

[youtube:<http://www.youtube.com/watch?v=DNTww7UiRBg> auto]

How Green IT Saves Money and Improves Image

People talk about Green IT for different reasons. Some worry about pollution in manufacturing or disposal. Others may just want to save energy costs.

Video and post 2008 - very accurate forecasting.

IT directors are under huge pressure to save money, increase efficiency and meet environmental standards – and the good news is that they can do all this at almost zero cost, if capital outlay on Green IT is offset against savings in future years.

Many corporations are rapidly changing their hardware, using better software, improving the operating environment, increasing recycling and encouraging users to work more efficiently.

“Greening of IT” is not only paying for itself in many cases, but can also improve corporate image, customer loyalty, staff retention and productivity.

Greatest impact is more likely when different teams work together: IT, real estate management, marketing, corporate affairs and human resources.

For example, if the electricity bill for an entire office block is paid centrally, there may be no financial incentive for the IT department to buy new equipment, paid for out of reduced electricity bills.

Green IT saves energy, reduces cost and carbon footprint

While many people hoped that the digital revolution will save the planet by reducing energy on things like paper printing and travel, the fact is that IT itself is now a major consumer of energy, not just at work but also at home.

There are many weeks a year when my own home is kept warm by gas central heating, but our electricity bill is larger than our gas bill. That is because of simple physics: every watt of electrical power used in gadgets, computers and other equipment ends up as heat.

And it can be shocking how it all adds up:

mobile phone power supplies, wireless router, computers, plasma screens, digital TV receivers and so on.

And it is the same situation at work.

[youtube:<http://www.youtube.com/watch?v=oEw3Z3vTba0> 300 250]

Internet consumes 5.3% of global power

Take the internet itself. 1 trillion kilowatt hours of electricity was used last year to power the web – 5.3% of all global power use and 9.4% of electricity consumption in the US.

Around half of this was running online PCs in offices or homes.

1 trillion kilowatt hours is equivalent to a billion people running electric fan heaters in their homes for an hour.

We can expect web traffic to grow by 40-100 times over the next 15 years, mainly as a result of video on demand – how much of the world's energy will that require?

Green IT can save 50% of global power used by web servers

Web servers alone already consume more than 1% of global electricity, growing 14-20% a year. A single 50,000 square foot data centre uses around 5 megawatts – enough to power more than 5,000 homes. Yet much of that is wasted energy.

Web servers in large data centres across America use the equivalent of a full year's output from **seven 1,000 megawatt power plants**. That is more power than that used by the **entire state of Mississippi**

. Cooling uses almost as much energy as the servers themselves. Web servers each costing EU2,000 require an additional EU350 in power every year.

Yet half of all web server energy can be saved relatively easily.

Green IT means more efficient power supplies for example (Google's are 90% efficient). Other ways to reduce web server energy losses include: power management software (Windows Server 2008 boasts 10% energy savings, but Linux does better).

Green IT also means more efficient chips; better cooling systems; better use of fibre-optics, turning additional servers on and off depending on load (200,000 servers can be powered up in less than 5 minutes).

Most large corporate offices are heated and cooled very inefficiently, and companies like Johnson Controls regularly see savings of up to 40% in monthly energy bills, after controls and other equipment is upgraded. And the same applies to specialist IT centres.

Green IT means adjusting cooling systems to the numbers of servers actually active; separate sections of IT rooms to run at different ambient temperatures according to equipment need; placing air conditioning units closer to equipment to reduce distance air has to travel; using heat exchangers to cool server farms and sell surplus heat to nearby homes – and of course installing low energy lighting.

Exactly the same principles can be used for corporate servers connecting internal networks.

[youtube:http://www.youtube.com/watch?v=T6s5E_0Qavg 300 250]

Virtual servers use spare capacity in large IT departments

Most large companies use only a fraction of the server capacity they have, yet these machines burn up energy every hour of the year.

Green IT means using Virtual Servers to save energy, by allowing many different users to share the same equipment. Virtual setup allows multiple operating systems and applications to run on the same computers and breaks the old restrictions imposed by x86 computer hardware – only one operating system, only one purpose for each machine.

Virtual Server energy savings can be huge – almost \$300 a year per virtual server and 300 kWhrs of power each year. IBM has rolled out virtual servers and storage aggressively in-house and many other companies are following.

We can expect Virtual Servers to be a normal part of IT infrastructure within the next three years. Many smaller companies are already sharing space in huge data archive centres, which store vital data each night, and millions of individuals are sharing servers by using companies like Norton / Symantec for their own backup.

Plasma screens - power nightmare

There are wider issues: some new devices are much more power hungry than the ones they replace and one example is plasma screens which use four times as much energy as old cathode ray tube displays / TVs. In the UK alone a new plasma screen was sold every 15 seconds in 2008.

If all UK plasma screens were on at the same time it would require an additional 2.5 gigawatts of power – equivalent to two new nuclear power stations. Just one reason why the 18 terawatt

hours of power used in 2008 will jump to over 30 terawatt hours in just 3 years. While next generation large flat screens will be more energy efficient, the fact is that those sold last year will be in use for an average of 10 years.

Green IT means buying lower energy screens and ensuring screens power off automatically if not in active use.

A further challenge is equipment left on standby which wastes 5 million tons of CO2 every year in the US alone. Yet a single chip can reduce standby energy use almost to zero.

More than energy – Green IT manufacture and disposal

Green IT also means much more careful attention to disposal and recycling – reducing the amount of toxins used in manufacture, reducing lead, cadmium and other pollutants in circuit boards, connectors, batteries and components, and enabling 100% capture after disposal.

Hazards from 500 million old computers

Green IT means efficient collection and disposal of old equipment. The Silicon Valley Toxics Coalition estimates there are over 500 million obsolete computers in America, with 130 million mobile phones being thrown away each year. Over 70 million of these computers are already in land fill.

E-waste is now 2% of solid municipal waste in America, and contains many hazards which can end up polluting water supplies or endangering wildlife. Computer screens and old TVs are responsible for 40% of all lead pollution in land fill – mostly lead in the glass itself, but also in printed circuit boards and components.

Green IT means hazard reduction in manufacture. More than 1,000 chemicals used during electronics production, such as lead, mercury and cadmium, have been linked to cancer,

reproductive problems and other illnesses.

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Apple has banned a long list of toxic substances from its products, including asbestos, cadmium, mercury and lead. In 2006, the company stopped using CRT monitors, which contain lead oxide and barium.

Apple also removed lead from its batteries and has ended use of brominated flame retardants and polyvinyl chloride.

Intel has already reduced use of substances which contribute to global warming and is working to replace isopropyl alcohol, a volatile solvent known to contribute to smog, used to clean the edge of silicon wafers during manufacturing.

100% recycling and recovery

Green IT means better recycling. Hewlett-Packard has taken a lead, with 250 million pounds of hardware and print cartridges recovered in 2007, double the previous year. Their target is to reuse 2 billion pounds of products by the end of 2010.

Every molecule in an old computer can in theory be re-used in another manufacturing process. As prices of precious metals have rocketed, it has become profitable to dip old circuit boards in acids and solvents to collect gold, cadmium, lithium and so on.

The same process can recover plastic, aluminium, glass and steel.

[youtube:<http://www.youtube.com/watch?v=x1G-CddJkWc> 300 250]

Energy savings from using IT – more elusive than people thought

So what about the huge promises of energy *savings* from IT? Well they have sometimes been more elusive than people imagined a decade ago.

The paperless office has yet to materialise in most parts of the world.

Paper printing has actually gone up, although we will eventually see a firm downward trend.

One reason is biological:

the human eye can process 3 terabits of information every second, while your ears can only handle 112kbps.

Computer screens deliver very low resolution and low contrast in comparison to printed paper. That means it is almost always faster to get data into your brain by reading text on paper than on a computer screen.

There are also other paper advantages: the ability to tear out what you don't need and scribble comments on what you want to keep; the ease of jumping around a huge text looking for different things.

Green IT means encouraging people to print out less material, except for large documents, printing onto lower quality paper, and to ensuring 100% paper recycling.

Virtual teams and virtual working – impact on travel

Virtual teams and virtual working have often been cited as powerful ways to help the environment. That is true and every phone call you could say is a way to prevent travel. And it is also true that the rapid shift to (partial) home working is already reducing the amount of energy spent commuting.

Green IT means better virtual working, however virtual working using video has been slow to take off, and most team members around the world in large multinationals strongly prefer to be physically present at meetings. The paradox is that executives are using video more and more – watching on YouTube and even uploading their own material, but not for live situations.

We are only in the first stages of globalisation. Many senior executives I talk to are already spending 6 weeks a year cruising at 35,000 feet.

They have also been doubling the amount they travel every 2-3 years.

So what happens in the

next

2-3 years?

Answer:

we have to find radically better ways to work across huge distances.

Companies that reduce increase the proportion of virtual team meetings may gain significant

competitive advantage – but only if those virtual meetings become (almost) as effective as meeting face to face.

[youtube:<http://www.youtube.com/watch?v=Mz02lhU-AuE> 300 250]

While we have seen many complex work-sharing and collaboration tools, most people leave the video buttons turned off. The reasons are emotional. Video provides a huge amount of data – not just about the person’s facial expression, but whether they look tired or happy, energised or frustrated. Video tells us whether they

ironed their shirt, or still have wet hair after a shower.

Video shows us the pet running around the room and the children’s clothes hanging over a chair.

It shows us who else is overhearing the conversation.

Huge amounts of data leak across the channel, and that is a reason why people feel vulnerable when the camera is on.

Video also feels unnatural when located only in the board room and rarely turned on.

It is the same with videophones – use is almost zero whether by teenagers or middle aged or elderly users. Yet all are heavy users of YouTube and 100 million people a day upload clips they have just made. People love creating video about themselves – carefully edited to reflect their image, but fear live video will damage that image. It is true that cost has also been a factor, but even when video calls are thrown into a package deal, those cameras almost always stay off.

Green IT means better video linking – for example washing an entire wall with the always-on image of a “sister” office at another location. Remember that the entire cost of a major video link upgrade can be paid for out of saving the long haul flight costs to a single team meeting. It means video equipment where the camera allows true eye contact by being positioned in the middle of the screen.

Green IT means agreeing perhaps with human resources that people can buy their own technology upgrades for things like video linking out of savings in their travel budgets. Travel budgets should be renamed communication budgets because all travel is for one purpose: communication.

Green IT should allow people to cash in air tickets and install state of the art equipment in their

own homes (with built in 24 hour support).

What is the point of wonderful video systems at work when most people have to make calls from home very early in the morning or last thing at night because of time zone differences?

Many CIOs are uncomfortable at first with these kind of suggestions because they fear loss of control and chaos with proliferation of different equipment, plus security issues when it all connects into existing networks.

It is true: such steps need to be taken only with great care, and with guidelines. But the fact is that we can no longer afford to waste huge amounts of money installing videoconference suites which are hardly ever used, and other huge amounts of money (from different budgets) on air travel.

These issues are complex and require a joined up approach from IT, human resources and each team leader.

Wider issues: energy use in mass communication

We can expect some questions about more energy efficient ways to communicate – the web is not always best.

For example, the opening ceremony of the Olympics was watched by over 100 million Americans – of which 10 million did so online using the NBC website. But just think about how wasteful that was.

Satellites were already beaming live video of the event across the whole of America, and the same images were widely available on cable and on terrestrial TV.

An extra 10 million people watching in these ways would have created no extra strain on energy use, apart from viewing equipment in their homes.

But people watching online were forcing point to point data streams across America on a massive scale – watching online is very inefficient.

[youtube:<http://www.youtube.com/watch?v=RTR95zaHTXs> 300 250]

Satellite broadband internet access has been widely promoted as the answer for 10 million rural homes and businesses with few alternatives to getting fast web access. But satellite web may be seen as a last-century solution in the future.

Think about it: a householder near Yosemite in California goes online to order supplies from a store 25 miles away. He sends a signal to a satellite 36,000 kilometres above the earth, which bounces it back to a base station in New York another 36,000 kilometres distant.

Then conventional servers, relays and cables carry the data another 2,800 miles across America.

All that to send a local wireless message.

Light takes significant time to travel those kind of distances – 700 milliseconds each way – so latency delays are a problem which will never be overcome for phone or video calls over the web on these long routings.

Green IT may mean investing in shorter and lower latency web connections using alternatives to satellite broadband, even in really remote areas.

Summary – how green is your IT?

In summary, expect to see many tens of thousands of [innovations](#) to make the digital world more environmentally friendly, most of which will be low cost, easy to implement, and will pay for themselves in a very short time in energy savings.

Green IT will not only reduce cost but can also improve productivity, brand image, market share and team motivation.

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