IBM Information Infrastructure to meet new emerging green initiatives and needs in IT

Introduction

This is not the traditional approach that we at IBM would take to publishing a white paper. In this case, we have chosen to instead highlight one of the leading analyst firms in the IT world today and let its work speak for itself. I have worked with Enterprise Strategy Group on several projects over the years and feel that there is a great deal of benefit to be had from letting you be the judge of the value of their perspective.

While reading this paper, you must be aware that today's business executives are concerned not only with the growing costs of energy to run and cool data centers, but also with presenting a green corporate image in today's era of heightened environmental awareness. The data center has become a major energy consumer on the corporate balance sheet. At the same time, many IT organizations are facing a multidimensional crisis that is the first of its kind in the history of information processing. These companies are experiencing a virtual explosion of information to process and store as energy costs soar to record levels. More energy efficient data centers can help reduce environmental impact while curbing IT costs.

Energy and environmental issues are concerns for organizations of all sizes from IT to the corner office as we all adjust to new global requirements for implementing environmentally efficient IT solutions. Others talk about environmentally friendly data centers; IBM delivers through industry-leading technologies and services. IBM has become the clear leader when it comes to helping its customers address information and data management, storage, and archiving issues. We have helped IT organizations reduce data center power, cooling, and facility costs as they comply with corporate environmental directives.

Many vendors talk about environmentally-friendly storage infrastructures only to ultimately deliver more of the same storage products. IBM takes a holistic approach to storage requirements by looking at the *entire* information infrastructure, not just the storage information infrastructure. Since storage accounts for as much as 20% of energy costs in the operation of IT, a blended approach to storage systems and infrastructure is needed. While users try to improve the energy profiles of their storage infrastructure, IBM supports those efforts with continued investments in cooling, power distribution, power-efficient storage products and services to dramatically impact the power consumption and carbon footprint of IT infrastructure.

As an example of our commitment, IBM has developed the New Enterprise Data Center (NEDC) as an evolutionary new model for efficient IT delivery based on a holistic, integrated approach to the data center. The New Enterprise Data Center is focused on optimizing systems and networks to break the barriers between IT resources and business services while providing rapid service delivery and alignment with business goals. In addition to reduced power requirements and significant heat reduction for an efficient, green and optimized infrastructure, the benefits of the New Enterprise Data Center include increased asset utilization, reduced disaster recovery time and reduced floor space requirements. The New Enterprise Data Center lends a green,

competitive edge from a business perspective—the lower your data center costs, the more competitive you are in the marketplace. In fact, because of rising energy costs, failing to "go green" in your data center may leave your IT infrastructure unable to support the growth of business demands.

Information storage is one of the fastest growing technologies in today's data center. Storage will become one of the most power-intensive elements of the data center information infrastructure as the current explosion of information—due to data retention requirements—continues unabated.

In 2007, we partnered with ESG to study green trends in both IT and the corporate office; together we produced a comprehensive overview of green trends globally. As a result, we confirmed that IT needs to be proactive in understanding green initiatives of the company. In the following two papers from ESG, we believe you will get the sense that Green solutions cannot be thought of as single product solutions, but rather as an all-encompassing approach to a balance between business demands, corporate initiatives, global citizenship and operational efficiency. IBM understands this and takes an approach that addresses all issues and organizational needs while helping clients make the right choices for a true green solution.

ESG
REPORT

IT Powers Green Business

By Mary Johnston Turner and John McKnight
With Tony Prigmore and Steve Duplessie

June, 2008

Table of Contents

Table of Figures

Executive Summary

Green business is here to stay—ESG's research shows that most business executives expect green business programs to directly impact the sustainability of their organization over the next 20 years. Green business objectives touch almost every business function and rely heavily on IT to help meet goals that include fulfillment of regulatory mandates, reduction of operational costs, shrinkage of carbon footprints, improvement of corporate market position and demonstration of strong corporate stewardship and community commitment.

In order to assess green business opportunities, calculate potential savings and carbon cutbacks, and document progress towards regulatory goals, business executives increasingly ask IT to provide integrated access to many diverse types of information housed in a myriad of formats and corporate systems. To make effective green business decisions and fulfill compliance and internal reporting requirements, business executives need to track company-wide energy costs and consumption across multiple lines of business and many types of enterprise assets. They need to monitor and enforce supply chain carbon reduction agreements; develop and revise manufacturing process flow charts; and undertake, measure and monitor many other complex business model changes.
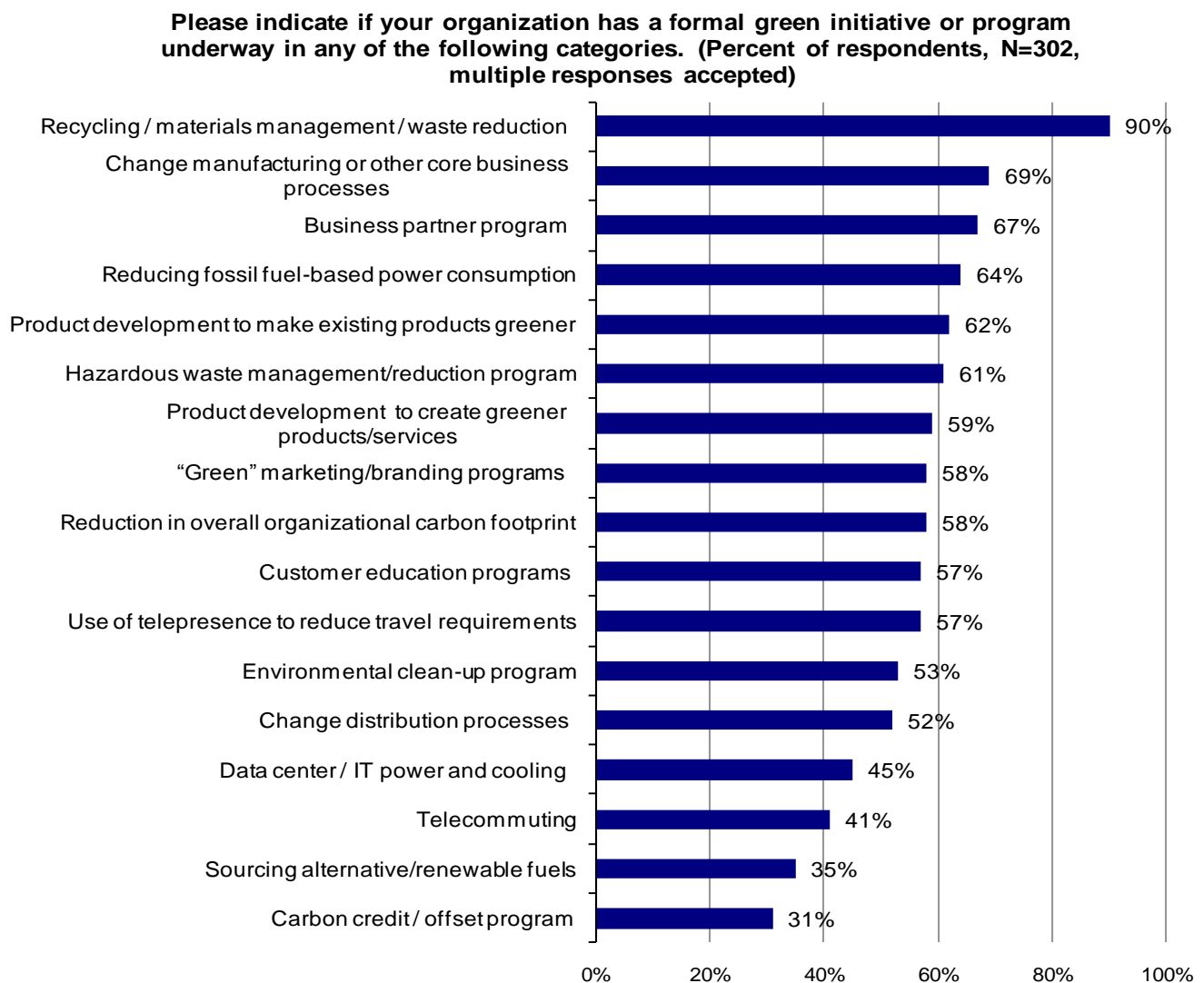
ESG's research indicates that IT leaders frequently miss out on the early stages of green business planning—outside of data center power and cooling initiatives. As a result, they are often behind the curve when it comes to providing the information management and infrastructure resources necessary to support complex green business objectives. To their credit, IT decision makers—and their hardware and software vendors—have been investing aggressively to reduce data center carbon footprints by deploying more power efficient, virtualized servers and taking steps to curb the growth of information assets that in turn drive rapid growth in storage system capacity, cost and carbon generation. However, they often are forced to make decisions in the absence of business input and with limited insight to the broader information management requirements they will expected to support over time.

Organizations committed to going green need to bring IT into the green business planning process early on so that the information management tools, infrastructure, and processes needed to support green business assessment, planning and reporting can be deployed when needed. Just as many green business programs aim to radically change core business processes over time, the way IT partners with green business leadership also needs to change substantially. ESG recommends organizations adopt a holistic green business/IT approach to proactively link planning for green business requirements to information management and data center infrastructure investments. By taking this coordinated, holistic approach, IT organizations will turbo-charge green business programs while simultaneously reducing data center carbon footprints.

IT Powers Green Business

In broad terms, green business initiatives aim to reduce costs, improve the environment, and create new business opportunities by eliminating waste, conserving energy, reducing carbon footprints, and taking new approaches to the development and marketing of products and services. Green business can be implemented in many different ways; depending on an organization's specific industry, geography, market position and regulatory realities. In fact, in most organizations, multiple green initiatives are undertaken simultaneously. Among enterprise and medium size businesses in advanced economies,[1] ESG's recent global survey of 1,000 business and IT executives found the most widely implemented green business initiatives include efforts to reduce waste via recycling (90%), manufacturing or other business process changes to conserve energy and reduce waste (69%), and business partner and supply chain programs to promote energy efficiency (67%) (see Figure 1).

FIGURE 1. TOP PRIORITY GREEN BUSINESS INITIATIVES IDENTIFIED BY SENIOR BUSINESS EXECUTIVES

Please indicate if your organization has a formal green initiative or program underway in any of the following categories. (Percent of respondents, N=302, multiple responses accepted)

Initiative	Percent
Recycling / materials management / waste reduction	90%
Change manufacturing or other core business processes	69%
Business partner program	67%
Reducing fossil fuel-based power consumption	64%
Product development to make existing products greener	62%
Hazardous waste management/reduction program	61%
Product development to create greener products/services	59%
"Green" marketing/branding programs	58%
Reduction in overall organizational carbon footprint	58%
Customer education programs	57%
Use of telepresence to reduce travel requirements	57%
Environmental clean-up program	53%
Change distribution processes	52%
Data center / IT power and cooling	45%
Telecommuting	41%
Sourcing alternative/renewable fuels	35%
Carbon credit / offset program	31%

Source: Enterprise Strategy Group, 2008

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[1] The International Monetary Fund (IMF) designates 31 countries as having the highest levels of per capita income. ESG's recent *Green Business and IT Survey*, completed in January 2008, recruited participants from 10 of these countries—specifically US, Canada, UK, Germany, France, Italy, Australia, Japan, South Korea, and Taiwan.
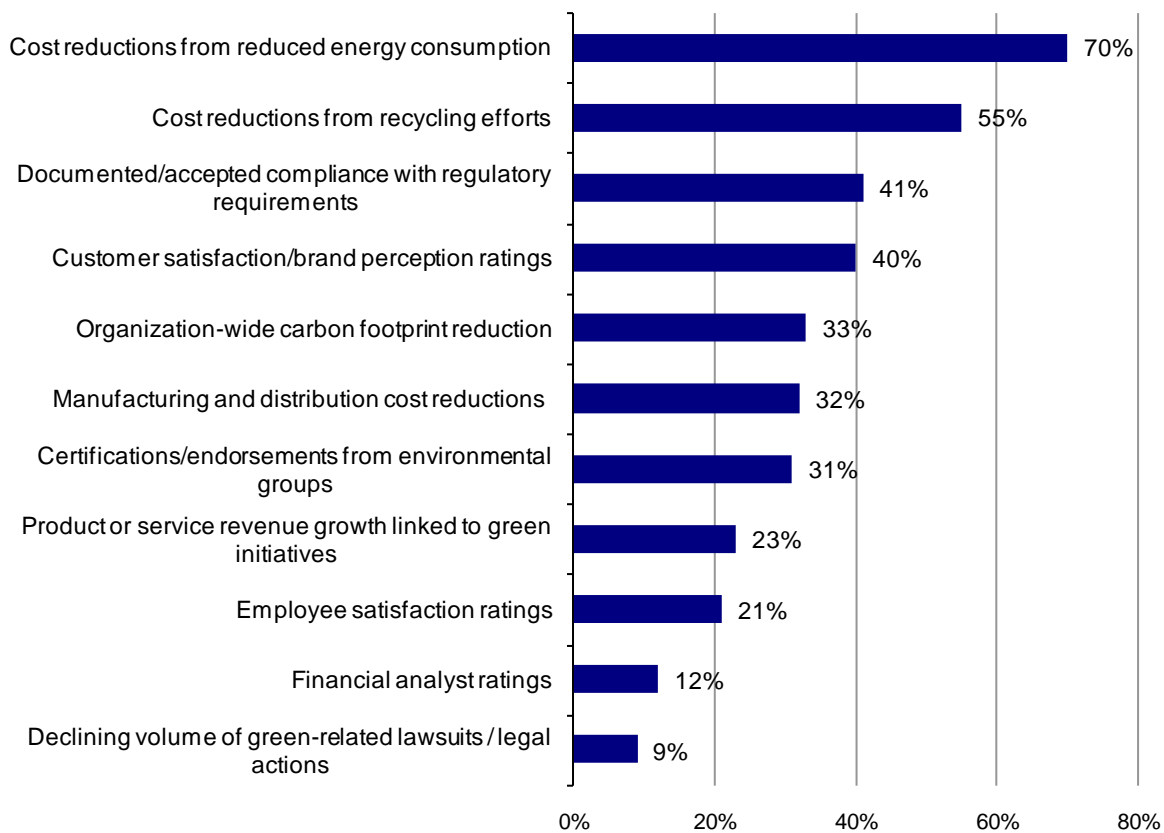
Many organizations are also undertaking innovative programs to reduce packaging, develop more environmentally friendly products, and educate customers about conservation. Almost half (45%) of senior business executives also identify data center/IT power and cooling reduction as a current green initiative.

Regardless of the industry, going "green" has become a business imperative for executives around the world. ESG's research shows that **the majority of senior executives believe green business initiatives will have significant impact on the sustainability and success of their organization over the next 20 years**. Over half (59%) believe their organizations' green commitments with have noticeable impact on their customers' willingness to do business with them over the next five years.

ESG's research indicates the majority of corporate "green" programs (56%) are championed by senior business leaders who keep one eye on the bottom line as they strive to be good corporate citizens. As is shown in Figure 2, almost three-quarters (70%) of senior business decision makers use company-wide energy cost reductions as a major metric to track the success of their green initiatives. Over half (55%) use cost reductions related to recycling and 41% track compliance documentation acceptance rates.

FIGURE 2. GREEN SUCCESS METRICS USED BY SENIOR BUSINESS EXECUTIVES

As a management team, what metrics are your senior business executives tracking most closely to evaluate the success of your organization's green initiatives? (Percent of respondents, N=302, multiple responses accepted)

Metric	Percent
Cost reductions from reduced energy consumption	70%
Cost reductions from recycling efforts	55%
Documented/accepted compliance with regulatory requirements	41%
Customer satisfaction/brand perception ratings	40%
Organization-wide carbon footprint reduction	33%
Manufacturing and distribution cost reductions	32%
Certifications/endorsements from environmental groups	31%
Product or service revenue growth linked to green initiatives	23%
Employee satisfaction ratings	21%
Financial analyst ratings	12%
Declining volume of green-related lawsuits / legal actions	9%

Source: Enterprise Strategy Group, 2008

By comparison, IT decision makers are more likely to judge the success of green programs based on the extent to which data center-specific power and cooling requirements can be reduced (40%) and the impact on IT operating expenses (39%). Just 29% of IT decision makers report that they use contribution to line-of-business green success as a key metric.

The fact that IT leaders don't rate contribution to line-of-business green success more highly is an area of concern. ESG's research shows that senior business decision makers expect their IT organizations to provide critical enabling technology for a wide variety of green programs; not just data center power and cooling efforts. Often, the most critical IT-enabler required by the business is access to business information to guide decision making and support compliance reporting and audit activities. Senior business executives expect IT to help them access current and historic data that is frequently archived in many different formats, applications, databases and media types. All too frequently, IT leaders are not included in the early stage development of corporate green strategies. This disconnect can make it difficult for IT to prepare the information management groundwork needed to enable the business vision—which can in turn significantly delay or derail many green initiatives.

Business/IT Disconnect Imperils Green Business Priorities

The reason IT decision makers are so frequently left out of the corporate green discussion is that business executives rarely appreciate the information management complexities engendered by their green visions. When asked what IT-related green enablers create the most concerns in terms of business impact, senior IT managers flagged the growing cost of data center power and cooling requirements (32%), the impact of data center power and cooling requirements on the location of new buildings (20%) and the business risk associated with legacy applications and data access as IT migrates to newer, more energy efficient platforms (32%). By comparison, these topics were rated as much less important by senior business executives. Just 13% of senior business executives worry about data center power and cooling and only 17% are concerned about the business risks associated with data migration (see Figure 3).

FIGURE 3. IT/BUSINESS DISCONNECT ON THE IMPORTANCE OF IT ENVIRONMENTAL ISSUES

IT-related environmental factors about which organizations are "very concerned" due to the "potential for high business impact," by role of respondent. (Percent of respondents)
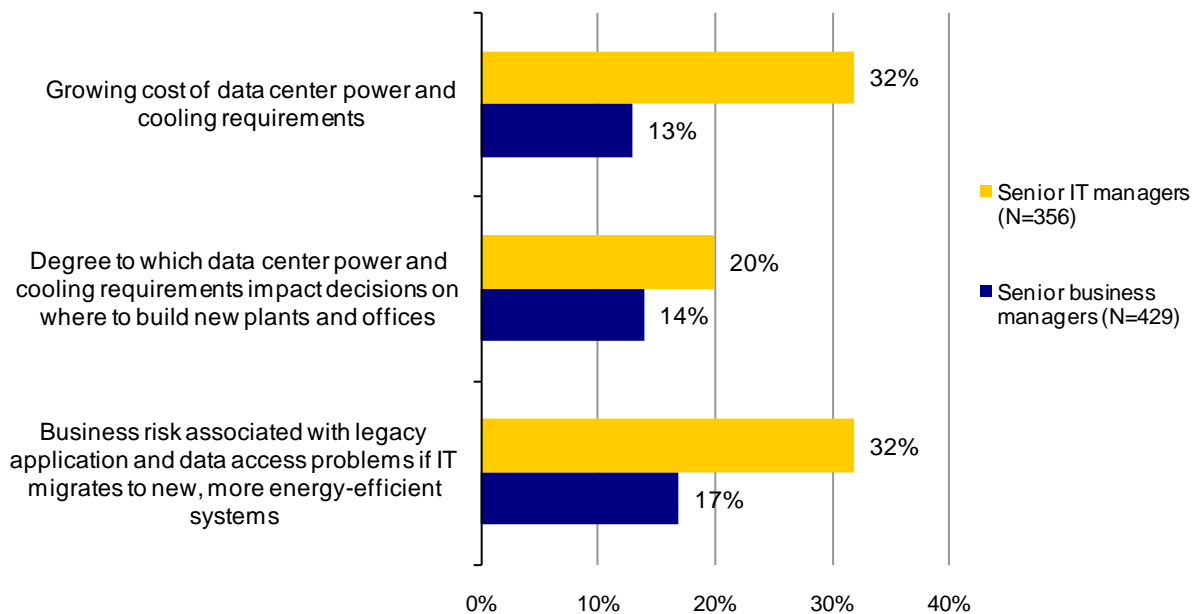
Source: Enterprise Strategy Group, 2008

Data center power and cooling is no doubt a challenge for many IT organizations and, as such, should be addressed as part of any green IT strategy. However, the demands of green business have significantly more far-reaching IT implications. For organizations looking to quickly and fully execute their green business strategies, senior business leaders and IT teams need to jointly identify the information assets needed to drive green initiatives and agree on processes, policies and systems to collect, analyze, document and protect that information. In particular, they must clarify what types of internal metrics and audit systems will be used to track green effectiveness and align on how this information will feed into externally required regulatory compliance and reporting systems. In some cases, this effort will also require developing a strategy for accessing and analyzing

information generated by partners, channels, suppliers and customers, and/or feeding internal data into green compliance tracking systems used by business partners or external regulatory agencies.

IT in turn, must apply these green business requirements to the way it architects and operates not just specific applications and databases, but the way information is collected, analyzed, archived, recovered and protected across its entire lifecycle—from creation to destruction. Depending on the types of information needed to support green business programs, IT organizations may need to implement new data management policies to assure that information is tagged and searchable across the organization and that necessary business intelligence tools can make effective use of the data.

IT must also translate these business requirements into infrastructure investment priorities and operational policies. Green business analysis often requires access to historic information in order to support trending analysis and to document carbon reductions. Yet, retaining too much data in live systems can dramatically drive up storage volumes and needlessly increase both the cost and the carbon footprint created by corporate information management systems.

In order to create a future-proof green data center, one that can adequately support evolving green business analytics and reporting requirements, IT needs to seamlessly coordinate the way it plans, implements and operates server and storage infrastructure, information management tools including archiving, backup and disaster recovery and information search and retrieval systems. This requires IT stakeholders representing a wide range of technology disciplines to work together closely.

In parallel, IT organizations must continue with ongoing efforts to reduce the energy consumption and carbon footprint of the data center by implementing tools and technologies to slow the growth rate of power consumption by storage systems that house ever-increasing amounts of business critical information. When asked to identify the major challenges related to the migration to more energy efficient systems and storage, almost half (46%) of IT decision makers noted that application and information migration is a major inhibitor. This fact reinforces ESG's finding that information management needs to get significantly more attention in many organizations in order to efficiently achieve both data center and broader green business goals.

A Holistic Approach to Green Business Technology Pulls the Pieces Together

Effective green business information strategies span technology, people and processes and assume that an organization's information needs will be dynamic and continuously changing. Rather than relying on stove-piped tools to access information in support of one specific business process or compliance report, effective information architectures make use of enterprise-wide policies and automation to enable consistent, scalable information retention, search, retrieval, and analysis across multiple data types and infrastructure platforms.

Important elements of an effective green-enabling information management environment include:

- Information indexing, search, and retrieval capabilities that ensure access to a wide array of current and historical corporate information sources needed to support both internal business analysis and external compliance reporting requirements.

- Integrated role-based access to business analysis of data collected from multiple business processes and databases. Web-based interfaces and state-of-the-art business intelligence tools can enable seamless information access and analysis across many data sources.

- Automated, policy-based information archive management tools that can migrate data across storage resources automatically to reduce costs while maintaining service levels.

- Robust information backup and disaster recovery solutions that protect and recover green business data 100% of the time in order to ensure the organization's ability to comply with regulatory reporting requirements on a timely and accurate basis.

- Data reduction technologies and processes that automatically eliminate redundant data and enable organizations to avoid or delay the purchase of new storage systems—and their associated carbon footprint and general environmental impact related to power consumption, the manufacturing of those systems, and eventual disposal.

- Databases and business analytic tools that support consistent carbon footprint analysis and green business models across research, development, manufacturing, logistics and other lines of business

- Power- and cost-efficient tiered storage architectures that allow IT to use policy-based, automated tools to migrate data to lower-cost platforms based on the stage of the information's lifecycle and the speed and frequency with which the information may need to be retrieved.

- Virtualized server and storage environments can improve both resource utilization and information availability while reducing costs and enhancing power, cooling, and space efficiency. Both server and storage virtualization technologies enable IT teams to more easily migrate information across different resources, based on cost and performance policies.

- Secure mobile access to networks, applications, and data to enable and promote telecommuting and other flexible employee work arrangements that reduce travel-related energy consumption and carbon emissions.

- Information encryption and key management technologies that protect sensitive business data at rest and control access based on business policies.

- Solutions implemented and operated using industry-standard best practices for risk mitigation and information protection.

Implementation of a comprehensive, next-generation information management environment must be undertaken using well defined roadmaps and phases. With the many technologies and processes needed to support a comprehensive approach to green business, IT needs a planning and architecture design process that proactively and collaboratively works across multiple technology domains as well as being strongly linked to business priorities.

Within the IT organization, IT teams frequently need to restructure the way they make investment decisions. Rather than expecting each specific technology team to make individual choices based on general green business priorities, CIOs need to drive infrastructure and information management teams to work together to jointly define the policies and processes that will support green business information requirements. By collaboratively considering green business information needs, including current and planned analytic and reporting requirements, access and security priorities and data modeling and integration needs, IT teams can jointly create green data center environments that reduce power and cooling by reducing the amount of data stored, shift archived information to more efficient systems over time as appropriate, and fulfilling line of business analytic and reporting requirements via use of data integration and business intelligence technologies.

Different organizations will choose different points to begin aligning information management and infrastructure environments with emerging green business requirements. The optimal starting point will depend on the organization's existing IT environment and its top priority green business requirements. In some cases, organizations may target infrastructure investments such as policy-based archive solutions and virtualized server and storage platforms. Other organizations will begin with information security, mobile data access or business intelligence improvements (see Figure 4).

FIGURE 4. ADVANCED INFORMATION MANAGEMENT ENTRY POINTS

Best practices
- Assessments, roadmaps and architectures
- Information management processes
- Clear, consistent management and metrics
- Business/IT alignment

Policy-based information management
- Intelligent archiving
- Integrated backup and recovery
- Data reduction and compression
- Data encryption and key management

Efficient , secure storage infrastructure
- Virtualization
- State-of-the-art power and cooling
- "Future-proof" information availability
- Intelligent tiered storage

Source: Enterprise Strategy Group, 2008

Regardless of the entry point, any organization that is seriously committed to comprehensive green business initiatives needs to implement a robust, cost and power efficient, green business information management environment.

Business and IT Must Collaborate on Green Business Information Management and Infrastructure Plans

ESG believes implementing an automated, policy-driven, green business information management environment supported by efficient, virtualized data center architectures is critical to the long-term success of most green business initiatives. In organizations where IT and business leaders have not yet developed a shared view about the role IT should play in supporting green business initiatives, it is the IT leadership team's responsibility to get the message into the board room. Specifically, IT leaders need to:

- Educate green business leaders about the role information assets play in executing green business initiatives.

- Gain early insight and agreement about emerging green information requirements that will drive IT budgets over the next decade.

- Educate business leaders as to the challenges posed by current information management architectures and execution of green priorities.

- Build support for funding a long-term, automated, policy-based information management environment.

- Benchmark their organization's information management and supporting infrastructure strategies against

industry leaders and best practices recommended by experienced vendors.

- Evaluate enabling infrastructure technologies such as automated archiving and storage virtualization that will reduce the carbon footprint of the data center while simultaneously improving information access, availability, and security.

- Implement a collaborative and coordinated planning program that links stakeholders across the business, software, database, middleware, development, server, storage, security and related IT teams.

Just as green business programs are designed to radically change core business processes over time, IT needs to plan for major changes in the way it plans for and manages the information management and data center infrastructure used to support green business programs. By taking the first step of developing a joint business/IT roadmap for enabling green business over the long run, IT can better prioritize infrastructure and software investments, plan for graceful application modernization and data migration, and ensure that green business information is accessible, secure, and compliant over the long term.

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Big Blue's Green Foundations

Date: June, 2008

Author: Mark Peters, Analyst

Abstract: The greening of business and IT is a huge and varied topic…and IBM is a huge and varied organization. The resulting mix—IBM's role and value in that greening—has much intricacy, complexity and nuance; *however,* it is the very breadth and depth of IBM's engagement that offers the greatest benefit to customers. By spanning IT and business, and providing a wide range of infrastructural foundations, IBM can be an objective partner for those organizations in pursuit of green.

The Greening of Business and IT

 It seems that everyone is chasing 'green.' Across the world, whether as consumers or businesses, the aim to 'tread a little lighter' on our planet has gathered strong momentum in recent years. Whatever the motivation (usually conscience, regulation, or financial improvement), it is hard to argue with being more efficient and less wasteful in consuming resources. And this endeavor is no fad—recent ESG research found that global business and IT users foresee at least a 20 year progression along the green path.[1] And indeed, it's an extremely broad path that can cover elements ranging from customer satisfaction and cost savings over streamlined business process and supply chains, to generating new 'green' revenue and satisfying compliance requirements. While overall business needs are invariably paramount, the role of the data center is potentially crucial—there, a diversity of green initiatives demands a robust mix of hardware, software and IT services enablement. If involved early enough and broadly enough in a business' green initiatives, IT can play a broader role than one might superficially expect. As ESG commented in a recent report[2] based on the aforementioned research, "Regardless of the entry point, any organization that is seriously committed to comprehensive green business initiatives needs to implement a robust, cost and power efficient, green business information management environment."
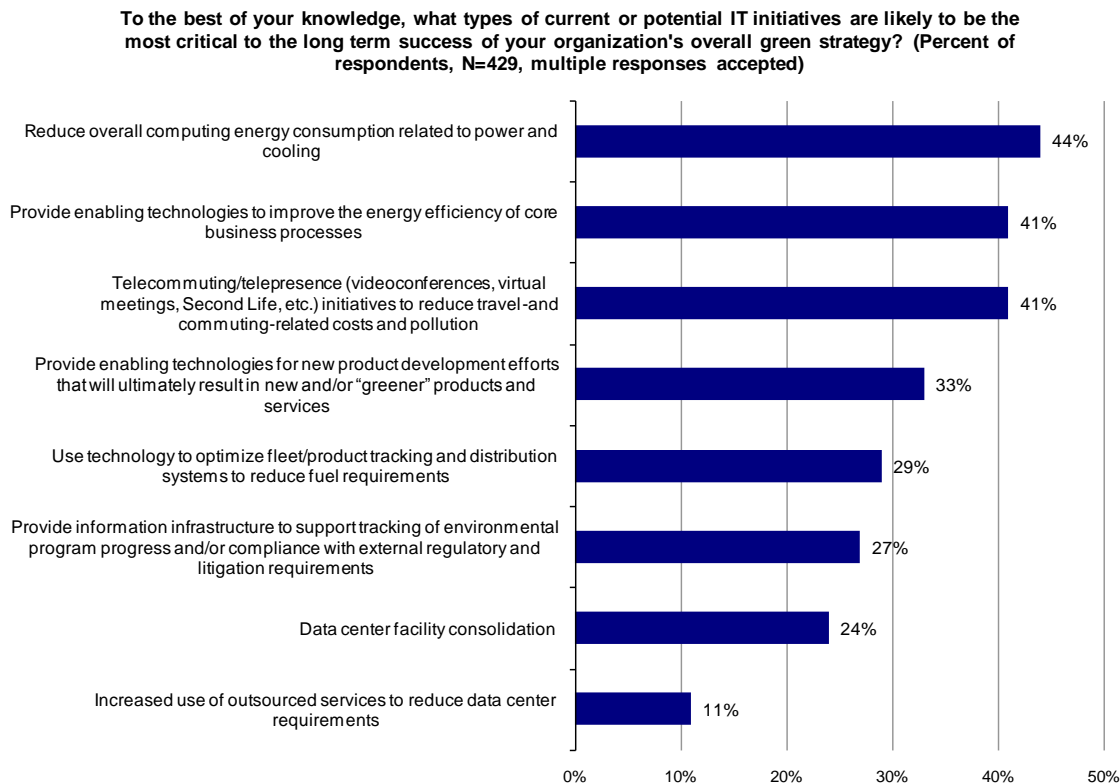
'Big Green' – Where it Can Contribute

The phrase, 'think globally, act locally,' can be adjusted to apply to green efforts in organizations—'globally,' the overall objectives must be clear and the entire organization must be working in concert, but 'locally,' the individual areas must be where the heavy lifting is done. Working in concert is how the benefits are maximized—both for the overall organization as well as for individual departments. Getting specific to IBM, it has the ability to contribute at multiple levels and in multiple areas of an organization, but there's still an infrastructural basis to many of the eventual key green benefits. The 'magic' is to link the infrastructure to the rest of the organization, which requires awareness on all sides. In other words, if you know what you're trying to build, then the proper foundations can be put in place. When it comes to building a green result, it's hard to imagine many organizations better placed than IBM. Let's consider some facts—in Figure 1 it is clear that senior IT managers know where and how they can provide green value to their organizations, but Figure 2 shows that there's a serious disconnect between that group and their senior business manager peers when it comes to understanding IT's role in an overall organizations' green strategy. Given that the research also shows that funding for green initiatives—even IT ones—is often held by business management, and that those business managers aren't fully aware of what green benefits can be generated by improved IT fundamentals, the opportunity for IT is significant.

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[1] Source: ESG Research Report, *Green Business and IT Survey*, January 2008
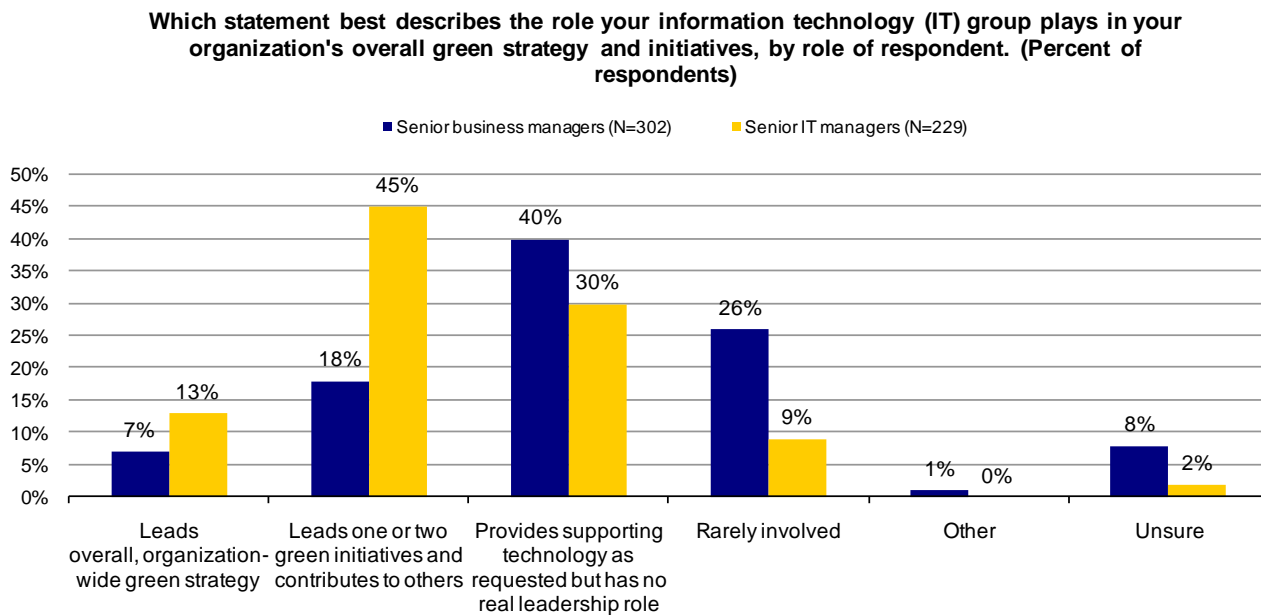[2] Source: ESG Global Green Business and IT Initiatives Survey, 2008

FIGURE 1. IT INITIATIVES THAT ARE LIKELY TO BE CRITICAL FOR THE SUCCESS OF A GREEN STRATEGY

To the best of your knowledge, what types of current or potential IT initiatives are likely to be the most critical to the long term success of your organization's overall green strategy? (Percent of respondents, N=429, multiple responses accepted)

Initiative	Percent
Reduce overall computing energy consumption related to power and cooling	44%
Provide enabling technologies to improve the energy efficiency of core business processes	41%
Telecommuting/telepresence (videoconferences, virtual meetings, Second Life, etc.) initiatives to reduce travel-and commuting-related costs and pollution	41%
Provide enabling technologies for new product development efforts that will ultimately result in new and/or "greener" products and services	33%
Use technology to optimize fleet/product tracking and distribution systems to reduce fuel requirements	29%
Provide information infrastructure to support tracking of environmental program progress and/or compliance with external regulatory and litigation requirements	27%
Data center facility consolidation	24%
Increased use of outsourced services to reduce data center requirements	11%

Source: Enterprise Strategy Group, 2008

FIGURE 2. ROLE OF IT IN THE OVERALL GREEN STRATEGY

Which statement best describes the role your information technology (IT) group plays in your organization's overall green strategy and initiatives, by role of respondent. (Percent of respondents)

■ Senior business managers (N=302) ■ Senior IT managers (N=229)

	Senior business managers	Senior IT managers
Leads overall, organization-wide green strategy	7%	13%
Leads one or two green initiatives and contributes to others	18%	45%
Provides supporting technology as requested but has no real leadership role	40%	30%
Rarely involved	26%	9%
Other	1%	0%
Unsure	8%	2%

Source: Enterprise Strategy Group, 2008

So, what does this mean for IBM and its market position? Where can IBM contribute? One more piece of research completes the puzzle. Figure 3 shows in stark detail the extensive contribution users are seeking from vendors in the journey down the green path. So, to net this all out, for end-users, green business and IT:

a) Is a massive and broad undertaking
b) Requires all parts of an organization to work together
c) Requires help and fulfillment from a vendor on an equally broad plane

FIGURE 3. MOST IMPORTANT ATTRIBUTES IN GREEN VENDORS AND SERVICE PROVIDERS

In the context of your organization's green initiatives, what attributes are most important when it comes to selecting IT vendors and service providers? (Percent of respondents, multiple responses accepted)
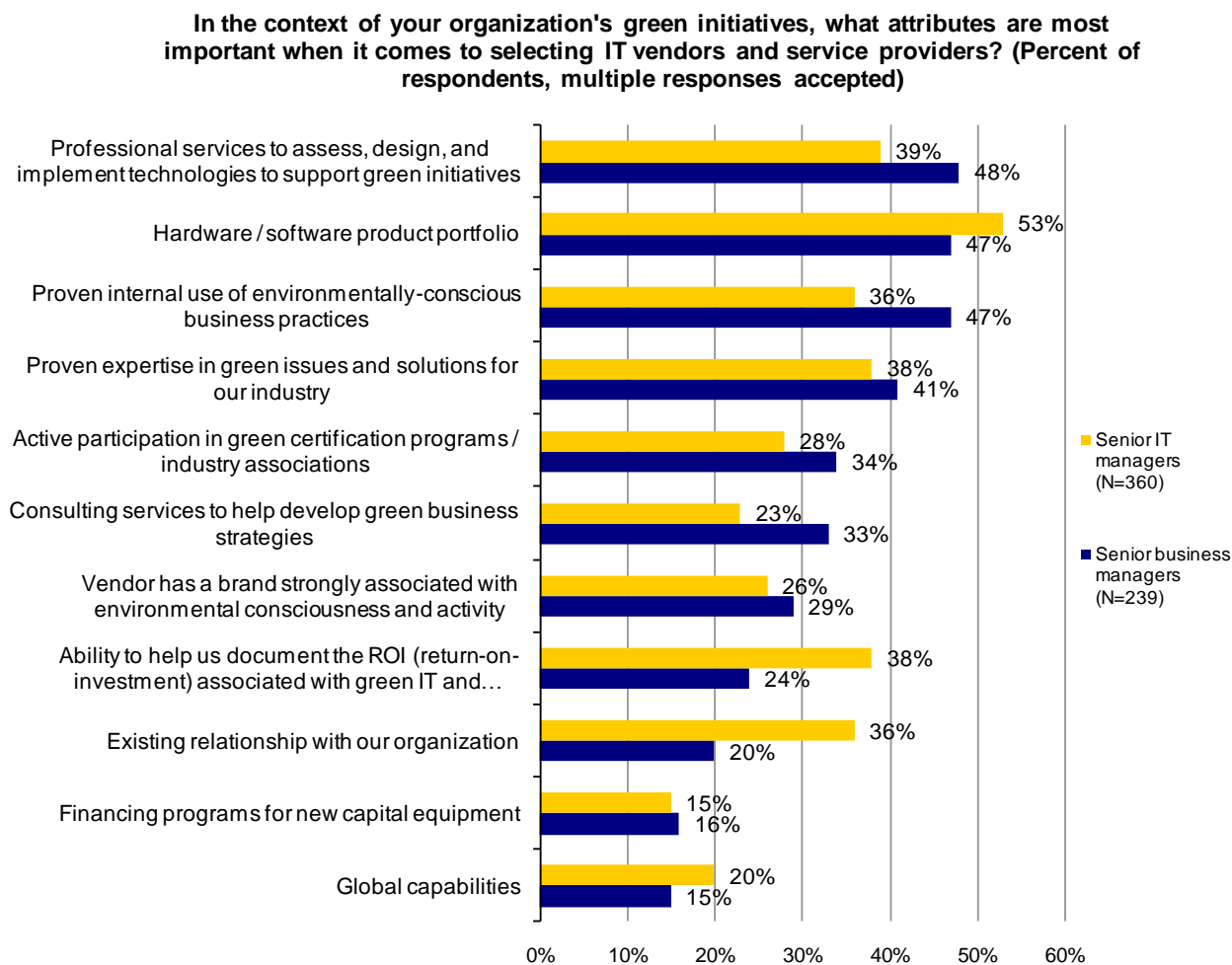
Source: Enterprise Strategy Group, 2008

For IBM and its customers, this is as near to a perfect marriage as you're likely to find. Although sometimes a 'one-stop-shop' can mean compromise and lack of choice, in the case of large green initiatives, the breadth that IBM offers is just what is required. The company had an internal green history—even before the term was coined—and its formal project Big Green initiative is a massive corporate commitment and achievement from which its customers can benefit and learn. Certainly, 'green business' is more than just computers and data centers—it can cover recycling, telecommuting, Business Process Reorganization (BPR) and a host of other things. But here's a key point: when senior business executives were asked what metric they track most closely in order to evaluate the success of their organization's green initiatives, the number one response (at 70%) was cost reduction from reduced energy consumption. One of the significant opportunities in any organization to gain such cost reductions is the data center—yet, in terms of recognizing the potential for high business impact, only 13% of

senior business managers were concerned about data center power and cooling, compared to 32% of senior IT managers. Putting all these facts and figures together, the conclusion is that there's a huge—and real—mutual opportunity for users and IBM to cooperate in order to reap the green rewards of optimized information infrastructures.

IBM's Specific Foundations: Information Infrastructure and More

In most organizations, a significant amount of 'rubber' (green IT opportunities) meets the 'road' (of overall green business objectives) on the data center floor. However, measuring the direct energy savings in any one given product is too simplistic of an approach. Perhaps the aim is to reduce waste and inefficiency, increase utilization, develop and execute on a roadmap to an optimized green data center, or simply reduce the data load and power consumption while maintaining or improving productivity. Whatever it is, it is not just about a product. Instead, it's about addressing issues with an optimized combination of resources—people, information and infrastructure. And in this respect, IBM can deliver on a number of the prerequisites:

1) The ability to construct best-of-breed solutions via both heterogeneous support and breadth of solutions
    a. Information on Demand and New Enterprise Data Center initiatives
    b. Business knowledge and consultancy across industries and regions

2) Integration with multiple parts of IBM
    a. Software – The key to unlocking many infrastructural savings. It could include process optimization via collaboration tools, information sharing and access across supply chains and business groups, effective reporting and compliance, or modeling to measure and optimize carbon footprints. IBM Tivoli software can monitor and manage everything from thermal footprints to resource consumption.
    b. Services – Examples include carbon footprint measurement and the innovative Energy Efficiency Certificates. Indeed, IBM can take green to interesting new levels, integrating with facilities companies so that they can monitor the environment, and also proactively adjust settings in a data center to optimize efficiency—for example, powering down equipment or adjusting cooling temperatures to accommodate for lighter loads (such as weekends).

All the above integrate with, and support, designing and implementing the most suitable underlying infrastructure. Although it is tempting to showcase a large portfolio (since the basic hardware—from System z mainframe systems through to tape—is so crucial to delivering the savings), a few examples will suffice. Some of the most dramatic potential returns come from the storage component. This is partly because it has not traditionally been a tightly managed area in terms of utilization. Further, the rapid growth of capacity is continuing and increasing— meaning that the ongoing opportunity cost of inaction is high and that the ROI potential is significant. Potential improvements range from intelligent archiving and automated migration and tiering (designed to put data in the optimum place) to extensive virtualization (SAN Volume Controller, as well as servers and tape) and data reduction capabilities (de-duplication offered after the recent acquisition of Diligent Technologies)—these latter tools allow for optimum purchase and usage levels. All of the above can have a major impact on power and cooling needs—and hence on energy consumption, which has already been noted as the number one tracked metric for green progress in organizations.

While individual implementations are good, a holistic approach is better. This means working across a company to determine what the green business objectives and possibilities are (IT's role will no doubt be significant in terms of providing the relevant data), as well as promoting the full potential for a green data center to contribute to the end result. IBM can provide suitably holistic support—from knowledge of specific industries, through to functional advice, and everything from software for assessments through to the services that monitor the eventual new data center. It can even supply a fully virtualized infrastructure that delivers the green results. This could include both SVC and the accompanying IBM storage for instance, as well as, potentially, partner products—two good examples being VMware ESX servers, and COPAN's MAID technology. There's an old adage that when the only

tool you have is a hammer, everything starts to look like a nail; when you are as big and broad as IBM, you can afford to concentrate more on the customers' best interests… the chances being there's an IBM tool that will make the benefits mutual. And green initiatives are a prime example of where such breadth and depth is important. The physical manifestation of this is to adopt IBM's 'blended approach' to information storage needs. This is an approach designed to combine better asset utilization with lower operational costs. It can include virtualization, tiered levels of disk, tape, and other technologies, to create an optimal and green solution.

The Bottom Line

Size matters—that's not always true in this business, but for customers pursuing green initiatives, getting everything they need—both simply and in a coordinated fashion—can come from very few places. IBM is one of the few. This is not just because of the wide range of its product offerings (although that's important), nor is it just because of its holistic approach that encompasses green business as well as green IT (although that's important too). ESG research shows that customers also want to deal with a vendor that has specific industry knowledge and that also 'walks the walk' in its own operations. IBM has made massive savings in its own IT — in one operational area consolidating servers from 3,900 to 40, reducing its emissions, and driving up efficiency. By 2010, the company plans to double the computing power in its Green Data Centers without increasing power consumption. This makes IBM stand out from the crowd: successful vendors will be those that combine all the elements (professional services, broad hardware and software portfolios, proven internal use and industry expertise) and allow customers—whatever their entry point—to plan, implement and manage their green endeavors in a holistic manner. IBM can meet expectations on all fronts.

At the data center implementation level, IBM has a sufficiently wide portfolio and is sufficiently open that it can afford to keep its focus on its customer's objectives. As a vendor, when you cover the bases from mainframe servers to rear-door heat exchangers, and from solid state devices to offsite repositories (the Arsenal Digital acquisition) as well as support open management and architectures, you can stop worrying about directing customers to the fewer specific items to which a lesser vendor would be limited, and worry more about genuine fulfillments against business imperatives such as green.

Finally, for green business and IT projects, it's not just a matter of IBM asserting its capability. There are some 2,000 real customer examples, with many documenting ground level data center power savings of 70-85%. Numbers like that mean IT managers can grab some deserved spotlight, and show that IT can be a bigger green contributor than is often understood.
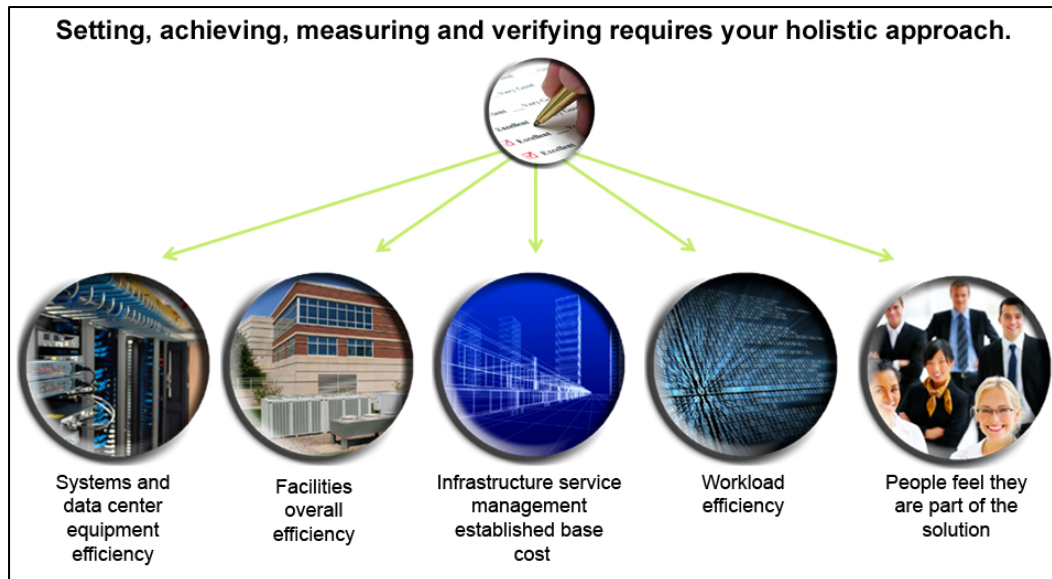
In Conclusion

Size does matter when it comes to the challenges IT is and will be facing over the next five years. In fact, due to rising energy costs, failing to "go green" in your data center may leave your IT infrastructure unable to support the growth of business demands. IBM, with our depth and breadth of knowledge and technology, can ensure that a comprehensive and cost effective approach will be taken to solving your green challenges.

The amount of energy consumed by data centers is not to be underestimated. Information storage is one of the fastest growing technologies in today's data center, driven by ever-expanding volumes of business information. Improving data center efficiency by 20% would save 36 billion kwh of electricity; the equivalent of 22 million tons of carbon dioxide—or the amount of CO_2 emitted by 4.2 million passenger cars—according to the U.S. Climate Technology Cooperation Gateway.

Leveraging IBM Information Infrastructure, green storage solutions from IBM System Storage™ can help cut your energy costs while making more efficient use of available storage space.

IBM can help you achieve the highest level of storage infrastructure efficiency through a fully integrated and blended hierarchy of disk and tape. The use of Virtualization and Information Lifecycle Management are integral to any true green storage implementation. As information is created or captured, revised, routed, approved, published and then archived or destroyed, IBM Information Infrastructure enables the most needed information to be accessed the fastest—key to green storage efficiency.

Setting, achieving, measuring and verifying requires your holistic approach.

Systems and data center equipment efficiency | Facilities overall efficiency | Infrastructure service management established base cost | Workload efficiency | People feel they are part of the solution

Under IBM Information Infrastructure, the first step towards greater efficiency is to diagnose just where possible energy consumption problems lie. IBM data center assessments, through the IBM Systems and Technology Group and IBM Global Technology Services, offer a variety of services to support your power efficiency objectives, such as:

• IT system energy efficiency and data center efficiency assessment
• IBM server and storage power/cooling trends assessment
• Data center best practices assessment
• Data center thermal analysis and optimization
• Storage optimization and integration services

In terms of energy consumption, IT managers need to look at the costs of both the physical data center and the IT infrastructure. As such, IBM assessments aim to gain efficiency not only by reducing energy consumption in the powering and cooling of the physical plant, but also through server and storage consolidation and virtualization to reduce the overall data center footprint.

In some cases, the opportunity to realize significant energy savings involves either upgrading existing data centers or building new ones. Since the IT infrastructure in many data centers is replaced every two to four years, addressing green initiatives as new equipment comes in will prevent older data centers from exceeding powering and cooling capacities—one reason why building or upgrading the data center can be an important stepping stone on the path to a greener organization.

Data center overhauls are not always possible, but you can gradually change your infrastructure over time. IBM offers hardware and software storage solutions that can bring significant savings in energy costs through consolidated and virtualized servers and storage equipment. Your storage goals may include improved performance, compliance, data security, and disaster protection, as well as reduced total cost of ownership and energy costs. All-disk or all-tape storage may not be able to address these requirements, but a tiered, blended storage solution from IBM may help to optimize energy savings.
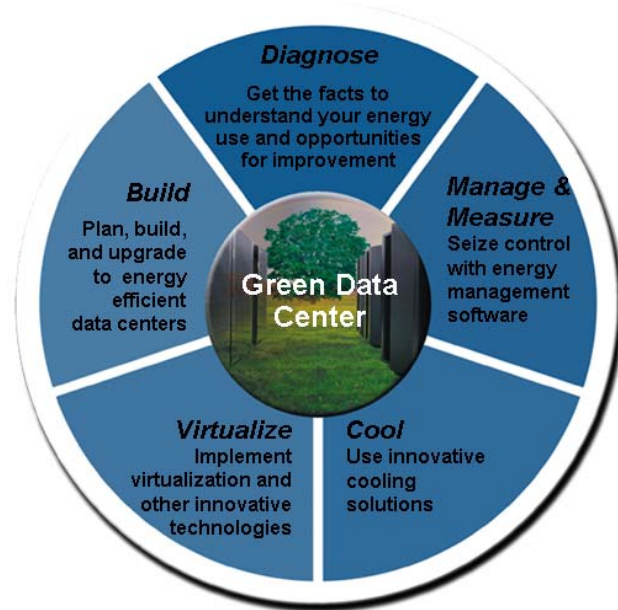
IBM's Information Infrastructure approach to services and technology addresses the diverse power, cooling and related environmental issues for green storage. IBM offers many solutions that can be utilized to achieve a greener profile, such as data de-duplication to reduce data footprint. All tiered storage should be virtualized where possible to reduce both complexity and operational costs and then aligned to application requirements. The use of technologies such as MAID or solid state drives should be considered for cost effectiveness and carbon footprint reduction when looking at long term plans. Consolidation through virtualization technologies and techniques will result in better utilization of all your resources, including servers, storage, networks and applications. In essence, you must consider the entire IBM Information Infrastructure offering as a key part of your overall drive to meet green requirements and operational efficiency