

Critical peak demand management with data analytics

Summary

QIC Global Real Estate (QICGRE) and building analytics technology partner CIM, successfully reduced peak demand at Melbourne Shopping Centre, Eastland, during critical peak demand (CPD) periods, in response to local initiatives aimed at reducing pressure on the electricity network during times of extreme weather stress.

Using the insights generated by CIM's building analytics platform PEAK, QICGRE's operations team optimised Eastland's heating, ventilation and air-conditioning (HVAC) plant and equipment to facilitate a 15.4% combined demand reduction across the shopping centre on peak demand days.

KEY SUSTAINABILITY OUTCOMES*



0

Zero compromise on thermal comfort



23.52%

mechanical power reduction during CPD hours



15.4%

combined power reduction during CPD hours



\$0

additional operational expense



* January - December 2019

Challenge

“ QICGRE is continuously focused on facilitating efficiency opportunities presented to us by CIM that will impact positively on local communities while helping us cut back on CO2 emissions, said Damien Stacy, QICGRE Portfolio Facilities Manager ”

Significant energy savings were facilitated through advance planning and close monitoring of Critical Peak Demand (CPD) periods. Doing so facilitates lower network tariffs, by contributing to the reliability and safe supply of the electricity network and reducing the overall cost of operating it.

CPD information is sourced through AusNet Services, the Victorian transmission system operator. AusNet operates the GoodGrid CPD program to encourage its largest energy consumers to reduce electricity use on five nominated peak days per year – typically the hottest days of the year, when the network is most under strain.

AusNet sends an SMS notification to its subscribers of an upcoming CPD day anytime between one day and one week in advance. To allow QICGRE to react quickly to this opportunity, CIM’s engineers analysed the centre’s energy data and costs in the PEAK platform then pulled together a plan to further optimise existing plant and equipment at Eastland during CPD periods.

“ Unlike traditional peak demand tariffs which are backward looking, the critical peak demand model provides advance notice. This allows the use of advanced building analytics to plan and execute an effective demand reduction program which benefits the customer, through lower demand charges, and the system by reducing peak demand at the time it is needed,” said Arghya Sen, Senior Systems Engineer at CIM. ”

“QICGRE is continuously focused on facilitating efficiency opportunities presented to us by CIM that will impact positively on local communities while helping us cut back on CO2 emissions,” said Damien Stacy, QICGRE Portfolio Facilities Manager.

“At Eastland in particular, nearly 20% of our annual electricity bill is based on the energy we use on these five nominated days, so reducing our critical peak demand was a top priority,” he added.

Before moving forward with the plan, the team had to be certain any changes to mechanical equipment performance wouldn’t impact thermal comfort for retailers and visitors.

“We needed to fully understand the impacts on individual tenancies before we started optimising their set points. For example a jewellery store, with lots of lights and a very high heat load, could be severely affected compared to a dimly lit female fashion store,” said Stacy.



Building intelligence
smart



Machine learning
simple



Technical engineering support
transparent

Solution

Since 2018, CIM has helped QICGRE to increase the operational efficiency of Eastland and 21 shopping centres within its retail portfolio. By collecting and analysing all live and historical data from these assets, CIM and QICGRE are using PEAK to set a new standard in best practice asset management.

"Having already consolidated our energy, equipment and thermal comfort data in the PEAK platform, it took the CIM team a matter of days to understand the building usage and load patterns for Eastland, and recommend a control strategy that wouldn't negatively impact thermal comfort," said Stacy.

A cross functional team was pulled together including Eastland's site operations representatives, building management system (BMS) contractors, CIM engineers and 1Circle consultants to implement the agreed CPD reduction strategy.

Each time they received an SMS notification from AusNet, the team programmed Eastland's BMS with the new plant and equipment time schedule proposed by CIM for CPD days. They also adjusted the lighting and vertical transport usage schedules for those CPD hours.

Power consumption

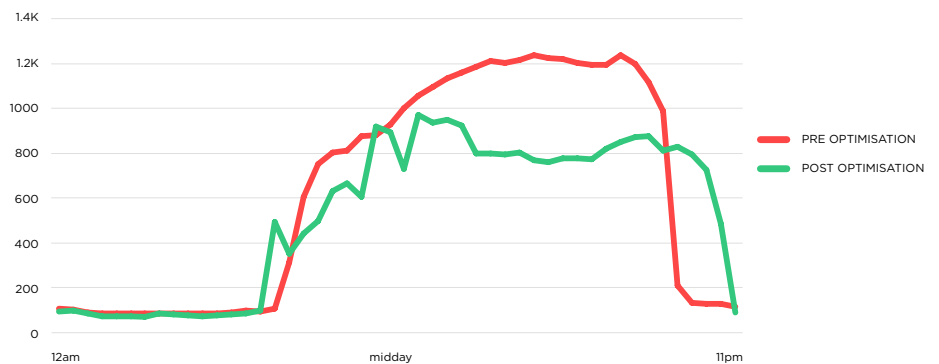


FIGURE: Power consumption change and equipment profile. The red line represents 24 January 2019, the hottest day that served as the baseline for a year-over-year calculation.

Results

Based on PEAK's insights, the Eastland team successfully optimised the shopping centre's plant and equipment on all five nominated days and improved retailer comfort, without any additional OPEX costs.

The drop in CPD energy use generated a 15.4% overall year-on-year reduction based on the five CPD days the previous year.

By focusing on the centre's mechanical equipment alone, including chillers, carpark exhausts and air handling units, the team delivered a 23.52% combined mechanical power year-on-year reduction compared to the same time a year earlier.

These efficiencies were tracked and reported in real-time using the PEAK dashboard, which facilitated a transparent and collaborative process for everyone involved.

"Without access to the granular data provided in PEAK, it would have been very difficult to roll out this process without potentially compromising tenant comfort," said Stacy.

"The data PEAK collected from all of our systems and equipment helped us manage expectations, find the right opportunities and accurately measure building performance against our new targets on each CPD day," he added.



*As at 30 June 2020.

Future initiatives

CIM and QICGRE are now using PEAK's data-driven insights to replicate the success at Eastland across other QICGRE-owned centres.

"We are working towards similar strategies for the entire QICGRE portfolio by taking into consideration individual structures, building demands and load patterns for each asset," said Arghya Sen, CIM's Senior Systems Engineer dedicated to the QICGRE portfolio.

“Coming up with these site specific recommendations is very complicated without a data platform such as PEAK, which can show you how to manage the load properly to deliver desired outcomes,” said Sen.

An element of this work involves configuring PEAK's Programmatic Control Algorithm feature so it can automatically write back to the BMS on CPD days, and make systematic overrides to equipment performance to optimise building energy use based on outside weather conditions.

The ability to successfully manage electricity loads at short notice on CPD days is one of the many outcomes QICGRE derives by applying a data-driven and proactive approach to its building operations.

"Being able to slash energy consumption when the electricity network is under pressure not only helps prevent blackouts across the region, it also reduces price volatility and helps meet short term shortages of supply in a sustainable way," said Sen.

By responding to operational efficiency opportunities across its AUD\$12.5 billion retail portfolio*, QICGRE is successfully using PEAK to reduce energy consumption and carbon emissions, in support of the reliable supply of energy to other users across the state, and improving asset performance for customers and shareholders.

PEAK

CIM's award-winning PEAK platform integrates building intelligence, machine learning and technical engineering support to improve efficiency, sustainability and comfort across QICGRE's property portfolio. PEAK was recognised as "Best in Class" by the CSIRO following a 24-month independent evaluation of building analytics technologies.

- ✓ Simplifies and accelerates the end-to-end process of fault detection, diagnosis and problem resolution
- ✓ Automatically collects and monitors live building data, and leverages algorithms to pinpoint, highlight and prioritise inefficiencies
- ✓ Facilitates a collaborative workflow with stakeholders to quickly resolve issues
- ✓ Provides visibility and insight to optimise site and portfolio performance.

We look forward to hearing from you.

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