EAUC Company Member case study

Future-Tech

Subject area: Green ICT

Title: Data Centre Optimisation

Queens University Belfast

Company profile

The data centre specialist: Whether you are looking to build a new data centre, refurbish an IT environment or use current best practices to audit and improve an existing facility Future-Tech is the company for you.

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Background

Queen's University Belfast is constantly striving to further improve the energy efficiency of its campus buildings. Initiatives such as Combined Heat and Power (CHP) for their P.E. Centre and the introduction of Voltage Optimisation Equipment across the whole Estate have helped reduce carbon emissions and a campus wide strategy looks at any and all areas of potential improvement.

In 2007 a new energy efficient library building, that would also house a new data centre, was built in the centre of the Main Campus. Sustainability was at the heart of its design, so along with ground source heat pumps, automatically controlled lighting, mixed mode ventilation systems and rain water harvesting, the data centre was also designed to be as energy efficient as possible.

Four years on, the University's Estates Team wanted to check how well the facility was performing and whether any further steps could be made to improve the data centres energy efficiency.

The approach

It was decided that the data centre presented a unique and specialist discipline and that a data centre specialist was most suitable to carry out the assessment.

Having researched different companies and spoken with other educational institutions the University's Estates Team commissioned Future-Tech to carry out a Data Centre Optimisation Survey. This survey assessed the physical infrastructure that supports the data centre and provides a controlled environment for the servers and other IT equipment to operate in.

- **Scope**

The survey looked at three distinct areas within the data centre; power provision, environmental control and future expansion.

The power provision section covered systems/phase loads, power metering, UPS performance and facility power capacity. The survey also highlighted current energy use, areas of inefficiency and elevated risk.

The environmental control section assessed the cooling system parameters, air distribution, existing compressor free cooling system, energy efficiency, cooling capacity and future expansion.

- **Findings**

Although the data centre was performing well, changes in technology and best practice presented areas that could offer improvement with regard to the data centre's energy efficiency and air flow.

When the data centre was originally designed the application of high density blade servers was not on the horizon. When the University's IT Team invested in this new technology it reduced the overall number of servers required, thus reducing energy consumption. However the new high density servers concentrated more heat load into a smaller area, resulting in hot spots in certain parts of the facility.

As there was no air segregation within the data hall itself, supply and return air was mixing which reduced the potential return air temperatures within the system. These lower temperatures returning back to the air handling units resulted in the system operating at a less efficient level than possible.

- **Solution**

Removing hot spots and increasing return air temperatures can both be achieved by introducing an aisle containment system. Aisle containment segregates the supply and return air plenums; this means cooled air can only return to the air handling units after travelling through a server. This increases energy efficiency as all the cooled air has to perform "work" before returning to the air handling units. Because the air plenums are fully segregated hot air from the back of the servers is not drawn round to the front of the servers, resulting in the removal of hot spots.

Aisle containment is only part of the solution as the new air flow paths and increased return air temperatures means the entire system needs to be recalibrated and commissioned. This ensures the very best performance can be achieved by the cooling system.

Implementation

To ensure best value for the University a tender was issued to four companies that provided prices for the manufacture and installation of the new containment system. Future-Tech's submission demonstrated best value and minimum risk for the University. As the installation was happening within a live data centre environment reducing risk was very important and Future-Tech's proven track record allowed the Estates Team to implement the project with total confidence.

Performance and results

With the installation completed on time and under budget, with no interruptions to the University's IT services the first stage of the project was a success.

The University's IT team will complete the final stage of their server reconfiguration in May 2012 at which point Future-Tech will revisit the data centre and begin the recalibration and commissioning of the cooling system.

Once this is complete regular power monitoring will provide the data to show the real savings this project has realised.

- **Return on investment**

The data centre's Power Utilisation Effectiveness (PUE) was 2.0 before the improvements were implanted. By increasing the return air temperatures and commissioning the system to its new parameters the data centre's cooling system should be improved by around 50%, taking the PUE to 1.5 or better.

In real terms this translates to an energy saving of approximately £60,000 per year, giving the project a payback period of less than 12 months. It will also reduce the University's carbon footprint by approximately 315 tonnes of CO_2 per year.

Clients comments

"Our University's Carbon Management Plan requires us to save energy and reduce our carbon emissions by 20% by 2020. This is very onerous considering that Queen's is a research-intensive university set in an urban location. In order to meet our targets, therefore, we are having to implement a wide range of large and small scale projects aimed at reducing energy consumption. Reducing consumption in our data centre would be one such project.

In our experience, most M&E consultants are generally good at designing the building services systems for conventional buildings. Data centres, however, are not conventional buildings. In order to obtain a data centre design that is optimised in terms of space, layout, resilience and energy consumption it is necessary to employ a specialist like Future-Tech who is as familiar with computer server equipment as they are with building services installations.

We were initially introduced to Future-Tech at a seminar on Greening Data Centres held at St. Andrews University in November 2010. Our new data centre had been completed 3 years earlier and, although we were broadly pleased with the scheme, we had encountered problems with hot spots and plant was running harder than expected to maintain the required temperatures. We were impressed by Future-Tech's specialist knowledge, experience in data

centre design and their claims of being able to deliver significant energy savings. We decided to commission them to look at potential improvements for our data centre.

We have had a really positive experience working with Future-Tech. Coming from an I.T. background, they understand how critical data centres are to any organisation. They work efficiently, taking great care to avoid any disruption and they communicate well to keep everyone informed."

Bill Annesley, Estates Manager, Queens University Belfast

Further information

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