



Research

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The Brite Project

A series of innovation case studies has been developed by the BRITE Project of the Cooperative Research Centre for Construction Innovation to demonstrate the benefits of innovation in the Australian building and construction industry.

Outstanding whole-of-life gains without higher up-front costs

A suite of air-conditioning innovations in a government office building in Cairns – William McCormack Place – is delivering substantial energy and cost-saving benefits, compared to conventional buildings, including:

- 37% savings in energy costs; and
- 61% savings in air-conditioning capital and maintenance costs.

These and other innovations incorporated in the building demonstrate that environmental sustainability can be addressed without compromising quality, cost, time or scope.

William McCormack Place is a four-storey commercial office building, built by a private sector construction manager, Barclay Mowlem Construction Ltd, under a two-stage, design and construct, guaranteed maximum price contract with an overall budget of \$17.5m. The building was delivered on time and within budget, after an 18-month design and construction program.

The achievement

Queensland Department of Public Works (DPW) wanted to demonstrate that an office building could be constructed to meet strict environmental sustainability targets while remaining commercially viable. The Department stipulated that the building meet a minimum 4-star energy rating under the Australian Building Greenhouse Rating Scheme, administered by the Sustainable Energy Development Authority (SEDA).

William McCormack Place achieved the maximum, 5-star energy rating. It is the first commercial office building in Australia to be awarded this rating, and it cost no more to build than a comparable conventional building. Additionally, the lower energy and maintenance costs attract higher rents and increase capital value of the building.

The innovations

The improvement in life-cycle costs at William McCormack Place is largely due to a collection of well-combined, advanced and proven, air-conditioning technologies, comprising:

- chilled water thermal storage tank: eliminating the need for a low-load chiller and associated prolonged periods of inefficient low-load operation of chiller sets





- moisture absorbing thermal (heat exchanger) wheel: used to recover cool and dehumidified outside spill air energy to precondition incoming hot, moist ventilation air
- variable speed motor drives applied to air-conditioning pumps and fans: so that only the amount of air or water required at any time is mobilised
- 'duty-standby' operation of the two 100% chiller sets: reaping efficiency gains over the suggested alternative 'lead-lag' configuration of two sets at 70% each, plus a low-load set
- rotary screw chillers and low fan power cooling towers: facilitating high efficiency chilled water generation

The thermal tank and wheel are the most novel elements of the air-conditioning system, and are major contributors to significant energy savings. Energy costs for William McCormack Place are currently 37% less (on a per square metre net lettable area basis) than the energy costs for similar North Queensland government properties. The savings are assisted by the thermal qualities of the building structure.

The thermal tank is largely maintenance free, so provides savings in capital and maintenance costs. Comparison of the projected hardware and service costs over 45 years shows savings of 61%.

These benefits indicate the significant value of adopting innovations that are simply new in context, rather than necessarily 'new to the world'.

Implementation process

The Queensland government engaged MGF Consultants, a local firm of mechanical and electrical engineers for this project. MGF have considerable experience with the often extreme local weather conditions, as well as a high degree of technological expertise.

MGF designed the first large-scale thermal tank in Australia in the late 1990's, and introduced the first total enthalpy thermal wheel into Queensland. They have continued to develop these technologies while monitoring performances overseas.

MGF's expertise and ability to champion the use of the air-conditioning advances resulted in better-than-expected outcomes for William

McCormack Place, showing that regional firms can be technology leaders.

overcoming obstacles

The well-researched value of these new technologies helped to overcome the traditional obstacles to innovation; perceived cost and risk. The builders' risk was also reduced by a very thorough design process - the result of a guaranteed maximum price contract. The construction management style of contract resulted in the builders being involved very early in the design process, and therefore well aware of the innovations being incorporated.

Building users are providing positive forces for innovation by demanding energy-minimising buildings. Also, on this project, the team responsible for the ongoing management of the building delivered the project. Therefore, decisions considered not only time, budget and quality, but maximum building performance in terms of user needs and whole-of-life costs.

For further information, see the BRITE Project website www.brite.crcci.info, or contact Dr Karen Manley via email at k.manley@qut.edu.au.