CH_2 CASE STUDY

1200 BUILDINGS PROGRAM

SNAPSHOT

Building details

Built: 2006

GFA: 12,536m²

NLA: 9,373

Owner: City of Melbourne

Major tenant: City of Melbourne

Facility manager: Brookfield GIS

Consultants for this project

- **Level 2 energy audit:** Energy Action
- **HVAC contractor:** AG Coombs
- **BMS contractor:** Schneider Electric

Retrofit features

- **BMS upgrade**

NABERS Energy rating (base building)

Pre-works: 3.2 stars

NABERS Energy rating (base building)

Target: 4.5-5.0 stars

Outcomes

ROI: 8 per cent

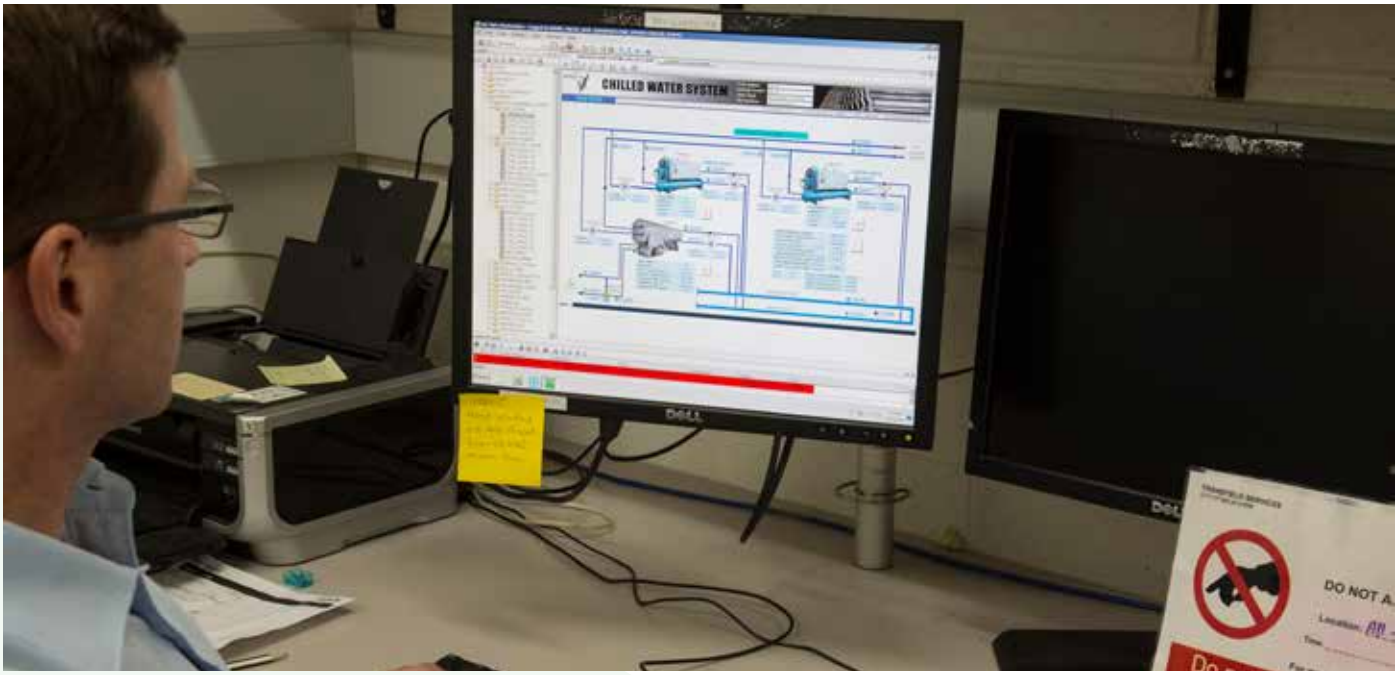
Energy savings ($): $41,500

Energy savings (%): 10%

Greenhouse gas savings: 264,000kg CO_2-e

Percentage reduction CO_2-e: 25%

Current NABERS Energy Rating (base building): 4.04



Case study: Council House 2, 218-240 Little Collins St Melbourne

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BACKGROUND

Council House 2 (CH_2), Australia's first 6 star Greenstar designed building was commissioned in 2006. While the indoor environment quality is excellent resulting in higher staff productivity when compared with non-green buildings, a NABERS Energy assessment in 2013 revealed that CH_2 was under performing and a plan was developed and is in the process of being implemented to increase energy efficiency.

ISSUES TO ADDRESS

The objective of this upgrade project is to gain a greater understanding of the gap between original design intent and operational performance and to improve the energy performance of CH_2.

CH_2 is a complex building and therefore difficult to operate because the building's HVAC system contains many components that are not usually combined together in one building. The system includes: a chilled ceiling panel cooling system, high thermal mass to assist with comfort control, passive ventilation systems, Phase Change Material (PCM) thermal storage tanks, shower towers, cogeneration and renewable generation.

UPGRADE PLAN

A Level 2 energy audit of CH_2 revealed that energy consumption was higher than expected and a number of retro commissioning activities were recommended to improve efficiency. A number of these have been implemented including:

- an upgrade of the BMS control strategies
- an upgrade of the tenant condenser water system to variable flow
- installation of an energy sub metering and monitoring system.

Also recommended is the rebalancing of the heating hot water and chilled water systems however this will be undertaken when the chilled ceiling panels are returned to working condition. See below for more details.

At the end of a 12 month monitoring period an informal NABERS Energy rating confirmed that these works had improved the base building performance by 0.8 stars, raising the rating from 3.2 to 4.0 stars.

Following the implementation of the retro-commissioning activities, further actions were undertaken:

- revision of the base building packaged air conditioner (PAC) unit and split unit controls
- revision of the tenant condenser water loop operation and
- optimisation of the building's HVAC operating schedule.

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RESULTS

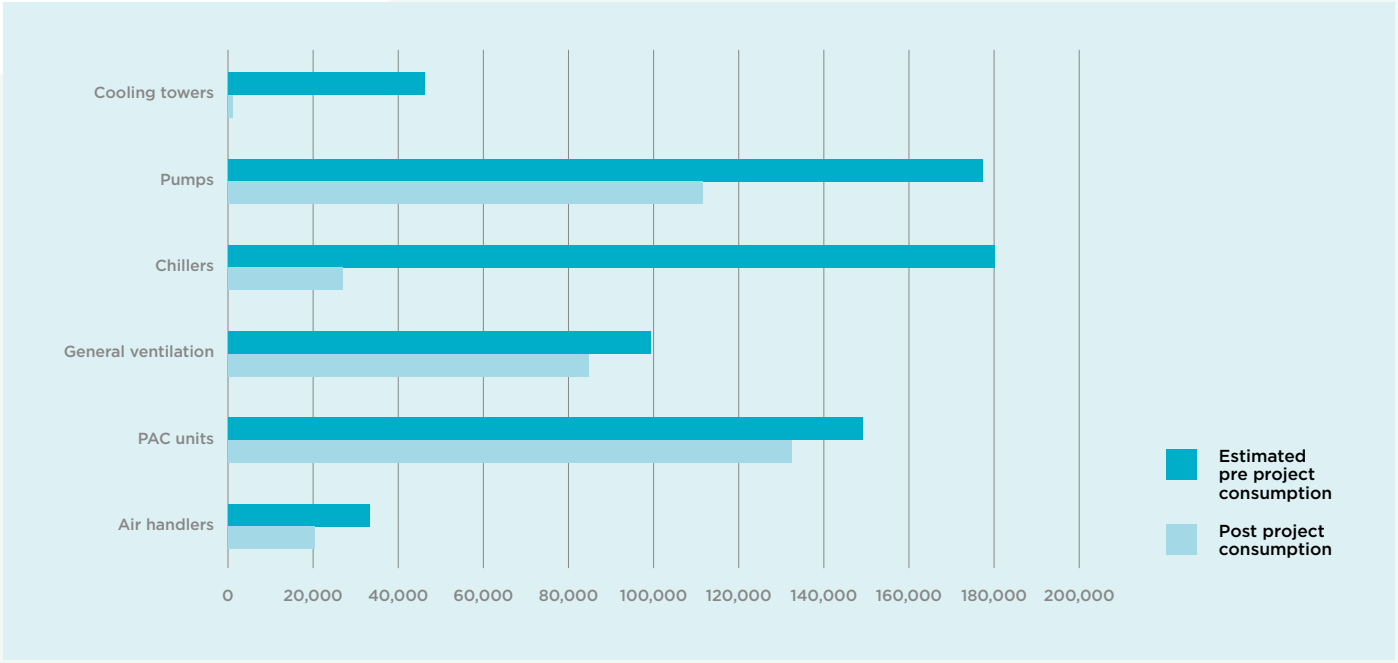
Following these additional works, the average equivalent monthly NABERS base building performance was lifted from 4.0 to 4.5 stars. Following a full 12 months of operation, it is expected that this rating will be formally recognised.

ISSUES

During works to the BMS, it was discovered that the thermal storage balls in the PCM tanks had corroded, leaching PCM salts into the chilled panel system. This caused decreased chilled water flow and corrosion throughout the panels and chilled water network. The system was turned off in 2014 and is currently being restored. It is interesting to note that over the past two summers, the building has held up well during heatwaves despite the chilled panels being off-line, a strong testament to the good design of the passive cooling elements.

Analysis suggests that the non-operation of the chilled panel system improved the NABER Base Building rating by approximately 0.1 stars and further analysis will be conducted to determine the system's impact on site energy consumption as well as comfort control.

The graph below highlights that following works to the BMS, energy consumption fell significantly in the cooling towers and chillers, although some of the gains made in the chillers and pumps is due to the non-operation of the chilled panels. Energy consumption of the air handling units has improved despite the fact they have had to pick up the role of primary cooling in the absence of the chilled panels. Ancillary systems including the PAC units and ventilation fans now dominate the building's energy consumption (See Next steps section on the following page).



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NEXT STEPS

Further interventions are currently being investigated and/or implemented:

- Replacement of oversized basement server room PAC unit with a split unit
- Replacement of oversized tenant condenser water pumps to achieve higher pump turndown
- Optimisation of the out of hours domestic cold water pumping
- Basement ventilation optimisation
- Carpark and back-of-house lighting upgrade and occupancy control
- Optimisation of the floor zone control to an operative temperature strategy which takes into account the radiative effectiveness of the floor thermal mass, radiation gain or loss through the windows and zone air temperature
- Due to multiple controller faults, the night purge system has only been partially operational over the past couple of years. Upgrade of digital controllers is currently underway.

These works will contribute to continued improvement of the building's efficiency and contribute towards the ultimate base building NABERS Energy target of 5.0 stars.

Finally, consideration of the value of returning the shower towers system to service will follow once a high level of performance has been achieved.

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