Timber windows and doors

Desktop Guide

THE ENVIRONMENTAL BENEFITS OF TIMBER WINDOWS AND DOORS

Timber as the preferred material choice in windows and door

Today, timber windows and doors can be highly engineered, precision components, built to the most demanding thermal and security specifications, with low maintenance intervals and a long service life.

Timber windows and doors have many distinct advantages in building of all types:

1. they are attractive. They look and feel right,
2. they are available in a wide range of designs, colours and finishes,
3. they are more thermally efficient and resist ‘cold-bridging’,
4. they are economic, have a long service life and can be refreshed or repaired efficiently,
5. they are made from sustainable and renewable materials, and
6. they store atmospheric carbon

Timber windows and doors are attractive. They look and feel right

Timber is an extraordinary material for any home, office or shop. Naturally renewable, it is beautiful, light and strong, welcoming, and warm to the touch.

Timber window and doors have an innate attraction to building designers and occupiers. Timber in joinery and surfaces contributes to a more livable environment. It attracts the eye, and expresses a contemporary beauty, intrinsically rooted in nature and a respect for the environment.

Those living in wood-rich environments intuitively understand the origins and character of their surrounds. Timber's is easy to work and this provides most people with the opportunity to make and enjoy making wooden objects of beauty and usefulness for themselves.

Famed Finnish architect, Alvar Alto felt that wood's 'biological characteristics, its limited heat conductivity, its kinship with man and living nature, the pleasant sensation to the touch it gives' made timber a suitable material for the design of a sympathetic world and used wood extensively in his work.

Timber windows and doors are available in a wide range of designs, colours and finishes.

Timber enjoys a flexibility in window and door design that other material find hard to match. Easy to work and available in a wide range of products, species and sizes, timber encourages innovation and creativity.

With timber, designers are not bound to use only the common extruded sections or finishes found in most projects. Wood can be easily shaped, moulded or bent to suit a particular project or assembled into much larger units, either with glue or mechanical fixings.

Manufacture is innately flexible as timber can be shaped and moulded to suit the project and design. Designs can be easily modified. The size, shape and configuration of elements are flexible and the detail of assembly can easily accommodate glass of different thickness, or walls of different types.

Timber units have a wide range of finishing options. They can be left unfinished to weather naturally, clear coated, stained or painted a wide variety of colours. Also, the colour can be changed on site.

Timber windows and doors are thermally efficient and resist 'cold-bridging',

Timber in windows and doors helps to save operational energy over the life of a building.

Timber provides ***superior*** thermal insulation: 15 times better than concrete, 350 times better than steel and 2000 times better than aluminium. So, timber windows and doors are intrinsically more thermally stable than those made from other materials. Timber doesn't provide the ready thermal bridge that allows expensively generated heat to escape into the colder outside air, or let the outside heat in.

Table 1. Thermal values of various materials

MATERIAL	U-VALUE(W/mK)	R-VALUE(100mm)	DENSITY(kg/m^3)
Glass Wool Insulation	0.038	2.6315	52
Softwood	0.135	0.7407	550
Hardwood	0.175	0.5714	700
Concrete	0.93	0.1075	2300
Steel	45.3	0.0022	7850
Aluminium	221	0.0004	2740

As a result, a timber window or door will have a significantly higher insulation value and better thermal performance than an aluminium window or door of the same size and glazing. As a rule of thumb, a generic single-glazed timber framed window will have a similar thermal performance to a generic double glazed aluminium window.

Table 2. Performance of different window types

Hampton: Using Generic WERS Data							
		COOLING	HEATING	Total Window System Values - ANAC			
Glazing ID	Frame	%impr.	%impr.	Uw	SHGCw	Tvw	Air Inf.
GENERIC STANDARD INDUSTRY TYPICAL WINDOW - SINGLE GLAZED							
3Clr	Generic: Aluminium	0%	0%	5.84	0.859	0.75	5
3Clr	Generic: Timber	15%	15%	4.24	0.736	0.72	5
GENERIC STANDARD INDUSTRY TYPICAL WINDOW - DOUBLE GLAZED							
3/6/3	Generic: Aluminium	11%	17%	4.34	0.777	0.68	5
3/6/3	Generic: Timber	26%	31%	2.82	0.659	0.65	5

Source: WERS 007 Generic Product Directory. www.wers.net

Timber windows and doors are economic, have a long service life and can be refreshed or repaired efficiently

> In 2003, a consultancy working with the London Borough of Camden Council conducted research on window costs. KSC Partnerships discovered that high-performance timber windows cost on average 14 per cent less than PVC windows, when comparing an identical specification… A "whole life cost" appraisal… took into account maintenance and replacement costs and shows that high performance timber and aluminium clad timber windows cost 23-25 per cent less than PVC over a 60-year life span. (Thompson 2005)

Timber windows and doors have been part of effective building solutions since ancient times. In Australia, they have been used since the first colonial building. Many remain in service after hundreds of years in service.

Wood is resistant to heat, frost, corrosion and pollution. With regular maintenance, carefully designed and finished timber windows and doors can perform in the toughest external environment, and provide a resilient response to internal wear and tear.

Timber windows and door can be repaired, refreshed or upgraded and this has its own environmental benefits. Timber joinery can be refurbished efficiently and remain in service, avoids the impacts generated by acquiring new materials.

Also, refurbishment benefits culture and place-making in design as the refreshed element retains a reassuring echo of continuity and tradition.

Timber windows and doors are made from sustainable and renewable materials

Timber can be regrown on a continual and sustainable basis. Wood grows in trees. For the trees to grow, they only need soil, air, water, sunlight and time. If the process is well-managed, trees can be grown, harvested and regrown on a continuous basis to provide a renewable resource. This is in stark contrast to other building materials made from finite and non-renewable resources.

Australia has 149 million hectares of forest, managed for timber, environmental protection and other uses. About 16% of Australia's native forests are in formal nature conservation reserves, including nearly three-quarters of all known old-growth forests (BRS 2009).

The 2008 State of the Forest Report highlighted Australia's world-class forest conservation reserve network that helps to protect native forests. Production forests outside this network are subject to a closely monitored sustainable forest management regime. This regime is supported by codes of practice for harvesting and environmental management and, increasingly, by the independent certification of high-quality forest management.

Table X. Area of old-growth forest in areas surveyed for RFAs ('000 hectares)

	NATIVE FOREST IN REGION	AREA OF OLD-GROWTH IDENTIFIED	AREA OF OLD-GROWTH IN FORMAL AND INFORMAL RESERVES [a]	PROPORTION OF OLD-GROWTH IN RESERVES
NSW [b]	8989	2536	1742	69%
Qld[b]	3230	270	196	73%
Tas.	3116	1229	973	79%
Vic.[c]	5774	673	460	68%
WA[d]	1909	331	331	100%
Total	23018	5039	3702	73%

Note: Old-growth forest has not been assessed in the Australian Capital Territory, Northern Territory and South Australia.

a Includes nature conservation reserves and informal reserves on other tenures.

b Area surveyed in Queensland did not lead to establishment of a RFA. New reserves have been established in New South Wales and Queensland since this information was prepared. The 'area of old-growth in formal and informal reserves' is therefore an underestimate.

c The area of old-growth was reduced as a result of conversion to regrowth by fires, predominantly in 2003.

d Original RFA old-growth mapping.

e Proportion of total area for the five states listed.

The bulk of Australia's production forests are now certified under international recognised forest certification schemes. In June, 2009, the management processes for 9.2 million hectares of Australian forest were certified; 8.7 millions hectares, including most state forestry agencies, under AFSC, and 0.5 million hectares under FSC. 0.25 million hectares had recognition under both schemes.

Timber windows and doors store atmospheric carbon

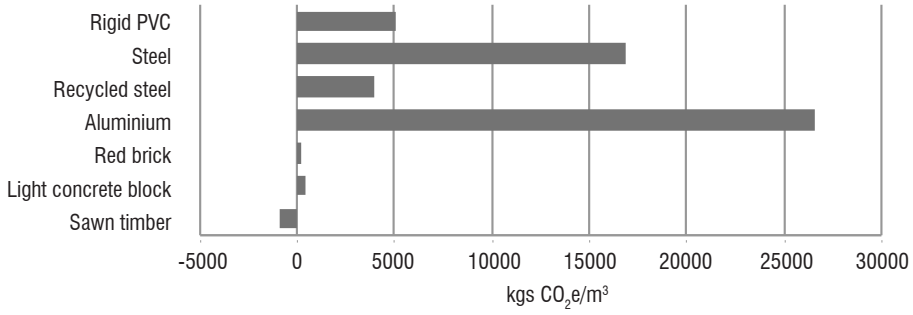
> "Wood products can displace more fossil-fuel intensive construction materials such as concrete, steel, aluminum, and plastics, which can result in significant emission reductions (Petersen and Solberg, 2002)"

A house lot of timber windows* can typically store 225 kg of carbon, equivalent to 830 kg of atmospheric CO2.

Timber in windows and doors reduces carbon emissions in three ways:

- the carbon stored in growing trees is retained and stored in the timber for at least the life of the building. Timber in building extending the period that the CO2 captured in forests is kept out of the atmosphere;
- using wood instead of energy intensive materials avoids the emissions associated with producing those materials; and
- increased timber use supports the economic expansion of forests through the landscape. These are significant carbon sinks.

Each cubic meter of timber in a building sequesters between 250 and 300 kg of atmospheric carbon. This is equivalent to 0.9 to 1 tonne of CO2. Emissions from using high-energy materials are also avoided. On the basis of European studies, using one meter of timber also averts another 1.1 tonnes of CO2 emissions.



Source: RTS Building Information Foundation, 2001, 'Environmental Reporting for Building Materials' – 1998 – 2001

Timber production encourages forestry, and forestry has significantly less environmental impacts than other resource acquisition processes. Growing forests and plantations for timber sequesters more atmospheric carbon. Australia's Kyoto-compliant plantations are expected to store about 21 million tonnes of CO_2 a year by 2010, even while some are being harvested. Native forests and other plantations will also be continuously adding to this storage (AGO 2006).

* Assuming 22 windows of various types.