



# Decarbonating IT

Information technology and  
global commitment to carbon reduction

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# 1

## Executive summary

For CIOs carbon reduction has become a core business issue. From quiet beginnings as a 'nice to have' CSR credential, it has become an indisputable financial issue. There has been a growing realisation that cutting carbon emissions represents a way for organisations to make money and save money, for example by reducing travel and energy use. But for global organisations, a patchwork of national legislation is becoming established that penalises organisations for their carbon impact. The message is becoming clearer than ever: carbon costs money.

This whitepaper seeks to provide CIOs with answers to the most pressing carbon reduction questions. What – if any – were the achievements of the recent Copenhagen Summit and how do they relate to business? What are the different carbon cutting requirements in place in different countries around the world? What steps do CIOs of international organisations need to take to enable them to comply, given the variance of the schemes in place? And how do CIOs use IT to turn carbon reduction into cost savings?

# 2

## Introduction

Carbon is fast becoming a currency that global organisations cannot ignore. With carbon cap-and-trade schemes either being planned or implemented by a growing number of national and regional authorities, the carbon impact of an organisation's operations is becoming a measurable cost. And after the global recession, with the focus still very much on the bottom line, carbon impact management is closer than ever to becoming a universal boardroom issue.

But who, within an organisation, is responsible for mitigating the carbon cost? Certainly, this question does not yet have a straightforward answer. But one thing is clear – however organisations choose to deal with the carbon question, CIOs are bound to be involved. This is because – even if they are not given primary responsibility for managing organisational carbon impact – CIOs will need to ensure carbon reporting systems remain up to date with legislative requirements.

On top of that, there is a growing realisation that ICT itself has a significant role to play in carbon impact management. The European Commission recently announced<sup>1</sup> the information and communication technologies (ICT) sector should lead the transition to an energy-efficient economy.

It called for Europe's ICT sector to:

- Agree on common energy consumption measures
- Overtake the EU's 2020 targets by 2015
- Make innovative use of ICT to make Europe a low-carbon economy

The EC said replacing 20 per cent of European business trips by video conferencing could save more than 22 million tons of CO<sub>2</sub> per year. It also said that broadband facilitating increased use of online public services could save two per cent of total worldwide energy use by 2020.

It is clear that CIOs need at least to know all the facts, if they are to make an informed decision about the role they will play. So where should they begin?

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1. European Union Press Release

# 3

## Carbon emissions and the bottom line

The poster child in the war against carbon emissions has been 'green' energy. But while the likes of hydropower, biomass, wind and solar energy may have a knack of exciting the headline writers, none have yet become affordable mainstream technologies. And while the race to find ways to replace our reliance on 'dirty' fuels needs to go on, the place to look for short-term emission cuts is in energy efficiency. Unglamorous it may be, but 40 per cent of the carbon reduction to be achieved by 2020 and beyond needs to come from precisely this source<sup>2</sup>. And central to the story of how business will meet those targets is IT.

When asked to provide an example of environmental irresponsibility, the airline industry is never far from people's lips. Yet global CO<sub>2</sub> emissions from IT are roughly on a par with those pumped into the atmosphere by planes. What's more, the opportunities to use technology to cut emissions are vast. A recent report notes that IT could contribute as much as 15 per cent of global emissions reductions by 2020<sup>3</sup>.

Of course, the idea of cutting the energy consumption associated with IT is not new. It's a target that has featured in the CSR programmes of big business for some time. What is new however is the growing realisation that an energy efficient approach to IT is far more than a PR tool. Instead it is a bottom-line issue. It doesn't just look good on the corporate website, it can help save serious sums of money. Consider the 15 per cent figure mentioned above. That equates to €600 billion in cost savings<sup>4</sup>.

BT estimates its own carbon cutting programme has been an influencing factor in £1.9 billion worth of bids and tenders it has been involved in. Meanwhile, its environmental programme has saved £400 million over the past five years. Those kinds of figures would excite a chief financial officer (CFO) in any climate, but at a time when the belts of the business community are well and truly tightened, the argument becomes even more urgent.

And while the message does seem to be hitting home with some – 48 per cent of senior executives believe that monitoring carbon consumption helps them improve profit margins, retain customers and win new business<sup>5</sup> – many are still only paying lip service to it. BT believes that this is an attitude that needs to change.

When world leaders met to discuss climate change at the Copenhagen Summit, carbon reduction was one of the topics under discussion. It played a central role in the Copenhagen Accord, which was the key output from the summit (for more details, see sidebar "Copenhagen: implications for global business").

As part of the Accord, countries were invited to submit their own carbon reduction targets by the end of January 2010. Fifty five did so. They include the US, all EU countries and China, as well as major emerging economies such as Brazil, Indonesia and India. Between them these nations emit 78 per cent of the world's greenhouse gases. So although there were notable absentees – Brazil was the only South American nation to volunteer a pledge, and just six out of 55 African countries did so – and although the combined country targets are insufficient to cap the temperature rise at the desired two degrees, this was still an important step on the path towards ultimately achieving a legally-binding global agreement. (Though just when such a step will be taken is another matter.)

Crucially, the Accord also provides for scrutiny to monitor whether or not countries meet their emissions reductions targets – a key point of difference between developing and developed countries throughout the negotiations. Unsurprisingly this was an issue that the US was particularly keen on in relation to China. As *The Economist* put it: "Unless China can be shown to live up to its promises, it will be very difficult to get a climate bill through America's Senate."

# 4

## After Copenhagen

### Copenhagen: implications for global businesses

"It's very disappointing, I would say, but it is not a failure." So said Sergio Serra, Brazil's Climate Change Ambassador at the conclusion of the Copenhagen Summit. This was a view echoed by many, from fellow politicians, to NGOs, to the legion of green pundits in the world's media.

After the summit, there was a feeling that at least a global consensus on climate change was reached. The Copenhagen Accord gives international backing for an immediate global move towards action on climate change. In some ways this is a bigger achievement than the binding commitments that resulted from Kyoto 17 years earlier when the deal only affected developed countries.

So what exactly did they agree to? There were three key components:

1. Backing for an overall limit on global warming of two degrees;
2. Agreement that all countries need to take action on climate change;
3. The provision of \$30 billion of immediate short-term funding from developed countries over the next three years to kick-start emission reduction measures and help the poorest countries adapt to the impacts of climate change; as well as a commitment by developed countries to provide long-term financing of \$100 billion a year by 2020.

2. *The Age of Smart*, Chris Tuppen, BT, 2010

3. 'SMART 2020: Enabling the low carbon economy in the information age', available at [www.smart2020.org](http://www.smart2020.org)

4. 'SMART 2020: Enabling the low carbon economy in the information age', available at [www.smart2020.org](http://www.smart2020.org)

5. BT Global Services Enterprise Intelligence survey.

# 5

## Local action – a snapshot of carbon reduction activity around the globe

While some hope the Copenhagen Accord will pave the way for binding global targets to be agreed at the follow-up conference in Mexico in December 2010, a quick look around the world reveals significant differences in the scale and ambition of the measures in place. For some, governments, rather than international bodies, are the most effective vehicle to bring about change. However, such a fragmented approach can lead to a more complex global picture for CIOs and senior executives seeking to meet requirements in every country in which they operate.

### USA

Barack Obama swept to power on a wave of optimism, not least among the green movement. Change, though, has been elusive. And with the recent election of Republican Senator Scott Brown, the Democrats lost the majority they needed for ultimate control of their legislative agenda. At some point over the next few months the Senate will decide whether to approve or reject legislation to set up a cap-and-trade system. Many believe this would have more impact than any international conference on the future levels of greenhouse gas emissions. (Where America leads, others follow.) Yet its passage into law is now by no means certain, at least not in its existing form. President Obama has pledged to cut absolute carbon emissions by about 17 per cent below 2005 levels by 2020.

### China

Fast catching up the US when it comes to per capita annual emissions, the world's new superpower has pledged a reduction of between 40 per cent and 45 per cent by 2020 in the level of its "carbon intensity" – the amount of carbon emitted in proportion to output. It is hard to tell how big a change the Chinese promise represents from business as usual, certainly there was scepticism from many in the US camp, but China has nevertheless made strides in recent years. Importantly however, like the rest of the developing world, Beijing's efforts will only result in a slowing of carbon emission growth, not an absolute reduction.

### India

Similarly, India pledged to reduce emissions growth by up to 25 per cent from 2005 levels by 2020. However the process of implementing change through the governmental system in India is made more difficult by the fact that it has a federated system in which the states retain considerable power. (By contrast, China has no such issues.)

### Australia

Australia is in the process of putting the Carbon Pollution Reduction Scheme through the legislature. It is designed to promote renewable energy and will also see the introduction of a cap-and-trade scheme. The original plan was for it to come into force in mid-2010. However, echoing the state of play in the USA, it is currently stalled in the Senate. An interesting footnote to Australia's efforts is the recent creation of an Australian Carbon Trust, very similar to a body<sup>6</sup> of the same name in the UK.

### Saudi Arabia

Saudi Arabia is an interesting case due to its abundance of fossil fuels. Perhaps unsurprisingly it has been a vocal supporter of carbon capture and storage (CCS). It is angling for the technology to become a Clean Development Mechanism-approved methodology. The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing industrialised countries to invest in ventures that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries.

### EU

The EU has pledged to cut its carbon emissions 20 per cent below 1990 levels by 2020, and to cut 30 per cent if other nations further their reductions. It already runs the EU Emission Trading System (EU ETS). Focused on large industrial polluters, it is the largest multi-national cap-and-trade scheme in the world.

### France

Other than the UK, France perhaps offers the most advanced action on climate change in the world. The 2005 Energy Law was aimed at cutting carbon emissions, setting down a target of 75 per cent by 2050. One of the other main outcomes of the legislation was the Grenelle Environment Programme. 2007's Grenelle conference and consultation exercise resulted in 200 recommendations for action on everything from agriculture to waste management to renewable energy.

### Germany

Germany has a target to cut emissions by 40 per cent against 1990 levels by 2020. It has put in place an integrated energy and climate programme, which has 29 measures to meet that target. It is one of the only European countries that has kept on track to meet its Kyoto commitments.

### UK

The UK has possibly gone further than any other nation in passing carbon reduction legislation. For some time now, big polluters, such as the manufacturing sector, have had to comply with laws on achieving energy usage targets. From 1 April 2010, however, less energy-intensive organisations will also have to start looking at lowering their emissions too.

The Carbon Reduction Commitment Energy Efficiency Scheme (CRC) is a new cap-and-trade programme. Managed by the UK government's Environment Agency, it forms part of the UK Government's commitment to reach its 2020 and 2050 emissions targets.

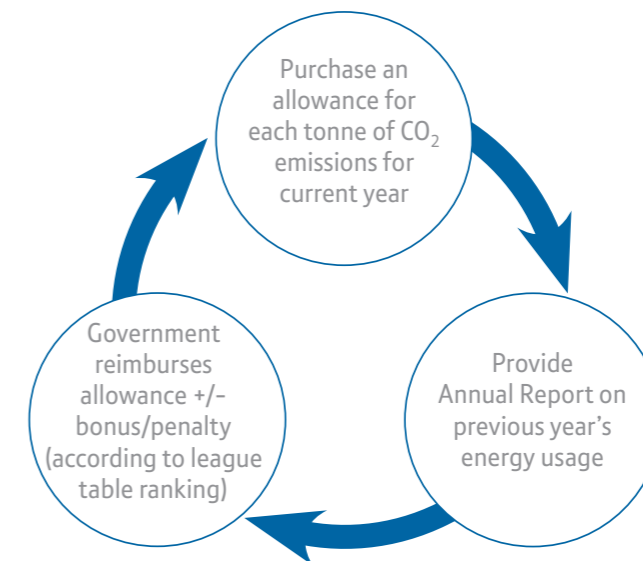


Figure 1: Carbon Reduction Commitment Yearly Cycle, Analysis Mason.

6. For more information, see <http://www.carbontrust.co.uk/>

Companies will be required to measure all electricity, gas, and oil use (excluding transport and travel). They will then purchase allowances equal to their annual emissions. Within that overall limit, individual organisations can decide on the most cost-effective way to reduce their emissions. Just like most cap-and-trade schemes they will then have the ability to buy extra allowances or invest in ways to cut the number of allowances they need to buy.

A league table is then created, with credits being handed out based on that year's performance. An organisation at the top of the table will receive repayments totalling more than has been paid for the allowances in the first place, while those at the bottom will receive repayments that are less than the amount paid out. In other words, organisations in the bottom half will lose money. Analysys Mason estimates that for the biggest companies, being ranked at the bottom of the table could amount to a financial penalty of over £120,000<sup>7</sup>.

#### UK: Carbon Reduction Commitment – key facts

##### Who is affected?

The scheme is designed to tackle CO<sub>2</sub> emissions not already covered by Climate Change Agreements and the EU Emissions Trading Scheme. It will cover large public and private sector organisations, which are responsible for about 10 per cent of the UK's emissions. This will affect around 20,000 organisations because all of those that have a half-hourly meter will need to measure and report their emissions in year one to establish whether they are a full participant in the scheme. Around 5,000 of these, it is estimated, will be full participants and will need to buy allowances each year.

##### What are the criteria for inclusion?

The CRC is targeted at large non-energy intensive private and public sector organisations within the UK, whose combined electricity use through half-hourly metering exceeds 6,000 MWh per year. Likely participants will include supermarkets, water companies, banks, local authorities and all central government departments.

##### Are there any exemptions?

Emissions covered within the EU-ETS (EU Emissions Trading Scheme) and CCAs (Climate Change Agreements) are exempt. Subsidiary organisations with over 25 per cent of their emissions within CCAs will be exempt.

##### Is the scheme likely to be extended to lower-emitting companies?

There has been no official word on this yet but some believe an extension to the scheme is likely. Quocirca analyst Clive Longbottom: "The UK has some of the most stringent carbon reduction targets on the planet, and the only way it can hope to meet them is to extend the reach of the CRC scheme beyond its current boundaries."<sup>8</sup>

7. Analysys Mason's Carbon Reduction Commitment Brochure ([http://www.analysismason.com/PageFiles/13899/Carbon\\_Reduction\\_Commitment\\_Brochure.pdf](http://www.analysismason.com/PageFiles/13899/Carbon_Reduction_Commitment_Brochure.pdf))  
8. <http://www.computerweekly.com/Articles/2010/01/22/240048/carbon-reduction-brings-financial-benefits.htm>

## How IT can cut enterprise costs

Several technologies are leading the way in helping businesses save hundreds of millions of pounds in the process of cutting their emissions.

#### Green data centres

One of the most exciting is data centre virtualisation, a technology that slashes the number of servers required to run your organisation. In the case of BT, data centres used to account for a significant chunk of the company's carbon emissions. However the average server is utilised at a tiny percentage of its overall capacity. By 'virtualising' these servers, or by asking each server to carry out an increased number of tasks at the same time, utilisation shoots up, and this means the number of servers needed slumps. In one of BT's data centres, the number dropped from 1,500 to around 100, saving £600,000.

Large numbers of servers create lots of heat which, in turn, means the need for power-hungry air conditioning systems. BT has redesigned its data centres to allow fresh air to cool servers. Air conditioning is only used on the rare occasions when the temperature reaches 28°C or above.

#### Flexible working and home working

Flexible working and home working are more familiar approaches to cutting power use (and improving productivity) yet many organisations still make little use of them. At a time when there's an ongoing pressure to find cost savings, there's a strong argument to take a fresh look at the efficient use and potential rationalisation of building space.

BT's own results make a persuasive case. By enabling over 13,700 employees to become home workers the company saves €750 million a year in property management costs.

#### Conferencing and collaboration tools

Using conference calls to replace face to face meetings has had similarly dramatic effects within BT, saving the company an estimated £183 million in 2008 and saving over 50,000 tonnes of CO<sub>2</sub>.

9. For more information, see BT Work Anywhere Quick Start

Collaboration technologies have the same effect, allowing people to work together without the need to travel to the same location.

#### Illustration: Comparison of emissions for a typical 200-server Windows estate

This illustrative comparison shows the major impact virtualisation and data centre energy efficiency can make to CO<sub>2</sub> emissions.

##### 1. Impact of virtualisation

- Non virtualised: 130KW (~610 tonnes CO<sub>2</sub>)
- Virtualised: 24-50KW (~112 – 130 tonnes CO<sub>2</sub>)
- Virtualisation can reduce power consumption by between 66 per cent and 82 per cent.

(Assumption: Average data centre Power Usage Efficiency\* of 2.4)

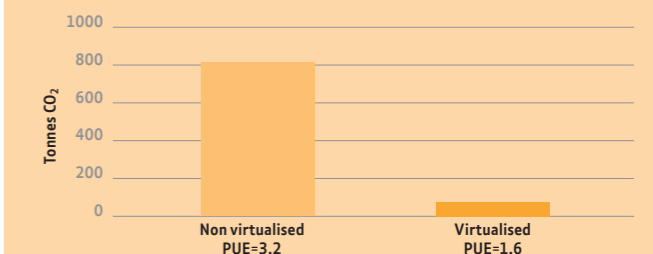
##### 2. Impact of data centre efficiency

- The difference in energy consumption between an inefficient data centre and an efficient one can be as much as 50 per cent.

(Assumption: PUE range from 3.2 to 1.6)

##### 3. Combined impact:

Best and worst-case CO<sub>2</sub> emission scenarios



- Potential energy saving/CO<sub>2</sub> saving ~91 per cent

\* Note: PUE is the industry standard energy efficiency measure for data centres

# 6

## The smart network – a vision of the near future

For many years IT crystal ball gazers have spoken about 'smart' networks – IT and communications networks designed to automatically provide only as much energy as is required. Finally we are starting to see them emerge – the UK government has plans to roll out 'smart' energy meters to allow people to monitor their own energy consumption.

Below BT's Chris Tuppen paints a picture of a near future where the smart network is in use throughout the work and home environment.

'You get up from your desk – as you stand up and walk away – the screen powers down. But of course it's not 'your desk' – no one has their own desk any more. And no one has a computer – all the intensive computing is done in mega, highly efficient data centres built near sources of renewable electricity. As your screen powers down the data centre immediately re-allocates its server capacity over to another user. No more computers that took lots of energy to make sitting round doing nothing any more.

You walk down the corridor towards the car park. It's a dark corridor but as you walk LED lights gradually brighten in front of you and dim behind – you walk in a halo of light.

At the car you are joined by a colleague from the car pool who had been notified you were leaving. You get in your electric car. Not something that looks like a converted milk float but a fashionable, comfortable vehicle.

As you drive home your mobile, with built in GPS, is constantly communicating with your home. Your home is extremely well insulated and very smart. The roof is covered in photovoltaic cells, the walls are made from materials that absorb heat when it's hot and release it when it's cold. The building knows the weather, it knows when you will arrive, it knows how much solar heat it's received today, how much electricity it has generated and how much it sold onto the grid. It knows you usually have a shower when you get in, it knows which rooms you will use and it starts preparing them for your arrival. There is a neighbourhood heating system fed from a massive ground-source heat pump.

You are proud of the community in which you live. You are the top community in the region in the smart living index which is based on real time data feeds on energy consumption, transport use and local food production. As you drive, your home starts preparing for you to arrive home.

You arrive home, having dropped off your colleague, plug in your car to charge up. You have your shower and as dinner is cooking you have a weekly video link up with your parents and two sisters.

Though your parents are frail, they live in their own home. In the past few years health and social care have been transformed. Sensors check people's activity and state of health. Regular checkups are undertaken using remote diagnostics. Health problems are detected far earlier leading to a much more efficient, and therefore low carbon, health service which is now, more accurately, called a wellness service.

As your day comes to an end you head for bed, there are no switches and the house lights and heating simply dim behind you. Towards the end of the night the wind drops as a high pressure system arrives and the power company buys back some electricity out of your car battery to keep the grid stable.'

Taken from The Age of Smart by Chris Tuppen, Chief Sustainability Officer, BT

# 7

## Top tips: what should a CIO do today?

CIOs are at the heart of the emissions reduction story. Information technology is not just a huge energy consumer but can also play a role in reducing energy use and cutting costs in other areas of the organisation. But what are the first steps CIOs can take today to ensure they are prepared to lead the way in cutting their carbon impact, as soon as it becomes a bottom-line issue within their organisation?

### 1. Build environmental responsibility into your distributed organisation

As organisations have globalised in recent decades, they have had to face the challenge of maintaining a common corporate culture, irrespective of geography. They now face the same challenge in their attempts to engender a sense of carbon impact responsibility across the business. Concerted and consistent education, support and encouragement are needed to ensure people are aware of what is expected of them, and that they actually exhibit the desired behaviour. But this message needs to come from the top down – the CIO needs to lead the way.

### 2. Ensure the right systems and processes are in place

A group-wide function should be put in place to capture, manage and report all the data related to IT use in the business. Work with facilities management, environmental management and finance, because they will each potentially be affected by legislation as it is brought in around the world. With more countries looking to enshrine environmental commitments in law, there is an increasing need to display accountability at the highest level of the organisation. Simply storing information on a spreadsheet will no longer suffice.

### 3. Redefine the workplace

The vast majority of action on climate change so far has focused on energy use. Surprisingly there has been very little emphasis on travel, whether between business locations, or from home to the traditional workplace. In the UK, for example, approximately 25 per cent of all emissions are travel-related. Promoting technologies that can replace the need for travel (while also saving huge sums of money), by enabling people to meet virtually or work nomadically, is something that CIOs can be doing at board level.

# 8

## BT's expertise

As a global business you understand that concerted action to tackle your emissions is now a bottom-line issue. Understanding the level of emissions your company's IT operations produce is an important first step. BT has developed a service called the Carbon Impact Assessment for exactly this reason. It measures the emissions of people, buildings and external IT services, and provides recommendations on how to achieve reductions.

- **People:** When we consider your employees, we look at what types of workers they are (home, mobile, office-based) and calculate the full scope of their energy consumption from lighting, to travel to IT resources.
- **Buildings:** This part of the assessment looks at your buildings and the contribution each makes to carbon impact through heating, lighting and the use of equipment.
- **External IT Services:** Finally we examine the carbon impact of services that may be shared or even outsourced.

BT can also help you implement technologies – such as flexible and mobile working – that save you money, enhance workforce productivity and reduce your carbon footprint. Equally we offer data centre services that reduce cost, improve flexibility and help organisations manage exposure to carbon legislation.

If you would like to know more about any of these services, please contact Ninder Takhar ([ninder.takhar@bt.com](mailto:ninder.takhar@bt.com)) or visit: [bt.com/globalservices](http://bt.com/globalservices)

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