



Why IT must take a lead in greening the enterprise

The Environmental Challenge to the CIO

As the scientific consensus on the man-made origins of global warming hardens into fact, there is overwhelming pressure to take action from governments, business and consumers. New laws are coming in to reduce the threat, especially in Europe. With whole industries striving for greener ways of working, embracing both new cost issues and new opportunities, what can the forward-looking CIO do to help?

The EU has already established strict regulatory regimes for electronic manufacture and waste disposal, backed by financial penalties. The UK government will be the first to set binding legal limits on CO₂ emissions, aiming for a 60 per cent cut by 2050. Carbon caps were tightened across Europe in 2006 and are expected to tighten further as the European Emissions Trading Scheme enters its second phase, forcing many countries to accept lower target emission levels. All this will have direct impact on enterprise – and the trend seems certain to grow in power and influence.

Investors are calling for enterprise climate risk disclosure in record numbers, with a cumulative effect on stock valuations. Financial institutions are signing up to dedicated climate change policies. As environmentally aware consumers vote with their wallets, more businesses are launching green initiatives, balancing market opportunity alongside the need for real improvements to sustainability. The green economy for goods and services is growing twice as fast as its normal counterpart.

'Adapt or die'

The spotlight is focused remorselessly on the role of technology in accelerating or mitigating climate change. As IT consumes a higher proportion of the enterprise energy budget, it is subject to more intense scrutiny. 'Green IT' is now a critical issue, both in itself and as a key enabler of new environmental imperatives within the enterprise. Environmental sustainability in IT can no longer be treated as an optional extra or a PR plus point. It is becoming a fundamental business driver.

There is increasing agreement among analysts that IT organisations must take immediate action to ensure that they are part of the solution, not the problem – and be seen to do so. They can start by setting targets for the IT contribution to electrical efficiency, recycling, cutting down business travel, managing equipment lifecycles, and adding sustainability to selection criteria for equipment, services and vendors. The ultimate aim is to tackle the much more challenging issues of sustainable IT and sustainable business. In short, say some, it is a case of adapt to climate change or die.

Carbon accounting

The impact of increased boardroom attention to green issues generally and IT in particular is making itself felt now. Soon it will be ubiquitous. Indeed, Forrester argues that “sourcing policies that work on reducing energy costs and incorporating environmental frameworks into sourcing processes will be commonplace by 2010”. The implications are clear: “The cost of a product or service will be measured in terms of price plus the energy it consumes over its lifecycle,” writes Forrester in “Why Green IT Should Feature in Sourcing Plans”, Forrester Research, Inc., April 2007.

This means carbon accounting will need to be progressively integrated by the CIO into an already complex portfolio of business priorities, starting with simple spreadsheets to include electrical power needs, road mileage and air miles alongside expenses and financial returns. As carbon account planning matures into a natural complement to fiscal account planning, the CIO will be a key enabler for cultural change towards a company policy that integrates green factors into all its daily activities. No CIO can afford to ignore the issue. CIOs need to start now to ensure that IT is a key player in the process.

Why the CIO is well positioned to make the transition

The CIO is central to the drive for greener IT and greener business. As IT has grown in importance and scale, the CIO has become responsible for a progressively larger share of enterprise energy costs. Data centre power consumption is increasing at a compound annual growth rate of seven per cent, and, by 2009, electricity costs are expected to balloon from 10 to 30 per cent of the entire IT budget.

The Intergovernmental Panel on Climate Change forecasts global temperatures rising by up to 6.4C and sea levels up to 43cm by the century's end; tropical storms will be more intense, heat waves more frequent.

The IT group therefore needs to become a centre for innovation to reduce the carbon footprint. First, CIOs need to ensure that complex, power-hungry IT systems become more environmentally sustainable by promoting energy efficiency across the board. Then he or she can begin to empower the enterprise to cut emissions by using the IT system's capabilities to enable new practices across the business as a whole.

As the personal touch point between business initiatives launched by the CEO and the right technological tools to implement them, the CIO is pivotal to the efforts of each enterprise in meeting new targets, both regulatory and market-driven. In doing so, the CIO is in a position to create a showcase environment that will enhance the company's reputation as an environmentally responsible organisation.

The share of enterprise energy costs attributable to IT varies by industry, representing a higher proportion in data-intensive sectors such as financial services and a lower one in manufacturing or retail. Yet European enterprises with a declared commitment to 'green' policies range from Tesco, Britain's largest supermarket chain, to major banks such as HSBC and ABN Amro. Many others have started to demand sustainability commitments in RFPs and IT tender documents.

Looking at the system as a whole

The starting point for moving towards sustainability is to look long and hard at all aspects of the business to find ways of reducing the overall carbon footprint. This means careful consideration of every kind of energy usage, from ground transport and aviation to buildings, manufacturing and logistics, home working and IT.

The network is central to efficient usage and management of energy, underpinning a range of potential initiatives in these areas. Because it is ubiquitous, touching every part of the business, the network can create a 'multiplier effect', extending CO₂ frugality measures beyond expectations. CIOs need to take a system-wide view. The right technologies, implemented in a timely and appropriate way for the power consumption patterns of each industry sector, will enable companies to make rapid energy savings as part of a longer-term drive for sustainability.

Cisco, for instance, has a highly mobile workforce. In 2006, company employees flew a billion miles. Under the Clinton Global Initiative on Climate Change, Cisco's chairman and CEO, John Chambers, announced that Cisco would slash its carbon footprint over the next year, largely through a cut in the number of air miles travelled.

"The Carbon-to-Collaboration initiative is a \$20 million investment in collaborative technologies that will reduce the need for physical travel at Cisco.....With this initiative, Cisco has committed to reducing the carbon emissions starting with a dramatic reduction in our air travel over the next year."

John Chambers
Chairman and CEO, Cisco

The Stern Review, commissioned by the UK Government, predicts dire results from inaction: major flooding from melting glaciers, up to 200 million people permanently displaced, global output down by as much as 10 per cent.

Virtualisation of resources

A typical data centre housing 1,800 servers consumes 5MW of electricity, costing about €5 million a year. Some 60 per cent of the power generated from coal escapes up power station chimneys and another 5-10 per cent is lost in grid distribution. Of the 35 per cent or so actually reaching the data centre, half goes to cooling, 11 per cent to power conversion and three per cent to lighting.

Servers and storage consume just over a quarter of the power and the data centre network uses another 10 per cent. Yet in a non-virtualised data centre, disk utilisation rates are very low – around 15 per cent for servers and 30 per cent for storage. This data centre accounts for 10,000 tonnes of coal each year, emitting roughly three times that amount of carbon dioxide. So what is to be done?

Server virtualisation using VMware, EMC's proprietary software, coupled with consolidation and virtualisation of storage, can have a powerful impact on energy usage. Integrated storage services – including Virtual Storage Area Networks (VSANs), inter-VSAN routing and data replication – eliminate separate SAN "islands", leading to better utilisation. Further improvements can be gained by introducing storage tiers, running at lower speeds for retrieval of older data and so consuming less power.

With utilisation rates reaching 70 per cent on servers and storage disks, only a quarter of the server capacity and half the storage capacity are needed. A virtualised data centre consumes far less energy and lowers CO₂ emissions commensurately. A radical reduction in the number of data centres required is also attainable. The consequent reduction in greenhouse gases is highly significant – even if the much smaller number of virtual data centres use more energy individually.

Collapsing appliances into the network

The demand for more computing power to drive faster business applications and meet regulatory requirements leads to a proliferation of separate devices in the data centre, each with its own power and cooling needs. A server consuming 500W of electricity may have attached devices using a further 2.7 kW. Heat rises rapidly, placing a greater burden on the cooling system and increasing the power draw. By 2008, the power requirement for servers alone is on track to reach 15-20kW per rack.

Virtualisation and replacing discrete firewalls, Intrusion Prevention Systems (IPS), SSL offload and load-balancing appliances by network-embedded functions, produces a dramatic reduction in power usage of up to 85 per cent. The effect is enhanced by the 'burden factor' of 1.8 to 2.5 on each watt of electricity used by the IT infrastructure for cooling, conversion and lighting. In Cisco's data centres, the saving on power and cooling through virtualisation was up to 1,400 watts per logical server group.

Centralising branch office IT

Many businesses still use separate servers and storage systems in branch offices to manage and store customer and business data. Consolidation of files on a centralised, scalable storage area network, coupled with centralised file administration and servers, leads both to lower costs and reduced energy usage in branch offices. The effect multiplies rapidly as the number of branch offices rises into the hundreds.

Rising oil and gas prices have triggered a switch to coal generation in power stations. The International Energy Agency expects global energy demand to rise 53 per cent by 2030, with a 55 per cent surge in carbon emissions.

Changing business behaviour

Business travel is responsible for a major part of company carbon emissions. Whether the journey is a long-haul flight or a 50-mile drive to the office and back, technology offers ways to cut down on the need for physical presence, without losing the human contact that remains an essential part of doing business effectively.

The enterprise can, for example, deploy collaboration solutions to enable remote meetings between executives, partners and customers and thus cut down air travel, as Cisco is doing with its new TelePresence technology. It combines rich audio, high-definition video and interactive elements to provide a unique in-person experience over the network. Meanwhile, by providing secure access to the network and network services at home, teleworking plays a major part in reducing car emissions.

Remote access to specialist skills

In industries where face-to-face access to a specialist adviser is required by law, such as financial services, videoconferencing technology helps save on car journeys, too. Instead of travelling to see a client, an adviser can meet the client at a local branch over a videoconferencing link, satisfying the legal stipulation and saving energy.

Better buildings management

Inefficient energy management in office buildings makes business districts a major source of needless carbon emissions. Separate legacy networks control a host of functions, including fire alarms, elevators, building security and access, energy, lighting, air conditioning, each needing its own power supply. A converged IP network offers automated control of heating and lighting, ensuring lights are dimmed or switched off and heating turned down when rooms are unoccupied.

Networked CCTV is another effective way to promote energy efficiency while maintaining effective physical security. Cisco's global security network eliminates the need to transport VCR tapes by road to off-site locations, as well as reducing or eliminating regular "drive-past" security patrols. The use of motion-detection sensors means stored images from CCTV cameras need only cover a short time on each side of a security incident, such as unauthorised entry through a fire-escape door, while intelligent reduction of stored information, consolidated into shared storage at the data centre, creates company-wide power efficiencies.

Changing Business Processes

Optimising the supply chain

In manufacturing, transport and distribution, smart technology is starting to facilitate efficiencies in the supply chain that promise to have a beneficial effect on energy consumption. Using RFID tags to track shipments is at an early stage, but will allow consignments to be rerouted in mid-shipment to meet 'just-in-time' schedules. Stock control will improve and wasted delivery trips will be reduced. In manufacturing, RFID tags will give better control over processes on the factory floor, minimising unnecessary movements and ensuring less wasted energy.

Fostering employee contributions to green IT

Environmental awareness is growing rapidly among employees. Staff concerns can be channelled into a productive reservoir of shared ideas with encouragement from senior executives. The CIO should mobilise the creativity of IT staff in suggesting new ways to cut energy consumption, from localised measures affecting a single site to company-wide initiatives. A culture of sharing also promotes greater staff receptivity to future 'top-down' green IT initiatives.

EU laws on electronic equipment disposal (WEEE) and new restrictions on using hazardous materials (RoHS) were followed in 2006 by tighter EU carbon caps. Many countries will have to accept lower limits than they originally proposed.

Better monitoring and reporting on energy use

IT staff can be given key reporting and monitoring roles in the overall design of a greener business. The same applies across complex systems, such as traffic flows in urban business centres. Through careful examination of interactions between people and business process, IT can enable significant changes in behaviour to cut pollution. This is a multi-disciplinary approach, beyond the immediate remit of the individual CIO. Yet as businesses are drawn into broader public schemes, it is a factor of which every CIO needs to be aware – and be ready to contribute, in much the same way as company IT staff reporting internally to the CIO.

Cisco's Green IT action plan

Cisco has devised a three-spoked strategy to set the wheels of green IT in motion.

- It means gearing new product design to strict environmental sustainability criteria.
- It seeks out new ways in which customers can use technology to optimise energy savings through the multiplier effect of the network.
- It has engendered a raft of green initiatives extending across Cisco's own operational activities, including the following:
 - Collaborative technologies are central to Cisco's green IT plans. The key to Cisco's air miles project is Cisco TelePresence technology, offering an effective way to conduct business meetings remotely. TelePresence creates the illusion of being in the same room, with remote participants appearing life-sized on screen. It is being installed at 110 Cisco offices worldwide and will be ready for customer use on Cisco premises throughout Europe in 2007. Cisco also has 6,000 remote workers accessing the Enterprise-Class Teleworker system from home and helping to save on car mileage.

- Urban emissions produce an estimated 75 per cent of all greenhouse gases. A second outcome of the Clinton Global Initiative is a \$15 million Cisco study of three major cities – Amsterdam, San Francisco and Seoul – under the Cisco Connected Urban Development programme. Consultants from the Cisco Internet Business Solutions Group (IBSG) are working with municipal authorities, public transport systems and the private sector to create a replicable model, based on teleworking, traffic management and innovative 'green' business models, to improve quality of life.
- The Climate Group forecasts that the world clean energy market will more than quadruple in size by 2015 to \$167 billion. All electricity used by Cisco UK is already bought from a brokerage that sources power supplies from renewable sources only. In mainland Europe, where the renewable energy market is less developed, it is working with national providers towards this objective.
- EU directives on the disposal of electronic waste (WEEE) and the use of hazardous substances in manufacturing (RoHS) pose new challenges to vendors. Cisco is fully compliant with both, offering a 'take back and recycle' programme to partners for equipment at the end of its life to ensure proper treatment, recovery, recycling and environmentally sound disposal, and it works only with RoHS-compliant suppliers.
- Cisco's Technology Migration Programme creates incentives for customers to return IT equipment by allowing them to trade in old machinery against the purchase of new. The programme is specifically designed to stop scrap equipment ending up in landfill sites. Cisco also works with recycling companies to promote extraction of valuable metals from old equipment for reuse in new products.
- Cisco has built a strong organisational framework to encourage environmental innovation and responsibility. It includes Corporate Stewardship and Power Steering Committees, set up in the wake of the Clinton Global Initiative, and a dedicated EcoBoard. European in-country Environmental Aspect teams focus on hazardous waste, recycling and energy management. Their brief is to encourage use of 'green' company cars, recycled paper and other energy-saving measures.
- Farther ahead, the company is working on the development of a complete, integrated, low-carbon strategy. The company is gearing up for a full strategic energy audit of all its IT resources. Cisco Europe also hopes to develop a carbon 'cap and trade' system, setting personal carbon allowances for all employees. The idea is to create an easy-to-use 'carbon dashboard', with running totals of air miles and carbon emissions saved, thus enabling unused air miles to be traded. The system would interlock with Cisco's Carbon-to-Collaboration initiative, embedding best practice across the organisation and raising staff awareness.

The UK Government is set to become the first nation in the world to make targets set under the Kyoto Agreement legally binding, aiming for a 60 per cent cut in emissions by 2050. It is unlikely to be the last.

Enabling Cisco's green IT approach

Cisco has developed a range of products that are already well positioned to help the CIO contribute towards a more sustainable enterprise profile. Some are well known to customers, like the Catalyst 6500 Switch and the Integrated Services Router. Both play a vital role in improving network capabilities and lowering energy requirements by handling multiple functions over a single device. Research and development will seek further cost and energy savings across the full Cisco product range.

Data Centre Virtualisation involves complex deployments of Cisco technologies, including the Cisco Server Fabric Switch (SFS), Catalyst, MDS and Optical Networking Switch (ONS) families at the network infrastructure level. In the green data centre, Cisco Service-Oriented Network Architecture (SONA) operates at the application and collaboration layers to help keep electricity consumption down.

Unified Communications, providing common resources for voice, messaging, video, web-conferencing and shared applications, is another familiar set of Cisco tools that already offer the prospect of energy savings by cutting down on car travel. With a stronger emphasis on green IT, Cisco will seek to build on existing capabilities.

TelePresence represents a breakthrough in corporate communications. It provides everything needed for remote meetings, using fixed cameras and large screens positioned at eye level to create the illusion of presence.

For Cisco, being part of the green IT solution is not just about individual products or solutions, any more than it is just about the individual enterprise. It is about transforming the business ecosystem for the future, creating a new mindset, and using IT to its fullest extent across all sectors. In this way, human beings and the environment will benefit, and the best companies will thrive.

Getting started on the road to greener IT

The long-term transition to sustainable IT is challenging. As a leading vendor, Cisco is committed to helping CIOs get started. First steps should include:

- Consider the carbon footprint of the whole organisation: IT takes up a significant proportion of a modern company's energy budget, but the potential of IT to reduce power consumption spreads into all parts of the business. Work with the energy management team to define the overall carbon footprint.
- Make recommendations on where technology can enable savings: By facilitating internal discussions and initiating consultations with technology partners such as Cisco, the CIO can become a key adviser to business leaders on carbon emissions reduction across all areas of the enterprise's operations.
- Review IT and networking roadmaps: Build energy saving recommendations into all future plans and anticipate changing external demands, as technology becomes a key enabler of CO₂ emissions reduction.
- Conduct a strategic IT energy audit: Using an objective, scientific methodology, the CIO should work towards a full assessment of present IT energy consumption, starting with the data centre.
- Allocate and manage an energy budget: Energy consumption and carbon output should be managed in the same way other budgets are managed. Move towards an allocation system, supported by regular energy audits.
- Encourage employee collaboration: Enlist the support of your employees. Invite them to participate by contributing ideas and taking responsibility for specific actions.
- Review your network architecture: Keep the enterprise network architecture under constant review, not only to make sure that it is doing its job in business terms, but also to promote greater energy efficiency.
- Weigh up gains and losses: Major reductions in carbon footprint often result from changes in personal behaviour made possible by technology advances. It is frequently possible to reduce the overall footprint by investing in technology. For example, the carbon 'debit' of deploying home working equipment can be more than outweighed by the reduction in commuting.
- Support energy-efficient practices: Simple things make a difference. Encourage staff to turn off lights and power down desktops when not in use – frugality is a good preparation for more complex initiatives to come.
- Challenge your vendors to work together: Cisco supports a collaborative approach to green IT within the industry. When more vendors are committed to working together in a complementary way, results will improve faster.

In 2007, a record 284 institutional investors, representing \$41 trillion under management, sought climate risk disclosure from enterprises. This will have a growing effect on company valuations.



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