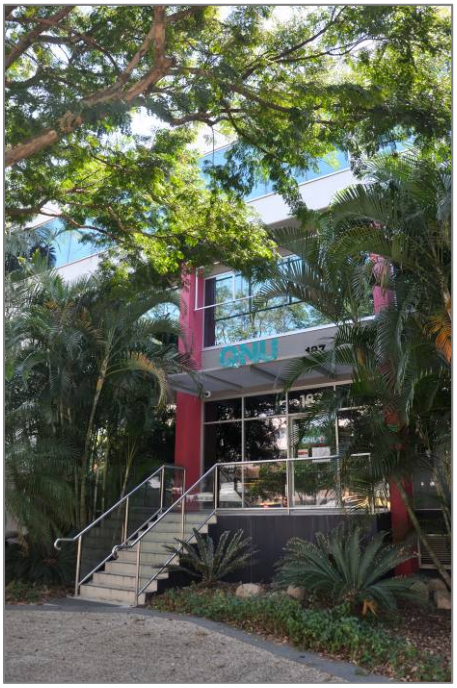
187 Melbourne Street, South Brisbane, Qld

Building Profile

Building	187 Melbourne Street, South Brisbane, Queensland
Construction date	1985
Refurbishment date	2005 - 2011
Owner	Queensland Nurses' Union
Building Size	1,705 m² / 3 Levels
Refurbishment Team	Interior Engineering Leading Edge Automation QLD Pty Ltd
Building Management	Jocelyn Connor (QNU) Interior Engineering Leading Edge Automation
Ratings	4.5 Star NABERS Energy (Whole Building) (without GreenPower)

Overview



The Queensland Nurses' Union building in South Brisbane is a 3-storey commercial building constructed in 1985 and refurbished during 2005-2011. The building underwent a low-cost refurbishment involving key energy efficiency upgrades and the installation of a new Building Management System (BMS). The on-site building manager uses the BMS as a tool to educate occupants about the impact of their actions on their own comfort and on the building's energy performance. This engages occupants as active participants in the operation of the building, contributing to improved energy efficiency and a reduction in thermal comfort complaints while helping to lift the performance of the building to a 4.5 Star NABERS Energy Rating. The energy efficiency upgrades and behaviour change programs have contributed drastically to the improved performance of the building and helped reduce electricity costs by approximately $10,000 per year.[1]

[1] Davis, T. (2011) *Nurses Union makes a Powerful Switch*, City News, April 6, 2011, online: http://city-news.whereilive.com.au/news/story/nurses-union-makes-a-powerful-switch/, accessed 19/08/2012.

Design Elements

Monitoring and Control Systems

The retrofit included the installation of an open BACnet Building Management System, which has been integral to the improved energy performance of the building. The BMS system interfaces with and controls a number of building systems including:

- cooling towers
- air handling units
- VAV boxes
- car park fans and carbon monoxide control.

Carbon monoxide sensors in the car park are connected to the BMS to control exhaust fans. This has drastically reduced car park ventilation system run-time. Previously fans ran 8-10 hours a day, regardless of the volume of traffic through the car park. With the upgraded system, it now operates only when sensors register higher carbon monoxide levels, and briefly when cars enter the car park.

Lighting[2]

Upgrades to base building and tenancy lighting have contributed to reduced energy consumption. This has included installation of more energy efficient lamps, as well as lighting controls and improved zoning. Key lighting upgrades include:

- Efficient lamps, with the previous 2 x 36 Watt T8 lamps being replaced by 1 x 28 Watt T5 lamps
- Occupancy sensors in variable-occupancy areas, such as meeting rooms, kitchen, kitchenettes, and toilets
- Separate lighting control switches in individual offices with a master floor control switch to turn off all the lighting.

Heating, Ventilation and Air Conditioning[3]

The retrofit project was implemented over several years and included upgrades to existing building services, including the heating, ventilation and air conditioning system. The original constant volume system was replaced with a pressure-independent variable volume system with separate internal and perimeter zone control. The central heater duct was disabled and replaced with trim heating limited to the perimeter variable volume boxes. Additionally, a new cooling tower with variable speed drive fan was installed, and air handling units on Levels 1 and 2 were upgraded with more efficient internal components, including compressors and

[2] Gough, C. (2012) *Personal Communication*, Colin Gough, Director, Interior Engineering, 14/09/2012.
[3] Gough, C. (2012) *Personal Communication*, Colin Gough, Director, Interior Engineering, 14/09/2012.

coils. In order to reduce unnecessary cooling, two small supplementary systems were also installed in conference rooms, and can be operated when these rooms are in use.[4]

Other Plant and Equipment[5]

Lift motors and equipment have been upgraded with more energy efficient models after being damaged in the 2011 floods. During the post-flood period while the lifts were out of operation building occupants were required to use stairs, and since that time, many staff have continued to use them.

Building Fabric

External shading features along the eastern façade help to reduce solar gain and control glare. Vegetation planted along the eastern and western facades helps to reduce direct solar gain on the building envelope, reducing heat gain. External walls are also painted predominantly with light colours. Light coloured and visibly reflective surfaces have been shown to limit solar gain and reduce the amount of additional heat transferred to internal spaces.

Tenancy Design and Fit Out

The tenancy design and fit out also contributes to improved energy efficiency and occupant satisfaction. Internal operable blinds allow occupants to control lighting conditions and glare. The blinds and external fixed shading also reduce heat gain in perimeter areas. Energy efficient office equipment includes computers with power-management features.

Building Management

Commissioning and Tuning

Commissioning and tuning building systems is integral to their efficient operations. Quarterly maintenance of the Building Management System contributes to the ongoing high performance of the building.[6]

Management Personnel, Communication and Education

The on-site building manager oversees the day-to-day running of the building, supported by engineering services consultants when issues arise. On-going involvement of the team involved in the refurbishment[7] has contributed to the continuation of performance improvements. The building manager was provided with extensive education on the building systems, including the Building Management System, and this has contributed significantly to the ongoing efficient operation of the building.

The building manager engages building occupants in energy efficiency and helps them understand how they impact building performance. Colin Gough, Director of Internal Engineering, one of the services contractors involved in the retrofit, explains:

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[4] QNU (2010) *The QNU Goes Green*, The Queensland Nurse, October 1, 2010, Queensland Nurses' Union, online: www.readperiodicals.com/201010/2162696241.html#ixzz24M0hhcm6, accessed 19/08/2012.
[5] Gough, C. (2012) *Personal Communication*, Colin Gough, Director, Interior Engineering, 14/09/2012.
[6] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.
[7] See 'Leading Edge Automation QLD Ltd Pty', and 'Interior Engineering'.

> "*There are obvious engineering factors behind the reduction in the electrical consumption but a major contributor, not to be overlooked, is in our opinion how the building has been managed in terms of both day to day operation but also in how Jocelyn (the on-site Building Manager) has managed to involve the staff in the energy reduction. The BMS system in this situation is really only a tool to be used in assisting the management of the building…The key factor is having someone looking at the system, knowing what they are looking at and being able to use the information in managing the building and more importantly the occupants. Too often these systems are installed and virtually never looked at unless there is an issue. As Jocelyn has proven, in the right hands they can be much more useful*."[8]

Reporting and Evaluation

The BMS has a graphical user interface that allows control of HVAC and other building systems. The BMS provides the on-site building manager with daily fault reports that help to quickly identify any potential problem areas. By assessing key parameters and overall function daily, a greater awareness of system performance is fostered.

Agreements and Culture

Communication and Education

On-going communication and education initiatives involving the building manager and occupants have been integral in achieving energy efficiency improvements. Part of the success of the initiatives is the integration of energy efficiency into everyday operation. As Jocelyn Connor, the QNU building manager, explains, "it is not something that can be shelved and brought out once a year. It has to become a way of working and part of every day".[9]

Staff have been educated in the energy efficient operation of office equipment, including power-management options, and they are encouraged to turn computers and printers off overnight.[10] Small behaviours that staff can participate in help them feel involved in the energy targets. Moreover, interesting initiatives such as the CitySwitch 'Black Balloon day' keep staff aware of their responsibilities. In this case a black balloon is tied to every piece of equipment left on overnight, supplemented by follow-up emails on the impact of leaving office equipment on, and this helps to educate and remind staff about standby power and energy wastage. Follow-up emails were distributed following the event to explain the significance of leaving office equipment on. Staff are also updated on energy performance and progress on efficiency initiatives at training/strategy days.

[8] Gough, C. (2012) *Personal Communication*, Colin Gough, Director, Interior Engineering, 14/09/2012.
[9] Davis, T. (2011) *Nurses Union makes a Powerful Switch*, City News, April 6, 2011, online: http://city-news.whereilive.com.au/news/story/nurses-union-makes-a-powerful-switch/, accessed 19/08/2012.
[10] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.

The building manager can also use the BMS to educate occupants about building operations, which helps them to understand the impact of their actions on building performance. For example, thermal comfort complaints were common in an area of the building prior to the retrofit. The building manager used the BMS to investigate the issue and identified additional heat loads in the area. It was found that occupants were not using the available blinds to control solar gain control solar gain, and this was contributing to the higher heat loads and poor thermal comfort. The building manager was able to use the BMS to explain to occupants what was happening and how they could better operate the building. If occupants get direct feedback on the link between blinds and HVAC results they have a better understanding of what is happening and feel more in control of their comfort while taking an active role in operating the building. As a result, occupants have been more tolerant of temporary discomfort and more aware of how they impact the performance of the building and their own thermal comfort. This has improved occupant satisfaction and saved money on call-out fees.[11]

Commitments and Targets[12]

QNU sets progressive targets to improve the energy performance of the building. The organisation participated in the CitySwitch program, and through this set an initial target to achieve a four-star NABERS Energy Rating.[13] QNU found the CitySwitch program to be practical and to provide good information that helped guide energy efficiency initiatives. The target was surpassed and the building has now achieved a 4.5 Star NABERS Energy Rating.

Ratings, Mandates and Incentives[14]

QNU has been continuously improving energy performance over the past several years and, as just noted, has achieved a 4.5 Star NABERS Energy (Whole Building) Rating. Achievements are reported to staff in newsletters and training days and this helps to generate enthusiasm and keep staff informed.

Organisational Culture[15]

QNU Management is supportive of energy efficiency initiatives and NABERS Energy Ratings are celebrated. A sustainability team meets quarterly to discuss sustainability initiatives and keep occupants informed about how the building is performing. Additionally, strategy meetings are held twice a year with staff, at which they are informed of efficiency improvements and NABERS Energy targets.

[11] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.
[12] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.
[13] Davis, T. (2011) *Nurses Union makes a Powerful Switch*, City News, April 6, 2011, online: http://city-news.whereilive.com.au/news/story/nurses-union-makes-a-powerful-switch/, accessed 19/08/2012.
[14] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.
[15] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.

Occupant Experience

No formal occupant surveys have been identified. However, staff satisfaction has reportedly improved (from the experience of the building manager who manages the building on a day-to-day basis). Additionally, call-outs for HVAC complaints have been reduced.[16]

Indoor Environment Quality

No formal indoor environment quality analysis has been identified.

Performance Nexus Summary

Key lessons to inform the Performance Nexus concept:

- The retrofit focused on energy efficiency but has also resulted in improved occupant satisfaction, due largely to good communication between building management personnel and occupants. Innovative use of the Building Management System by the building manager as a tool to educate occupants about the impact of their actions on their own comfort and on the building's energy performance has contributed significantly to the improved energy performance and occupant satisfaction in the building and supports the building manager to deliver a high performance building.
- Good communication between building management and occupants contributes to improved building performance. Occupants are educated about the correct use of design elements to improve thermal comfort and reduce energy consumption. For example, occupants' operation of blinds helps to control solar gain and provide a more comfortable indoor environment while reducing HVAC energy consumption.
- Occupants are involved in energy efficiency initiatives through programs such as CitySwitch, which help to define targets and provide assistance to achieve energy efficiency goals, and in the process engage staff in the retrofit journey.

Acknowledgements:

Jocelyn Connor, Queensland Nurses' Union

David Ross, General Manager, Leading Edge Automation

Colin Gough, Director, Interior Engineering

[16] Connor, J. (2012) *Personal Communication*, Jocelyn Connor, Building Manager, Queensland Nurses' Union, 07/09/2012.