



Tesco - The green IT challenge

Executive Summary

Think of supermarkets and environmentally-friendly initiatives, and Information Technology is probably not the first thing that springs to mind. However, a new project for Tesco demonstrates that IT can make an important contribution to reducing carbon emissions.

Tesco is determined to be a leader in helping to create a low-carbon economy, and has made it a central business driver to reduce its carbon footprint. The company has set itself some very stretching targets, including a 50% cut in emissions from existing buildings by 2020.

IT accounts for a small, but significant, 3-4% of Tesco's carbon footprint. However, IT Director Nick Folkes was concerned to discover that the existing 20 year-old data centres were running out of power and space, and traditional solutions would mean a hike in emissions.

Tesco urgently needed to make its data centres more efficient. Nick Folkes chose Deloitte because the consultancy was able to combine deep technical skills with a strategic view, to suggest a holistic solution that addressed both the building and the IT equipment inside.

Using a multi-disciplinary team, Deloitte identified areas of the data centres that were consuming the most power, defined a series of efficiency improvement initiatives across three main areas (the facility, IT and operational processes) and created a roadmap aligned to growth projections.

Deloitte's green IT solutions could reduce power consumption by 40-50%. They will cut the baseline CO₂ emitted, increase the longevity of available space and power, and change the relationship between CO₂ growth and IT capability growth.

Problem/opportunity faced by the client

Tesco is committed to reducing the size of its global carbon footprint, which currently stands at 4.1 million tonnes of CO₂ every year. Electricity accounts for half this total, refrigerant for a quarter, and the rest is split between diesel, natural gas and business travel. The company has set itself the following targets:

- * Halve the energy use per square foot in its buildings by 2010
- * 50% cut in emissions from existing buildings by 2020
- * 50% cut in carbon footprint of all new stores built by 2020
- * 50% cut in CO₂ created per case of goods delivered by 2012.

Tesco's IT Director investigated how the IT department could cut its emissions. A review showed that IT in stores was the major contributor to carbon emissions, followed by Tesco's data centres.

The data centres were 20 years old and were not designed to cope with the new demands from

the IT infrastructure. Twenty years ago, for example, no one could have imagined that Tesco would have a virtual store, or be a bank.

At the same time as the client was considering how to reduce the IT carbon footprint, Business Operational Development teams started requesting new IT systems to help them define, measure and control the CO² emitted across the business.

It became clear that there was a serious problem. Rather than reducing IT's contribution to Tesco's carbon footprint, these new demands risked raising emissions. More computing power would mean more electricity, which would generate more heat, which would require more electricity for air conditioning. All of which would mean more carbon emissions.

In brief, Tesco needed to:

- Improve the efficiency of its data centres
- Increase the longevity of the available space and power.

Project background

In the first phase, Deloitte measured and analysed Tesco's data centre facilities and their IT infrastructure.

Having measured power consumption, Deloitte analysed mechanical and engineering components, IT and operational practices. The consultancy identified a list of efficiency improvement initiatives, categorised as quick win enablers, best practice observations and strategic initiatives. It then produced a high-level 'Green IT' deployment roadmap aligned to Tesco's business growth projections.

Consulting activity

The team

The Deloitte team of ten or so people was led by John Winstanley, the Associate Partner who heads up the firm's Green IT proposition. John has over 20 years' experience in IT Infrastructure, IT cost reduction and data centres, and uses his expertise to examine all areas of IT operations and processes to understand how to reduce carbon emissions. The team included Nicola Beckford (a Senior Manager in the firm's Technology Integration practice), who has worked in the data centre arena for nearly ten years, two managers intrinsically involved in the Green IT proposition (one of whom is a qualified environmental engineer), and a team of mechanical and electrical engineering specialists headed up by Dr Robert Tozer (a Technical Director) from EYP (now HP Critical Facilities Services).

Consulting activity

Split into two stages, the project took place from January - June 2008. The first stage involved identifying the areas of the data centres that were consuming most power. Key activities included:

- Capturing current state data, such as power usage and costs, Power Usage Effectiveness efficiency rating and CO² output
- Making thermal Computational Fluid Dynamic studies of the data centre floor and rack layouts
- Identifying efficiency improvements within the mechanical and electrical infrastructure
- Carrying out an efficiency analysis of the IT infrastructure
- Reviewing the data centre's operational processes and procedures.

Deloitte selected and worked with a specialist partner in energy-efficient facilities consulting, EYP, to assess the energy output of the infrastructure supporting the data centre.

Deloitte allocated the work according to the teams' expertise. EYP investigated the mechanical and electrical infrastructure for power consumption, looking at areas including generators and air conditioning. Meanwhile, Deloitte experts assessed the IT infrastructure, including Wintel, mid-range, mainframe and storage environments and the management of the data centre space.

This activity demonstrated that mechanical and electrical equipment was consuming 55% of the total power, with the IT infrastructure responsible for the remaining 45%. It also unearthed the alarming fact that the amount of power used had doubled in the three years from 2005-2008. Worryingly, this analysis also indicated that all the data centres' power capacity would be used up by 2010.

In addition, a thermal analysis of Tesco's data centres showed that the vast majority of chilled air (over 70%) was being wasted. There were two main causes of poor air flow: poorly-positioned ventilated floor tiles and variation in air conditioning settings.

Having established a baseline for measuring improvements, Deloitte identified a list of efficiency initiatives, categorised into mechanical and engineering enablers, IT, and IT service management best practice observations. Collectively, these initiatives could reduce the data centres' power consumption by a massive 40-50%.

Since Deloitte delivered its findings, Tesco has wasted no time in implementing a number of improvements. These include installing new Uninterruptible Power Supply systems that don't need batteries or cooling and thereby cut 10% of the data centres' CO₂ emissions. New air tiles with increased ventilation have been repositioned, and blanking plates, brushes and gaskets control the air circulation, meaning that less energy is needed to cool the air. Tesco has installed a High Density Heat Containment system which removes 90% of the carbon emitted from its Wintel estate, and has deployed storage virtualisation technology that will reduce carbon from storage systems by 30%. Tesco has also cut power consumption by implementing a virtualised production Wintel estate, which reduces physical Intel servers by a ratio of circa 1:20.

Success factors and challenges

Results

"The work undertaken on this project has put Tesco in a position of strength. We can now focus on the challenges without fear that our IT infrastructure will hold us back. It has also shown we can use technology to fight climate change."

Nick Folkes, IT Director, Tesco

The solutions that Deloitte proposed:

- Give Tesco's IT department a plan to reduce its carbon footprint that will contribute to the company's overall goal
- Could reduce IT's carbon emissions by 40-50%
- Extend the data centres' potential life span
- Reduce the number of physical servers needed

- Make drastic cuts in heat-intensive equipment by virtualising storage and installing the High Density Heat Containment system.

Having understood the issues raised in Deloitte’s report, Tesco quickly carried out initiatives to cut power use and reduce carbon emissions, including virtualising 1,500 servers.

Challenges

At the start of the project, it was crucial to understand the power being consumed by the electrical and IT systems without risking disruption to services. The engineers overcame this problem by taking measurements further away from critical systems, then applying their experience and knowledge to calculate the power used. They coupled manufacturer plate readings with readings taken at Power Distribution Unit level to calculate the power draw of the IT equipment.

Relevant data was located in a variety of different sources. Deloitte dealt with this by mining the data, pulling the information together, and thereby extrapolating the key details.

Lessons

For Deloitte, this project confirmed the importance of integrating facilities planning and IT management in order to maximise efficiency and minimise carbon emissions. Only around one in a 100 organisations currently takes this approach.

Tesco has also learned the advantages that can be derived from facilities and IT working more closely. There has been a real shift in the way the two areas work together, so they involve each other in changes and jointly manage the data centre environment.

Tesco now also considers energy-efficiency as a key factor when buying new equipment.

Client/consultant relationship

There was a close working relationship between the Tesco client and the Deloitte team. Deloitte consultants met frequently with Nick Folkes to ensure that he understood the solutions and agreed with the direction of the project. The consultants shared their thinking, and tailored reports that the client could use to convince the board and other stakeholders at various stages.

Deloitte challenged the client to consider:

- How to take a holistic view of the facility, IT and operational procedures
- How a closer working relationship between IT and Facilities would benefit the management and capacity planning of the data centre space
- How to look for opportunities to share infrastructure, rather than buying new hardware for each project
- Whether a chargeback model would help control demand from the business.

“Deloitte was engaged to help us not only understand how we could improve the efficiency of our data centre facilities but also the IT infrastructure within them. Deloitte did this in an innovative way by partnering with a specialist engineering firm to deliver the project, and they retained full management responsibility throughout the engagement. The quality of the team provided by Deloitte was very high, as was the quality of the deliverables they produced. They added real benefit by not only providing a detailed report of their findings, but articulating

complex technical ideas at a level that could be readily understood by senior executives within our organisation.”

Nick Folkes, IT Director, Tesco

“Deloitte were the first firm we talked to that brought the two disciplines of IT and data centre efficiency together. Their work has provided us a baseline from which to measure future improvements against, as well as practical and tangible recommendations; we immediately started to implement them and see the benefits we were looking for in improving our data centre energy efficiency and significantly reducing the carbon footprint of IT in Tesco.”

Mike Yorwerth, Group Technology and Architecture Director

“The Deloitte team worked closely with both our IT and Facilities departments to gain a real understanding of the different challenges that we faced. In addition to their original brief, Deloitte went the extra mile to ensure that their findings were documented in time (and in a format for) our IT Executive meeting, which enabled us to secure funding for improvements. Their holistic view has strengthened the on-going working relationship between the IT and Facilities departments and, together, we have successfully met our objectives by implementing a number of Deloitte’s recommendations.”

Douglas O’Connor, Infrastructure Programme Manager