exceed the cost of the server itself.

Small wonder that overall electricity used by servers doubled between 2000 and 2005 (from 12 billion kilowatt hours to 23 billion), much of it generated by ancillary electrical equipment, such as cooling fans and facility lighting, according to scientist Koomey. This adds up to a cumulative energy cost for servers and data centers in the U.S. of approximately \$3.3 billion annually. This pain is borne not only by the earth and atmosphere, but by the shareholders of companies spending their potential dividends on power bills, cleanup and disposal of obsolete equipment. And companies are now working against the inexorable equation that performance per watt doubles roughly every two years, along with a corresponding shift in power density. That means power density can now outstrip the data center’s cooling capacity before the limitation of floor space is reached. Until science can develop and deploy a cheap power source that is safe and practical, the only option for

business is to become as lean and green as possible to halt the runaway server train before it can wreak its full havoc on the environment and the bottom line.

The Need for a New Computing Model—Lean & Green

Our domestic and global economy is increasingly data-intensive, and the only anticipated change is more of the same. The volume of data that we store is growing exponentially; data-intensive businesses are becoming more numerous—legal discovery, entertainment, pharmaceuticals, energy and minerals exploration, and services providers, to name a few. But the problem is not confined to these companies. All corporate data is exploding.

With evidence of the damage caused by server sprawl now incontrovertible, enterprises are going to have to deal with the looming data center environmental crisis, and sooner rather than later. The central question is, how to downsize and transition the data center in a financially sound and beneficial way. Data centers are an integral part of an organization; they cannot be simply dismantled.

The data center needs a new model, one that acknowledges environmental and cost pressures; that is able to meet massive processing needs without adding to the environmental crisis. If computing and high technology are not to become a blight on the earth, large organizations must assume leadership in environmental responsibility, and it falls to the IT department to find ways to reduce energy drain.

The benefits of going Lean & Green are both environmental and financial, as efficiency gains reflect across power and operational costs, revenue, and future capital investment needs—when each server is truly pulling its weight, fewer are needed. But taking the heat off the environment requires both discipline and a new way of thinking. Following in the ways of the past and simply adding inefficient servers will only continue to lure computing in the wrong direction. In the 21st century, profitability and environmental responsibility are not conflicting goals but rather the only possible future strategy. More and more, an organization's viability depends

on how that entity addresses environmental sustainability. The good news is that right now, businesses can lower their power usage and costs dramatically while increasing data center productivity. It's possible both to meet growing data storage needs and reduce server sprawl and power consumption. And as a data center shrinks, so does the cost of maintaining it—in essence, storage scales upward, but headcount and cost remain stable. Tasks like storage provisioning, managing of data policies, and resolution of performance hot spots can be accomplished smoothly using current resources.

A Formula for Downsizing the Data Center—Consolidation and Beyond

Using less equipment to do more goes to the heart of being Lean & Green. Consolidating and virtualizing storage and using efficient computing practices and power-saving tactics are the route to achieving environmental efficiency. Removing one physical server from service saves \$560 annually in electricity costs, assuming a cost of 8 cents per kilowatt-hour, according to a recent VMware estimate.

Even with the resources on hand, there are many actions that organizations can take to diminish server inefficiency. Power management tools are available, but are often bypassed or ignored by administrators. Simply turning off unused servers and complying with recommended management guidelines can cut data center energy drain by as much as 20 percent.

Replacing the least efficient servers with more power-sparing models as they wear out should be ongoing. And moving to servers based on advanced designs can increase energy efficiency substantially. Virtualization is one of the most effective tools for more cost-effective, greener computing, allowing the flexibility and agility to manage performance, capacity, and planned downtime.

A certification program called 80 Plus, initiated by electric utilities, lists power supplies that consistently attain an 80 percent efficiency rating at load levels of 20, 50 and 100 percent. The Environmental Protection Agency is working

TAMING THE DATA CENTER COLOSSUS

with Lawrence Berkeley National Laboratory to study ways to promote the use of energy-efficient servers with an Energy Star specification potentially in place later this year.

Opening up internal corporate lines of communication and exposing the problem to other departments can also help to streamline data center downsizing. The wasteful practices of many IT organizations go unrecognized because another department pays the bill. Clearing those channels helps both departments understand the challenge and provides financial accountability and incentive for change.

The BlueArc Lean & Green Model

BlueArc, a leading network storage company focused on high performance and scalability, is a pioneer in making environmentally responsible computing possible. The company's ability to drive server consolidation is dramatically reducing complexity, lowering total cost of ownership and significantly cutting power and cooling costs.

From its inception, BlueArc saw the potential of developing environmentally healthy systems. The company's keen eye for storage issues guided its thinking that the "power struggle" could only be won by going simpler and leaner. So the BlueArc architecture consolidates servers; reduces the power used in cooling, simplifies data infrastructures, and optimizes processing resources. Put simply, the company has innovated a new model—one that can collect, store, share and process digital data at top speed for a fraction of the heat and power of traditional systems. This company's solutions are already reaping impressive financial benefits even as they provide a path to corporate environmental responsibility.

A Total Lean & Green Approach: Simplicity, Capacity, and Price Performance

The "less is more" green computing formula can be expressed in BlueArc's case as "less does more" borne out by BlueArc's power and performance statistics. BlueArc's distributed parallel FPGA architecture actually expands capacity while reducing the number of file systems by a factor of 16 compared to the nearest competition. Not only does this smaller footprint slash power and cooling costs, it yields 70 percent higher capacity, along with the industry's

best price/performance in terms of \$/IOP and \$/BTU—half the cost per IOP of the nearest competition.

This capacity advantage can yield savings of 50 percent and above, while the larger file systems reduce manpower and migration cost by 50 percent. So a simplified BlueArc data center is not only cheaper—by two to three times that of the competition—but also a substantially more productive entity that pays its way and boosts productivity throughout the enterprise. Each BlueArc system is designed to replace 10 or more CPUs, for 100 to 1000 times the performance. With far more operations per watt and per device—plus more sustained operations, BlueArc systems easily deliver the industry's highest performance per unit of rack space, while simplifying management and administration for the lowest total cost per managed gigabyte.

The High-Performing BlueArc Titan Rescues the Beleaguered Data Center

The performance of BlueArc's flagship Titan 3000 storage system is ideally suited to a wide spectrum of high-demand compute tasks, including database, email and file server applications. Its ability to scale storage to an unprecedented four petabytes, allows far greater processing capabilities with far less investment and power usage. The effect of this far more efficient technology in terms of lower power usage and reduced environmental impact is immediate and will increase with time.

The BlueArc Titan 3000 easily handles the workload of numerous traditional NAS systems or file servers, naturally reducing the environmental weight of the data center. This not only translates into lower acquisition cost and capital outlay, but to lower power bills for cooling a much more efficient device. To accomplish this, BlueArc has consolidated its powerful NAS servers until just one Titan can replace dozens of lower performing NAS servers—while reducing both power and cooling costs by over 70 percent. This makes Titan 3000 the highest performing, most flexible and scalable NAS server in the industry.

The Titan 3000 does not use adapter cards and uses fewer switch ports than do legacy network storage devices,

further reducing power demands, cooling and floor space requirements. The BlueArc approach delivers both high bandwidth and more inputs/outputs per second (IOPS) for volume small-file or query operations such as those used in financial services and internet-based service companies, making it a superior platform for application consolidation. Also, when it comes to scalability, the BlueArc can rise to the challenge of four million files per directory, with no compromise in performance.

To reach these performance levels, BlueArc employs a unique hardware-based approach. The company's architecture and file system are the first to be architected entirely in hardware—allowing the system to overcome the bottlenecks of traditional servers. And because the file system and other functions are in firmware, they are more rugged, reliable and secure. Also, the system uses massively parallel technology to provide the functionality of a regular file server, but with far higher performance and reliability, as well as superior scalability for future processing needs as enterprise data continues to explode. BlueArc systems, dedicated to moving data at near-supercomputer speeds, are also easily managed.

BlueArc's comprehensive virtualization framework enables fast, easy expandability of the storage infrastructure to meet burgeoning demand. Virtual servers enable each physical storage system to be partitioned into up to eight logical servers, each with a different IP address and different data management policies. These can be easily moved around the infrastructure and used by administrators to represent different user groups, applications, or projects. Virtual Volumes provide flexibility and efficiency for provisioning storage, while Virtual Storage Pools provide efficient capacity utilization and optimal performance for the file systems in both clustered and non-clustered environments. The virtual file system provides a global name space to the Titan infrastructure and flexibility in clustered and non-clustered environments.

Greater Power Translates into Green Efficiency

Because the network storage performance of the BlueArc Titan is so high, it's even able to take on applications that storage area networks usually handle, such as database and e-mail systems. The titan essentially offers hardware-based NAS with SAN performance levels—and serverless backup.

The BlueArc model is a cost-effective way for a company to profit from using environmental wisdom. Because the BlueArc approach is able to deliver more compute power with less equipment, it halts server proliferation and yet easily handles the workload of numerous traditional NAS systems or file servers. Its total sustained read/write rate is ample to support the most demanding applications requiring large file transfers and sharing, such as entertainment, life sciences and pharmaceuticals.

When it comes to data management, the robust capabilities of BlueArc systems eliminate the waste and complexity of trying to manage many small file systems on numerous traditional, general purpose file servers, or software-based NAS units.

Only BlueArc's advanced storage architecture is optimized for Lean & Green functionality across all key server functions—network, file, and disk access. The file system is architected to provide massive scalability up to four petabytes in a single file system and up to four million files per directory. Implemented in hardware, the BlueArc solution is more robust and resistant to failure, as well as being more economical. Performance is excelled across large and small files. As a vendor committed to addressing the problem of data center power wastage and environmental damage, BlueArc has seen the future and taken command.

“ Profitability and environmental consciousness are increasingly going hand in hand. Now is the time to start ‘greening’ your IT department, from cleaning up your data center to reducing overall emissions and improving your hardware recycling efforts. ”

—CIO Magazine, April 2007

Toward the Greening of the Data Center

As the phenomenon of data center sprawl and its profound environmental consequences become better publicized and acknowledged, it departments of major enterprises will soon commit large sums to Green initiatives. For example, IBM announced in May it would spend \$1 billion per year to find ways to make computing more energy efficient and environmentally friendly. That makes now the ideal time to assess the data center with clear eyes and look for a platform that enables significant downsizing.

The Lean & Green approach can pay its way in lowered power costs, even as it benefits the environment. Organizations need to look for storage vendors that are forward-trending, committed to a “lean and green” future, and that can provide the systems that accomplish the task.

In the case of the data center, the environmentalists have the weight of truth on their side: Data centers have been referred to as the SUVs of green computing—powerful, costly, and a drain on power and the environment. They are also a bulls-eye for future environmental campaigns, and no company wants to be in those cross-hairs. It is inevitable that one way or another, server sprawl—and the corporate inertia that sometimes works against change will have to cede to progress.

Major change is on the horizon already as CIOs grow more aware of ways to reduce energy drain and drive business gain by consolidating storage systems, eliminating server proliferation, implementing efficient computing practices, and minimizing power usage. To reach those goals, the storage vendor is key—and today, BlueArc is in the forefront of data center efficiency. Lean & Green solutions are the way to promote both financial return and environmental commitment.

BPM Forum: The Premier Advocate and Sponsor of Lean & Green Computing



The Business Performance Management (BPM) Forum is dedicated to advancing performance accountability, process improvement, operational

visibility and compliance in global organizations. It provides support to thousands of senior executives and practitioners representing enterprises with more than \$500 billion in combined annual revenues. The BPM Forum’s C-level members engage in research, thought leadership, and knowledge exchange programs around a variety of strategic issues and challenges. More information is available at www.bpmforum.org.



The Global Renewable Energy and Environmental Network (GREEN) is an affinity

group comprised of corporate, non-profit, academic and government professionals committed to the development and adoption of a wide range of clean energy and sustainability solutions. GREEN believes that environmental and economic priorities must coexist if either is to be truly lasting. The goal is to deliver thought leadership and spur innovation through research, reports and events that advance insight into the critical fields of renewable energy, waste management, green building, smart transportation, sustainable agriculture, pollution, conservation, education, and much more.

Resource Links and References



BlueArc

<http://www.bluearc.com>



Lean & Green

<http://www.getleanandgreen.org>



GREEN Forum

Global Renewable Energy and Environmental Network
<http://www.bpmforum.org/green/>



Flex Your Power

California's statewide energy efficiency marketing and outreach campaign.

Authority Leaders



The **Business Performance Management (BPM) Forum** is dedicated to advancing performance accountability, process improvement, operational visibility and compliance in global organizations. It provides support to thousands of senior executives and practitioners representing enterprises with more than \$500 billion in combined annual revenues. The BPM Forum's C-level members engage in research, thought leadership, and knowledge exchange programs around a variety of strategic issues and challenges.

More information is available at www.bpmforum.org.



The **Global Renewable Energy and Environmental Network (GREEN)** is an affinity group of corporate, non-profit, academic and government professionals, who are involved and interested in a wide range of clean energy and sustainability topics. We endeavor to deliver innovative resources, reports and events that advance knowledge and further reflection in a number of different areas, including renewable energy, biofuels, waste management, green building, pollution prevention, smart transportation, sustainable agriculture, environmental education and advocacy. The organization's partners and members bring considerable industry and technical knowledge to the undertaking as the channels of communication always remain open.

Research Sponsor



BlueArc is a leading provider of high performance unified network storage systems to enterprise markets, as well as data intensive markets, such as electronic discovery, entertainment, federal government, higher education, Internet services, oil and gas and life sciences. Our products support both network attached storage, or NAS, and storage area network, or SAN, services on a converged network storage platform.

We enable companies to expand the ways they explore, discover, research, create, process and innovate in data-intensive environments. Our products replace complex and performance-limited products with high performance, scalable and easy to use systems capable of handling the most data intensive applications and environments. Further, we believe that our energy efficient design and our products' ability to consolidate legacy storage infrastructures, dramatically increases storage utilization rates and reduces our customers' total cost of ownership.

Information about BlueArc solutions and services can be found at www.bluearc.com.