

Data Centre Best Practice Case Study

Cooling system optimisation: EkkoSense and Digital Realty

1. Summary

Analytical thermal optimisation from EkkoSense has enabled Digital Realty to reduce cooling energy by 20% in its West Drayton facility, delivering significant energy cost savings and achieving full ROI in within five months. Cooling consumes up to 30% of the data centre's energy, so these savings play an important part in reducing infrastructure energy consumption and site PUE. The scale of these savings far outstrips the small incremental improvements usually suggested with more conventional methods in traditional data centre environments. The solution is particularly applicable to legacy sites so there is scope for wider deployment both within Digital Realty and for colocation and enterprise operators across the industry at large.

2. Where and when has it been applied?

The solution was deployed for a proof of concept project at Digital Realty's West Drayton facility in London, starting in February 2019. It achieved full ROI within five months and, on the basis of these results and the low capex involved, it is now being trialled in New York and looks set to be rolled out to other Digital Realty sites.

3. Strategic Fit

A long-time advocate of the EU Code of Conduct for Data Centres (EUCoC), Digital Realty has developed its own three-tier Energy Management strategy, firmly based on the EUCoC's applicable best practices. The three elements within this strategy are:

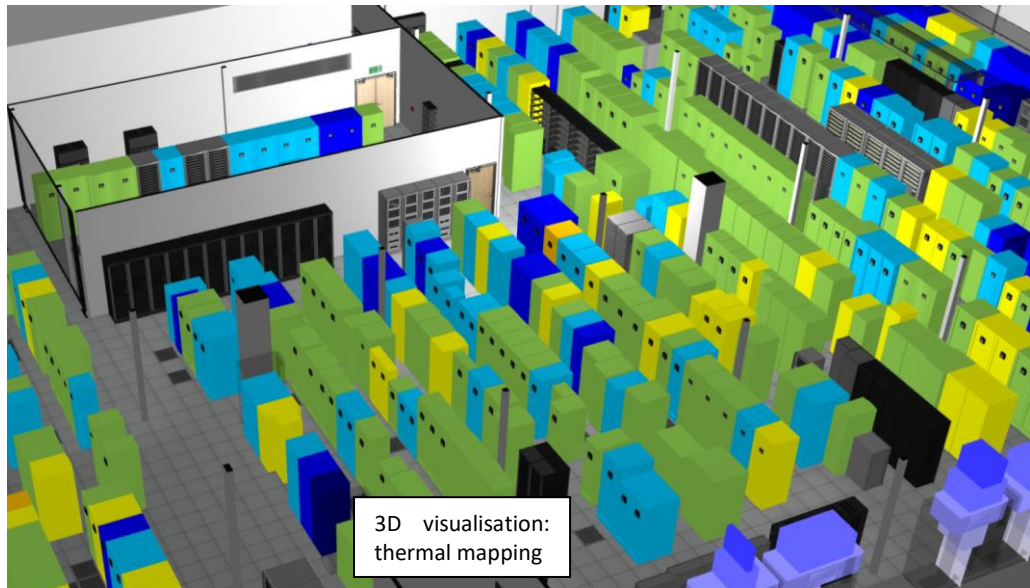
1. Airflow Management
 - Continual improvement in the segregation of hot and cold air masses (e.g. aisle containment, blanking panels, fixing leaks, number and location of vented tiles, etc.).
2. Cooling System Efficiency
 - As air segregation improves over time, incremental adjustments are made to the cooling system asset parameters, thereby saving energy (e.g. fan speeds, CRAC/CRAH and free cooling temperature set points, etc.).
3. Capital Plant Replacement
 - Replacement of older inefficient equipment with new best available technology.

Focusing on the 'Cooling System Efficiency' element of the three-tier Energy Management strategy, the proof of concept project was approved to commence in February 2019.

4. How does it work?

The EkkoSense solution is a powerful, intuitive SaaS platform that provides immersive 3D visualisations, unique cooling and airflow insights and one-click capacity management for data centre environments. It is a measuring, analysis and visualisation system specifically for data centres. The software acquires intelligence through wireless sensors on each rack, collecting thermal and humidity data with CRAC/CRAH sensors providing real-time cooling information.

Traditional rack temperature sensors show how well racks are being cooled, but they don't show how the cooling is being achieved or how much power is being used in the process. EkkoSense's CRAC/CRAH sensors deliver insight into the



actual operation of the cooling system and the deployments feature many more sensors than traditional data centre monitoring and provides real-time, not simulated, data output using deep analytics techniques. Real-time data enables real-time power, cooling and space capacity planning to maximise performance. A 'Rapid Room Builder' feature lets organisations quickly build, populate and edit their data centre rooms in 3D. 3D visualisation provides a risk-free, drag and drop capability to simulate planned data centre changes for IT loads or cooling upgrades. Currently this cooling performance analysis is unique within the industry, and truly innovative.

5. What did you do?

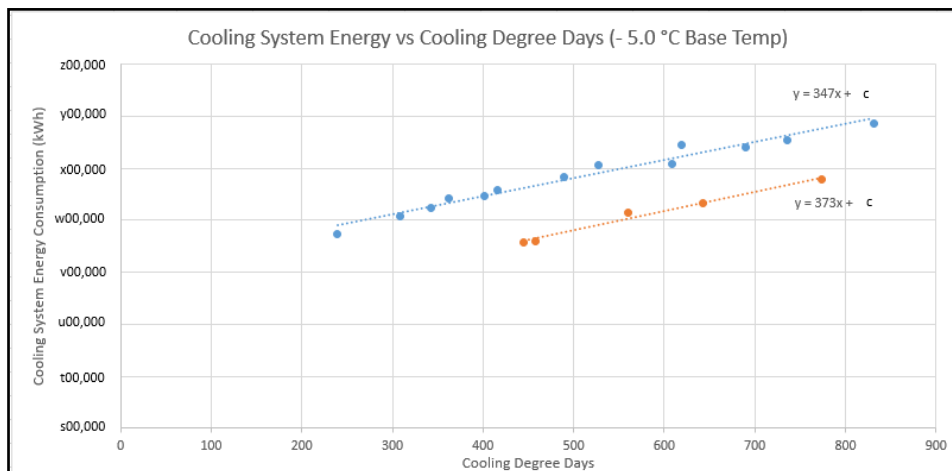
Digital Realty's legacy facility in West Drayton was selected for the proof of concept, as its stable IT load enabled the cooling system's energy consumption to be analysed without having to consider a variable IT load. The relationship between the cooling system's energy consumption and the ambient temperature was established beforehand, using degree day data as it is statistically more accurate than average temperature. The project involved five phases:

- i. Hardware installation: One thermal wireless sensor per rack, supply and return sensors on all CRAC/CRAH units plus supporting infrastructure (wireless hubs, cabling, etc.). No physical connection to Digital Realty's network was required. Connectivity with the cloud-based software was via a dedicated external 3G data connection.
- ii. Commissioning: Using a 'Rapid Room Builder' feature, the software constructed a 3D model of the facility showing all assets with sensors.
- iii. Benchmarking: Pre-optimisation benchmark data was collected over a period of c. one week.
- iv. Optimisation: Site operations team and EkkoSense experts worked together to optimise the existing cooling infrastructure. Activities included relocation of floor grilles, CRAC/CRAH unit temperature and fan set point modifications, adjustment of free cooling set points, identification and removal of key hot/cold spots and controlled shutdown of cooling units.
- v. Post optimisation: Data collection and analysis

6. What were the outcomes?

During the five-month project, a 20% reduction in cooling system energy was achieved. Continual improvement in PUE was recorded and full ROI was achieved within the project period (March to end July).

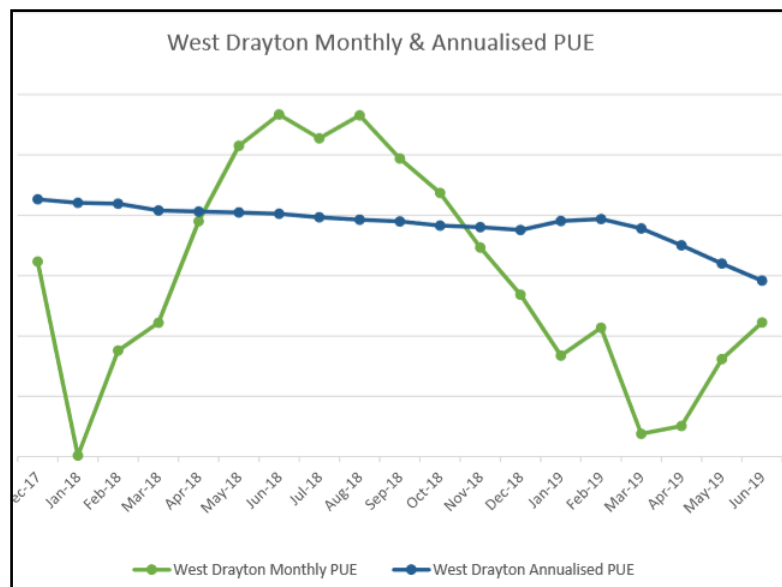
7. Charts and Illustrations



Pre-Optimisation = Blue data points – January 2018 to January 2019

Post-Optimisation = Orange data points – March 2019 to July 2019

Site PUE reducing steadily during project period



8. How widely applicable is the solution in the sector?

Very. The approach is particularly effective in legacy sites: these comprise a significant proportion of the data centre market and retrofitting is typically problematic and costly, usually only delivering incremental improvements. Over 300 facilities are already using the platform; telcos, enterprise and colocation, 80% of which are legacy sites. It is also applicable to data centres of all sizes. EkkoSense works with customers with just a few racks to customers with 10,000+ racks, though the average is around 500. Typically, they achieve a at least 20% cooling energy saving with a return on investment of 10 months. With low capex and immediate returns, it should be attractive for legacy operators seeking a step-change improvement without the disruption that accompanies a major refit.

9. Links to further information, product profile, white papers, related case studies

<https://www.ekkosense.com>

<https://www.digitalrealty.co.uk/environmental-social-and-governance-report-2018-highlights>