Seeking the green balance

There is plenty of conjecture around about what data centre operators should do to 'green' their data centres, not always matched in reality. A notable exception, however, is Bull Information Systems' joint venture with Barnsley Metropolitan Borough Council

Bull Information systems recently had the opportunity to put theory into practice in designing a new data centre to host the outsourced services Bull runs for Barnsley Metropolitan Borough Council (MBC), and other local government and commercial customers.

To provide these outsourced IT and telephony services - utilising the expertise available from one of its core 'Bio Data Centre Initiative' partners Schneider APC - Bull established a joint venture company called Bull TCL. After nearly three years of successful service delivery, and steady growth of other outsourcing and hosting business delivered from the existing Barnsley data centre, Bull made the commitment to a multi-million pound development of a new Tier III standard data centre earlier this year. As part of planning the investment, Bull wanted to both demonstrate its expertise as a provider of green ICT and also produce a future-proof, but cost-effective, data centre for its existing and planned business, based in Barnsley.

MASSIVE SERVERS REDUCTION

The planning of the new data centre was far from the first step Bull had taken to provide Barnsley with a sustainable IT infrastructure. An early accomplishment of the Bull TCL operation was to use Bull's expertise in virtualisation technology to reduce the number of servers in the existing data centre from more than 170 to the current six. In addition to the server estate, the storage, backup and business continuity capabilities have been improved and optimised. However, the growth requirements of Bull and Barnsley's operations necessitated a move to a new, more energy-efficient, data centre and so planning for a new, greener data centre began in late 2008. To assist with ensuring that the right balance between 'green' options, current operating costs and future requirements (business and technology) was struck, Bull involved its European partner Schneider APC to provide specialist assessment consultancy on the options for cooling and powering the new data centre.

"It was interesting, seeing the benefits that the APC Data Centre Assessment Service - which, by the way, is one our own sales team resell to local authorities - brought to our planning process," explains Peter Bush, general manager of the Bull Barnsley MBC joint venture company. "We had already produced an outline design, which we knew would bring the power utilisation effectiveness of the new centre down to around 1.6, but APC suggested some improvements which allowed us to achieve more for less.

"Ultimately, we have ended up with a design that balances the green optimisations across

power supply, cooling and data centre capacity considerations in a way that fits best for our projected business. One specific area we were very keen to address was the issue of 'right sizing' the UPC systems in the data centre," adds Bush.

LOAD FACTORS

"It is well known that over-sized units (sized to peak projected demand) are really inefficient, so we selected APC PX Symmetra PX 160Kw modular array based in-row UPS systems. These units are based on multiple 16Kw power modules that will be configured to match true critical load and allow extra modules to be brought online as the load increases over time.

"One area we thought long and hard about was whether to limit ourselves to the more traditional downflow cooling solution (with hot and cold aisles) or deploy a water-cooled solution with in-rack cooling to create a complete hot aisle containment (HAC) system," continues Bush.

"In the end, in order that we retained the maximum short- to mid-term flexibility in the way we use the new data centre space for incremental business, we settled on the air cooling option.

"However, by using a revolutionary new system - hot aisle return plenum (HARP) - Bull is gaining the advantages of a HAC, without the costs and complexity of a water-chilled, in-row system."

The industry-standard DX (Direct eXchange) air conditioning units deployed use a 'free to air' system that allows the outside atmosphere to cool the glycol water system when possible (70% of the year in Northern Europe), as well as having dual compressors and variable refrigerant flow; 60% of cooling duty is achieved with only 45% of the input power to the compressor when only one of the pair is in action. This feature alone is predicted to save in the order of 816 tonnes of carbon emissions per year.

ENERGY SAVINGS

By using sealed hot aisles and directed cooling flow, Bull will be able to run the computer equipment at a higher temperature than before, still well within the manufacturers specification, therefore saving more energy otherwise wasted in 'overcooling'.

The entire environment will be monitored with more than 40 sensors, all feeding back to a central APC NetBotz device that will alert staff to any prospective issues with the environment. The actual PUE/DCiE for the data centre will be monitored in real-time, using information provided by the APC Schneider Merlin Gerin panel boards.

"Because of the way we have laid out the data centre, we have the inbuilt flexibility of implementing an APC water-cooled solution at a later date, should the requirement arise," adds Bush.

Also commenting on the project, Mike McCaig, Bull's projects and consulting director, says: "Although the data centre Bull has designed is only of medium size, the consultancy audit approach used was just as applicable as it would have been to a much larger commercial data centre. Bull has reviewed the consultants' recommendations against the needs of the local authority and we feel we have produced a practical, rather than a theoretically optimised, result."

Meanwhile, Barnsley MBC is really pleased with the way that Bull and APC have worked together to produce, "perhaps not a best practice, but rather a pragmatic 'best affordable practice' data centre for Barnsley," states Ken Rutt, assistant CEO, Barnsley MBC. "Balancing considerations of technology, facilities and the future work/capacity will produce a result that adds no cost to the authority, saves over 800 tonnes of carbon emissions per year compared to current levels and, most importantly, delivers operational cost savings that will make the Bull TCL-run data centre in Barnsley a cost-effective hosting or outsourcing option for local and regional businesses."