

CASE STUDY

SIGNIFICANT ENERGY REDUCTIONS AT HIGH PROFILE EUROPEAN DATA CENTRES

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As some of the world's largest consumers of energy, data centres are under enormous pressure to reduce the amount of power they use.

Therefore, it should come as no surprise that energy management is high on the agendas of owners and managers of these facilities, a fact highlighted in a recent study by Pike Research which found that by 2015, 28 per cent of the expenditure in the \$150bn data centre infrastructure market will be on energy efficient technology.

A growing number of Europe's prestigious data centres have already embraced the powerful flexibility provided by Trend Building Energy Management Systems (BEMS) as a way to achieve greater energy efficiency and benefit from the resulting cost savings.

Headquartered in Westerham, Kent, Chartwell Controls is a leading designer and installer of BEMS, and a Trend Controls Partner. Paul Coker is the company's project director, and says, 'A well designed BEMS is crucial for any organisation which has business critical systems. We have implemented our designs utilising the Trend technology in a number of data centres across Europe that recognise the importance of energy reduction whilst ensuring that the BEMS is robust and that operating temperatures outlined in their service level agreements (SLAs) are adhered to.'

Naturally the most unwelcome side effect of rows and rows of data racks containing high density servers and

supporting equipment is the heat load generated. Overheating and the potential of server shutdowns is not an option as the subsequent downtime and losses can equate to hundreds of thousands of pounds in lost revenue and landlord penalties. Robustly cooling the clients business critical equipment uses significant amounts of energy. It is therefore important to monitor and meter energy use in order to provide ways of reducing energy consumption.

Hot and cold aisle configuration is the preferred method of ensuring the traditional rack formation found in most data centres is optimised. Usually this set up uses inline coolers or computer room air conditioning (CRAC) systems to control temperature. If there is very little room within the data centre, liquid cooling can also be provided directly to the rack to allow IT equipment to be condensed into a smaller space.

'A BEMS can be programmed to efficiently monitor and control the

primary chiller system that supports the secondary cooling services such as CRAC's as well as any liquid cooling units,' comments Paul Coker. 'As this is where the majority of running costs are incurred, optimising the energy use of the chiller is essential. One simple way to do this is to use free cooling where outside air is blown across the heat exchanger which, in turn, helps remove the heat before it gets to the chiller – reducing its activity and associated running costs.'

Since the publication of the European Code of Conduct on Data Centres Energy Efficiency in October 2008 there have been huge improvements in the way the sector uses energy. Nowadays, the main way to measure power efficiency is via The Green Grid's power usage effectiveness (PUE) model.

Developed to enable operators to estimate the energy efficiency of their data centres, a PUE rating is determined by dividing the amount of



power entering a data centre by the power used to run the infrastructure within it. PUE is therefore expressed as a ratio, with overall efficiency improving as the quotient decreases toward 1. From an average figure of over 2.5 only a couple of years or so ago, PUE is now typically below 2 with new data centres achieving 1.5 or lower. Most of this improvement is the net result of better design based on experience, innovation and energy management advances.

'A well designed BEMS helps achieve a lower PUE rating and can report energy usage down to individual server levels – information that can be fed back as part of the whole package of information about these devices,' states Trend Control's Strategic Marketing Manager, Chris Monson. 'Connect this with room and/or rack level environmental information and the ability to monitor energy consumption whilst adjusting temperature becomes a valuable tool in shifting an organisation's PUE.'

For Chartwell's blue chip clients, robustness, reliability and resilience are also vital in order to achieve Tier 3 or Tier 4 levels of performance. Tier 4 requires that all cooling equipment is independently dual powered, including chillers and heating, ventilation and air conditioning (HVAC) systems.

Paul Coker explains, 'Most of our customers want to achieve N+1 redundancy – a form of resilience that ensures entire system availability in the event of component failure.

This means components (N) have at least one independent back up component (+1). Having a BEMS installed means that in the event of a breakdown it can quickly make adjustments, close CRAC units down remotely if necessary and can also send an SMS or email to a designated person to alert them to any issues – even if the control centre happens to be in a different country'.



Paul Coker of Chartwell

A variety of information can be entered into a BEMS such as utility tariffs, CO2 ratings or levels, and cost and consumption targets. When free cooling is activated it can even outline how much energy has been saved as a result. It can also be configured to allow remote access and visibility to relevant personnel both on-site and off-site via a graphical user interface (GUI) and can provide specific information by dynamically updating the dashboard accordingly.

The system's software based tools provide the ability to extrapolate and analyse energy usage patterns in detail across an entire data centre and instigate changes where necessary. Chartwell looks at plant usage data

to configure optimal setpoints and, for example, has found that by using two pumps at half speed rather than one at full speed, significantly less energy is used.

While cost savings alone are usually enough of an incentive to utilise a BEMS, other factors are influencing the growing adoption of this technology in data centre environments.

Firstly, there is now always likely to be a CRC scheme or the equivalent.

Secondly another more subtle factor concerns the growing number of organisations that are actively looking to work with data centre operators that can demonstrate clear environmental and corporate social responsibility based agendas. Chartwell's Paul Coker states, 'We are seeing that data centres with a genuine environmental track record are quickly becoming the first choice for end users requiring a provider that can help reduce their own carbon footprints.'

Good energy management is an ongoing process and a necessary part of reducing data centre energy consumption. As Chartwell Controls is already finding, BEMS are playing a vital role in helping forward thinking owners and operators of these facilities meet their CO2 reduction objectives, a trend that is only set to continue as we move towards a carbon neutral future.

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