



Build in **TIMBER**



Australian Government
Forest and Wood Products
Research and Development
Corporation



BUILDING TRADITION

Timber is one of mankind's most tried and tested building materials. Since the first settlers harvested trees and used them to build shelters, Australian builders have used sawn timber as their preferred building material in private dwelling construction. Timber framing now comprises over 90 percent of wall and roof frames in all detached housing construction in Australia.

The dominance of timber frame construction is not unique to Australia - it is used in more than 90 percent of housing starts in North America and Scandinavia and is also an established part of the building cultures in these countries. In Australia there is a strong tradition of timber construction with considerable building expertise and experience in timber, supported by building codes and standards. A culture and a sizeable industry have been developed around light timber frame construction, which is recognised as the standard building system.

This brochure has been produced to assist builders, designers and home owners to appreciate the values inherent in timber construction.



SIMPLY THE BEST!

Instinctively, timber is the best material to build with because it is:

- **Environmentally friendly** - Timber is the most environmentally responsible building material. Timber has low production energy requirements and is a net carbon absorber. Timber is a renewable resource. Well-managed forests produce timber on a sustained continuous basis, with minimal adverse effects on soil and water values.
- **In plentiful and growing supply** - Timber is readily available. Australia has significant forest resources including a plantation estate covering more than 1.6 million hectares, and the area is growing rapidly.
- **Strong and lightweight** - Timber is strong, light and reliable making timber construction simpler and safer than steel or concrete construction.
- **Reliable - quality assured** - Advanced processing and quality assurance programs ensure "fit for purpose" timber is consistently produced in the right sizes and grades.

Additionally, timber is:

- **Safe** - Timber has low toxicity and therefore requires no special safety precautions to work with it, other than normal protection from dusts and splinters. Timber frame construction requires little in the way of heavy lifting equipment making building sites safer work places. Timber being non-conductive has obvious benefits in terms of electrical safety. Modern timber construction has increased fire resistance due to incombustible linings protecting light frames.
- **Easy to install** - Increasingly specialist timber frame and truss manufacturers use high tech prefabrication enabling accurate and speedy installation. Recyclable - Timber is a forgiving material that can be easily disassembled and reworked. If demolition or deconstruction of a wooden building is necessary, many wood-based products can be recycled or reused.
- **Cost effective** - Comparative studies of the economics of different wall framing systems indicate that, in terms of direct building expenses, timber frames are consistently the most cost-effective solution.
- **Durable** - Good detailing, coating and maintenance ensure that timber structures last for lifetimes.
- **Comfortable** - Well-designed Timber structures are comfortable to live in all year round no matter where you are.
- **Flexible** - A particular feature of timber is the flexibility of design forms and finishes that can be used. This flexibility also extends to the ease with which existing buildings can be added to or modified to suit changing circumstances. User friendly versatile timber gives building designers creative freedom providing homeowners with flexible design choices. Timber is simply the best building material for builders, designers and homeowners and can be used to construct the homes we love, structures we admire and warehouses, commercial buildings and other structures.



ENVIRONMENTALLY FRIENDLY

With an increasing awareness of the environmental impacts of human activities, homeowners are more often looking for building systems and designs which use little energy to manufacture and are built with sustainably produced materials. Wood and wood products meet these aspirations better than any other common building materials.

Forests have important roles to play in delivering sustainability because they:

- filter the air and soak up carbon dioxide, one cause of climate change
- create habitats for many birds and animals
- create jobs and wealth across the States
- have the potential to offer recreation opportunities
- provide timber and wood products sourced from a renewable resource

Assessments of the life cycle impacts on the environment of the most commonly used building materials consistently rate timber ahead of all others. It has low embodied energy (the process energy requirement to produce the basic material) and is a net carbon absorber. Timber truly does grow on trees and well-managed plantations and forests can produce timber on a continuous basis, with minimal adverse effects on soil and water values. Wildlife values of natural forests are protected by setting large areas of forests aside in reserves.

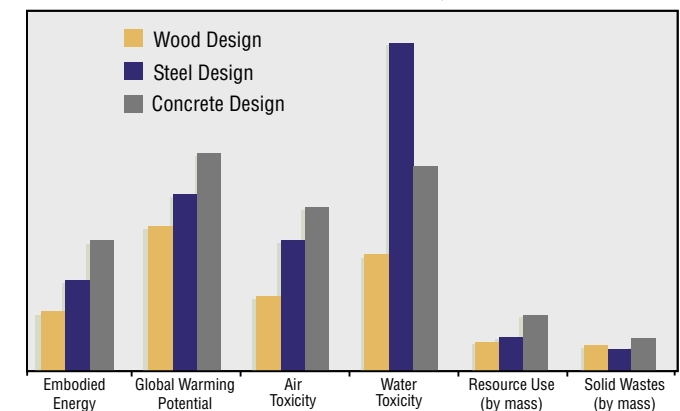
Comparative Life Cycle Analysis of Residential Housing

The Green qualities of timber construction are hard for other materials to match. These qualities include sustainability, low embodied energy, carbon absorption and high thermal efficiency of timber framed buildings in use.

Trees remove carbon dioxide from the atmosphere via photosynthesis retaining carbon in biomass. An expanding forest is a carbon sink (carbon sinks are any natural or man-made systems that absorb and retain greenhouse gases, mainly carbon dioxide). Carbon absorption continues until a forest reaches a steady state (maturity) where the carbon remains locked in.

Thus the forest acts as a carbon reservoir, even if individual stands are continually harvested and replanted.

Environmental Performance of Timber, Steel and Concrete



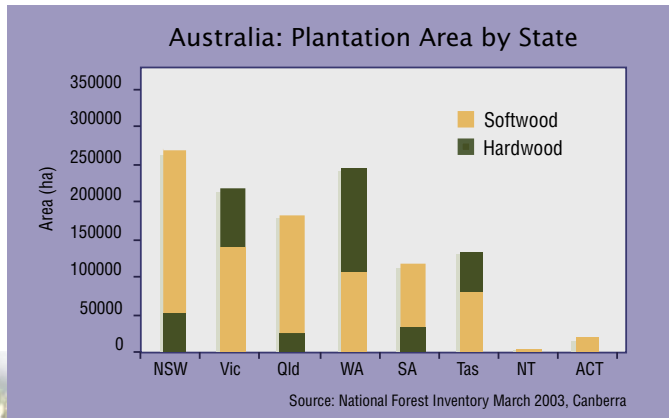
Source: ATHENA Sustainable Materials Institute Canada
<http://www.athenasmi.ca/>



PLENTIFUL AND GROWING SUPPLY

Australia's building industry is supplied with framing timber, which is mostly derived from plantation forests as well as sustainably managed native forests. Australia has a significant plantation estate covering more than 1.6 million hectares, and the area is growing rapidly. Currently it comprises about 61 percent softwood species (pine) and around 39 percent hardwood species (mostly Australian eucalypts).

Australia's plantations have attracted a substantial investment in the forest-based processing industry, supplying the building industry with about 3 million m³ of sawn timber every year. Other forests supply around 1.8 million m³ /annum. Close scrutiny of native forests, environmental certification of sustainability values and the increasing plantation estate, will ensure that builders will be able to access a sustained supply of their prime building material for many years to come.



NATURE'S OWN STRUCTURAL MATERIAL

As nature's own structural material, timber has evolved high strength for weight in order to support trees that can grow as high as 100 metres. Timber is used to build a wide variety of structures including commercial and multi-storey buildings, warehouses, bridges as well as housing. All these types of construction are assisted by Australian and industry standards as well as the provisions of the Building Code of Australia (BCA).

A particular feature of timber is the flexibility of design forms and finishes that can be used. This flexibility also extends to the ease with which existing buildings can be added to or modified to suit changing circumstances.



STRONG AND LIGHTWEIGHT

A comparison with steel and concrete shows that radiata pine structural timber, for example, has a strength for weight ratio 20 percent higher than structural steel and four to five times better than unreinforced concrete in compression.

The lightweight structures possible in wood confer flow-on advantages in terms of reduced foundation costs, reduced earthquake loading and easier transport. Building components and complete constructions are simple and safe to erect, and cheaper to deconstruct or reuse at the end of a building's useful life.



QUALITY ASSURED

The natural variability of timber strength, between and within species, requires reliable systems to sort timber into strength groups and grades best suited for particular applications. These grading systems rely on:

- visual identification of strength reducing characteristics (Visual Grading standards AS 2082 Hardwoods, AS 2858 Softwoods including Cypress) or
- direct machine measurement of the timber stiffness (Machine Grading standards AS/NZS 1748) and the determination of strength properties.

Timber-grading systems, and the products they produce, are generally monitored by third party audited quality schemes, which ensure the delivery of reliable products to the end user. These Quality Assurance (QA) schemes are managed by organisations such as Plantation Timber Certification Pty Ltd (PTC) for softwoods and Australian Timber Industry Certification Pty Ltd (ATIC) for cypress pine and hardwoods. Further, engineered timber products such as plywood, Laminated Veneer Lumber (LVL) and glue-laminated timber, are monitored by the Plywood Association of Australasia (PAA) and the Glue-Laminated Timber Association of Australia. The PTC and PAA are JAS-ANZ accredited product certification bodies.

Prefabricated frames and trusses are used in the majority of projects around Australia because of efficient construction, better control of tolerances and speedier installation. In the frame-making plant, drawings are translated into instructions for the automated frame making machinery.

Safe to use

Timber has low toxicity and therefore requires no special safety precautions to work with it, other than normal protection from dusts and splinters. Because it is light weight, timber frame construction requires little in the way of heavy lifting equipment making building sites safer work places.

Easy to install

Timber trusses and frames, factory fabricated from sawn timber and toothed metal plate connectors, have come to dominate roof construction for small buildings such as houses and large industrial buildings where clear spans up to 50 metres are required. Timber trusses compete with other roof structural systems on cost, high performance, versatility and ready availability, supported by design software packages supplied by the plate manufacturers to the fabricators.

Electrical resistance

With increasing use in buildings of electrical and electronic equipment, a non-conducting frame has obvious benefits in terms of electrical safety and freedom from interference due to stray currents, which may arise from insulation breakdown. Timber frames inherently avoid such problems, as wood is an excellent insulator and will not affect the operation of wireless receiving and transmitting equipment.



Fire safety

Modern timber construction has a high fire resistance. Incombustible linings generally protect light frames for at least 30 minutes of fully developed fire. In reality, the contents are the major hazard in building fires, and this is so regardless of the construction material. It is generally true to say that people die in fires from burning contents and the resulting poisonous combustion products, not burning building components. Hence the emphasis on smoke alarms and getting people out early, within a few minutes of ignition of the contents, well before the building fabric is involved in a fire.

Resistance of houses to bushfires starts with the maintenance of a secure, combustible free environment around the house grounds, roof and walls. The next line of defence is the resistance of roof and wall cladding materials and openings, such as windows and doors, to sparks, embers and radiation. The frame is the last component to be involved in a bush fire, well after claddings and contents may have been destroyed.

Design for durability

Although many buildings become obsolete and are demolished long before the end of their natural lives, timber buildings correctly designed and maintained can have an indefinite life. The key to long life is protection from weather, insect attack and decay, through well-established design detailing, surface coating systems, selection of durable species, and preservative treatment processes. In all countries of the world, and Australia is no exception, historic timber buildings testify to these principles.

In termite-prone areas, all buildings are vulnerable to termite attack of contents, so protection is needed regardless of construction materials. Protection systems rely on physical or chemical barriers, or both, and their effectiveness depends on the quality of the design, construction, inspection and maintenance. The risk of termite attack should be assessed after consulting with local building authorities and an appropriate termite management system should be implemented.

The system may include physical or chemical barriers or in higher risk areas, a termite resistant treated timber or naturally termite resistant frame may also be chosen. In any case any management system should include regular inspection to ensure that barriers have not been breached. It is therefore critical that the system type and inspection schedule are understood by all future householders. Importantly, termites are an integral part of the ecology of Australia, however, with awareness, planning and using cost effective systems, they can be effectively managed.

Comfortable buildings

Good thermal design results in buildings that are cool in summer and warm in winter. Ideally, these ends are achieved with low energy inputs and without compromising other liveability aspects, such as arrangement of spaces, doors and windows. Good architectural design will build in the ability to use the weather, breeze, shading and sun to control indoor comfort. Lightweight timber framing allows design flexibility to achieve the right result. A well designed home encourages the homeowner to use the features of the home to achieve the level of indoor comfort they desire without necessarily using additional heating or cooling.

Timber has other advantages, for example the capacity to absorb and release moisture, reducing cavity condensation risk. Timber floor framing and timber feature floors are warm to touch and less fatiguing to walk on. Suspended timber floors are dry and off the ground offering space for services and allowing the installation of insulation. All in all, when you take into account timber's low embodied energy, design flexibility, warmth and other attributes it has to be the choice of designers and homeowners who want to design quality, comfortable homes.



RECYCLING

If demolition or deconstruction of a wooden building is necessary, many wood-based products can be recycled or reused. The salvage value of older timbers from retrofitting and demolition projects has enabled a trade in recycled products (particularly doors, windows and trusses), as well as providing planks (from flooring, cabinetry shelves and cladding) to be reworked into new high-value products. The salvaged timber is reused for furniture or other suitable building applications



COST-EFFECTIVE

There are many factors to consider when comparing the economics of different construction systems including the complexity of the layout, site, builder experience, and relative material prices at the time of building. However, comparative studies of the economics of different wall framing systems indicate that, in terms of direct building expenses, timber frames are consistently the most cost-effective solution.

In the medium to long term, the forecasts for the Australian wood supply indicate a stable and growing supply. This means that prices for framing timber are likely to be more stable for builders in the long term. However, this price stability is questionable for materials such as steel, which consume considerable amounts of fossil fuels in their manufacture. The smelting of steel is heavily reliant on the continued availability of cheap sources of fossil fuels, a scenario which is becoming highly uncertain in an increasingly energy and security conscious world.



FLEXIBLE

Timber is used for a diverse range of applications and building styles. Light and adaptable, it can be used for both interior and exterior structures and surfaces, both structural and non-structural, and can be used aesthetically as well as structurally.

Timber and wood componentry products are widely available in a number of sizes and species, each of which has unique properties, colours and grains. Whether used in its original shape, rough sawn or hewn to size, stained or sanded, and machined into shapes and smooth surfaces, wood is certainly one of the most versatile materials available to designers and builders. The large range of wood-based products available including solid wood, veneers, fibreboard, particleboard, laminated and engineered structural members allows wood to be used in almost any building application.

The available range of timber products includes:

Structural sawn timber

- Australian hardwoods and cypresses
- Plantation pine and Araucaria

Engineered wood products

- Laminated Veneer Lumber (LVL)
- Glue laminated Timber
- Composite components including I-beams and trussed beams

WHO'S WHO

State Timber Advisory Bodies

Timber Advisory Centre (Victoria)

Phone: (03) 9875 5010
Fax: (03) 9877 6663
Email: info@timber.asn.au
Web: www.timber.asn.au

Timber Promotion Council (Victoria)

Phone: (03) 9665 9255
Fax: (03) 9665 9266
Email: tpcvic@tpcvic.org.au
Web: www.tpcvic.org.au

Timber Advisory Centre (Western Australia)

Phone: (08) 9380 4411
Fax: (08) 9380 4477
Web: www.forestindustries.com.au

Tasmanian Timber Promotion Board

Phone: (03) 6324 3135 Freecall: (TAS only) 1800 244 870
Email: timber@arch.utas.edu.au

Timber Development Association (New South Wales)

Phone: (02) 9279 2366
Fax: (02) 9279 2377
Email: info@tdansw.asn.au
Web: www.timber.net.au

Timber Development Association of South Australia, Inc.

Phone: (08) 8297 0044
Fax: (08) 8297 2772
Email: peter.llewellyn@internod.on.net

Timber Queensland Limited

Phone: (07) 3358 1400
Fax: (07) 3254 1964
Email: christine@timberqueensland.com.au
Web: www.timberqueensland.com.au

National Bodies

A3P

Phone: (02) 6273 8111
Fax: (02) 6273 8011
Email: hazel.cringan@a3p.asn.au
Web: www.a3p.asn.au

National Association of Forest Industries

Phone: (02) 6285 3833
Fax: (02) 6285 3855
Email: enquiries@nafi.com.au
Web: www.nafi.com.au

Certification Bodies

Plywood Association of Australasia Ltd

Phone: (07) 3854 1228
Fax: (07) 3252 4769
Email: simon.dorries@paa.asn.au
Web: www.paa.asn.au

Australian Timber Industry Certification

Phone: 1300 131 481
Fax: (03) 9665 9280
Email: atic@atic.net.au
Web: www.timbercert.com.au

* Also Plantation Timber Certification

Standards Information

Standards Australia

Phone: (02) 8206 6000
Fax: (02) 8206 6001
E-mail: mail@standards.com.au
Web: www.standards.org.au

Australian Building Codes Board

Phone: 1300 134 631
Fax: (02) 6213 7287
Web: www.abcb.gov.au