

Nominee: Kao Data

Nomination title: Energy is Key to Kao Data Campus

Kao Data's London One data centre is designed and built to provide customers with a platform to deliver highly efficient IT architecture in an environment that fully adheres to volume server manufacturer's warranties. This exemplary building design provides transparent operational metrics, demonstrating that new ideas in energy management are essential as our industry continues to grow. It is time to move away from the entrenched data centre mind-set that chilled white space and mechanical air cooling is an efficient answer to colocation environments.

The concept for the Kao Data Campus was to develop a technology and engineering-led solution to data centre design, build and operation with an acute focus on the customer requirements. This has delivered a site that is adherent to current leading energy supply and usage best practice, providing optimised solutions and reduction on the overall energy-to-technology load ratio by 70%, delivered to customers providing market leading cost levels for this type and size of data centre.

Kao Data's management team offers a wealth of technical and operational experience in the data centre market and that expertise informed the decision to partner with an engineering services organisation, JCA Engineering, with its wide experience in data centre construction as the lead contractor. Key to the Kao Data Campus development is the collaborative relationship that was created with JCA Engineering, as the Design and Build Contractor. Data centres are heavily technical projects to deliver and this was a highly innovative approach to a project of this scale, £200 million investment.

Power IN

Kao Data has built a secured 43.5MVA power supply served by its own UK Power Networks substation. The company has made a significant investment in the power train, with three primary transformers in N+1 configuration independently fed from the primary grid to ensure maximum resilience for all four buildings on the site, which will house sixteen technology suites in its final built-out state.

The 43.5MVA maximum capacity of power is supplied to the Kao Data Campus from the UK Power Networks (UKPN) national grid substation Harlow West Grid. The power is delivered via a 5km route comprising of three 33kV circuits each supplying a 33/11kV transformer rated at 30MVA. The transformers are located within the security demise of Kao Data Campus.

The UKPN infrastructure 11kV serves to Kao Data 11kV primary campus network including 2N 11kV supplies to each of the four data centre buildings. The end-to-end supply conforms with the Security Supply standard P2/6, and ensures there is no single point of failure on the Kao Data Campus network nor that of UKPN. The data centre has been designed and built to offer 100% availability.

The design incorporates back-up HV diesel generators, configured in N+1, with dedicated fuel storage ensuring operation at full load for 48 hours, with priority refueling contracts in place. The UPS is configured in N=1, with 2N active-active power supply systems providing a minimum of five minutes autonomy, in the unlikely event of a utility power failure. Customers have the option of 230V and or, 400V power supply with independent phases delivered to their rented space.

The power protection system enables Kao Data to guarantee industry-leading Service Level Agreements (SLAs) backed by robust Service Performance Guarantees (SPGs). This power spectrum allows us to tailor the power configuration to meet the wide range of different energy demands that customers may have, whether they require a Technology Suite, Technology Cell or Rack service.

Inside Climate Control

Kao Data Campus has implemented N+1 Indirect Evaporative Cooling (IEC) units, providing highly efficient climate control, and offering a resilient back-up capability in the unlikely scenario of a unit failure. Uniquely, the IEC's incorporate no mechanical refrigeration 'trim' - a first for a UK wholesale data centre, which will revolutionise data centre operational efficiency. The capabilities of IEC allow the data centre design to utilise a reduced component count in terms of mechanical powered cooling systems, this design reduces capital costs, increases both reliability and availability as well as eliminating the high-energy use of these units and so reduces operational energy costs.

Energy is the largest Op-Ex cost for a data centre, and cooling represents the largest percentage of the energy use, beyond the servers. Therefore, this represents the greatest opportunity for energy and cost saving. Correspondingly, to reduce the energy used within the data centre infrastructure, effectively releases that capacity for more IT utilisation. This snowball effect, provides better PUE, as a higher-percentage of total data centre energy is utilised by IT, as well as higher IT capacity.



The Technology Suites provide column-less space which ensures optimised floor configuration, maximising rack layout and improved cooling airflow to each rack position. The racks are configured in enclosed hot aisle containment systems to offer maximum server performance efficiency, to manufacturers' warranty specifications. This ensures optimized airflow circulation through the containment systems as the cooling air is drawn through the racks, heats, rises and exhausts through chimneys up into the ceiling space for recycling.

The IEC units are located externally, adjacent to the Technology Suite and cool and re-circulate internal air through the custom designed "diffusion wall" . This separation of cooling equipment to the Technology Suites, allows maintenance of the IEC units to take place without requiring access to the white spaces of the facility.

The cooling infrastructure is designed around a conservative delta-T:12oK, and the data centres also benefit from the application of innovative free-cooling technologies resulting in increased reliability, higher energy efficiency, increased sustainability and lower operating costs over the life-cycle of the facility. Using non-mechanical cooling techniques, we can safely and reliably increase the temperature set points and maximise the operational hours of minimal cost cooling. This approach ensure the ASHRAE recommendations are maintained and drive PUE lower, not only at peak load, but consistently deliver sub 1.2 PUE on building and campus developments.

The Kao Data Campus is compliant with the ASHRAE Thermal Guidelines (2011 and 2015) including the International Society for Automation Environmental Conditions for Process Measurement & Control Systems: Airbourne Contaminants (ISA 71.04 (2013)).

Why nominee should win

- * Reduced Energy Use through technical experience of data centre designs offers greatly reduced cost structure.

- * IEC Cooling strategy provides reduced impact on energy drain on local and national grid, even at full IT load.

- * Energy strategy achieves PUE of 1.2 across part and full IT load scenarios.

- * Kao Data Campus is fully compliant with ASHRAE Thermal Guidelines (2011 and 2015)



*** Technology and Engineering-led design and build with real collaboration with the lead constructor (JCA Engineering) and the Kao Data team. This realized and delivered this highly energy efficient campus.**