



Council Name: Wollongong City Council

Web Address: www.wollongong.nsw.gov.au

Size: 714 square kilometres

Population: 201,438

Abstract: Wollongong City Council is actively taking steps to reduce its operational footprint. One of the strategies currently being implemented is to improve the overall operational efficiency of assets. The Administration Building had an aging and inappropriately-sized heating, ventilation, air-conditioning system (HVAC). Further opportunities to improve the energy performance included replacement of hot water systems, installation of T5 lighting, installation of heat reflective blinds, upgrading of building management system and the tinting of ground floor glazing. These energy saving initiatives have decreased consumption in the vicinity of 40,000 to 50,000 kWh/per month. Payback for the upgrades is expected to be less than 5 years.

Outline of Project Background:

Council's Administration Building has been identified as the top ten energy consuming assets/properties and is therefore included in the organisation's energy savings action plan. The overriding objective of this project was to improve the environmental and economic performance of the building at the same time as improving the comfort levels of staff working within the building.

Implementation:

Council's Administration Building is one of the organisation's highest energy using sites, using in excess of 9,000 kWh/day for the 2007/08 financial year. After the completion of a building assessment, it was determined that Council's HVAC hot water, lighting systems plus heat gain were major contributing factors. The HVAC plant, hot water and lighting systems were in excess of 20 years old and thus approaching the end of their service life.

Due to the complex nature of the work undertaken and the need to maintain a functional work environment, it was deemed necessary to undertake the work over several years. In 2006 Council established the state of the existing HVAC equipment. A report detailing the optimum design and specifications for the new equipment was then commissioned and a preferred option selected and detailed tenders distributed for quoting. The successful vendor worked with the Building Manager to implement the plant over 2 years. This project also included the upgrading of Council's BMS to better manage/monitor electrical demand within the building. The majority of the work was conducted out of hours to minimise staff impacts and to manage risk. As the work involved road closures for the craning in of equipment, detailed traffic management plans were developed and approved. Throughout the implementation phase, the building manager posted regular updates on Council's intranet so staff were aware of what was occurring. The old plant was recycled by the vendor.

Council's Building Manager worked with the Sustainability Team to establish the feasibility of the proposed lighting upgrade. With the feasibility established, Council approached contractors to work with the organisation on the retrofit. One of the key objectives was to minimise waste by maximising existing equipment and minimising the need to modify ceiling panels. With the design work completed, Council worked with the local distributor who managed the manufacture and supply of the new light fittings, and the internal Maintenance staff performed the installation of the new lights. This work was completed out of



operating hours. Furthermore, the lighting upgrades were rolled out over a period of 3 months. This option was taken to spread costs and to distribute tube replacement when they reached end of life. All components removed during the retrofit (tubes and lighting troughs) were recycled.

Council's Building Manager and Sustainability Team worked together to deliver the smaller projects such as the installation of heat reflecting blinds, window tinting and the upgrading of the hot water system to heat pumps. Once scopes were developed quotes were sought and vendors appointed. As with the larger projects all work was completed out of hours to minimise disturbance to the building occupants.

Implementation of these projects has cost Council in excess of \$2.9 million. However, the overall payback, including reduced maintenance and electricity costs is anticipated to be less than 5 years.

Challenges

Implementation of the HVAC project was highly complex. This project was Council's largest single Capital Project implemented during the 2009-10 financial year. Delivery of the project was only possible due to the comprehensive pre-implementation planning. This was paramount for several reasons including:

- Several road closures required for the craning in of plant;
- Implementation of plant without impacting on occupants (work need to be completed out of hours);
- Having old and new plant working together while various pieces of plant were installed; and
- Management of the large number of OH&S risks.

Council's Administration Building also contains the Wollongong City Library. This results in core operating times from 6am through to 8:30pm on weekdays. The need to maintain the operational capacity of the building provided significant challenges for the implementation of the projects. Some of the key challenges included:

- Power and water disruptions;
- Work in the ceiling spaces above work stations;
- Noise related to works; and
- Delivery of materials.
- Temperature conditions in work areas
- Managing old and new plant and equipment as change over occur

These challenges were overcome through consultation and negotiation with contractors and other key stakeholders, such as Council staff. The discussions typically resulted in works which may interrupt the buildings operations, such as removal and replacement of lighting infrastructure occurred out of hours such as during the night or over weekends, which raised significant OH&S issues. Identified risks were ranked and managed using Council's risk assessment processes. The implementation of the out of hours work and effective risk identification/management strategies, as per Council policies, resulted in the seamless implementation of the various projects.

Another key challenge faced was keeping staff informed about implementation of the various sub-projects, particularly the larger projects such as the HVAC and lighting upgrade. The Building Manager was very proactive throughout the implementation of all of the projects. The primary communication technique employed was the use of corporate announcements on Council's intranet site. He also encouraged staff to contact him directly to discuss any concerns/comments they had regarding the projects. The effective dissemination of information, the Building Managers open door policy and prompt action taken to address concerns further assisted with the seamless implementation of the projects.



Monitoring and Evaluation:

The effectiveness of the energy efficiency measures is monitored through Council's electricity database which tracks consumption, cost and greenhouse gas emissions. The Building Manager also has Smart Metering which allows for interigation on energy being used including water consumption. This supports quick response to unusual usage and becomes a proactive tool.

Outcomes:

The lighting project yielded consumption savings of 342,415 kWh resulting in the abatement of 366 tonnes of CO₂-e and saving \$21,737 for the 2009 calendar year. Actual savings associated with this project are understated as electricity use increased during post November 2009 due to the commencement of the HVAC upgrade. Observed and ongoing savings combined with the increased lifespan of the lighting has exceeded initial expectations. With the increasing cost of electricity supply the initial payback period of 5 years will continue to reduce to approximately 3.5 years.

Quantification of actual annual cost, electricity and emissions savings associated with the HVAC upgrade is not possible at this stage as installation, commissioning and balancing has recently been completed. Consultants estimate the new HVAC plant upgrade will result in electricity savings in the vicinity of 20%. And will use significantly less water, have reduced maintenance requirements and have an increased life expectancy, which is consistent with the project objectives. Preliminary evaluation demonstrates electricity savings of 1,637.32 kWh/day (March) and 800.9 kWh/day (April) 2009/10 have been achieved when compared to the previous financial year. These savings equate to average daily emissions savings of 1.75 tonnes of CO₂-e and 0.85 tonnes of CO₂-e respectively. It is also important to note the HVAC system was in a commissioning phase and therefore not running as efficiently as it can. Ongoing analysis will enable an enhanced understanding of the long term compliance with Council's objectives.

Energy savings associated with the installation of the heat pumps has been difficult to trace, due to the relatively low electricity consumption, when compared to the buildings overall consumption. Estimated savings, based on modelling indicate the heat pumps will use approximately 75% less electricity than the previously installed commercial electric hot water systems. After overcoming some initial problems the systems are adequately supplying the building with hot water.

Council is unable to quantify consumption savings associated with the heat reflective blinds as electrical savings are achieved indirectly. However, installation of the blinds has reduced internal heat gain (summer) and loss (winter) significantly. The manufacturer of the blinds estimate heat gain reductions to be around 20%. By controlling the heat gain and loss the blinds reduce the overall load on the HVAC system and thus realising consumption savings.

The above mentioned energy savings actions are being complemented by a series of water savings initiatives which resulted in water savings of 26% being realised for the 2009-10 financial year when compared to the previous year. Some of the key initiatives include a 40,000 litre rain water harvesting system, fitment of flow restrictors to taps and installation of semi waterless urinals. Future actions include installation of sensor operated dual flush toilets and increased water storage capacity.

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