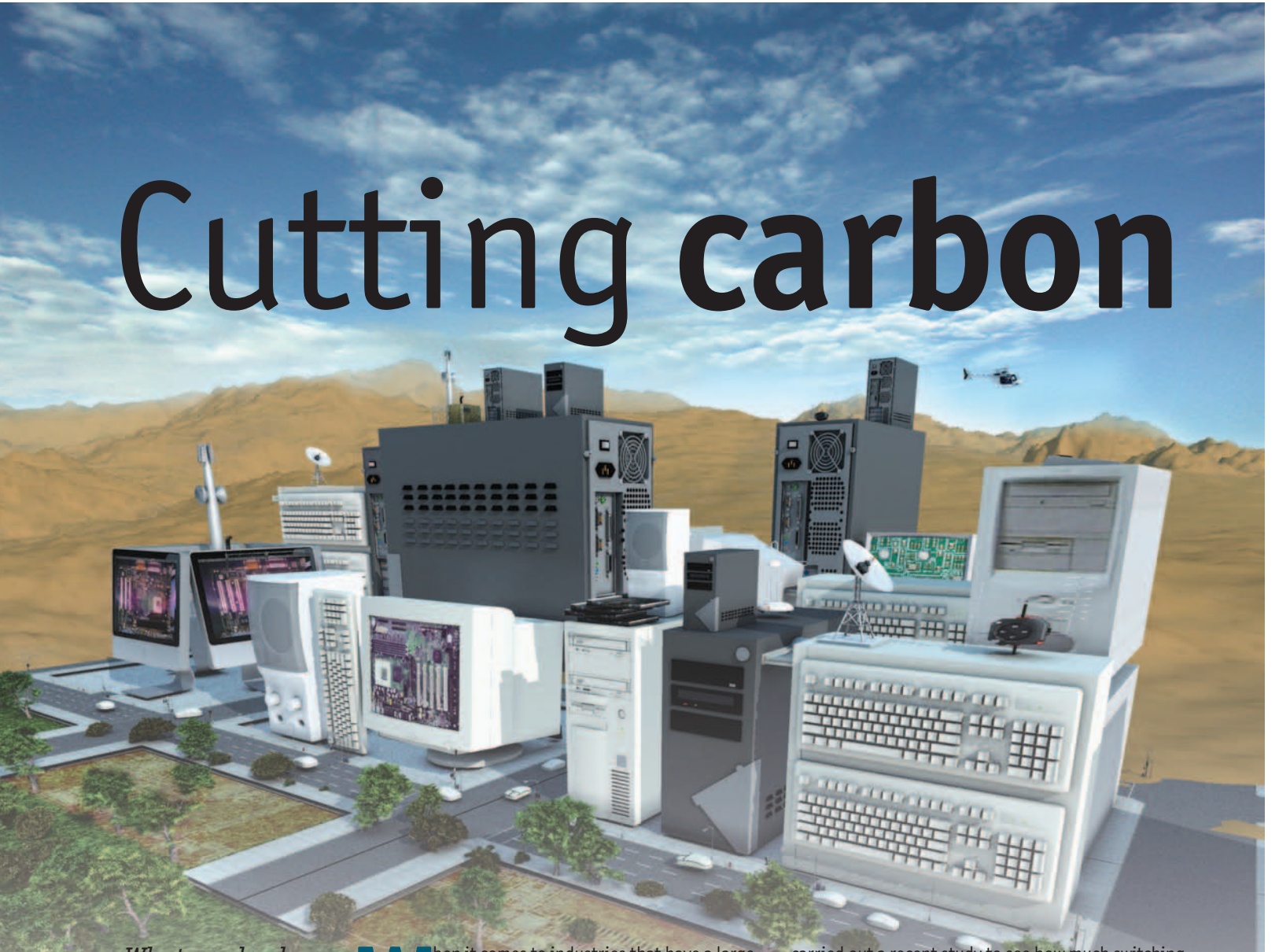
Cutting carbon



What can be done to reduce the IT industry's carbon footprint?

*By **David Boothroyd**.*

When it comes to industries that have a large carbon footprint (CF) and contribute to global warming, surely the IT industry is relatively innocent? Far from it. Research company Gartner recently estimated that IT contributes as much to global warming as everyone's favourite culprit, the airline industry, at around 2% of global emissions per year. Some think IT may be even worse.

A combination of increases in computer processing capacity, demanding more and more power, a vast growth in personal electronic devices, and rapidly growing huge markets in China and India, is making the IT industry distinctly ungreen.

The problem is compounded by bad habits – like hundreds of millions of us leaving equipment switched on or in standby mode. In the US, for example, standby mode – known as 'vampire power' – is estimated at 25W per home, which means it costs consumers $2.7billion a year and requires the equivalent of 2.5 large power plants.

"Generating this electricity produces 15bn kg of CO_2, equivalent to the CO_2 from 2.8million cars on the road, around 1% of all passenger vehicles in the US," says National Semiconductor's Dave Lewis, who carried out a recent study to see how much switching off devices could save.

Personal electronic devices are as bad. He estimates that powering 1000 1W devices for a year generates 5300kg of CO_2 per year – more than the average US car emits in the same time.

The Climate Group recently published a report on global emissions and the Information and Communications Technology (ICT) industry called Smart 2020, which predicts that by 2020, there will be 4bn pcs, 5bn mobile phones and 900m broadband accounts. Emissions from the whole telecoms infrastructure will double in this period.

But not all is doom and gloom. While IT may be contributing significantly to global warming, it is also seen as one of the most crucial tools we have for combating it. The Smart 2020 report opens with this statement: "While the sector plans to significantly step up the energy efficiency of its products and services, ICT's largest influence will be enabling energy efficiencies in other sectors, an opportunity that could deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020."

ICT's ability to monitor and maximise energy efficiency within and outside its own sector means it could save 7.8 giga tonnes of CO_2 by 2020, the report claims. How will it do this? One way is dematerialisation: techniques that replace physical products and services with 'virtual' equivalents like teleworking, video conferencing, and e-paper and commerce.

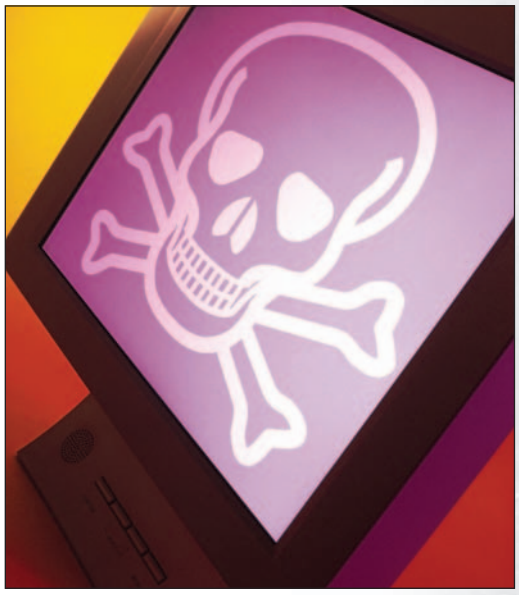
"Using technology to dematerialise the way we work and operate could deliver a reduction of 500m tonnes of CO_2 by 2020 – the equivalent of the total ICT footprint in 2002, or just under the emissions of the UK in 2007," says Molly Webb, the Climate Group's ICT Programme Director.

But the report cites other areas that have even greater potential. This is because the largest contribution by mankind to greenhouse gases comes from two sources: power generation and fuel used for transportation.

"It is therefore not surprising that the biggest role ICT could play is in helping to improve energy efficiency in power transmission and distribution, in buildings and factories, and in the use of transportation to deliver goods," Webb says.

Delivering savings of these levels by 2020 would represent a significant proportion of the reductions to pre 1990 levels that scientists and economists believe is necessary by 2020 to avoid dangerous climate change. The potential cost savings are equally dramatic: nearly $1trillion.

So, the four most important areas to work on, the Climate Group says, are using ICT to put more 'smartness' into buildings, logistics, industrial automation and – the greatest opportunity – electricity grid technologies. To take just the last: in India, better monitoring and management of electricity grids and integrating ICT into the 'energy internet' has the potential to reduce losses by a staggering 30%.



Above:
In the US, it is estimated that 25W per home is wasted by leaving equipment switched on or on standby. To generate this costs $2.7billion a year and produces 15bn kg of CO_2, equivalent to the CO_2 from 2.8million cars on the road.

Another group well aware of both the problems and potential the IT industry has is the British Computer Society (BCS). Its independence from any suppliers or consumers makes it ideally positioned to provide best practice advice on how IT companies can minimise the environmental impact of their business, which is why it established its Carbon Footprint Group (CFG) some 18 months ago.

"There is a lot of what might be called 'greenwash' around at the moment and we wanted to help companies see through that to what really matters," says Bob Harvey of the CFG.

Most IT people now acknowledge that one of the largest carbon footprints in the industry comes from data centres (DCs). IDC has just announced that the amount of energy required by servers and data centres is climbing at a worrying speed and grew by more than 13% between 2006 and 2007. IDC says DC power consumption in Western Europe exceeded 40TWh in 2007 and is expected to grow to more than 42TWh in 2008.

DCs house a company's computer systems and associated components, such as telecommunications and storage systems. They usually also have backup power supplies, redundant data communications connections, environmental controls like air conditioning and fire suppression, and security systems.

The power that DCs need, the heat they generate and the cooling they require can result in huge energy consumption and dissipation. The CFG is tackling this on three fronts.

The first is simulating how a DC works – increasingly being seen as one of the crucial tools in reducing their carbon footprint. Working with the Carbon Trust, it is developing open source software for DC simulation that will be completed in 2009. Another area is the production of a European code of conduct for DCs, due to be published within the next couple of months.

As well as simulation, an equally vital tool for managing carbon footprints is measurement – how to calculate exactly how much different activities in the DC are contributing. The CFG is soon to publish a white paper on this.

Two other areas the BCS is working on involve looking at how the IT industry can help other industries reduce their CF, and how end user devices should be used. For the first, telecommunications has

Below:
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Above and right: *A report by the Climate Group revealed that by 2020 there will be 4bn pcs and 900m broadband accounts. Emissions from the telecoms infrastructure will double in this period.*

huge potential in the form of home working, tele- and video conferencing, and so on. For the latter, it is working with the government, notably the Cabinet Office.

In July this year, the Cabinet Office claimed it was the first in the world to aim to slash the CF of its computer systems.

"ICT is responsible for up to 20% carbon emissions generated by Government offices – around 460,000 tonnes a year," it said. "Under the plan, the Government aims to make energy consumption of ICT carbon neutral within four years."

This will involve Departments taking 18 key steps – some of them being obvious, like automatically switching off desktop computers outside working hours.

"Turning off every desktop pc in central Government for the 16 hours that fall outside the standard working day could save up to 117,500 tonnes of CO_2 per year – equivalent to taking 40,000 cars off the road," the Office said.

Other tactics include reusing as much computer equipment as possible – most of the energy used in the lifetime of a pc is consumed during manufacture, so extending its use can save energy and money – and auditing DCs and server use to maximise efficiency. A server that is switched on but idle uses up to 70% of the power it consumes when fully operational, the Office says.

The Cabinet Office strategy illustrates a key feature of the whole problem of CF reduction: far from being technically difficult, frequently it is actually remarkably easy to make major cuts. The challenge is to change people's habits.

Below: *Research company Gartner recently estimated that IT contributes as much to global warming as the airline industry – around 2% of global emissions per year.*

"One obvious problem we are finding today is that IT directors and management are not responsible for their power bills," Harvey says. "That means any savings they make are not in their budgets. An obvious solution, which a few forward thinking companies are doing already, is to include power in their IT budgets. Simple, and potentially hugely effective."

In fact, the technology now available that has significant potential for energy saving in DCs is not especially complex, as the name of one system suggests – LS Simple, developed by LS Corporation.

LS Simple features Intelligent Power Management (IPM), which includes several components, such as a rack monitoring unit, intelligent power distribution units, and a monitoring software package. The system provides 'micro management' of DCs, measuring power use at a cabinet or power distribution level, and also monitoring the environment in which the equipment is operating: parameters like temperature, humidity, and air flow.

Analysing power use in the light of these parameters provides the potential for significant efficiency enhancements.

"Many DCs today are operated as if you were driving a car without a dashboard," says Keith Ford, corporate account manager for LS. "You would have no idea what speed you're doing or your fuel consumption. Once you do know, you can do something about it and our aim is to provide visibility of what a customer's system is doing. Monitoring of new DCs is improving but there are thousands of unmanaged ones out there and we find they are typically using four times as much power on the environment as on the IT system themselves, so major savings can be made."

LS Simple claims the potential for improvement through the micro management of DCs is vast: Ford estimates that 80% of DCs need to retrofit such systems, while even with new ones, only around a third are considering true IPM.

In 2010, the larger computer users, probably more than 500 cabinets, will be given a carbon footprint budget, and will be required to record and measure their energy usage and send the data to the government.

If they exceed their limit, they will have to trade with others who are under using, so there will be healthy profits to be made for companies who successfully cut their energy use. ■