

# The green

**I**nformation Technology has planted itself firmly at the heart of all modern businesses and has become inseparable. From the moment you wake up, until the moment you go to sleep billions of transistors, sensors, control systems, software applications and business rules shape your day.

Gone are the days where a mechanic would diagnose a problem with your car by opening the car bonnet or hood to remove the distributor cap, or a bank manager would decide whether to grant a loan based on his or her local knowledge of an individual or their business.

These manual processes have all been replaced by automated systems running almost entirely in tiny wafers of silicon and germanium. Some would say for the better, some would say for the worse. It depends if you are sat waiting for a breakdown truck because you don't have a laptop with an RS232 interface cable and a copy of the engine management diagnostic software, or the ability to reason with a live human being who can see through the credit scoring, risk weighting and loan-to-value ratios sent through from head office.

The pessimist might argue that we have taken a step back, whilst the optimist might argue that we have made progress, but few would now want to be without the luxuries we have been afforded in the modern era such as mobile phones, satellite navigation, online banking, Internet shopping and the ability to carry around 40,000 MP3's and a blockbuster movie in a device no bigger than a pack of cards.

For some people the electronic, virtual world is far more "real" than the real world. Do you see yourself as "The immortal Dark Prince of Azeroth, raider of the Burning Legions", or "Keith the Regional Accounts Director of Firetop Mountain" who gets anxious when his blackberry doesn't receive any emails for 20 minutes? Either way technology has become interwoven into our lives, even if you don't regard yourself as a geek.

## The evolution of energy efficiency

Who would have thought ten years ago that energy efficiency and carbon reduction would be a big enough issue to justify the United Nations holding a conference about climate change?

Just as manufacturers were starting to attach "Energy Star" logos to flat screen monitors to persuade us to replace our old CRT versions with less power-hungry models, Intel engineers were busy developing a range of portable office heaters they would later name the "Pentium 4".

Nobody had seemed to notice how much our power requirements for completing the same day to day tasks had gone up. During the 90's it was much cooler to have your own personal paper clip to ask you if you were writing a letter ever time you started a new document than to worry about polar bears, ice caps and the fact that we might all look like David Dickinson from Bargain Hunt by 2020.

So how did we get here? In 1993 the original Pentium processor consumed roughly 9 to 12 Watts of power, followed by the Pentium II in 1997 consuming roughly 16 to 43 Watts and in 1999 the Pentium III processor which ran between 16 and 42 Watts (Depending on processor speed and manufacturing process).

In 2000 and 2005 it all starts to go horribly wrong and we see the "Pentium 4" and the dual-core "Pentium 4 D" using up to 115 Watts and 130 Watts respectively.

Once you add on all of the other associated chips on the motherboard, graphics cards, network cards, sound cards, memory and hard-drives the situation starts to look really grim.

Based on this Pentium 4 model, each PC could be using up to 200 Watts of power, for up to 168 hours a week, which by modern figures would be creating roughly 992.41 Kg of carbon per year, and using 1747kWh of electricity per year, which in turn would cost £244.61 per year

(assuming 14p per kWh and 568g carbon produced per kWh, as per UK L2 building regulations calculations).

In addition to this for every 3Watts of energy/heat produced and average air conditioning system will draw another 1Watt of electricity to remove it, giving us another 330kg of carbon and 582kWh of additional electricity at an additional cost of £81.53 per year.

## What have we achieved so far

The good news is that we have the Intel Atom, the Via Nano, AMD's Cool-n-Quiet, Intel's SpeedStep and ACPI power management.

The mistakes made with Intel's "Netburst" architecture which left the door open for AMD's faster, more efficient processors a few years ago have led to improvements in multi-core processors, processor efficiency and power saving technologies which allow modern processors to turn off or power-down sections of the processor when not in use.

Just as Intel's "Netburst" architecture became the "Net-bust" architecture and was abandoned in 2008. "Moore's Law" the theory about cramming more and more components into the same space ran out of steam when atoms and electrons refused to be squashed any further. The IT industry had started to loose it's appetite for single-core processors that get increasingly hotter and power-hungry as speeds increase.

You could argue that the physical limits to how far you can push a single piece of silicon came to a dead-end roughly five years before people realised it was the wrong road to be taking anyway. Faster is sooo "last year", out is the new up.

## The carrot and the stick

So why would I want to go green anyway? Apart from the obvious savings in electricity and cooling re-using and re-purposing existing equipment is much

# IT agenda

## The author

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more environmentally friendly than buying new low-energy computers. Recent figures from computer recycling charities show that 75% of all the energy a device will consume over its lifetime occurs during the actual manufacturing process.

And the stick might be initially introduced to you as a CRC "Carbon Reduction Commitment" if you are a public or private sector organisation that is metered half-hourly as 20,000 organisations currently are, or exceeded 6,000 megawatt hours of energy consumption during 2008 as 5,000 organisations currently are (including all subsidiaries).

The fines, or penalties if you prefer to call them will run into millions of pounds for most of the organisations caught up in this legislation in 2010, however other legislation such as the FIT or "Feed In Tariff" will actually reward organisations who reduce their dependence on "dirty" energy, in favour of renewable energy sources such as solar and wind.

## What is the business case for green IT?

- Reduced cost
- Reduced complexity
- Reduced management overhead and server sprawl
- Extending the useful working life of existing equipment
- Taking the carrot
- Avoiding the stick

## Where do we need to be in two years

- Re-using existing equipment instead of scrapping it
- Increasing the use of Terminal Services, Citrix/Xen and VDI
- Building our own internal clouds to consolidate compute and storage
- Developing legislation to encourage remote working
- Developing legislation to clarify the position on data security in the cloud

## Where do we need to be in five years

- Investing in low power thin clients based on Atom, Nano and ARM processors
- Extending the cloud across other business processes or creating a hybrid
- Making part-time or full-time remote working the norm to reduce CO<sub>2</sub> from cars
- Developing legislation to bring disenfranchised workers back into the economy
- Bringing into law clear legislation to offer a carrot for introducing Green-IT

## Where do we need to be in ten years

- Treating the IT services as just another utility like electricity, gas and water
- Introducing the stick for organisations that do not show corporate responsibility
- Teaching our children how to be business solution architects, not computer users
- Growing up and taking responsibility for our excessive lifestyles (One Planet Living)

## The real issues moving into the next decade

In one sentence: Resistance to change and self preservation.

In the cold light of day the truth might simply be that less people need to be involved in the technical "nuts-and-bolts" of IT as Cloud Computing Everything-as-a-Service becomes more prevalent, and the softer skills such as business strategy, businesses process and business project management become more prominent.

The love affair with "My Computer" may also be short lived as people demand ubiquitous access from everywhere, from anything. Our children may laugh at us when we tell them we had a quad core 3Ghz PC on each desk even though we could only type with two fingers at a time.

The future of the computer or "Mobile Internet Device" may actually lie in the hands of the ARM processors found

currently in many embedded and mobile devices. These ARM processors sport amazing battery life and power-consumption statistics and can already run WindowsCE, Linux and some of the newer Internet-centric operating systems being developed.

We may have to learn new skill-sets, and we may have to embrace new technologies and hardware devices if we are to remain in a job.

The good news here is for the many part-time workers, mothers with small children, physically disabled and other disenfranchised workers who need not be excluded from a new era built on Cloud Computing and home working.

## Summary

In 500BC the Greek philosopher Heraclitus wrote "Nothing endures but change", which in a twist of irony was then edited by Issac Asimov on Heraclitus's wiki to read:

"The only constant is change, continuing change, inevitable change, that is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be".

**As part of his involvement in the strategy, Jason is gathering case studies for use in the report concerning existing projects in the public sector that demonstrate energy efficiency, carbon reduction and use of renewable energy as part of an overall Green-ICT strategy.**

**If you are a product vendor, solution provider, project leader or architect working on a green ICT project in the public sector and would like to provide a case study as an example of a tried and tested solution, or best practice example for other public sector bodies to follow please send a brief summary to Jason Meers at [jason.meers@bcs.org.uk](mailto:jason.meers@bcs.org.uk).**