

Streamlined and sustainable: The Dynamic Enterprise

The role of ICT in realizing the business benefits of eco-sustainability

By focusing in a holistic way on organizational priorities that integrate the network, people, processes and knowledge, 'green' initiatives can marry eco-sustainability with core operational and strategic objectives. Applications such as teleworking, videoconferencing and others both reduce energy requirements (helping enterprises meet their environmental targets) and contribute to improved efficiency and effectiveness. Given that such solutions belong to the realm of information and communications technology (ICT), IT departments have a central role to play in helping their organizations pursue their mission-critical objectives.

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The color of competitive advantage

Enterprises have many compelling reasons to go green: the need to contain their energy costs; limitations of today's energy infrastructures and resource bases; entrenchment of corporate social responsibility as an active and central component of doing business; increasingly stringent environmental regulations; and greater awareness among enterprises of their own long-term environmental impacts.

At roughly two percent of the world total, ICT (information and communications technology) is a relatively small contributor to global greenhouse gas emissions (GHGs) but with data growing, subscribers increasing and automation on the rise, ICT's emission trending is up. With governments, businesses and people committed to reversing global warming, the ICT industry must improve the energy efficiency of its products and reduce its carbon 'footprint' (the amount of carbon its activities are directly and indirectly responsible for releasing into the atmosphere). It also has significant potential to help organizations in other sectors and industries conserve energy and cut their carbon emissions — and by doing so, control their capital and operational expenditures (CAPEX/OPEX). From teleworking and videoconferencing to building design, power distribution and industrial mechanics, ICT's countless applications make possible new, more efficient ways for companies to operate. Corporate IT departments are identifying opportunities to implement efficient, sustainable solutions.

GREEN IT

According to Simon Mingay of Gartner, green ICT, is the "optimal use of information and communication technology (ICT) for managing the environmental sustainability of enterprise operations and the supply chain, as well as that of its products, services and resources, throughout their lifecycles."

GARTNER AND WWF'S 'GREEN RATING' FOR MAJOR VENDORS. SYMPOSIUM/ITXPO 2008

What can technology do?

The economic output of the European Union climbed almost 40 percent between 1990 and 2007¹. At the same time, the region's energy requirements and power consumption rose by only 11 percent. A similar trend in the United States has seen the amount of energy needed to produce a dollar of economic output drop by 50 percent since 1970². These examples point to a 'decoupling' of economic growth and energy use: societies can accomplish more today than ever before with each unit of energy they consume.

That said, energy consumption is still increasing. In ICT specifically, always-on connectivity, portability, and the ever-growing abundance of household electronics have all intensified the demand for power.

The efficiency of devices themselves is also a contributing factor. The typical desktop computer, for instance, wastes nearly 50 percent of the power it receives (a fact that prompted the industry to set the goal of cutting PC power consumption in half by 2010³.) And a 2007 report from the U.S. Environmental Protection Agency (EPA) shows that data centers in the United States consumed about 60 billion kilowatt-hours (kWh) in 2006, roughly 1.5 percent of total U.S. electricity consumption. Up to \$4 billion per year could be saved in electricity costs through more efficient equipment and

1 "Advanced Electronics and Information Technologies: The Innovation-Led Climate Change Solution," AeA Europe, September 2007

2 "Information and Communication Technologies: The Power of Productivity," American Council for an Energy-Efficient Economy, February 2008

3 "Information and Communication Technologies: The Power of Productivity," American Council for an Energy-Efficient Economy, February 2008

operations, according to the EPA's "Report to Congress on Server and Data Center Energy Efficiency." That document suggested existing technologies and strategies could reduce typical server energy use by 25 percent, with even greater energy savings possible using advanced technologies.

A good system for breaking out the potential impact of telecommunications technologies on climate change was proposed by the World Wildlife Fund and the European Union Telecommunications Network Operators' Association (ETNO) in their joint report, "Saving the Climate @ the Speed of Light," which has become a touchstone of green awareness for the industry. Three impact categories were defined in that document: direct, indirect and systematic.

- The *direct* effects of telecommunications technologies relate to the sector's own carbon footprint, and involve reducing energy consumption through the development of next-generation networks, infrastructure consolidation, waste reduction, improved data center design, low-power radio transmission, asset sharing among providers and other such advancements.
- *Indirectly*, telecom technologies provide alternative means of accomplishing tasks that would otherwise consume more energy. Applicable to any industry or sector, these include solutions that reduce the energy requirements and financial costs associated with travel, maintaining meeting space, and so on.
- Finally, the *systematic* effects of telecommunications technologies are those that, by providing alternative means of working and living, contribute to the development of new habits, social structures and consumption patterns. These are the longest-term and deepest benefits.

Clearly, ICT has room to improve within its own sphere, and is also rich in potential to reduce global environmental impact as a whole, for example through:

- *B2B and B2C e-commerce* that minimizes transportation, physical premises and materials requirements.
- *Telecommuting*, which cuts greenhouse gas emissions associated with driving, office construction and operational energy savings.
- *Teleconferencing*, that similarly reduces greenhouse gas emissions by replacing travel, especially air travel.
- '*Dematerialization*', the replacement of physical 'things' with electronic substitutes — for example, cutting down on first-class mail, plastics for media packaging and office paper.

The integration of efficient, sustainable technologies and business practices into a company's operations, customer interactions and supply chain relationships can boost competitiveness, reduce expenses and open up new business opportunities. This is essentially the vision of the Dynamic Enterprise which provides a framework to help companies consume fewer resources, generate less pollution and produce less waste (and potentially make productive, revenue-generating use of the waste they do create). Every area of economic activity in the low carbon economy, from raw materials production and power generation to manufacturing, agriculture and services, is part of a single system powered by clean technologies and operating according to principles of sustainability.

MODEST CHANGE, MAJOR IMPACT

If half of all employees in the 25 countries of the European Union (EU) were to replace a single in-person meeting with an audio conference — and if video conferencing were substituted for 20 percent of all EU business travel — it's estimated that some 24 million metric tons of emissions could be eliminated each year. Another 22 million metric tons could be reduced if 10 percent of all EU employees were to work at home part-time instead of commuting to and from the office. Replacing paper-based systems (such as billing, taxation, government transactions) with electronic alternatives could save another 4 million metric tons each year⁴.

⁴ "Surfing the Green Wave in Telecom," Ovum, May 2008

Changing from the inside out

The concept of the Dynamic Enterprise focuses on interconnecting a corporation's networks, people, processes and knowledge. Together in a seamless whole, these drive performance, maximize efficiency, and enable the achievement of meaningful results — strategically, competitively and environmentally.

Within the Dynamic Enterprise, individuals are empowered, workflows are streamlined, and innovation is constant. Personalized tools support effective and cost-efficient virtual teams that make better use of the devices available to them. Software, hardware, services and R&D provide the knowledge the organization needs to maintain optimal performance. Automated, communications-enabled business processes facilitate corporate-wide environmental process compliance. And the network itself is equipped with low power-consuming technologies.

This isn't a far-off, distant-future vision for the enterprise. It can be achieved today, and moreover, dovetails with sustainability objectives:

- *Network:* Switches, storage facilities and data processing centers are becoming increasingly efficient, able to handle greater traffic volumes within a smaller physical footprint while consuming less energy than older technologies. The convergence of technologies and consolidation of equipment possible with IP-based networking introduces further efficiencies, eliminating the need for multiple networks to handle multiple media.
- *People:* Within the Dynamic Enterprise, users need access to devices that meet their needs, permit the highest degree of responsiveness, and conserve energy. Today's devices are becoming decidedly more robust, efficient and innovative. New phones, PDAs and other network-enabled technologies are less energy-intensive than they used to be while doing more of what today's workers require. Some devices utilize alternative sources of energy: Japan's DoCoMo, for instance, has rolled out a solar-powered cell phone.
- *Processes:* People need to work efficiently within the Dynamic Enterprise — constantly optimizing their productivity and power usage. Energy management systems, smart meter reading, video surveillance, business process routing, hosted and real-time web-enabled services all accelerate decision-making and action-taking, and at the same time reduce carbon footprint and conserve energy. Service providers are increasingly aware of the fact that more business (and consumer) buyers are looking for vendors of sustainable solutions.
- *Knowledge:* To achieve their environmental aims, organizations need to know how they're performing against their targets. Dynamic Enterprises focus on capturing and making accessible corporate information so environmental performance measures and metrics can be made part of the enterprise knowledge structure. They also push innovation in an effort to find sustainable alternatives.

Taking action: The role of IT

Corporate IT departments have the opportunity and expertise to help their organizations become more sustainable. To do so they must first understand three things:

1. Their impact on the environment
2. Their current environmental costs
3. Their opportunities to reduce those costs, realize efficiencies, and meet environmental goals

This can initially be challenging due to typical 'disconnects' within conventional corporations. For instance, few CIOs are responsible for paying their companies' energy bills: the costs are consequently invisible to them. Those who do pay for energy within the company tend not to know the details of how energy is being used, so their ability to identify opportunities for improvement is impaired. Eco-assessments and monitoring mechanisms can solve some of those issues.

Sustainability and the network

Enterprises are well advised to refine their approaches to provisioning — to purchase more accurately the features, functions and capacity they truly need, minimize the layers in their networks and control the numbers of devices they deploy. Just as consumers do when buying appliances and vehicles, corporations should consider power consumption essential to their purchasing and upgrade processes.

In many organizations, IP infrastructures and devices such as IP phones are operational 24 hours a day, seven days a week — consuming power and dissipating heat. Ethernet and Power over Ethernet (PoE) switches interconnect peripherals such as PCs, IP phones, printers, application servers, database servers and Internet gateways; the peripherals themselves are often powered by Ethernet to consolidate power backup and minimize the need for additional power supply outlets throughout a building.

Virtualization presents an ideal means of minimizing power dissipation in such environments. By deploying server hardware of sufficient capacity and adding a virtualization layer, IT departments can establish a single hardware platform capable of running multiple types of operating systems (OSs). This lends the advantage of being able to choose, for each network element or device, OS-optimized applications while conserving power consumption by having just one hardware platform instead of many separate ones.

Because network equipment in data centers and main equipment rooms needs to be temperature-controlled, it has additional power (and failsafe backup power) requirements as well. Dissipation here is directly related to the power dissipation of the network equipment itself. The lower the dissipation, the less power is needed to cool and backup — reducing both energy and equipment costs. The IEEE 802.3az Energy Efficient Ethernet Task Force is working to reduce energy consumption in Ethernet devices by defining a mechanism to reduce power consumption during periods of low link utilization. Researchers at Bell Labs are also looking to harvest the energy consumed and reuse it. They have nineteen patents pending on their thermal management technology.

“If left unchecked, the absolute CO₂ emissions and the percentage of global CO₂ accounted for by ICT-related equipment will grow as ICT use grows. Despite the overall environmental value of ICT, this increase in CO₂ emissions is unsustainable. ICT vendors (software, hardware) and businesses that use their equipment and products must act promptly to reduce CO₂ emissions from the life cycle of ICT equipment and operations. Failure to do so could result in unnecessary costs, compromise competitiveness, and solicit unwanted attention from environmental pressure groups, the media and regulators. All stakeholders in the industry must tackle this issue through product innovation, standards and legislation and by encouraging change in user behavior.... The good news is that, because of the current massive inefficiencies in the technology and usage behaviors, significant improvement is not difficult to achieve.”

SIMON MINGAY, GARTNER AND WWF'S 'GREEN RATING' FOR MAJOR VENDORS. SYMPOSIUM/ICTXPO 2008

Improving the efficiency of people and processes

One of the most conspicuous and oft-mentioned areas in which corporations can begin to see immediate effects of ICT-led sustainability initiatives is travel substitution. Teleconferencing, video conferencing and teleworking are all viable alternatives to commuting and long-distance business travel. They are available and being taken advantage of today.

The use of more efficient telecommunications technologies in place of travel allows companies to reduce their OPEX and their GHG emissions at once. Large-scale movement in this direction by the world's enterprises could have profound effects. In the United Kingdom, for example, telework can save on average six megawatt hours per person compared to full-time office work. If five million people in the United Kingdom were to work from home rather than commute regularly to the office, roughly eight million metric tons of CO₂ would be eliminated — 1.4 percent of the country's total emissions⁵.

A further empirical example comes from analysis of air traffic in and out of Wellington, New Zealand. The country's main airport sees more than 110,000 flights per year: 95 percent domestic and five percent international. More than half of all flights are business-related. According to calculations performed by Alcatel-Lucent Bell Labs, a one percent reduction in business flights to and from Wellington could eliminate 10,950 metric tons of CO₂ per year. The enterprises themselves would save on the associated travel costs — somewhere in the region of 87 million Euros.

IT departments that move swiftly to deploy teleworking solutions (which may include video and audioconferencing on their own, or bundled into unified communications and collaboration tools) will propel their organizations ahead of the pack competitively and help them begin to realize the cost advantages of sustainable behavior more rapidly.

AUTOMATING FACILITIES

Enterprises that own their own facilities spend huge amounts of money on their upkeep and operations — and especially energy. Commercial buildings account for nearly 50 percent of world emissions⁶.

Technology-based Building Energy Management Systems (BEMS) stand to significantly improve buildings' energy efficiency — by as much as 140 million metric tons of CO₂ per year in Europe alone, according to figures cited by AeA Europe. These BEMS may be simple monitoring or automation systems or higher functioning and more versatile digital controllers that oversee and control building systems to optimize energy performance. Advanced sensor technologies are key to such solutions, as are the data transmission networks that transport real-time information between sites and central control.

Within the framework of the Dynamic Enterprise, ICT and facilities departments could work hand in hand to plan for the implementation of such systems.

Connecting knowledge for change

Reporting regularly on results (i.e., on sustainability performance) is essential for organizations seeking to manage their ongoing impact. Such reporting inevitably improves outcomes because it provides the knowledge needed to set practical targets, calls attention to areas of strength and weakness, and encourages performance improvement. It is well known that organizations are far more likely to progress on issues they can measure. Reporting also promotes transparency and accountability. Results made public engage the interest of stakeholders, reinforcing corporate commitment and sustaining momentum.

An enterprise seeking to effect environmental change should start by striking a working group focused on building organizational understanding of the associated opportunities and risks. ICT has a central role to play: to determine the organization's environmental impact and how technology can help reduce its carbon footprint.

⁵ Gray, M & Hodson, H (1993) *Telworking Explained*, John Wiley & Sons

⁶ "The Contribution of ICT to Climate Change Mitigation," World Economic Forum, 2008

The working group must also communicate with employees, educating them in sustainability, and lead the enterprise's efforts to work with customers, suppliers and other partners to ensure that collectively each is supporting the others' sustainability objectives. A key group must ask: what are the implications of change — and of not changing? The risks of each must be known to be mitigated.

In the enterprise's interest

Eco-friendly technologies and innovative practices create opportunities to offer new services or revitalize traditional, mature businesses while minimizing environmental disruption and reducing energy consumption. The example of several companies has already shown this to be true. Consider GE and its family of environmentally oriented “ecomagination” products, which generated \$14 billion (United States) in 2007 revenue.

The UK's Marks & Spencer retail chain has integrated sustainability throughout its business, weighing considerations as the distance food must travel from where it's grown to the shelves where it's sold (and the associated carbon implications); the lifecycle impacts of goods and their packaging; and the conservation of resources such as peat, wood and fish. The chain actively communicates its sustainable sourcing commitment to customers and has made it an important part of its brand identity.

As environmental and business considerations increasingly co-mingle in these and other ways, a new, low-carbon economy will emerge.

Dynamic and green: the nature of the new enterprise

While the particulars may vary, ICT-led green initiatives support the same overarching organizational priorities relating to the network, people, processes and knowledge. IT departments can take concrete steps today to achieve sustainability and efficiency objectives in the following ways:

Network

Ensure compliance with industry standards and jurisdictional regulations such as RoHS (Restriction of Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment), and by lending substance to declarations of eco-sustainable commitment, which are becoming increasingly important to customers. Design networks to optimize energy consumption, using energy-efficient equipment.

People

Ensure users have access to the devices they need to expedite and integrate their communications, and have the ability to choose alternatives to travel and the use of material goods through teleworking, teleconferencing and a greater variety of electronic resources.

Processes

Contain energy costs by automating processes like power management, meter reading, customer service etc. It will not only make the organization more efficient, it demonstrates to shareholders and customers a commitment to social responsibility.

Knowledge

Analysis, monitoring, reporting, and innovation provide the enterprise with knowledge of how to manage power consumption effectively and how to do things differently to reduce carbon emissions.

Going green, in other words, is beneficial to the enterprise in a great many ways. Because ICT has such potential to enable that eco-sustainable transformation and realize the vision of the Dynamic Enterprise, the IT department has a central role to play, with the expertise and ability to act now in pursuit of these business-critical objectives.

Resources

Advanced Electronics and Information Technologies: The Innovation-Led Climate Change Solution, AeA Europe, September 2007

Gartner and WWF's 'Green Rating' for Major Vendors, Symposium/ICTxpo 2008

Gray, M & Hodson, H (1993) *Teleworking Explained*, John Wiley & Sons

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Surfing the Green Wave in Telecom, Ovum, May 2008

The Contribution of ICT to Climate Change Mitigation, World Economic Forum, 2008

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