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WOOD FOR THE TREES:

BUILDING SUSTAINABLY WITH TIMBER

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text

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Wood spans the ages: ancient, modern, futuristic. Rich in character, supple yet strong, distinctively and definitively organic, it is wood's connection to nature that for many architects makes the use of the material so appealing. For many of these self-same architects, however, this also presents something of a dilemma, in that in order to obtain wood, trees need to be harvested. This is why an understanding of the concept of 'sustainable timber' – the ability to harvest and regrow the resource in perpetuity – is so important, particularly as the world moves into a carbon constrained future. Wood has unique environmental credentials – a product obtained from a natural resource that grows on solar energy, converting carbon dioxide (CO₂) to carbon and emitting oxygen; it is renewable, recyclable and biodegradable; its production and processing are energy efficient; and its use, if managed properly, is 'greenhouse positive'. What other material can say this?

The recent focus on sustainability has thrown up a whole new set of metrics around how a building may be judged, and wood products still feature highly. Council House 2 (CH2) provides an example of arguably the most sustainable building in the southern hemisphere and the first

six-star GreenStar Building in Australia. CH2 has sustainable technologies incorporated into every conceivable part of its 10 storeys, a water-mining plant in the basement, phase-change materials for cooling, automatic night-purge windows, and an impressive façade of recycled hardwood timber louvres (powered by photovoltaic cells) that track the sun. CH2 also incorporates a host of other sustainable timbers including: Victorian ash hardwood window joinery, wood fibre composite laminate wall and ceiling panels, plantation softwood plywood partitions and shelving, and a stunning reception desk constructed by furniture craftsman, David Emery, from elm reclaimed from street trees by the City of Melbourne. Timber is well featured in this groundbreaking structure.

Environmental sustainability is by far the most significant new issue on the building agenda, its prominence enhanced by the intense global public, media and government interest in CO₂ emission reduction. New regulations, procurement guides and rating tools abound and each currently treat building products differently. The future metric though will undoubtedly be full life cycle assessment and by this measure sustainable timber provides the best environmental option.



SUSTAINABILITY AND BUILDING PRODUCTS

While the major 'building sustainability' focus at present is on reducing operational impacts (both energy and water), there is a rapidly increasing interest in demonstrating environmental product stewardship and assessing the full life cycle impacts of materials.

Building products today can be sourced from reused products or recycled materials; however, most products still utilise materials obtained by either 'mining' or 'harvesting' natural virgin resources. Mining generally means the extraction of metals and stone from the earth's crust. These raw materials often take millions of years to form; they exist in finite quantities and are not considered renewable. Harvestable materials, such as wood, however, are renewable. Trees can be grown in a comparatively short time-frame (sawn timber: 30 years for softwood, around 60 to 80 years for hardwood), then harvested for use in a range of timber products. New trees can then

be regrown, providing a sustainably managed process for production. Timber products require comparatively little energy in production. When the products are in service the carbon is stored in the timber. At end of life most timber products can be reused (flooring, windows, doors), recycled into new products, or the energy recovered in biomass energy plants, reducing the reliance on non-renewable energy sources.

In regards the global interest in CO₂ mitigation, forests also play an extremely important role as growing forests absorb carbon dioxide from the air and 'sequester' (store or fix) it in woody tissue. The CRC for Greenhouse Accounting has estimated¹ that Australian commercial native forests and plantations (hardwood and softwood) store around 323 million tonnes of carbon, of which wood products store more than 230 million tonnes of carbon.





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Queens Park Residence by Third Ecology Architects, winner of the 2007 Timber Design Awards Environmental Commitment category. The building features recycled and sustainably managed plantation timber extensively, and includes FSC certified Red Nordic Pine timber windows and door frames.

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The Bowden Centre, by Kennedy Architects, highly commended for Environmental Commitment in the 2007 Timber Design Awards. The building's cladding features Australian hardwood and dressed and undressed Silvertop Ash plantation timber, which will be allowed to age to grey, thereby removing the need for potentially environmentally damaging finishes.



TIMBER – LEGAL AND SUSTAINABLE

When it comes to timber the most critical issue for architects appears to be that the wood products that they specify come from a 'legal' and 'sustainable' source.

Timber products specified and used in Australia come from three major sources: plantations (either hardwood or softwood), native hardwood forests or as imports.

For timber harvested in Australia around 62 percent comes from plantations and 38 percent from native forests². These forests are managed under strict federal and state government regulations and the likelihood of illegal wood entering the supply stream is extremely low.

Australia also imports around \$4 billion in wood products; over 70 percent of this is paper-based product, the remainder sawn wood and wood products. Assuring legality is far harder for imported products; up to nine percent of Australia's forest imports potentially come from illegal or suspected illegal sources³.

Certification provides a major assistance in addressing the issues of sustainability and legality. Forest certification addresses the sustainability question as it provides an independent third-party assessment that on the ground forestry operations are being carried out in accordance with a predetermined standard. Forest operations found to be in conformance with the given standard are issued a certificate (hence certification).

Chain of custody certification assists with the issue of legality as it provides a specific system to track wood products from a certified forest through the processing and marketing channels to the final user. This system can also be audited and certified by a third party. This is extremely important where there is any question of illegally harvested timber entering the supply stream.

Certification is much more than a self-justified marketing claim. Rigorous, independent assessment by third-party auditors must be carried out before forest managers can claim that they are certified, and these assessments are subject to scrutiny. Certification schemes typically require forest management practices that are significantly more stringent than regulations and laws. Certification schemes allow manufacturers and ultimately consumers to be discerning in their purchasing habits, based on scheme labelling and claims, to provide reliable information about forest management sustainability. They also provide an extra incentive for forest managers to place a greater emphasis on their sustainability credentials.

Three forestry certification standards are currently operational in Australia, covering two overall schemes: the Australian Forest Certification Scheme (AFCS) and the Forest Stewardship Council (FSC).

The AFCS uses the Australian Forestry Standard (AFS) AS4708-2007 that has been developed utilising the formal Australian Standards process and has been designed specifically to suit Australian forests, legal systems and community expectations. The AFS has also been conferred mutual recognition by the international Program for the Endorsement of Forest Certification Schemes (PEFC).

The Forest Stewardship Council (FSC) does not currently have a formal Australian Standard, but utilises a set of international principles and criteria, with indicators that are adapted to suit local conditions to form 'Interim Standards'. In Australia, these are managed and implemented by two FSC-accredited certification bodies, Woodmark and SmartWood.

While the AFCS and FSC schemes have followed quite different development paths, from a practical point of view (that is, their coverage of forest management issues and how they are implemented to certify forest managers) they are very similar in application⁴.

Around 70 percent of Australia's forests are today certified, 66 percent to the AFCS and four percent to FSC. The industry is committed to maximising certification of its production forests.

CURRENT ENVIRONMENTAL SPECIFICATIONS AND THEIR TREATMENT OF TIMBER

A range of new voluntary, environmentally-based specifications and procurement documents, prepared for architects and specifiers, have started to gain traction in the market. These tend, at this point, to be somewhat subjective in terms of timber, simply focusing on recycling and certification. They do not currently take a scientific, full life cycle assessment approach where all of timber's environmental benefits are included.

Current environmentally-based specifications such as Good Environmental Choice, Ecospecifier, Eco-Selector and Eco-Find all recognise both the AFCS and FSC. The only one slightly out of step is the Green Building Council of Australia's (GBCA) GreenStar the Mat-8 Sustainable Timber credit which currently only recognises 'recycled or FSC certified' timber. The GBCA is, however,



reviewing the credit and the new draft specification recently out for public comment recognises AFCS, PEFC and FSC as well as suggesting a number of additional sustainability criteria. It is hoped that the new credit will be finalised within the next few months. Clearly, the new range of environmental specifications see forest certification as a minimum baseline for demonstrating sustainability and product stewardship, and the timber industry continues to work to meet this requirement for locally grown product.

Chain of custody certification seems less of a need for locally grown product because of the strict Australian forest and marketing regulations that ensure the legality of the wood. Many wood product supply chain companies, however, are voluntarily putting in place chain of custody certification, seeing it as a sound environmentally directed business decision. At present, for architects wanting to specify certified timber, there will likely be some difficulty in accessing commercial volumes of branded certified product, but there should be no problem in finding locally grown timber that comes from a certified forest. Specifications therefore need to be realistic in their requirements for supply chain members to demonstrate chain of custody certification for Australian produced timber.

ENVIRONMENTAL REGULATIONS: CURRENT AND FUTURE

The real interest for all building product sectors in the near future is the pursuit of full life cycle assessment (LCA) as the basis for environmental regulations, specifications and tools. It is felt that only LCA can provide a true, scientific measure of a product's, or a construction's (an aggregation of products) impact on the environment. LCA provides a detailed formal process of quantifying the environmental effects of a product throughout its entire life (cradle to grave). It accounts for all the material and energy usage (inputs) and subsequent environmental impacts (outputs).

A full LCA includes assessment of the amount of energy embodied in individual products during their manufacture, the collective impact of the construction process, the impact of a building during its operational phase (where current BCA five-star regulations are focused), the impact of demolition of the building and then an assessment of the products at end of life – what can be reused, recycled or recovered for energy or what ends up in landfill.

The Australian Building Codes Board has also identified sustainability as a core goal of the Building Code of Australia (BCA). In an investigation of potential reform of future codes

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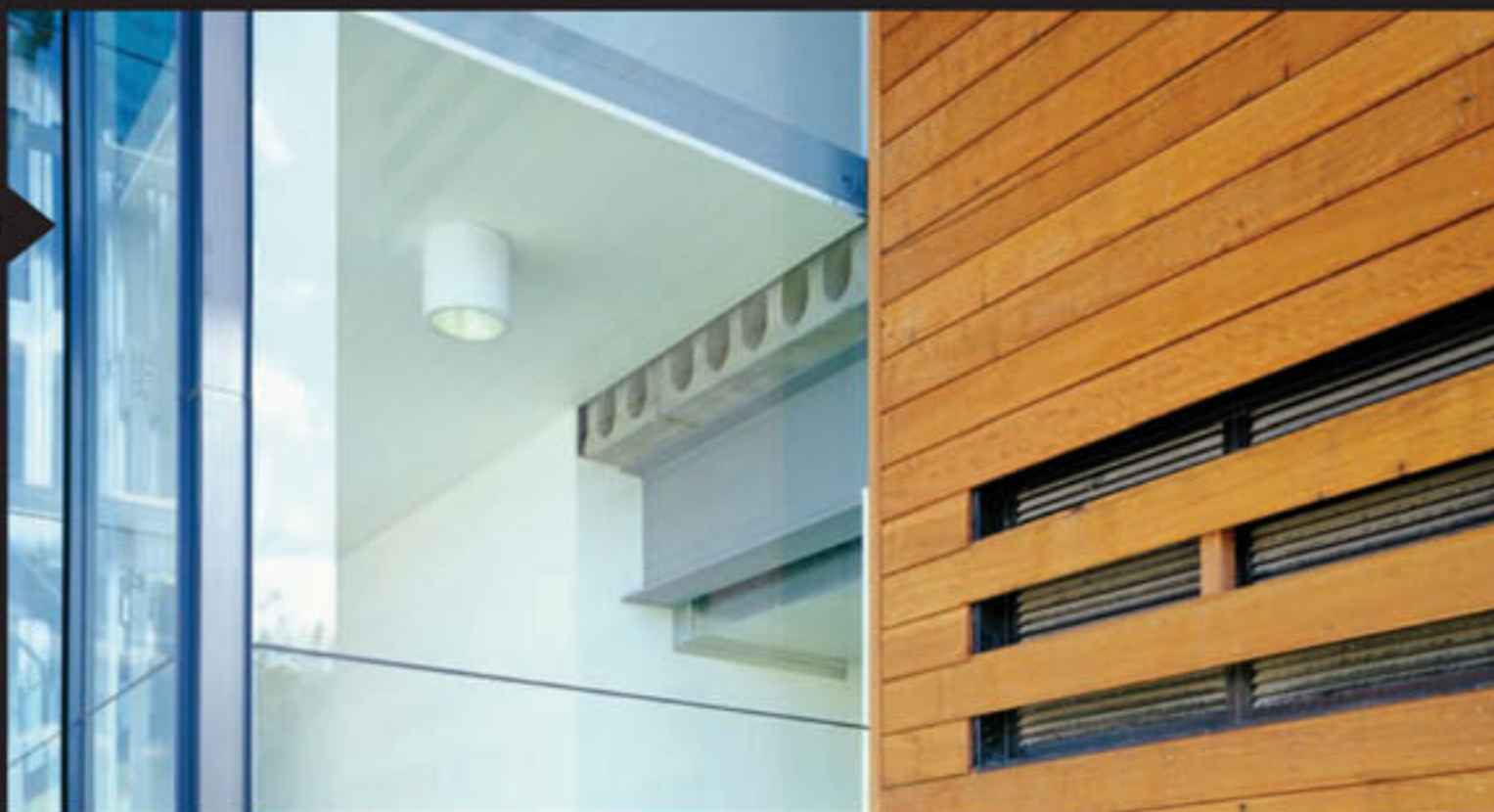
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Plus Architecture's Moonah Links Clubhouse features spotted gum timber cladding from sustainably managed plantations.

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Certification is much more than a self-justified marketing claim.

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BVN's award-winning RAAF Richmond base features recycled blackbutt cladding, and FSC certified timber. The first thing the visitor sees on arrival at the base. The recycled blackbutt functions as a key ingredient in the building's green narrative.

and standards a scoping study was undertaken for the Department of Environment and Heritage in 2006 investigating measures for improving the environmental sustainability of building materials⁵. The report strongly recommended LCA as the future basis of assessing sustainable buildings and environmentally preferred products.

The timber industry fully supports this position and has undertaken a detailed two-year R&D project with the CSIRO to develop state-of-the-art life cycle inventory (LCI) data for a wide range of Australian timber processes and products, including: softwood plantations and native hardwood forests, softwood and hardwood sawn products, veneer, plywood, LVL, particleboard, MDF, glulam and engineered beams. At the time of going to print this project was due for completion and the data will be the first sector-based information included in the new Australian Life Cycle Inventory Database initiative (AusLCI) currently under development. Nigel Howard, a past COO of the Green Building Council Australia, a past vice president of the US Green Building Council and a pioneer on LCA in

the US and the UK, has suggested that because of the strong industry involvement in this process the "LCI information collected would be some of the best in the world".

The next few years will see all building environmental specifications and rating tools adopt LCA as the core assessment process for building materials. The timber industry is proud to be a leading sector in this process.

Architects continue to demonstrate new, unique and innovative applications for the use of timber in their projects. In this vein, the timber industry is also keen to continue to demonstrate its innovation and its commitment through the provision of sustainable timber, strong product stewardship through third-party certification and state-of-the-art environmental life cycle inventory data. The ultimate aim is to allow the best design to be achieved using the most environmentally responsible products. **ar**

further information

Timber Sustainability
www.timber.org.au

Australian Forestry Certification Scheme

www.forestrystandard.org.au

FSC Australia

www.fscaustralia.org

LCA in Building and Construction

www.buildlca.rmit.edu.au

Your Building

www.yourbuilding.org

footnotes

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3. 2005, 'Overview of Illegal Logging', Jaakko Poyry Consulting.
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5. 2006, 'Measures for Improving the Environmental Sustainability of Building Materials', prepared by RMIT Centre for Design for the Department of Environment and Heritage.