intellect
REPRESENTING THE UK TECHNOLOGY INDUSTRY

High Tech: Low Carbon

The role of ICT in tackling climate change
Case study directory: Index and summaries

Contents

For full case studies please visit www.intellectuk.org/casestudies

Introduction

In February 2008, Intellect published a report, High Tech: Low Carbon, which was effectively a statement for the technology sector*. It explored the critical role that technology can play in reducing energy use across the economy. It started by examining the sector's own products and services and addressed a number of problems like proliferation, standby and rapid obsolescence. The report then went on to explore the ways that technology helps other sectors to become more efficient, firstly by enhancing existing processes to make them more efficient (so that people can do the same things they already do but more efficiently) secondly by enabling new processes (so that people can do things in different ways) and thirdly, by transforming behaviour through virtualisation (doing different things altogether and creating new, low-carbon business models). It concludes that innovation and the intelligent use of technology provide two possible solutions to climate change, and that everything possible must be done to accelerate their development and implementation.

The report was accompanied by a number of case studies that provided evidence to back up the points we were making. Since publication, this set of case studies has been expanded and now comprises around a hundred different examples. This document effectively draws together all of our case studies into a single digest. Each one is summarised into a short paragraph. Longer versions can be found on Intellect's website.

The case studies enclosed are also indexed in three different ways, to make them as accessible and useful as possible: by alphabetical order of title, by sector and by technology type (see above).

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*For the purposes of this document, the technology sector comprises the Information and Communications Technologies (ICT) and Consumer Electronics (CE) sectors, including electronics manufacturing, defence and space-related IT. These broad titles, however, disguise a wide range of environmental offerings that include, to name but a few, virtual conferencing and collaboration tools, satellite broadcasting systems, intelligent transport systems including transport telematics, logistics and satellite navigation tools, building and energy management systems, photovoltaics, in-silico modelling, testing and CAD and carbon auditing and accounting systems.

Index 1: Intellect case studies by title

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Index 2: Intellect case studies by sector

This index is sectoral and groups the case studies under the sectors that they most readily apply to. Sectors include agriculture, buildings, consumer electronics, energy supply, forestry, ICT, public sector and transport. Some case studies are truly cross-sectoral and are listed accordingly.

Index 2: Intellect case studies by sector

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Transport Substitutes	BT: Flexible Location Working in Westminster
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Index 3: Intellect case studies by technology type

This third index lists the case studies by type of technology and reflects the structure of our report "High Tech: Low Carbon – the role of technology in tackling climate change". Those case studies listed under best practice illustrate improvements we have made to our own products and services through the three phases of design, manufacture and use. The next section includes the rest of the case studies which all demonstrate how the intelligent application of technology across other sectors is delivering energy savings and emissions reductions over the wider economy. These case studies explore enhancing, enabling and transforming technologies in turn. These categories are not definitive; many technologies apply to more than one category.

Section 1: Best Practice These case studies listed under **best practice** illustrate improvements we have made to our own products and services through the three phases of design, manufacture and use.

Index 3: Intellect case studies by technology type

Section 2 – Demonstrating how technology can deliver efficiency savings across the wider economy

These case studies all demonstrate how the intelligent application of technology across other sectors is delivering energy savings and emissions reductions over the wider economy. These case studies explore enhancing, enabling and transforming technologies in turn. These categories are not definitive; many technologies apply to more than one category.

2A: Enhancing Technologies

Enhancing technologies enhance existing processes – they help us do the thing we already do but more efficiently.

Index 3: Intellect case studies by technology type

2B: Enabling Technologies

Enabling technologies enable new processes – the allow us to do things in different ways, yet achieve the same or better outcomes.

2C: Transforming Technologies – technologies that change what we do altogether

Full case studies available at www.intellectuk.org/casestudies

1E: Nightwatchman and Peterborough City Council

NightWatchman is a computer programme that enables computers that are left on but not in use to be switched of centrally, safely and remotely. Peterborough City Council has 4,500 staff and estimated that 30% of PCs were being left on when not in use, costing the authority between £40 and £60 per machine. Even after an education programme, machines were still being left on because staff found it hard to differentiate between stand-by and off-modes. The Authority recently implemented the NightWatchman software solution, supplied by 1E, across its entire ICT infrastructure. It achieved a return on investment within 3 months, cost savings of £50,000 per annum and a reduction of 250 tonnes of CO2 emissions per annum.

ACIS and The Bridge: Intelligent Transport Systems

ACIS is implementing Intelligent Transport Systems in Dartford, UK to encourage the use of public transport. The system currently being adopted provides residents with an electronic display in their homes which tells them when the next bus will arrive. Buses also use TLP (traffic light priority) to improve speed through traffic lights and bottlenecks if necessary, improving reliability and regulating the service.

AMD: PowerNow! Technology

AMD PowerNow! Technology is a power management solution integrated into AMD Opteron processors that helps to reduce CPU (central processing unit) power consumption in servers by 15% and up to 40% at idle. Correspondingly, this also lowers the electricity consumption of the cooling equipment. The result is increased performance by Watt because power and cooling requirements are reduced. Combined with other technologies, such as AMD CoolCore technology (which shuts off the flow of electricity to sections of the processor when not in use) energy consumption can be decreased even further. These systems should be implemented in as part of a holistic process of energy management– i.e. in data centers which have already been reorganised, i.e. unnecessary hardware removed, the system consolidated and virtualised.

Apsys: SIMLOG and system analysis

With much confusion over which system architecture has the least life cycle cost and lowest carbon emissions, Apsys has developed a new model. Over the last 15 years APSYS has developed and supplied an Integrated Logistic Support (ILS) software tool called SIMLOG. The main functions of SIMLOG are maintenance optimisation and life cycle cost (LCC) assessment. What makes this new module different is that it calculates the carbon emissions of a system and its maintenance and enables users to identify which system architecture and which maintenance options have the lowest carbon footprint and to select the most energy efficient option. Furthermore, it enables the carbon emissions for each option to be costed per tonne, and provides a metric for life cycle cost assessment.

Atkins: Transport Modelling in Scotland

Atkins has developed sophisticated modelling tools to enable transport planners and decision makers to identify and implement transport strategies with the least environmental impact. These calculate operational emissions from the transport network, using inputs from traditional transport models as well as taking into account additional factors such as local trips, behavioural change programmes and financial incentives. The tools are helping the Scottish Government to assess the effectiveness of different policy options in reducing the contribution of transport to climate change.

BAE Systems: IVHM – Round the clock MOT for military vehicles

IVHM or Integrated Vehicle Health Monitoring is a pioneering system being developed by BAE Systems in partnership with Rolls Royce, Thales, Boeing, Meggitt and Cranfield University. Simplistically it joins together a chain of maintenance and support technologies which detect faults in military vehicles before they cause damage. As a result maintenance is done when needed, servicing and replacement requirements become more predictable and the likelihood of catastrophic failure is much reduced. Fault sensors, corrosion sensors and acoustic crack detectors monitor the condition of vehicle parts, radar systems monitor engines for foreign bodies and performance and intelligent fault diagnostic technologies (IFDT) use software tools to diagnose faults. The information is communicated to maintenance crews via a logistics infrastructure. The system will dramatically improve efficiency by optimising vehicles, parts and labour but will also save many millions of pounds a year.

Best Foot Forward: Scenarios in Sunderland

Best Foot Forward undertakes cost benefit and carbon analyses for a wide range of bodies, many within the public sector, on the implementation of green technologies. One recent project with the GLA calculated whether there would be a financial benefit from adopting electronic conferencing. They were able to demonstrate that adopting video conferencing technologies would deliver very substantial cost savings and as a result it has since been successfully implemented. Another project in Sunderland explored different emissions reduction scenarios and identified a best case scenario (i.e. the one with the greatest overall reduction in CO_2) in which the emissions from ICT actually increased by more than 4000%. The reason for this was that the emissions from ICT were tiny in relation to the savings it could deliver so that even after this dramatic increase the footprint of ICT was still only 0.2% of the whole. This particular scenario used ICT to provide an online solution that reduced travel by 50%, equating to an overall CO_2 reduction for the organisation of 30%.

BT: Electronic Conferencing

BT implemented electronic conferencing to reduce travel and improve productivity. Video, phone and web-based conferences were introduced across the organisation to replace face-to-face meetings. This new approach to conferencing has eliminated 300,000 face to face meetings and 1.5 million journeys made by BT staff. In the UK alone BT reduced their CO_2 emissions by 47,700 tonnes in one year. Electronic conferencing is playing a key role in helping BT achieve its own challenging emissions reduction targets.

BT: Flexible Location Working (FLoW) in Westminster

Westminster City Council wanted to introduce desk sharing to use their office space more efficiently and worked with BT to deliver flexible working. Three workstyles favoured by the Council were Flexible Office Worker (someone working from the office but sharing a desk), Frequent Home Worker (someone who worked from home at least one day a week), and Fixed Desk Worker (who did not share a desk). The principle barriers were not technological but cultural and behavioural, but the excellent business case of £3 million savings in two years provided a good incentive to drive the project forward.

Opting for a 70% desk:staff ratio freed up flour floors of space in City Hall which could then be sub-let, funding a full refurbishment of office space for the 2,000 employees still based there. Next steps are to turn attention to other council buildings across the borough. BT were well-equipped to advise Westminster – their flexible working programme was one of the largest implementations of its kind in Europe and saves the company around £500 million a year in property costs. BT has also achieved an amazing 99% return from maternity leave and extremely high staff retention rates.

BT: Optimising IT Infrastructure efficiency in Edinburgh

The City of Edinburgh Council provides a range of services from more than 70 principal locations to 480,000 citizens, businesses, and organisations in Edinburgh and Lothian. In 2005, the City of Edinburgh Council embarked on a service-led IT transformation programme with its outsourcing partner BT. The result was a virtuous circle with reductions in service costs leading to efficiencies, which then generated further opportunities, leading to more service improvements. In addition to significant cost saving (£6.4 million over 5 years and dramatically improved service, there were a wide range of environmental benefits, for instance reduction in office space and associated heating and lighting as 2,500 information workers were moved into one building from 18 sites. The redundant sites were then sold, generating capital receipts of £40 million.

Capula: Real Time Emissions Monitoring

Emissions by power generators in the UK make up a substantial proportion of the UK's total carbon emissions. Capula is implementing its OSIsoft solution for power generators. Currently, information on environmental compliance is only available on a monthly basis, and issues are therefore managed reactively. The OSIsoft solution provides real-time, continuous information on emissions which is analysed and presented to operators and managers. The approach combines automation control, real-time data and business applications. It bridges traditional divisions between engineering, commercial and regulatory activities. The result is that generators are much better informed and can identify problems and implement changes immediately. This improves compliance with emissions targets and contributes to optimising carbon performance in energy generation.

Cisco: TelePresence video conferencing

Cisco TelePresence is a remote conferencing tool that makes a virtual meeting seem like a physical one, using state of the art technology with life-size images, high-definition video, and spatial audio. Users feel as if they are at the same table with remote participants, everyone communicates in real time, with no delay, catching every comment and every nuance of the conversation. The industry-leading high-definition video means that every expression and every gesture is now clearly visible, whether participants are meeting across town or across time zones. There are two different room systems for different applications: The Cisco TelePresence 3000 allows a meeting for 6 people per room, creating a "virtual table" for 12 participants in group meetings and small team interactions. The Cisco TelePresence 1000 has a unique design, allowing a small meeting for 2 per room or up to 4 at the virtual table, and is designed to be used in smaller spaces, such as executive offices, hotel lobbies, bank branches, retail stores, or doctors' offices -- anywhere a one-on -one or small group conversation is needed.

Co-Op Travel Group, Future Travel: homeshoring

New technology is now enabling "homeshoring"* where agents work flexible hours from home through a virtual call centre. The Co-Op Travel Group's Future Travel subsidiary is the largest virtual contact centre in the UK with 630 ABTA-certified home based staff. Besides a host of improvements in operating costs, quality of service and transparency, there are a number of positive side-effects including a reduction in energy requirements (because there are no central offices to heat and light), and staff travel is minimal. The "rebound" effects (see above under Teleworking) are also minimised because the majority of workers are already home-based, and now able to work productively, for instance whilst the children are at school.

DEFRA: Lion House

Lion House, completed in 2008, was designed with sustainability in mind. In addition to a number of ecodesign features like a photovoltaic array and high insulation, a building management system was also installed to optimise building performance. This monitors and controls heating, ventilation, lighting, power and hot water. It produces a monthly report to help monitor performance. A digital display of real time energy use and carbon emissions shows staff how their actions affect the building's performance. The combination of these technologies and their high visibility is particularly effective in changing behaviour.

Dell: Mobile Working in Healthcare

The CRS – (Care Record Service) is part of the national programme for IT (NPfIT) and provides clinicians with access to patient records. However, until recently they could not access the system away from clinicians do not have access to patient records. A pilot project with Dell, in association with Intel, implemented a mobile working trial developed specifically for community based clinicians and therapists. This solution enabled the user to access the care record service, email and all other normal online facilities live and in real time. Although the objective was to improve productivity by allowing clinicians to make use of what had previously been "dead" or unproductive time and optimise their schedules, there was a significant environmental benefit in the reduction of travel. Previously clinicians had to visit base each morning before visiting patients to check the day's appointments. In many cases the subsequent journey to visit patients could reverse the one they had just travelled. Instead they now access this information from home and travel directly to their patient. Similarly where they previously might have had to return to base to complete their notes, they no longer need to do so.

Dell: Liverpool Women's NHS Foundation Trust

Liverpool Women's NHS Foundation Trust is England's larges women's healthcare provider. As operational requirements became more complex the Trust's IT infrastructure grew more challenging. The whole IT infrastructure was upgraded using Dell PowerEdge servers using VMWare which allows the creation of virtual machines within one server, which can run applications independently of each other on a single machine. This reduced the number of physical servers from 30 to 4. The result is that more services use less hardware and 70% less power. Cooling costs have also been reduced because the server estate now generates less heat.

Dynamic Demand: stabilising energy demand

"Dynamic demand" is an emerging technology that could reduce the amount of electricity used by appliances like fridges and freezers during peak periods through the intervention of small electronic controllers inside the goods. This development could provide a more stable and efficient grid, removing some of the barriers to more renewable electricity generation in the UK which is variable in nature. If fully integrated across the network savings could be in the region of two million tonnes of CO_2 emissions a year - the equivalent of taking over 665,000 cars off the road.*

eCARE in Scotland: HEART

HEART – Highland Electronic Assessment Recording Tool allows electronic offline capture of assessment information in locations across the highlands, negating the need for network or wireless connectivity by practitioners in the field. HEART is being rolled out over Highland council and NHS Highland, covering a population of 200,000 widely dispersed over one third of Scotland's land area. The clinical objective is, where consent is given, to store and share data through a central repository for use by workers from multiple agencies, and to provide a mobile working solution which securely stores data offline until workers return to the office. This initial approach focuses on the elderly. The result has been a dramatic reduction in travel by service users and agencies because journeys are no longer duplicated when different agencies collect the same information.

EDS: holistic infrastructure management

EDS takes a holistic approach to the whole ICT infrastructure. This includes designing the whole architecture with as much centralisation as possible to achieve economies of scale in power consumption, standardising hardware configurations, using low energy devices and optimising power management features, and remote management of PCs so that engineers and IT support staff do not have to travel to different sites to resolve user problems and install upgrades.

Eneco: new chip technology

Eneco is developing a revolutionary solid state energy conversion/generation chip that will convert heat directly into electricity, or alternatively refrigerate down to -200 degrees C when electricity is applied. Based on principles of thermionic energy conversion, whereby the energy of a hot metal overcomes the electrostatic forces holding electrons to its surface, these free electrons then pass across a vacuum to a cold metal and in the process creates an electronic charge that can be harnessed. The result is a solid-state energy conversion chip that can operate at temperatures of up to 600°C and deliver absolute efficiencies (in terms of how much heat energy is converted to electricity) of between 20 and 30%. There is scope for chips replacing high end lithium ion and polymer batteries, but the major scope is in integrating the heat conversion chips into computing devices to harness the heat generated by processors and turn it into electricity to power fans or other cooling technologies.

EPSON: digitising textile printing

Traditional textile printing is a complex manufacturing process that requires several production steps before a fabric is printed and ready for use. Epson offers solutions, based on the patented micropiëzo print technology, that can be used to digitise the textile printing process. Digital printing eliminates several of the production steps required for traditional textile printing. The implementation of digital textile printing leads to significant reductions in energy and water use compared to traditional textile printing. By changing the traditional textile printing process to digital printing, energy reductions of 50% can be achieved, leading to savings in the area of 23.000 KWh per printer or 1,610,000kWh in total during 2007.

Evident Europe: Digital Evidence Seals™

Evident Europe provides Digital Evidence Seals™ that enable organisations to prove that digital data, documents and records have not been altered. An Evidence Seal™ is a simple piece of XML based data which is cryptographically appended to any digital data, over any digital medium. It proves, indisputably, over time which parties were involved, what the original information or data was and when the event happened. It provides independent validation, guarantees data integrity (as any changes to the original data are immediately verifiable), durability, transparency and portability. The key environmental benefit of Digital Evidence Seals is that they are a critical enabler of the paperless office. Traditionally, documents had to be printed in hard copy to be authenticated, and then stored securely. Now there is no need to do that, and documents can remain in electronic format indefinitely, without risk.

Fujitsu Siemens Computers: Data centre energy savings

Deployment of dynamic IT infrastructures have resulted in energy savings of up to 70%. Dynamic data centre solutions make IT operations more flexible and allows resources to be matched to requirements with an overall reduction in energy consumption. This is achieved by integrating monitoring and management tools so that IT resources are allocated in a more flexible way. These tools ensure that servers are only activated when they are needed and are switched off when workloads drop so they are not using energy running in idle mode. Disk capacity is also maximised through shared storage system. These dynamic data centre solutions also feature an energy efficient redundancy concept where backup servers are activated automatically in the case of server failure elsewhere, but can remain switched off until this happens.

Fujitsu: Environmentally Conscious Solutions

Fujitsu Laboratories has developed a method for quantitatively evaluating on a per-environmental-factor basis, the environmental burden reduction effects of adopting particular software or IT service. Utilising this method, Fujitsu is certifying as Environmentally Conscious Solutions those software and IT services offerings that can achieve by their adoption environmental burden reductions of 15% or more (in CO_2 equivalent terms) and providing these solutions to their customers. By the end of 2005 54 offerings had been certified. Fujitsu also participates in the IT solutions Working group of the Japan Forum on Eco-Efficiency and are involved in creating the ICT Environmental Efficiency Guidelines used to evaluate efforts to reduce environmental burdens through the adoption of IT services.

Fujitsu: life cycle energy requirements of laptop and desktop PCs

Fujitsu published details of life cycle assessment of a desktop and a laptop computer which found that the desktop used more energy during its in-use phase (4510MJ) than in the manufacturing and disposal phases (2416MJ and -432MJ) whilst the laptop's energy use was greater in the manufacturing and disposal phase (1655MJ and -19MJ) than the in-use phase (810MJ). Interestingly, this difference is a reflection of the lower energy requirement of the laptop in use - less than 20% of the desktop – and should not therefore be read as a negative aspect of laptops. It emphasises the importance of taking whole life energy use into account. In this case the total energy requirement of the laptop is less than half that of the desktop (2446MJ as opposed to 6504MJ).

HP: Dynamic Smart Cooling

Dynamic Smart Cooling is an advanced hardware and software solution that continuously adjusts data centre air conditioning settings and directs cool air to where and when it is required. Real-time air temperature measurements are taken by a network of sensors deployed on the racks of servers. An associated development, Thermal Zone Mapping, provides a three dimensional model of exactly how much and where the data centre air conditioners are cooling. From this information, air conditioning can be re-arranged for optimal cooling.

HP predicts that customers can reduce data centre cooling energy costs by up to 45% using dynamic smart cooling and thermal zone mapping. Cooling costs comprise on average around 50% of a data centre's energy use, so substantial energy (and cost) savings can be achieved this way. HP also provides a thermal assessment service which uses sophisticated modelling tools and techniques to determine the unique thermal conditions within a data centre. These are analysed and changes can then be implemented to optimise climactic conditions and maximise capacity.

HP: Virtual Collaboration System

Halo, HP's Virtual Collaboration System (VCS), offers a compelling alternative to traditional work and collaboration methods. The HP Halo Collaboration Studio is a precisely designed broadcast solution that enables remote teams to communicate in real-time in a face to face environment. The Halo Collaboration Studio allows for interactivity between teams and enhances business connections while visually reinforcing the sense that meeting participants are in the same room. It reduces CO_2 emissions by reducing the need to travel for team meetings.

IBM: Cooperative Group

Aiming to cut its total energy use by 25 % by 2012, The Co-operative Group identified overnight electricity consumption in its 2,200 food stores as a prime candidate for reduction. Working with IBM, The Co-operative's in-house IT team re-engineered its InControl store end-of-day batch processing system, enabling the introduction of 'Wake-up on LAN' capabilities for all 45,000 of its in-store POS-related devices. With 45,000 pieces of equipment in its stores – including 7,500 POS terminals with linked receipt printer, 15,000 screens, 7,500 barcode scanners and 7,500 chip-and-pin card terminals – the positive impact of the solution will be considerable. Turning off non-essential systems during the night will cut an estimated 1.68 million KWh each year, saving around £120,000 per year at current prices and cutting CO_2 emissions by an estimated 722 tonnes.

IBM: DONG Energy – Intelligent Grid

DONG Energy is Denmark's largest energy company. Increasing marketplace and regulatory demands along with a need for future infrastructure reinvestment drove DONG Energy to look for a way to manage and use its electrical distribution network better in order to respond to outages faster and more efficiently. DONG Energy teamed with IBM to implement an Intelligent Utility Network (IUN), installing remote monitoring and control devices that give the company an unprecedented amount of information about the current state of the grid. The new solution also involves extensive analysis of the data provided by the remote devices, as well as reengineering of DONG Energy's business processes. Although the benefits included reduction in outage, in fault search times and capital savings on planned reinforcements, the real benefit was not the fact that the system gave DONG visibility into the grid, though that was the initial goal. It was the availability of information on grid performance which DONG could do a lot with.

IBM: ENBW and changing behaviour by real-time pricing

Industrial energy customers get tailored energy tariffs according to their need, but residential customers could not. EnBW wanted to be the first utility company in Germany to offer advanced energy service to households. A time of use price will influence the energy use behaviour of the clients to shift from high peak time to low time periods. EnBW needed to set up a flexible solution to define, publish, communicate and bill real-time pricing. This includes implementing smart devices like displays in the living-room to publish prices and to set up an automated meter infrastructure to collect consumption data. EnBW joined forces with IBM Global Business Services and developed a display called the Power Price Signal Device that can be conveniently mounted anywhere in the home. Actual energy prices are displayed on the device, reflecting peak and low price periods. A customer specific application generates the individual current prices for each day and a monthly report to show the individual energy consumption and prices. Smart electronic household meters from EnBW continuously collect consumption data for billing. The display helps customers to control utility bills and tells them when it is least expensive to use high-energy-consumption appliances, saving customers money and increasing energy efficiency."

IBM: Guangdong Dapeng LNG – New Energy Supply

To satisfy its growing need for power, China is turning to greener energy sources - most notably natural gas, with the joint venture known as DPLNG leading this pioneering effort. With five power plants and millions of customers dependent on it as an energy source, DPLNG needed to put processes in place that would ensure the efficient, reliable and safe production of natural gas from liquefied natural gas (LNG). DPLNG teamed with IBM Global Business Services to design and deploy a comprehensive business process framework for the reliable delivery of natural gas to millions of residents in China's fastest growing region. A key part of IBM's role was to design and deploy the scheduling and management processes that maintained the balance between gas processing and distribution, and ensure the facility's reliability in the natural gas supply chain. Benefits included optimised efficiency through flexible, integrated processes, the ability to dynamically optimise LNG receiving processes as demand grows and improvements in reliability and safety whilst minimizing downtime risk through the use of proactive asset management practices.

IBM: ICT-enabled office optimisation

ICT technologies create opportunities for companies to restructure their office environment so that the use of available office space is optimised, temporarily unused space can be divested and by this the energy consumption per employee and the total energy consumption reduced up to 50%. IBM transformed their office structures at 8 locations in Europe, replacing desktops with notebooks, stationary phones with cordless substitutes, and copy, print and fax facilities with pooled, multifunctional devices. This enables employees to be completely mobile within the building, using an open plan environment which improves flexibility and reduces space and energy requirements. Moreover by combining the office concept with new management concepts, such as working time flexibility, mobile working and home- or tele-working, further demonstrable reductions are possible.

IBM: Modelling for the Nature Conservancy

IBM and the Nature Conservancy developed a technology and science partnership to deliver a decision support system to examine future planning scenarios and guide sustainable water use policies for great rivers around the world. The plan was to use readily available water and geographic data and incorporate data on climate, rainfall, land cover, vegetation and biodiversity to enable users to understand how policy decisions impact water quality and quantity. The overall objective was to facilitate more sustainable management of river basins. The result was a new computer-modelling framework with simulation, three-dimensional visualisation and scenario forecasting tools. (continued on page 17…)

This will facilitate more sustainable management of major rivers, help conserve and protect the rivers that provide much of the world's water supply, enable "smart" development while helping to conserve and protect the rivers that provide much of the world's water supply and enable stakeholders understand how policy and land use/ management decisions impact water quality and ecosystem services.

IBM: Pacific Northwest – Managing Electricity Demand

This involved two studies – In one a virtual marketplace was developed in which customers could trade flexibility in usage for lower costs. Intelligent devices such as thermostats automatically controlled power consumption in near real-time based on pricing signals and customer preference. A second study deployed smart appliances which could detect when the grid was under strain and temporarily curtail electricity use. The benefits included 50% reduction in peak electricity distribution loads, 15% decrease in overall peak loads in the course of one year, an average saving for consumers of 10% on their electricity bill and a projected reduction in infrastructure spending of US $70 billion over the next 20 years due to improved management of resources.

IBM: Recycling silicon for solar power

IBM has developed an innovative new semiconductor wafer reclamation process which will enable 3 million wafers to be re-used annually. Semiconductor wafers are the thin discs of silicon used to imprint patterns that make finished semiconductor chips. The IBM process uses a specialised pattern removal technique to repurpose scrap semiconductor wafers into a form that can be used to manufacture silicon-based solar panels. The new process was awarded the "2007 most valuable pollution prevention award by the National Pollution Prevention Roundtable (NPPR) in the US. The process enables the Intellectual property from the wafer surface to be removed efficiently and hence allows the wafers to be reused. The solar industry is currently being held back by severe shortage of silicon, which is one of the primary materials needed to manufacture solar panels. Re-using silicon in this way helps to stimulate the growth of renewable energy solutions.

IBM: Road charging

An automatic road charging system implemented in Stockholm by IBM and partners has made a real impact by reducing traffic congestion and energy waste. Congestion was becoming a serious issue in Stockholm, and by 2005 commuting time had increased 18% on the previous year.

A congestion charge was introduced in 2006 by the Swedish National Road Administration (SNRA) and the Stockholm City Council to reduce congestion, improve public transport and alleviate environmental damage. The system recognised, charged and received payment from vehicles as they passed control points on the way in or out of the Stockholm city center. A free-flow roadside system using laser, camera and systems technology seamlessly detected, identified and charged vehicles depending on the time of day.

By the end of the trial phase, traffic was down nearly 25% with an estimated reduction in CO_2 of 41,000 tonnes or 8-14% of the normal inner city emissions. Public transport schedules had to be redesigned to reflect the faster travel speed.

IBM: US Postal Service – Integrated Network Modelling

The U.S. Postal Service delivers 212 billion pieces of mail to 300 million people every year – 46% of the world's card and letter volume. The largest civilian fleet in the world (219,000 vehicles) delivers to a network of 33,000 retail outlets. The client wanted a detailed understanding of the transportation network and an ability to optimize on geography, time and demand. Typical network analysis is done every 2 to 5 years, or when a seismic shift in demand is experienced. With the focus on carbon and the rising cost of fuel clients are looking for more granular optimization (geography, time and demand segmentation). CO_2 reduction and implications of rising fuel costs were main drivers. IBM developed an integrated network modelling tool for rapid and frequent optimisation of highway corridors. In the first two regions, the tool identified annualised savings of 10% (1.3 million miles) and 20% (2.9 million miles) and resulting GHG emissions.

IBM: Virtualisation in Flintshire

Beyond its statutory obligations to increase energy efficiency and reduce carbon emissions, Flintshire is taking a proactive stance on climate change. For the growing IT infrastructure, the emphasis is to eliminate "white space" in servers and storage devices via consolidation and virtualisation. Flintshire will remove a total of 80 physical servers from its infrastructure by virtualising them to VMware partitions on six IBM System x3950 servers. This will remove the costs associated with 80 physical servers, as well as their significant lifetime carbon footprint; Flintshire now buys around five physical Intel processor-based servers each year, compared with more than 40 in previous years; the use of server virtualisation on the IBM System x platform supports ultra-rapid provisioning of new servers, with lower total power and cooling requirements.

Intel and Telefonica: Transforming IT Troubleshooting

Telefonica has a significant presence in 23 counties and a customer base exceeding 200m accesses globally. Telefonica launched its "Answers to Business People" service in 2006, offering customers a complete IT service. Telefonica was managing 200,000 workstations throughout Spain. Telefonica used Intel v Pro technology with Intel Active Management Technology to manage their workstations in a streamlined and efficient way. The result was that end-user productivity was improved through reduced down-time, better security and reliability. Streamlined processes are allowing Telefonica to deliver a better quality of services to its Answers to Business" customers. The remote management technology has dramatically reduced time, costs and emissions related to site specific visits, and improved productivity.

Intel and ING: remote PC management

Intel's new VPro™ microprocessor technology has major implications for improving efficiency of networked PCs because it enables computers within a network to be managed remotely. This dramatically reduces distances travelled by IT support staff who no longer have to physically access the PC to deal with problems. Moreover, the new processor technology means that individual PCs can be managed even whilst they are switched off, so there is no longer any need to leave PCs on when not in use in order for upgrades or maintenance to be carried out by support staff, since this can now be done when the PCs are powered down. Intel recently implemented this technology for ING, a global provider of financial services, with 114,000 employees spread over 50 countries. In addition to dramatic cost reduction and more streamlined PC management, substantial energy savings were achieved.

IPL: MIDAS and ATM – Telematics for the Highways Agency

The Highways Agency maintains the UK's network of trunk roads and motorways which supports more than 151 billion vehicle kilometers in England each year. Telematics are increasingly being used to optimise road use, reduce congestion and improve safety. IPL provides a range of telematics solutions for the Highways Agency. These include MIDAS – Motorway Incident Detection and Automatic Signalling, ATM – Active Traffic Management, NASS -Network Active Traffic Management Subsystem and OTAP – Open Travel and Traffic Information Access Point among others. As well as preventing accidents these telematics solutions reduce congestion and smooth traffic flow, with significant environmental benefits since non-optimal driving and congestion can account for 50% of fuel use. They also optimise the use of existing infrastructure.

Logica: Stamp down on Carbon

In 2006 Logica UK launched an internal "Stamp down our Carbon footprint campaign". The objective was not only to reduce emissions and energy costs but also to reduce other environmental impacts and improve staff awareness of these issues. Logica adopted a dual approach – combining technology fixes and behavioural change – so in other words, energy saving technologies were implemented at the same time as a programme of staff engagement and education. The results were impressive: After two years, the carbon footprint was reduced by 15%: waste to landfill was reduced by 49%, business air travel by 40%, road travel by 28%, paper usage by 9% and water consumption by 20%. Significant cost savings were also realised - £10m over the two year period with an ROI of 5:1. Logica is now able to roll out its tools and processes to customer organisations.

Lysanda's EcoLog: Measuring vehicle emissions

One extraordinary development in automotive software is Lysanda's Eco-Log® system, a pioneering technology that calculates the true emissions of a moving vehicle. This not only enables meaningful comparisons to be made between vehicles and enables efficiency claims by manufacturers to be authenticated, but it also provides intelligent feedback on driver behaviour, identifies poorly performing vehicles and allows problems to be identified and addressed.

Merryl Lynch: Data Centre outsourcing

Merrill Lynch, a US investment bank, recently adopted a virtualised, thin client approach in three business units, one in Glasgow and two in London. The thin client approach delivered greater working flexibility which was particularly useful in London where there was a lot of staff movement. The result was that desk requirement was cut by around 10%. While the thin client approach saved power in the desktop environment – (power requirements being reduced from 160W to 120W per desktop PC) the data centre environment proved more challenging because capacity was moved into an environment where the servers were permanently switched on, which reduced the overall saving to around 20W per PC. However, the thin client approach does have considerable advantages in life-cycle energy requirements because the equipment is simpler and has a longer life expectancy. Merrill Lynch is now investigating a distributed grid approach for its computing – partnering with an organisation that can provide computing on demand.

Microlise and Tesco: Vehicle telematics and tracking

Driving style has a major effect on fuel efficiency. Microlise provides vehicle telematics technology that monitors how vehicles are being driven. Microlise also provides vehicle tracking software that assesses how efficiently vehicles are being utilised with a view to reducing fleet size. Tesco.com delivers to customer homes from more than 300 stores, with over 2,000 vehicles making more than 250,000 deliveries a week. Microlise's in-vehicle telematics and GPS tracking systems have enabled Tesco.com's home delivery business to optimise fleet efficiency so that another 50,000 deliveries can be handled without increasing fleet size, whilst improving fuel efficiency.

Microsoft and Brockenhurst College: Enabling power savings through Vista

Microsoft conducted a pilot project at Brockenhurst college, deploying new Vista software to a number of HP desktops. The new software allows adjustable power management settings and centrally configured policies that enable administrators to switch computers on and off remotely and make better use of power saving features. Windows Vista also provides an ultra-low power sleep mode where everything but the RAM is powered down. Start up, however, is only two seconds. The new system offers much more energy efficient and dependable IT infrastructure.

Microsoft and Wakefield: Worksmart

Wakefield Metropolitan Borough Council has implemented an initiative called Worksmart to improve staff productivity whether working from home, remotely or in the office. A power failure in 2006 had highlighted resilience issues so Wakefield asked Microsoft to deliver a new IT solution. Microsoft implemented a 64bit architecture delivering more scalable, higher performance computing solutions for 8,000 staff. As a result, of improved efficiency from this solution. Wakefield saved £4 million in revenue, raised £7.3 million in receipts from asset disposal and improved productivity by 15% in some areas with cashable savings of £81,000 per year in e-Services alone. The number of office buildings can be reduced from 34 to 6 and commuter miles have been reduced by 127,000 per annum, a saving of around 35 tonnes of CO_2. In short, the new computer network infrastructure at Wakefield has delivered notable economic and environmental gains.

Microsoft and Westminster: Member information portals

Westminster City Council provides local government services to 232,000 people and over 47,000 businesses. The Council wanted to upgrade their system to improve efficiency and user interface, putting information at members' fingertips and providing the capacity to add new services for councillors. Microsoft worked with Artemis to integrate neighbourhood-specific information with GIS mapping. The resulting secure extranet, accessible to elected members, gave them location specific information, enabling them to work more proactively on issues of concern, respond more effectively to enquiries and network with stakeholders across the area. It enables councillors to work effectively from home or remotely, dramatically reducing transport both of people and documents. It is the first portal to be integrated with GIS mapping.

Microsoft and Wise Group: Paperless Office

Microsoft delivered a paperless office system to Wise group. As a result Wise has moved to a predominantly paperless office environment. Since the implementation, the new application has processed more than 1000 forms with an estimated 5000 to be processed electronically over a 12 month period. All of these would previously have been delivered by hand, posted or couriered from one site to another. Central electronic storage has also eliminated the chance of forms being lost. In short, the system has enabled Wise to minimise paper consumption and also dramatically reduce transport related emissions.

Microsoft: Virtualising IT infrastructure in Perth and Kinross

Perth and Kinross Council wanted a more cost-effective delivery environment for its growing portfolio of citizen-centric services, some of which required multiple servers consuming large amounts of electricity. The council adopted a virtualisation strategy where multiple, software-based servers are stored on a single machine and opted for Microsoft's Windows Server® 2008 operating system with Hyper-V™ technology. The council forecasts that in the first year it will save £100,000 because the cost of virtualization at £50,000 is only a third of the cost of buying new physical servers (£150,000). This reduction in hardware will deliver annual savings of £40,000 in electricity costs and power savings of 350,000 KWh, equating to a reduction in CO_2 emissions of 151 tonnes. Plans include the reduction of 111 servers to 17 which will enable the council to decommission an entire data centre.

Microsoft: Virtualising IT in Slough

Slough Borough Council provides a full range of municipal services to 122,000 citizens. Its IT staff manage 2,500 desktops and laptops and a busy data centre containing around 145 servers. The server count was growing by around 20 per year as new programmes and initiatives were being rolled out such as online tax payment. However the council faced constraints on their data centre space and power demand, so a new solution had to be found. Using Microsoft's Windows Server® 2008 Datacenter operating system and Hyper-V™ virtualization technology Slough has dramatically reduced its physical server count so it can accommodate new servers in support of new municipal services, reduced data center costs, repurposed power capacity to install a larger storage area network, and improved its disaster readiness. Virtual machine performance has been exceptional, and CPU utilisation is much higher with multiple virtual machines on a single physical host.

Mix Telematics: Oxford Buses

Oxford Buses trialled a telemetry device that was supplied by Mix Telematics. The trial used a combination of driver training and telematics. The training program was called RIBAS, an acronym of Revs, Idle, Braking, Acceleration and Speed. The telematics device measured each of these from the driver unit within the cab. Parameters were set for each and when broken, the driver was alerted by a beep and a red light. Fuel readings were measured daily for 12 weeks on all trial vehicles. Significant fuel savings became apparent very rapidly. Although driver training produced initial fuel savings, this could not be maintained without the policing of the telematics device which provided a constant reminder for drivers. Over a year on, fuel savings have been maintained. As a result of this success the system is being rolled out to the entire Oxford Bus Fleet.

Nokia: charger alerts

For convenience, some mobile phone users may keep their chargers plugged into the wall constantly, which wastes energy because a charger consumes power (so-called standby consumption) even when it is not charging. Nokia decided to introduce an "unplug your charger" alert to some of its phone models. This application detects when the battery is fully charged and reminds the user to unplug the charger. If the charger is plugged into the wall all the time, the resulting standby consumption could amount to 60% of the mobile phone's total lifetime energy consumption so the "unplug your charger" alert could deliver significant energy savings. The reminder also helps to make users more conscious about the standby electricity consumption of electrical devices at large and, in turn, inspire users to check their usage habits with devices other than the mobile phone. It may also motivate manufacturers of other devices that use re-chargeable batteries to implement the same technology.

Nokia: Logistics and Enterprise Resource Management

As a result of networking, digitisation of structures and data and RFID applications, ICT plays an increasing role in rendering logistics processes more energy efficient. Stora Enso's wood logging areas in Finland are connected to pulp mills through an information system based on GSM, GPRS and GPS. The real-time information system contains the wood orders from pulp mills and the logging and transportation programs for each area. It takes as additional inputs the logged and hauled amounts of wood, sent to the system by forest entrepreneurs, and the coordinates of wood trucks from the truck drivers. Based on this information, the system performs real-time operational stock accounting, updates the logging program and devises transportation plans for wood trucks. It then sends the updated information to forest entrepreneurs and truck drivers. More efficient processes and optimised transport mean fewer empty drives and less waste of resources overall.

Nokia: Minimising mobile phone packaging

Nokia has redesigned the packaging for its mobile phones with the objective of minimising the size of each packed phone. The package is designed to fit the phone, user guide and accessories like the charger and battery. The user guide was reduced in size and the contents were rearranged with the help of a clever divider so that the overall pack size was reduced by 50%. As well as using 40% less material, the total package weight was also reduced to 123g as opposed to 217g and 900 of the new packages can be fitted onto one transport pallet, compared to 420 of the old sales packages. Nokia shipped 60 million phones in the new compact packages in 2006 and as a result used 1,200 fewer trucks to transport its products.

NXP Semiconductors: power converter efficiencies

NXP has developed high efficiency power converters. These comprise a series of power controller integrated circuits that integrate the basic functionality of a power converter and additional IP to increase the efficiency of the converter. The result is a cost-effective power converter with increased overall efficiency and wide applications in consumer electronics and lighting. Specific products include the GreenChip and STARplug controller families. NXP has established a long term roadmap with regards to increasing the efficiency of power converters. The goal is to increase the efficiency at all loading levels from minimum to maximum load. The energy savings potential is estimated at 500TWh+ in 2010 and of 2000TWh+ in 2020.

OSIsoft and Kodak Park

Kodak Park in New York USA operates like a small town, with two power plants, 150 buildings, 11,000 employees and covering 1300 acres. There was no central energy management system for the site and many of the buildings operated as silos. OSIsoft provided a single web-based portal for managing energy use across the entire site, which provided real-time data on energy use and consolidated all the different strands of data. It allowed engineers and energy managers to see what was going on, identify areas of waste and address them, then monitor the results and re-adjust if necessary. The system helped Kodak to optimise its energy assets, it identified opportunities for energy reduction and provided critical tools that enabled Kodak to meet their very aggressive energy reduction targets and make savings amounting to several million dollars annually. It also continues to identify new opportunities for energy saving.

Oyster Card: Transport for London

The Oyster card is an electronic public transport ticketing system for London which was implemented in 2005. Whilst it was primarily installed to deliver improved efficiencies and speed up passenger transit through traditional station bottlenecks, it has delivered a number of environmental benefits. Firstly it has made public transport options both simpler and cheaper and as a result bus and tube journeys have become more attractive to the user. Secondly, the system feeds back passenger movement data which facilitates forward planning and helps to optimise the available capacity, thereby delivering further system efficiencies.

Philips: Efficient highway lighting

In streets and highways, Philips has developed a new energy efficient lighting solution called Cosmopolis, which dramatically improves visibility whilst reducing energy demand by 57% - saving €70-130 per lamp and reducing emissions by around 600kg CO_2 per year.

Philips: Efficient lighting in offices and homes

In offices and industrial applications, lighting tends to be provided by linear fluorescent tubes. Current products have electromagnetic ballasts. Philips has developed linear fluorescent tubes with energy efficient electronic ballasts which are 61% more energy efficient, saving around 77kg of CO_2 during the lifetime of a lamp. Moreover, the new electronic ballast does not have the high copper content of its electromagnetic predecessors and uses fewer materials overall. In homes, traditional lighting has been with incandescent bulbs. Currently available technologies such as compact fluorescent bulbs, halogen bulbs and LEDs can reduce the energy demand by 85%, 50% and 82% respectively – between 20 and 34kg of CO_2 per lamp. Moreover, compact fluorescent lamps last six times as long as traditional incandescent bulbs.

Philips: Internet information and entertainment services

Philips provides a wide variety of third-party information and entertainment services through its easylog user interface. TV-based information can substitute paper-based versions and in particular the electronic delivery of entertainment content through Video on Demand (VOD) is substituting disc-based distribution (DVD), saving materials (paper, plastic, ink, etc.), plus the physical distribution of the DVDs via the stores to homes. Philips has estimated that in Europe people travel around 33 million km per year to buy or rent DVDs and that VOD can therefore reduce annual CO_2 emissions by around 6.6million kg. VOD also obviates the need to produce 2 million or so DVDs a year, a further saving of at least 181900kg of CO_2. Moreover, VOD does not require a DVD player which reduces the energy required for viewing over a physical video or DVD, a further saving of around 113.5 million kg of CO_2 emissions per year.

Philips: LED lighting for the National Theatre

Philips and the National Theatre are implementing a programme to replace the landmark London Venue's lighting scheme with a state of the art, dynamic and energy efficient design. The first phase of the LED lighting solution provided by Philips will focus on the exterior and give the National Theatre a spectacular colour palette, illuminate new areas and provide a new video wall installation on the roof to replace the old dot "seefact" display. The second phase will concentrate on revitalising the internal lighting and improving efficiency, and there will be an ongoing programme of improvement as Philips continues to develop even more sophisticated lighting technology. The LED solution will not only improve a dramatic visual enhancement, it will also reduce the energy needed to light the building's iconic exterior by 70% and deliver estimated savings of £100,000 per year.

Philips: LED Lighting for the O2 Arena

A partnership between Philips and the London O2 Arena, another landmark building, is using the latest LED technology to enhance the visual character of the building through better lighting whilst dramatically improving energy efficiency. The energy needed to light the building will be reduced from 426 KW to 147 KW - a reduction of 65%.

Philips: SmartPower

Philips SmartPower is an innovative technology that allows the back-lighting intensity of TVs to be adjusted according to the way that the TV is being used. SmartPower not only reduced the energy demand of TVs whilst they are on, but the technology also turns off the TV automatically when it is not in use. This application is aimed particularly at facilities like hotels and hospitals where multiple TVs are spread across the premises.

QinetiQ: Stealth Turbines

If ICT-enabled technologies are to help deliver the low carbon economy, their ability to remove barriers to the development and implementation of low carbon technologies and infrastructures should not be underestimated. One of the biggest barriers to the development of wind power is potential interference with civil and military radar. QinetiQ has innovatively applied technologies developed for military applications to the renewables sector. In partnership with Vestas Wind Systems (the market leading supplier of wind power solutions) they have just completed the successful trial of a unique radar mitigation technology for wind turbines. A five year programme, partly funded by BIS, has developed "Stealth Turbine" technology that can significantly reduce the size of the radar signature made by individual turbines to the point where they can be effectively factored out of air traffic control and air defence systems. Results from recent trials in Norfolk showed very significant reductions in radar signature which means that the technology could have a revolutionary impact on wind farm planning in both the UK, where 9GW of renewable wind-power generation is currently blocked by radar interference, and the rest of the world.

Sharp: Super Green initiatives

Sharp's objective is to balance its emissions by energy creating and energy saving technologies. This is being achieved through Sharp's Super Green initiative which is a combination of environmental best practice in five areas: products and devices, in technologies, in factories, in management and in recycling. The objective is to ensure that every aspect of Sharp's activity has an environmental focus.

Sharp: Super-Green Kameyama plant

Sharp's new Kameyama manufacturing plant in Japan has implemented Sharp's super green principles in its construction and function and was the company's first Super Green factory. The factory generates its own energy – 12 MW through LNG co-generation and 5 MW through solar panels and 1 MW from four environmentally friendly molten-carbonate fuel cells, the largest fuel cell system of its kind in Japan. It uses the waste heat generated for air conditioning, hot water supply or steam. 100% of the manufacturing process wastewater (up to 9,000 tonnes a day) is recycled and re-used. The factory generates zero waste. The Kameyama Plant was recognised for its outstanding environmental management by being chosen from among 125 applicants for the highest honor, the Sustainable Management Pearl Award, in the 2004 Japan Sustainable Management Awards.

Siemens: BACS - Multi-building energy management

Siemens implemented a Building Automation and Control System (BACS) in a hospital which operated on three separate sites. Following a full energy analysis, opportunities for savings were identified and evaluated. A web-based Energy Management System (EMS) provided full intelligence of the operation of the heating systems together with sophisticated control mechanisms, so that energy use could be optimised. It also continually sought further reduction opportunities. The result was that energy savings in excess of 30% for heating and electricity were achieved, with an ROI of less than six months.

Siemens: document management systems and emissions trading

On January 01, 2005, the EU launched its emissions trading plan. Since then, installations with high CO_2 emissions may only produce as much CO_2 as is allocated in their certificates. If their emissions are higher, they must purchase additional certificates. Conversely, any plant that cuts CO_2 emissions below its allowance can sell its remaining credits. Once a year, about 1,850 companies in Germany must report their CO_2 emissions to the German Trading Emissions Authority (DEHSt). This is done via the internet, with a document management system developed by Siemens together with partners. In a multistage process, the emissions data from the plant operator is first collected online and then checked by an expert assessor. The report is then sent, complete with an electronic signature, to state authorities. In order to prepare this report, companies can use Simeos, an emission management software package from Siemens. It combines data from measuring points, energy data management systems, financial accounting, and other company processes into a CO_2 account that helps to optimise emissions trading. The software also classifies the flow of energy and materials according to specific products and different forms of energy, providing rapid and easy identification of potential savings in energy and energy costs.

Siemens: intelligent algorithms for smart grids

Siemens' "learning" algorithms maximise the power generated by wind farms by introducing cooperation among all wind turbines. The increase of power output is estimated at 1-5 percent. Siemens' offshore wind farms are generally controlled remotely via ICT solutions and even defects can be detected and often repaired remotely by software applications.

Siemens: lighting solutions for Budapest

Siemens has replaced the light bulbs in all of Budapest's 33,000 traffic lights with LEDs. The monthly instalments paid to Siemens are lower than the savings Budapest generates from reduced energy consumption and the elimination of traffic light maintenance.

Siemens: making buildings "intelligent"

Siemens have been installing building and energy management systems for some years and have made thousands of buildings "intelligent", saving hundreds of thousands of tonnes of cumulative CO_2 emissions across Europe. In one case, Siemens building technologies optimised the energy consumption of an indoor swimming pool. The resulting improvements saved the pool operators over £140,000 a year. Siemens' industry–leading technology uses specialised algorithms to calculate the actual ventilation and heating requirements and has already been applied to optimise energy efficiency in thousands of buildings world-wide, including hospitals, banks, industrial sites and schools. In Germany alone, Siemens is a contracting partner for over 1600 buildings, producing savings of over £115million and almost 650,000 tonnes of CO_2 during the average contract term of ten years.

Smart Services: changing agricultural practice

"Smart services" applications are an offshoot of satellite based remote sensing technology and have the potential to change agricultural practice for the better. They are based on a remote sensing application that monitors soils, assesses the fertiliser or water requirements according to its specific signature, and feeds this information live to a device in the tractor or sprayer that adjusts the flow of fertiliser or changes the irrigation plan accordingly.

Sony: best in class TV standby

Sony has reduced TV standby power consumption by over 90% over the last ten years. As of February 2007, all Sony Bravia LCD televisions sold in Europe achieved a standby power consumption below 1W, while many models are below 0.2W. Sony has also drastically reduced the power consumed in operating mode. TV producers historically ship their products in a bright picture mode most suitable for display in shops, but the brighter the picture settings, the higher the power consumption. Most customers do not modify the picture settings after purchase, so Sony now gives the user a choice of "home" or "shop" modes upon first switch-on. This results in a saving of more than 20% in power in operating mode and raises awareness among consumers about the fact that they can actively contribute to reducing power consumption of electronic products.

Sun Microsystems: Black Box Data Centre

Most data centre construction involves building a major physical infrastructure. Sun's project blackbox is a build-once, deploy-anywhere modular datacenter that delivers the flexibility to locate computing resources where they are needed, when they are needed, anywhere in the world. These are particularly useful for large scale network service deployments including emergency response operations and rapid expansions. The complete, virtualised data centre is housed in a standard 20 foot shipping container. It can be deployed in 1/10th the time it takes to build a traditional datacenter, and breaks conventional design by providing a number of innovative features, such as high efficiency water cooling which is more than 40% more energy efficient than a normal data centre. This and other features mean that far less energy is consumed for a given amount of data processing. The carbon impact is also dramatically reduced, by over 1459 tonnes CO_2 per platform over a five year deployment, which will help companies meet the most stringent environmental regulations. Sun also operates a comprehensive take-back and recycling scheme.

Sun Microsystems: data centre consolidation

Sun is improving the efficiency of its data centres through a number of measures – consolidation, compression and more efficient design. By consolidating its multiple European datacentres into a single, UK facility, it has achieved an 80% space reduction and around 50% reduction in electrical power and cooling costs. High density design now enabled expansion to five times current capacity yet using only 15% of the original datacentre space. Improved server design means that Sun's servers can operate safely at higher temperatures – around 72° rather than 68° without harming reliability or performance. Each degree yields a 4% saving in cooling costs. On a worldwide level the move to new technology has enabled sun to reduce 267,000 square feet of data centre space to 133,000 and save around 4,100 tonnes of CO_2 per year. The new design can cut power costs by as much as 66% whilst increasing processing power by around 450%.

Tandberg: video conferencing solution for Vodafone

Vodafone recently implemented a move to videoconferencing in an effort to reduce air travel, using Tandberg as its supplier of video-conferencing tools. Vodafone has 200 globally connected videoconferencing units, all multi-connected and most using Internet Protocol. To ensure employee engagement in this policy, Vodafone implemented internal controls on employee travel (for instance, employees need to seek approval for travel in advance and state why their objectives cannot be achieved through videoconferencing) and marketed the policy clearly to staff. This has cut travel dramatically – travel between sites with videoconferencing facilities fell by 100 trips per month per site in 2006, facility utilisation was 85% during business hours and 5520 tonnes of CO2 were saved as a result. There were also some interesting learning outcomes – multi-point facilities (videoconferencing suites where more than two units could participate simultaneously) proved essential and Vodafone gained a clearer understanding of when videoconferencing was an appropriate substitute for travel - and when it was not.

Tesco: Building Management Systems

4% of Tesco's 4.1 million tonnes of CO_2 emissions are attributable to IT. Tesco is reducing that IT footprint by 25% through virtualisation technologies, but this will only reduce Tesco's overall footprint by 1%. Tesco, however, is also investing in ICT (principally in sophisticated automatic building management systems) which will reduce the company's overall footprint by 20%.

Thales: nuVa collaboration solutions

NuVa is a collaboration desk that allows teams of colleagues split geographically to work together and hold multi-way project meetings, using standard broadband connections to the internet. Collaboration tools will only be used regularly if they provide real benefits, are easy to use, non intrusive and make the users feel comfortable – it is not enough to provide faithful audio and video representation of the remote collaborator, support tools are also needed. Therefore the nuVa collaborative desktop includes a number of tools such as a synchronised document set for teams to use during their sessions. Benefits include improved staff efficiency, and better time management, reduced travel and improved multi-site and off site working, and reduced carbon footprint.

Thales: Smart Container Shipping

Thales is currently developing a secure system of container tracking called Smart Container Shipping. Smart container systems are designed to impart intelligence to the container system which can then be used by shippers, owners and customs officials. The smart container is simply a standard container which has sensors, processing capability and communications devices that can interact with a central database over a communications network. The database will also incorporate external data such as cargo manifests and will be accessed through web browsers or manifests. The smart container will provide a tracking and tracing capability to monitor the location and movement of the container, it will protect the integrity of the container and identify whether it has been opened or interfered with in any way, it will monitor the contents – particularly high risk contents – and the content inventory and it will identify the container. The primary objective of this system is to minimise vulnerability to terrorist attack (currently there are opportunities for terrorists to insert unwelcome materials into containers at several stages) but there are a number of substantial environmental benefits, in particular increased efficiency resulting from improved certainty. Goods cannot be lost and shippers know with confidence the conditions under which the goods have been stored (such as ambient temperature, humidity etc), which reduces wastage, and container contents are simply scanned in so physical searches and other interventions are reduced.

Toshiba: Factor T

Toshiba has introduced a novel approach to product design through its Factor T eco-efficiency indicator which is a simple but robust way to drive improvements in eco-design and product efficiency whilst taking into account improvements in performance and functionality. The eco-efficiency of a product is defined as the product's value (in terms of quality, functionality, etc) divided by its environmental impact. The smaller the environmental impact and the higher the product value, the greater the eco-efficiency. The Factor T indicator is derived by comparing the eco-efficiency of a new product against the eco-efficiency of a benchmark product (in other words, by dividing the former by the latter). The greater the value, the more the eco-efficiency has improved. Factor T is a simple but robust way to drive improvements in eco-design and product efficiency without losing sight of improvements in functionality. For instance, the Factor T for Toshiba's Notebook PC Portego R500 was 5.1 between 2000 and 2007. This means that the eco-efficiency of that product has improved by a factor of 5 over the 2000 version of the notebook.

Wyse: Thin client solutions for Reed Managed Services

Reed Managed services delivers managed IT across the Reed Group, whose IT estate encompassed over 4,500 Compaq and HP PCs, over 400 laptops and 300 servers. Reed realised that its IT department could play a pivotal role in reducing carbon emissions and examined the way the infrastructure was managed and distributed. Servers were under-utilised and equipment was generating significant heat which then needed to be removed through air-conditioning. After a successful 3 month trial, Reed implemented a thin client solution provided by Wyse Technology. This was popular with end-users because it gave them more working flexibility and also enabled greener working practices to be implemented in day-to-day routines. As part of the thin computing solution Reed also invested in blade servers in its datacentre. Power efficiency of the server infrastructure was optimised through virtualisation which in turn reduced space and cooling requirements. The virtualised solution provides a flexible infrastructure that can deliver desktop computing anywhere in the world. By migrating to a thin computing model, energy consumption was reduced by approximately 5.4 million KW hours of power, the number of storage drives was halved and the number of servers reduced by a factor of 20. It also resulted in a 20% reduction in Reed's annual IT budget and has provided a more cost effective way of working which will reduce operating costs for years to come.

Wyse and Queen Margaret University: Holistic ICT

A new Scottish university campus in Edinburgh is setting high standards for both energy efficiency and how a university can use information technology to create a much more flexible and inspiring learning environment. Queen Margaret University, with 4000 students and 550 employees, needed a flexible IT infrastructure to support staff, students and visitors in its new campus. The systems had to be exceptionally energy efficient and generate minimal heat in order to work in the natural ventilation used throughout the new building, which is designed to be sustainable. It also had to be easier and more cost effective to manage. Wyse implemented a thin computing infrastructure solution using Wyse V50 thin clients. All information services were centralised on data centre servers running Citrix Presentation server. Citrix Access Gateway also enables home working for staff and students. The result was that in addition to making personal data, applications and learning resources fully accessible, the thin clients have delivered significant energy savings, consuming 1/10 of standard PCs and emitting much less heat. Remote working was also fully enabled. Support and maintenance were simplified, the learning environment was more flexible and personalised and security was improved.

Xerox - designing for energy efficiency

Xerox follows a comprehensive approach to reducing product energy consumption. First, in the design phase, product teams evaluate the system as a whole as well as individual components to maximise energy efficiency. Second, during the customer use phase, features such as automatic power-saver modes lower the energy consumed. Finally, remanufacture and reuse programs do their part by requiring less energy than building new parts from raw materials. Together, these initiatives dramatically reduce energy needs, generating cost savings for Xerox as well as for customers – and notable benefits for the environment. Xerox has also developed a "secret e-Agent" used in the production of toner which reduces energy required in production by 22%, delivering 30mkWh of electricity savings by 2008. Xerox applies a systems approach to fuse technology and new electronics architectures to make its current products more energy efficient whilst enhancing functionality. Xerox is a Charter Partner in the Energy Star programme and the use of its several million energy star rated machines saved 1,000,000 MWh of energy in 2005 alone. A further 280,000MWh was saved by remanufacturing from re-used parts in the same year.

Xerox: carbon footprint calculator

Xerox provides complete document management services for companies with the primary aim of reducing cost and improving efficiency. This process involves scrutinising, analysing and streamlining every aspect of document management. Within this service, Xerox help companies understand their document carbon footprint, using a unique carbon calculator tool that Xerox has developed. The carbon calculator highlights the activities that are having the worst environmental effect so that companies can re-engineer processes if necessary. The carbon calculator also helps to show how intricately economics and sustainability are linked – if companies reduce their document carbon foot-print, they will reap the associated rewards of significant cost savings and productivity gains. The key to integrating sustainability is to find mechanisms that not only contribute to overall environmental goals, but which are also commercially viable.

Xerox: electronic reusable paper – Gyricon

Electronic reusable paper is a display material that has many of the properties of paper. It stores an image, is viewed in reflective light, has a wide viewing angle, is flexible, and is relatively inexpensive. Unlike conventional paper, however, it is electrically writeable and erasable. Although projected to cost somewhat more than a normal piece of paper, a sheet of electronic reusable paper could be re-used thousands of times. This material has many potential applications in the field of information display including digital books, low-power portable displays, wall-sized displays, and fold-up displays.

Electronic reusable paper utilises a display technology, invented at the Xerox Palo Alto Research Center (PARC), called "Gyricon." A Gyricon sheet is a thin layer of transparent plastic in which millions of small beads, somewhat like toner particles, are randomly dispersed. When voltage is applied to the surface of the sheet, the beads rotate to pre-sent one colored side to the viewer. Voltages can be applied to the surface to create images such as text and pictures. The image will persist until new voltage patterns are applied. There are many ways an image can be created in electronic reusable paper, eg by printer-like devices that will erase old images and create new images and which can be made very compact, portable and inexpensive or a "wand" which can be pulled by hand across a sheet of electronic reusable paper to create an image. With a built-in input scanner, this wand becomes a hand-operated multi-function device – a printer, copier, fax, and scanner, all in one.

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Does your company have a case study that we could include in our case study library?

If you have an example that demonstrates either:

a) how the technology sector is improving the efficiency of its products and services or
b) how the intelligent use of technology is delivering emissions savings across the economy,

then please contact Emma Fryer, E emma.fryer@intellectuk.org

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REPRESENTING THE UK TECHNOLOGY INDUSTRY

Intellect works with and for members to:

- develop the UK's capability to support a strong and growing technology sector
- improve their business performance by
  - providing insights into markets and supply chains and constructively influencing their development
  - engaging with government and regulators to create the most favourable environment for growth and employment
  - maintaining the industry's reputation and championing its strategic importance
  - sharing and promoting best practice

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