Award-winning ecofris solution used to refurbish university research facility and achieve a PUE of 1.19

“We are delighted with the achieved savings in terms of reduced energy consumption and environmental impact.”

Dr Chris Rudge, Research Computing Services Manager of the University of Leicester

overview

University of Leicester teamed up with Keysource to design and build a purpose-built data centre to meet the need for a highly efficient facility that was capable of supporting the high densities associated with High Performance Computing (HPC). Keysource delivered a scalable version of its award-winning Ecofris cooling solution, which has not only dramatically reduced energy usage but will also enable the university to consolidate the on-campus technology infrastructure moving forward.

the challenge

As part of its mission to meet the technology needs of world-class researchers and maintain its position as a leading UK educational establishment, the University of Leicester needed to develop an advanced data centre. When completed, the new facility would become the data centre for ALICE, a new HPC cluster purchased through a £2M Capital Infrastructure Fund award, along with a number of high profile research projects including the SuperWASP, the UK’s leading extra-solar planet detection initiative.

data centre: consult · design · deliver · manage
A tender specification was issued to a number of specialist contractors, which outlined the need for a future-proof, energy efficient solution capable of supporting high-density equipment and not compromising on levels of availability. Installation of the facility had to take place during term-time, with specified computing capacity remaining live throughout the process.

The university recognised the importance of energy efficiency, so wanted a facility with an annualised Power Usage Effectiveness (PUE) of less than 1.5 that would replace an existing computer room that had a PUE of 2.35. In addition, the current cooling solution was only capable of supporting IT at a density of around 5kW per rack, and with modern HPC systems consuming large amounts of power, it needed a facility that could support up to 30kW per rack position.

Keysource submitted two compliant solutions as part of the initial tender response, which demonstrated its ability to develop a facility that would comfortably support high density hardware platforms of up to 30kW per rack. Both designs possessed a flexible and scalable approach for an initial deployment of 150kW IT load that could be extended to handle a future IT load of 300kW with minimal disruption and zero downtime.

After being short-listed, Keysource were able to establish the most appropriate option, which offered a significant reduction in operational expenditure and would achieve a PUE well below the target requirement. Keysource were awarded the contract after providing high-density reference sites which demonstrated its award-winning ecofris cooling solution.

The ecofris cooling solution uses hot aisle separation, with the air circulating in a closed system. Free cooling is maximised by taking advantage of the UK’s weather conditions and using adiabatic cooling when external temperatures rise, which has meant that the compressor chillers have only been required for less than 14 days during the hotter summer period.

This approach has enabled the University of Leicester to achieve a PUE measurement of just 1.19, reducing the energy consumption required for cooling by more than 80 per cent. In fact, the facility is currently running with 70 per cent more IT load than previously but using 16 per cent less energy overall. When compared to running the current IT load at the old efficiency, the data centre offers annual cost savings of £130,000 and a reduction in CO₂ emissions of around 830,000 kg.

Furthermore, the flexibility of ecofris over traditional cooling solutions was a major factor for the University of Leicester when selecting Keysource. Having designed a future-proof facility, ecofris provides consistent levels of cooling throughout the data centre, so there is no need to predetermine where IT equipment needs to be located based on the density of the technology.

The use of Computational Fluid Dynamics (CFD) software was central to the design process. This ensured that the rack layout and server airflow requirements were optimally matched with the cooling equipment to maximise efficiency and ensure the environmental conditions are maintained.

As principle contractor and under CDM, the entire data centre build was managed by Keysource’s project management team, which delivered the project on-time and within budget using skills and expertise that the university was happy to recognise it did not have in-house. During the closing stages of construction, comprehensive Integrated System Testing was carried out to verify that the facility operated within the design parameters under normal and failure scenarios.

case study: University of Leicester
Keysource continue to provide a full data centre management contract for the university covering all operational aspects of the facility including emergency response to site and maintenance. As part of this contract and working closely with the university, Keysource continue to measure and monitor performance and through fine-tuning have been able to increase efficiency, further improving on the original design PUE.

In addition, a comprehensive remote management and monitoring solution has been adopted to alert Keysource immediately of any issues and provide high level reporting functionality to track the capacity and performance of the facility.

Due to the success of the data centre, the university has undertaken a second phase of development to double the capacity to provide an overall IT load of 300kW. This is part of a project to consolidate the on-campus technology infrastructure that will reduce operating costs and boost performance. This initiative is designed to rationalise from three to two data centres, with plans to also incorporate a number of smaller computer rooms located on the site in the future.

Dr Chris Rudge, Research Computing Services Manager of the University of Leicester says:

“Although the scope of the works inevitably caused disruption, the skill and professionalism of Keysource greatly reduced the impact of this. Whilst we have considerable expertise in managing complex IT, including High Performance Computing, the University recognised that we needed a specialist Data Centre provider to lead both the design and build of the room to achieve our objectives of energy efficiency, scalability and support for high density.

Our Estates and Facilities Management Division found that the strong project management and high quality of work carried out made Keysource an easy company to deal with.”
the benefits

- **Budget** – Keysource was able to work within strict budgetary constraints to provide an attractive Total Cost of Ownership proposition that demonstrated a real return on investment without any operational compromise.

- **High Density** – The data centre has been designed to support high-density hardware platforms of up to 30kW per rack and above, with guaranteed N+1 resilience, to accommodate modern HPC systems.

- **Energy Performance** – The data centre has achieved a PUE of 1.19 compared to the previous facility’s PUE of 2.35.

- **Operational Savings** – The facility is currently running with 70% more IT load than previously but using 16% less energy overall. Compared to running the current IT load at the old efficiency, the facility offers annual cost savings of £130,000 and a reduction in CO₂ emissions of around 830,000 kg.

- **Flexible Deployment** – Consistent levels of cooling can be maintained throughout the data centre, so the University of Leicester possesses the added flexibility of being able to deploy any IT equipment anywhere in the facility regardless of density.

- **Scalability** – The modular design has enabled the University of Leicester to initiate a second development phase that sees the IT load doubled to 300kW without disruption or downtime and consolidates the IT infrastructure from three to two data centres.

**Mike West, Managing Director of Keysource says:**

“ecofris enables the most efficient and cost effective data centres possible that support modern IT systems and are resilient to future needs. This new facility for the University of Leicester will not only reduce energy usage through optimum cooling efficiency, but also operate effectively with their high-density hardware platforms to increase savings and operational performance.”

can we help you and your company?

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