



Construction

With a stream of new developments coming from a coordinated program of innovation, Australia's building and construction industry has the capacity to become an international leader in sustainable building methods.

The building and construction industry is a major driver of activity in the Australian economy. It is also highly diverse, firms ranging from a few people in family-owned enterprises to thousands in major firms.

While the industry has traditionally been domestically focused, a new emphasis on innovation within the industry is being driven by CRC Construction Innovation, established in 2001 with its headquarters at the Queensland University of Technology. As part of Australia's Cooperative Research Centre program, the CRC brings together the sharpest minds in business, academia and government.

In establishing a vision for the industry's future and establishing a research agenda, this CRC is already positioning Australia to compete more effectively internationally. It is also developing key technologies, tools and management systems to improve the effectiveness of the construction industry.

>> Strong foundations

The CRC's '2020 Vision' report estimates that Australia's property and construction sector provides around 14% of the nation's GDP and employs some 730,000 people. It is growing at 2.6% a year and has huge untapped export potential.

Australia already provides world-class products and services, with Australian engineering construction services particularly highly regarded internationally. Out of Australia, engineering firms such as Leighton, John Holland, Lend Lease and Transfield regularly capture engineering and non-residential building

contracts across the Asia-Pacific region, Australia having particular strengths in skilled services for the construction of heavy industrial, telecommunications and other infrastructure projects.

Australian expertise and technology contributed to innovative building solutions at Hong Kong's Chep Lap Kok Airport, and at Europe's largest shopping centre outside London at Bluewater, Kent.

In 2002 an Australian consortium led by Barclay Mowlem, and including Leighton Contractors Asia, signed a A\$180m contract for work on the Taipei-to-Kaohsiung Taiwan High Speed Rail project, at the time the largest infrastructure project of its kind in the world.

Australia produces high quality value-added products, and has made advances in materials development.

The development of fibre-reinforced composites has been pioneered by Professor Gerard Van Erp and his research team at the Fibre Composites Design and Development (FCDD) centre at the University of Southern Queensland. Brisbane City Council has used the technology in its Brisbane River floating walkway project, which now sees foot traffic of more than a 1000 people a day. Other developments emerging from the FCDD include a fibre-composite railway sleeper as a stronger substitute for timber sleepers, and pre-stressed polymer-concrete technology which can be used for more environment-resistant small and large-scale structures.

Australia's BlueScope Steel produces premium steel building solutions and pre-engineered buildings, including its well-known value-added products Colorbond steel – a

coated steel designed to overcome costly problems of tropical staining – and Zinalume steel, a premium metallic-coated steel with the high corrosion resistance needed to withstand tropical conditions across Asia. Australia's leading steel company, BlueScope supplies customers in Australia, New Zealand, Asia, the US, Europe, the Middle East and the Pacific.

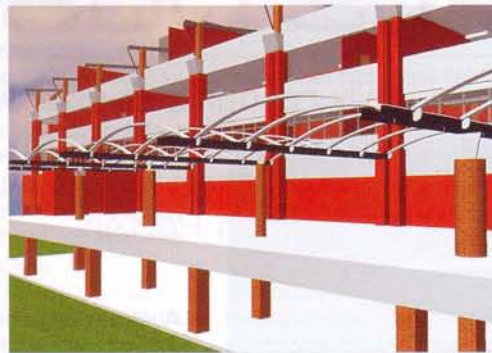
Australian-based Taiyo Membrane Corporation (TMC) designs, fabricates and constructs MakMax shelter solutions for clients in Australia, South-East Asia, the Pacific region and the Middle East. TMC raised the roof on Athen's second largest stadium for the 2004 Olympic Games, a 28,000m² PVC membrane roof. TMC has received more than 25 national and international awards for creativity in design and excellence in construction.

The CRC notes that suburban development is still driven by a desire for maximum 'yield' from land, regardless of the costs that poor layout then imposes on builders, home owners and the environment.

The concept is being trialled on new urban developments at Brookwater and Kelvin Grove, Brisbane, Queensland. If all the planned 8000 new homes at Brookwater were in a solar suburb, it would be equal to taking 3000 cars off the roads every year.

>> Green calculator

CRC Construction Innovation is working towards a comprehensive set of eco-design tools for all stages of the construction life cycle, to minimise energy use,



>> Environmental sustainability

One of Australia's greatest opportunities, identified by CRC Construction Innovation in its '2020 Vision' report, lies in environmentally-sustainable construction – the creation of buildings and infrastructure that minimise their impact on the natural environment.

Australia already has strengths in 'eco-buildings', with award-winning designs such as Toyota's new corporate headquarters in Port Melbourne, opened in July 2004, featuring state-of-the-art sustainable features. Melbourne's Essendon Baptist Church is also getting a green facelift, including innovative low-energy and water-efficient techniques, undertaken by Architectonic. Another first was the world's first solar-powered suburb, the Olympic Village for the Sydney 2000 Games.

This last concept has been taken to a new level with a project at CRC Construction Innovation. The CRC decided to see what could be done by planning an entire subdivision with its blocks best shaped and orientated for energy-efficient buildings.

The results were remarkable: a well-designed suburb could save residents 20% on their regular power bills, rising to up to two thirds of their total power bills if they use solar hot water. Such bottom-up design would reduce the greenhouse emissions of the typical Australian home by 700 kilos a year or, with solar hot water, by two tonnes a year.

greenhouse and other forms of waste or pollution. Its first success in this direction is the Life Cycle Analysis of Design (LCADesign) software, dubbed the 'green calculator'. This gives design and construction professionals an immediate cost and environmental 'footprint' assessment of any commercial building.

"Working from the 3-D CAD (Computer Aided Design) for a building, the calculator provides an instant display of the volume and cost of all the materials involved in its construction – at the push of a button," says the leader of the development team, Dr Peter Newton of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). "At the same time, it can calculate the environmental impact of all those materials – how many tonnes of clay were used to make them, how much water, how much energy, and how much greenhouse gas and other polluting emissions they made to air, land or water."

By providing an industry-level plan for innovation in the construction sector and forging ahead with developments in environmentally-sensitive construction and design, together with materials and building methods, Australia is providing its building and construction sectors with the opportunity to set new benchmarks, raise living standards and lower environmental costs at home, while gaining new competitive advantage in international markets.

Website: www.construction-innovation.info

Left: Architectonic's new enviro-friendly face for Essendon Baptist Church;
Centre: CRC Construction Innovation's Green Calculator calculates eco-costs;
Right: Toyota's eco-friendly Australian HQ