Focus

Wanted for lease: 6 star office

Green dividends are driving a new design era in commercial buildings, now being reflected in Australia. With some outstanding examples of sustainable office blocks in our capital cities now attracting the international limelight, what constitutes a green building, what are the main drivers and future projections of the increasing shift to more environmentally sound commercial spaces, and what is the cost/benefit reality behind it? **Hartley Henderson** reports.

In a recently published report titled *The Dollars and Sense of Green Buildings*, the Green Building Council of Australia (GBCA) defines a green building as 'one that incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and occupants'.

Target features include energy efficiency, greenhouse gas emission abatement, water conservation, waste avoidance, recycling, pollution prevention, reduced natural resource consumption and productive and healthier environments.

Ché Wall, Joint Managing Director Asia Pacific of engineering consultancy Lincolne Scott, is also Chairman of the World Green Building Council (WGBC). In 2004, he was awarded the Prime Minister's Prize for Environmentalist of the Year for his contribution to advancing the case for sustainable buildings in Australia, and for his involvement in the development of several of our leading edge commercial buildings, including Sydney's 30 The Bond and Melbourne's Council House 2.

According to Mr Wall, the level of understanding and appreciation of green buildings is changing rapidly.

'Five years ago the emphasis was on energy efficiency alone, but now a range of other factors, including water conservation, are firmly on the agenda,' he said.

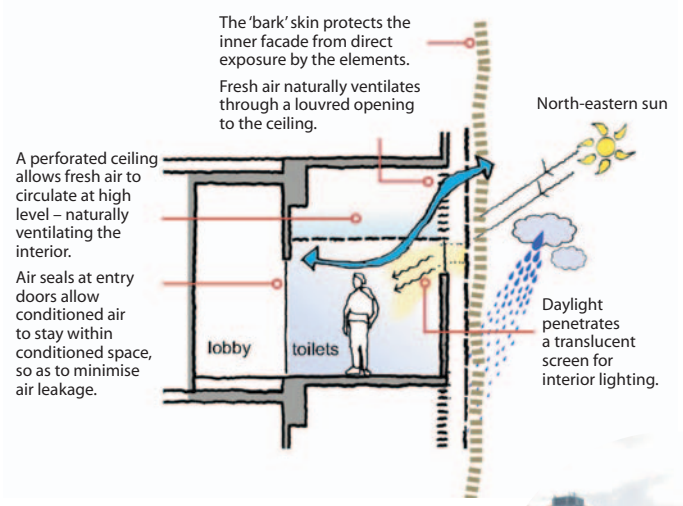
'There is an increasingly broad understanding of how buildings impact on the environment and people, and tools are now available to evaluate and rate the "greenness" of buildings.

'In the past there was a lot of talk amongst developers about building green, but not much action. Now the issue is not so much about reducing outgoings, but whether the building is tenanted or not. Tenants are driving the move towards green buildings.

'Leadership is critical because one successful example results in multiple followers amongst stakeholders including investors, financiers, developers, owners, building managers, tenants and the community.'

However, Chief Executive Officer of the Property Council of Australia, Peter Verwer, says he is not yet convinced there are direct business benefits from building

Left: 30 The Bond, Sydney, has 5 Green Stars.
Green Building Council of Australia



The City of Melbourne's new Head Office, CH2, is one of only a few 6 Star Green Star–Office Design rated buildings in the world, and features external wooden louvres (far right) and wind-powered extraction vents on the roof (right). Green Building Council of Australia

green. He notes, though, that those buildings that are not green are more likely to be less competitive in the future.

'Greening is being mainstreamed, which is demonstrated by the fact that 35 per cent of office space in NSW is already Star rated under the Australian Building Greenhouse Rating scheme (ABGR),' he said.

The ABGR scheme, based on parallels overseas, rates buildings up to 6 Stars based on a central range of sustainability performance criteria.

'The market is transforming very quickly and "greening" will continue to increase due to efficiency benefits. In the future there will be an economic penalty for not being green.'

Greg Johnson, Manager Corporate Sustainability for Colonial First State Global Asset Management, which provides a range of integrated property funds management services, says one of the aims of effective asset management is to ensure that buildings are fully tenanted.

'When a building has a lease expiry profile that exposes it to vacancy risk, the asset managers will look for ways to minimise vacancy risk. Undertaking enhancements using sustainable design principles is increasing in importance,' Mr Johnson said.

'For example, 259 George Street in Sydney is an older building which has a 1 Star rating and which will now be refurbished, involving a complete strip and upgrade of 22 office floors.

'The first step was to analyse why the building had such a low rating and then develop a sustainable design plan to improve the rating. The aim is to achieve an ABGR rating of 3.5 Stars for energy and a 4 Star National Australian Built Environment Rating System (NABERS) rating for water.

'We believe that successful integration of sustainability results in better business practices and ultimately better economic returns.'

Overseas transformations

Green building projects, involving both new buildings and refurbishment of existing buildings, are becoming increasingly prevalent overseas, especially in the USA.

The Toyota Motor Sales USA complex in Torrance, California, which was completed in 2003, won a gold certification from the US Green Building Council (USGBC) after being assessed against the council's Leadership in Energy and Environmental Design (LEED) rating system.

The complex, which consists of two large buildings, has a wide range of green features including a rooftop photovoltaic solar system that generates some 20 per cent of electricity requirements, thus reducing energy costs by around US$1.5 million per year.

Water saving initiatives, including the use of reclaimed water, result in further savings of some US$22 000 each year, and the complex incorporates around 95 per cent of recycled materials including reinforced steel from reclaimed automobiles.

Action to facilitate employee comfort and productivity includes attention to indoor air quality, acoustics and lighting, and gas-fired chillers are installed in the heating ventilation and air conditioning system to regulate temperature.

Meanwhile, in Bellevue, Washington, Puget Sound Energy rightly believes it is important for an energy company today to be a model for energy efficient building systems.

The USGBC's LEED rating system for Commercial Interiors is used to set goals and measure energy conservation performance in the company's new corporate headquarters.

Much of the energy savings come from lighting controls and motion sensors together with programmable low-voltage sweep controls to eliminate unnecessary use in different zones. It is estimated that the energy system will pay for itself in just three years.

Worker access to daylight and views is maximised by locating workstations along the perimeter walls and placing the offices at the core. In addition, software has been installed that measures, monitors and manages energy consumption across the entire PC network.

In Japan, Tokyo's 38-storey Shiodome Tower, which accommodates a hotel and offices, is also designed to be friendly to both people and the environment.

A particularly attention-grabbing feature of the building is its highly energy efficient facade of terracotta tiles, and construction materials include recycled bricks.

Its energy efficiency initiatives include a hybrid air conditioning system combined with large-scale natural ventilation where external air is taken through ventilation vents above the windows and into the ceiling space.

Energy efficient lighting and a building energy management system have also been installed, while water conservation measures include collection of rainwater and water recycling.

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Melbourne's pace-setting 60L building has thermal chimneys, a glazed atrium roof and a rooftop garden as energy efficiency measures, among an impressive list of other innovations that are attracting clients. Dare images, courtesy The Green Building Partnership

Building in self-sufficiency

The World Business Council for Sustainable Development (WBCSD), based in Geneva, is forming an alliance of leading global companies to determine how buildings can be designed and constructed so that they use no energy from external power grids at all.

The project aims to focus on a range of other sustainability initiatives such as super efficient water conservation, wastewater treatment and recycling.

The alliance will be led by United Technologies Corporation (UTC), the world's largest supplier of capital equipment to buildings, and the Lafarge Group, an international leader in building materials. Other participating companies are Cemex, EdF, DuPont, Gaz de France, Philips and Tepco.

If the WBCSD vision is achieved, by the year 2050 new buildings will consume zero net energy from external power supplies, produce zero net carbon dioxide emissions and be economically viable to construct and operate.

Project Director Christian Kornevall says the project is very important because if we look for the potential for globally reducing CO_2 by 2030, we find it in end-use efficiency and, in particular, in buildings.

'The prospects of increasing renewables in power generation, changing the fossil fuel mix or increasing nuclear power are much more limited. Building will therefore play a key role in trying to decrease global emissions in the coming decades,' he said.

Local stars

The number of green commercial buildings in Australia is increasing and several are now officially rated under schemes such as ABGR, NABERS and the Green Building Council's rating tool, Green Star.

An outstanding example is the City of Melbourne's 10-storey Council House 2 (CH2), which has received a 6 Star Green Star–Office Design certified rating, representing world leadership in office building design.

According to Rob Adams, Director of Design and Culture at the City of Melbourne and Professorial Fellow in the Faculty of Architecture at Melbourne University, CH2 is more like a Victorian-era building than modern counterparts because it relies as much on design as on technology for heating and cooling.

'Compared with the council's existing offices, CH2 will use 85 per cent less electricity and 93 per cent less gas, and mains water use will be reduced by around 72 per cent as a result of initiatives including a sewer water-mining plant in the basement,' Mr Adams said.

'Sustainable features are incorporated into every part of the building. For example, night-purge windows open automatically every night, and wavy concrete ceilings that provide greater thermal mass and have chilled ceiling panels also help to ventilate and cool the building.

'A facade of louvres powered by photovoltaic cells track the sun on the western side of the building and an automated building control system integrates the various systems and reacts to different climate conditions.

'CH2's improved air circulation system is expected to give the City of Melbourne a 4.9 per cent increase in staff productivity and reduced sick leave, which translates into a $1.12 million saving per year. Additional savings will occur as energy and water costs increase.

'Of the total building cost of $51 million, sustainability features account for some $11.3 million and payback is expected to be achieved within 10 years, or even sooner, depending on the rate of productivity improvement.

'Experience also shows that by implementing energy efficiency practices many buildings can save 20 to 40 per cent on their energy bills and reduce the emission of greenhouse gases.'

'The main economics are in the health benefits. People will increasingly demand healthy buildings and the future market will be driven more by occupants than by developers.'

One of the first office buildings in Australia to be widely recognised as 'green' was 60L in the Melbourne suburb of Carlton. Although this building has not been assessed for a Green Star certified rating, it received a Banksia Award and many other awards in 2003 for 'Leadership in Sustainable Buildings'.

Project Manager Alistair Mailer says 60L is a commercially viable example of a low environmental impact office building that is largely future-proofed against rises in the cost of energy, water and waste disposal.

He highlights that '60L's total energy consumption is around 65 per cent less than a traditional office building of the same size. This is achieved through a variety of means including maximising daylight through a large inner atrium with light wells on the north and south boundaries, energy efficient appliances and a computer controlled passive ventilation system. 60L also has a roof-mounted solar system generating a small proportion of energy consumed.

'Water efficient fittings and waterless urinals have been installed, and rainwater is harvested from rooftop collection points and then filtered and UV sterilised to provide drinking water for tenants. Such initiatives have reduced the need for mains water by some 80 per cent in an average rainfall year.

'Physical features of the building which are environmentally beneficial include its high level of recycled concrete, bricks, reinforcing steel and timber.

'60L's environmental objectives have also contributed to the provision of a healthy and pleasant building which tenants have assessed as being a more productive workplace.'

743 Ann Street, Brisbane, had a sustainability upgrade and includes an external thermosiphon ventilation system. Green Building Council of Australia

Another significant green building in Melbourne is 40 Albert Road in South Melbourne, which is the first office refurbishment in Australia to be awarded a 6 Star Green Star.

States of the art

In Sydney, 30 The Bond at Millers Point is a $112 million new building which is currently the headquarters for Lend Lease. It was the first project in Australia to be awarded a 5 Star Green Star–Office As Built certified rating.

Paul Edwards, Lend Lease Head of Sustainability, says the building is also the first in Australia to feature a chilled beam air conditioning system.

'This technology, which operates by passing water through cooling elements in the ceiling, creates a natural convection process. Importantly, the beams selected have a high radiant cooling component, improving comfort. When integrated with other initiatives, such as automated external blinds and light harvesting, a significant reduction in energy consumption is achieved,' he said.

'Also, a single pass air system provides double the standard air quality, with air being exhausted out of the building rather than recirculated, which increases the air quality and contributes to worker health and productivity.

'Low-flow water fittings and fixtures have also been installed throughout the building.

'Green initiatives at 30 The Bond have resulted in savings of around $157 000 per year and reductions in greenhouse emissions of 64 per cent compared to a typical 3 Star ABGR rated office building.'

In Brisbane, a 1980s office building at 743 Ann Street was refurbished about two years ago for the PMM town planning and urban design group to incorporate a range of green features.

Architect Mark Thomson from TVS Partnership, which designed the refurbishment, says the main energy savings initiative is a 'thermosiphon' naturally ventilated facade system that reduces heat load in the building.

'Other energy efficient features include maximisation of natural light through skylights on the top level and sunshade structures to restrict heat entering the building,' he said.

'Solar panels are installed to meet hot water demands and photovoltaic cells are also located on the roof to supplement mains power.

'Stormwater is collected in a storage tank and used to flush toilets and irrigate courtyard gardens. Water efficient fixtures and waterless urinals have also been installed, and a heat trace system on the hot water pipes ensures that hot water is immediately available to users.'

Incentives are driving take-up

The Australian Government is using a variety of policy approaches to achieve the goal of more sustainable cities and towns. This ranges from national standards for buildings (e.g. NABERS), and appliances used with them (e.g. energy and water efficiency ratings schemes), to grants schemes such as the Solar Cities program (see page 12).

In addition to the incentives of savings in water and energy bills, a range of measures to encourage adoption of better built environment practices are now being provided at all levels of government.

As a spokesperson for the Australian Department of the Environment and Heritage reiterated, commercial buildings are significant energy and water users, so substantial savings can be made.

'Savings in water consumption can be dramatic. If every office building in Australia improved its water rating by just one star, the overall annual water consumption would be cut by over 5800 megalitres of water.'

'Experience also shows that by implementing energy efficiency practices many buildings can save 20 to 40 per cent on their energy bills and reduce the emission of greenhouse gases.'

In a competitive world where energy costs are rising, those are figures worth striving for.

And that's why current trends indicate that the future for green buildings in Australia is very positive. However, as the GBCA report points out, there is still a need for strong and continued leadership from both the public and private sectors. Much more is yet to be done in a range of areas including closer coordination of the various rating schemes that now exist, further efficiency research, incentives design and education.

More information:
Green Building Council of Australia: www.gbcaus.org

Department of the Environment & Heritage: www.deh.gov.au

Australian Building Greenhouse Rating scheme: www.abgr.com.au

National Australian Built Environment Rating System: www.nabers.com.au