

CHILLER OPTIMISATION



THE CUSTOMER



The building at 80-100 Victoria is owned by LandSec who build and invest in buildings, spaces and partnerships to create sustainable places, connect communities and realise potential. They are one of the largest real estate companies in Europe, with a portfolio of retail, leisure, workspace and residential hubs. They shape a better future by leading their industry on environmental and social sustainability while delivering value for shareholders, great experiences for guests and positive change for communities.

Landsec employ NG Bailey who are the UK's leading independent engineering and services business who work across a variety of sectors within the building and infrastructure industry and work on ground breaking projects providing solutions using the latest tools and technologies. NG Bailey undertake FM management of the building and employ Birdsall to provide chiller maintenance services.

Together the three of us were keen to improve the sustainability of all their property assets and utilise Landsecs dedicated energy team to implement mutual sustainability objectives.

"THE PROJECT CLEARLY DEMONSTRATED THE
OPERATIONAL AND FINANCIAL BENEFITS..."

LANDSEC ENERGY MANAGER

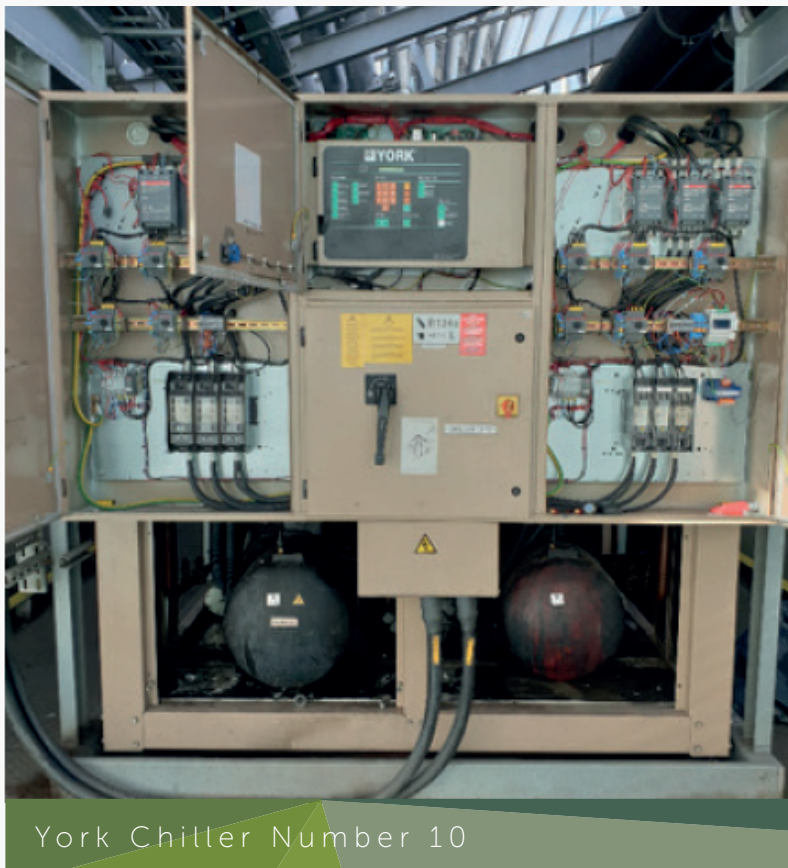
"THE PROJECT CLEARLY DEMONSTRATED THE OPERATIONAL AND FINANCIAL BENEFITS FROM UNDERTAKING THESE WORKS. THE ENERGY SAVINGS AND IMPROVEMENT IN PERFORMANCE FULLY JUSTIFY COMPLETING THE WORKS TO THE OTHER NINE CHILLERS USING FIXED CLIMACHECK PERFORMANCE ANALYSERS TO MONITOR PERFORMANCE."

LANDSEC ENERGY MANAGER

THE CHALLENGE

We were challenged to demonstrate the improvements in performance to one chiller following the completion of energy efficiency improvement works compared to a further 9 chillers in the fleet.

If we could demonstrate and prove that the works carried out were cost effective and delivered improved energy efficiencies and operating performance, then it would provide rationale for the enhancement we recommended to the remaining nine chillers.



York Chiller Number 10

THE PROJECT

Two ClimaCheck performance analysers were installed. One on modified chiller #10 at 100 Victoria and the other on unmodified chiller #4 at 80 Victoria.

Chiller 10 was also optimised via thermodynamic evaluation to produce an accurate, unbiased analysis (COP, capacity, compressor efficiency, approach temperatures and other vital performance parameters, to produce optimised performance.

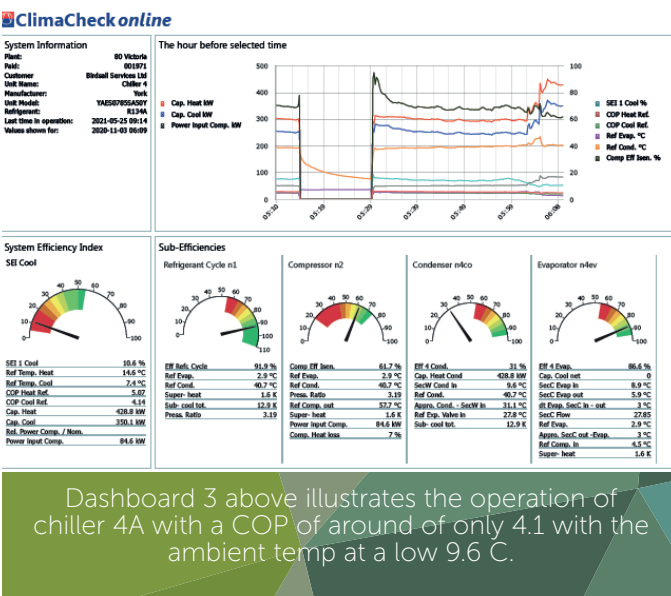
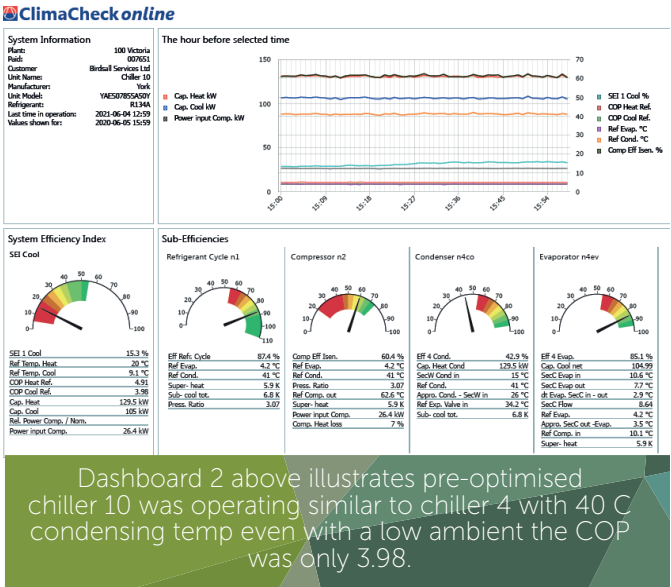
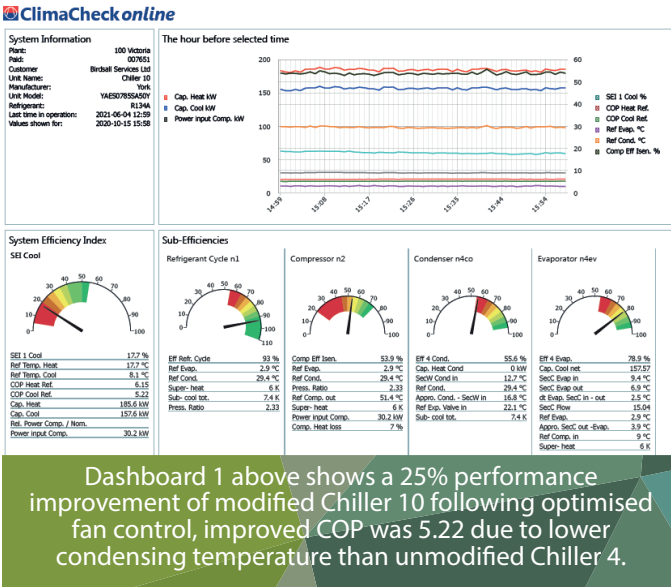
The systems enabled 24/7 data to be accessed remotely on the thermodynamic performance and the energy consumption.

Performance COP was accurately recorded during periods of stable continuous operation. Comparing energy use over the five month period was not as successful. In hindsight this required the chillers being compared to operate for the same number of hours and to be on similar cooling loads and controls. This was not achieved and outside our control as also was occasional unreliability affecting the hours in operation.

Chiller 10 has new efficient EC fans and fan control was adjusted to utilise data from the compressor manufacturers envelope, along with the removal of acoustic panels resulting in the total elimination of short cycling condenser air. Before these modifications condenser air in was recorded at 7-10°C higher than ambient, a major factor. Now this chiller is condensing at considerably lower temperature than that of Chiller 4.

THE MONITORED DATA

We monitored and assessed the two chillers over a five-month period. The outcome was:

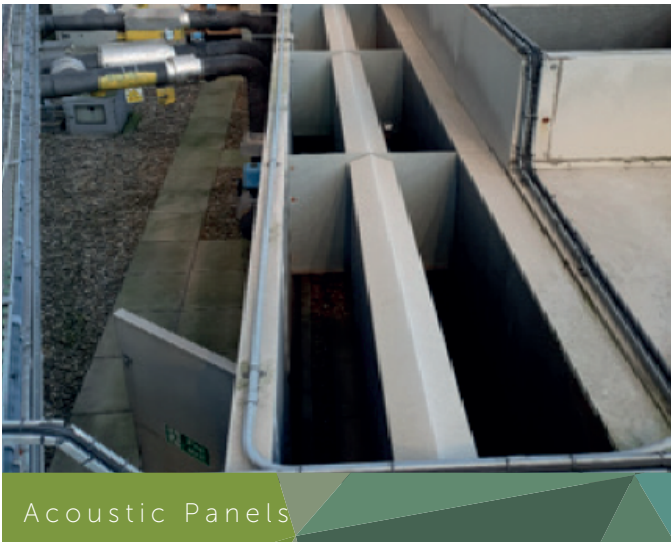


THE OBJECTIVE

The objective was to demonstrate that the chillers serving the property could be significantly improved in terms of energy efficiency, operating performance and reliability.

The scope of the works included the installation of new efficient EC fans and fan control adjusted to utilise data from the compressor manufacturers envelope.

With permission acoustic panels were removed resulting in the near total elimination of short cycling of condenser air.



We can safely conclude that 20-25% of the energy spent on the compressors could be saved. This percentage over 20 compressors across 10 chillers is a significant saving.

The information that Climacheck provided over the first five months, has enabled us to write our future proposals differently as we have a better understanding of the system and its capabilities so the data can be challenged more effectively.

Virtually eliminating condenser air bypass was the main reason for the performance improvements we saw in chiller 10, yet leveraging insights from analysed data to fine tune and optimise the chiller also had an impact. The single biggest influence on this was the removal of the acoustic panels.

The benefit of the EC fans is twofold, firstly we were able to optimise the condenser air approach temperature in accordance with compressor manufacturers specification and secondly the reduction in noise levels, we removed the start and stop noise completely which was present with the original fans.

After 12 months in operation this Chiller Optimisation project clearly demonstrated that substantial electricity reductions could be made on the site, together with the ClimaCheck software giving constant analysis that can predict equipment failure well in advance. We were able to drill down on excessive wear and stress which enabled us to pre-empt potential faults and outages and when we implemented these findings into a predictive maintenance plan it reduced down time and high costs compared to sudden unplanned repair works. We anticipate call-out and remedial costs to decrease further as we utilise all of the system capabilities including remote monitoring, which will provide further on-going savings and greater reliability.

The monitoring and control of environmental conditions have significantly improved the sustainability of the building. The teams understanding of electrical usage and bills is significantly better which enhances decision making capabilities.

Estimation of Energy Use

Chiller 4 used 150,000 kW hrs over an interrupted 5-month span.

We estimate that 8 out of the 10 chillers will be running to part load (over a 12 months period)

150,000kW per hour divided by 5 months
=
30,000 per month

multiplied by 12 months
=
360,000kW

multiplied by 8 chillers
=
2,880, 000kwh per annum @ 12p/kWh

=
£346,560 / a less 20% = £277,248.

A saving of £69,312 / a based on a 20% reduction

which we think will be higher





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