 EXERGY

Making
Energy
Efficiency
Work For You

Office Building Retro-Commissioning

Freshwater Place, Melbourne, Australia

Presented by
Dr Paul Bannister

29/03/2012

 EXERGY

Technical Overview

- 55,000m² NLA, 36 floors podium and office
- Low temp VAV, 2 perimeter, 3 rises, 2 internal zones, hot water reheat
- 4 chillers, primary/secondary loop, open cycle and close cycle cooling
- 3 modulating gas boilers with primary only pumping





Initial Performance

Simulation	NABERS Commitment Agreement	First 18 Months
4.7 stars	4.5 stars	2.5 stars

- Owners not very happy with outcome!



Issues Identified

- Tenant condenser water loop – continuous pump load
- AHU fan control – poor turndowns
- VAV terminal control
 - excess terminal reheat & error boxes
- Secondary chilled water pump
 - not able to match primary flow
- Limited chiller efficiency
- Extensive use of throttling and excessive use of gas
- Complex and uncertain metering



Stage One Works

- Control modifications
- Tenant condenser water loop reconfiguration
- Electrical metering improvement
- Chilled water loop modifications

2.5 stars to 4 stars



Control Modifications

- VAV reprogrammed to proportional
- AHU reprogrammed with variable static pressure set-point
- AHU temperature control to ensure low flow and low temperature
- Chillers controlled to work close to full load
- Hot water lock out at 18°C
- Leakage check and control commissioning
- On-screen reports provision



Tenant Condenser Water Loop

- ⊕ Major load – 110 kW pump (half star!)
- ⊕ Podium and retail thermal exclusion
 - not working
- ⊕ Auto-shut-off valves
 - 90% energy reduction
 - 80kW->8kW
- ⊕ Efficiency is a better solution than compliance



Electrical Metering

- ⊕ Single line diagram confirmation
- ⊕ Exclusion identification





Stage Two Works

- ⊖ Service Reviews
- ⊖ Monitoring and Targeting
- ⊖ Lighting

4 stars to nearly 5 stars



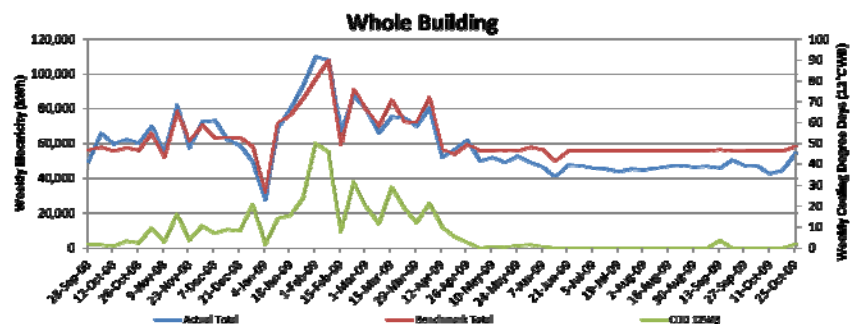
Service Reviews

- ⊖ Tuning of lift controls
- ⊖ Deadband adjustment
 - ⊖ 1°C to 1.5°C-2°C
- ⊖ Excessive service run-on elimination
- ⊖ Foyer air conditioning modification
 - ⊖ Simultaneous heating and cooling elimination
 - ⊖ Fan turn off in deadband



Monitoring and Targeting

- ⊕ Sub-metering benchmark development
- ⊕ Sub-metering monitoring in detailed basis

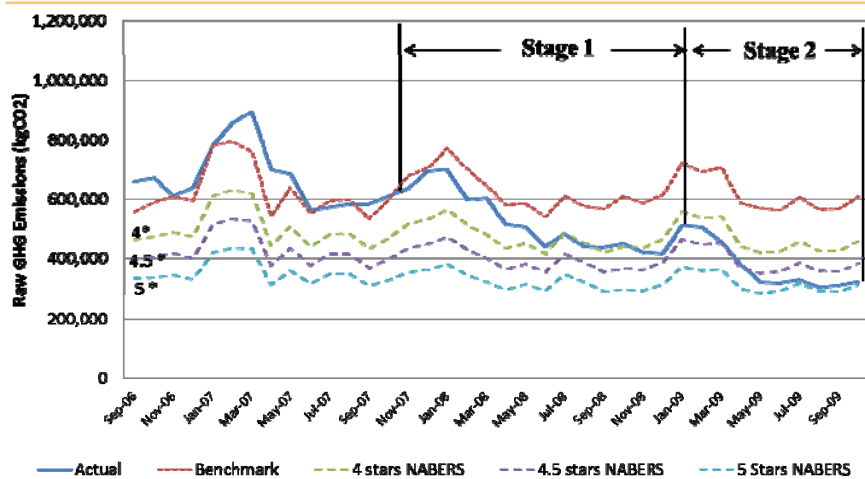


Lighting

- ⊕ Foyer light consumption reduction
 - ⊕ 1200 lux design
 - ⊕ Extensive de-lamping
- ⊕ Lighting control improvement
 - ⊕ Turn off external lights
 - ⊕ Re-commission CBUS system




Final Result Achievement



Lessons Learnt

- ⊖ Design review process
- ⊖ Commitment
- ⊖ NABERS compliance
- ⊖ Control and commissioning



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Questions?

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