# Technical Facts

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# Energy Efficient

## Simple

**Solid wood has a significant thermal mass i.e. capacity to store and exchange heat, up to 2.5 times as much as concrete per kilo.**

## Science

### Energy Efficient

Solid wood has high insulation and thermal mass meaning that less energy is required to heat, cool and ventilate a solid wood walled building. Studies conducted at Lincoln University have confirmed that for walls with equivalent thermal insulation the energy performance of solid wood construction is superior to that of timber frame construction. This is almost entirely due to solid wood's greater thermal mass.

### Low Embodied Energy

Embodied energy refers to the quantity of energy required to manufacture, and supply to the point of use, a product, or material.

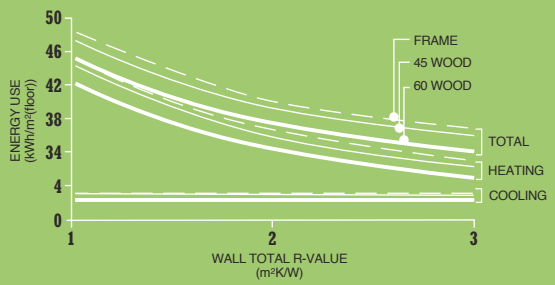
Solid wood takes little fossil fuel to manufacture. The embodied energy required to produce a wooden house is far less than a conventional light timber frame with gypsum board lining and brick or fibre cement cladding. Solid wood has the lowest energy consumption and the lowest $CO_2$ emissions of any commonly used building material.

### Energy Generation

Byproducts of the manufacturing process can be burned cleanly to produce energy, continuing the carbon cycle without adding to the total carbon presence in the atmosphere by burning fossil fuels.

### Natural Energy

Solid wood is manufactured by nature using sunshine, so very little energy is required.



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# Healthy Living Zone

## Simple

**Solid wood naturally breathes creating better indoor humidity, which in turn translates into improved comfort and health for you!**

## Science

### Comfort

"The use of solid wood improves indoor humidity. During the cooler months solid wood acts as a passive dehumidifier in bedrooms during the night, and a humidifier in living rooms during the day. This produces more favourable humidity indoors, which translates into improved comfort and health."

*Dr Larry Bellamy - Lincoln University, New Zealand*

### No.1 Healthy Building Material

Solid wood is the No.1 healthy building material on the planet.

Australian architect, Sydney Baggs in his book, The Healthy House, ranks materials based on many factors including a material's capacity to absorb toxic vapours and gases, its hygroscopicity, diffusion resistance, sound transmission, heat storage capacity, resistance to electrostatic charges, and surface temperature and conductivity. He also took into account the ecological impact of producing the materials.

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# Technical Facts

# Organic Air-Con

## Simple

**Solid wood creates an ideal comfort zone, by taking the edge off both high and low humidity levels.**

## Science

### Breathes

The single, most amazing attribute of solid wood is that it isn't inert like concrete, steel and other synthetic building materials.

A solid wood building is 'alive' and is technically more complex than synthetic materials. It will actively try to maintain your comfort level by working with the surrounding environment absorbing and repelling vapour to achieve a natural balance.

Solid wood's natural insulation qualities, combined with high heat capacity, provide a stable comfortable wall surface temperature.

### Thermal Regulation

The ability to absorb moisture vapour is an important functional attribute of solid wood. As the hydrogen bonds that bind the water molecules are reversible, water can be released in a process known as desorption. Heat is generated as water vapour is absorbed into the wood and lost again as the solid wood dries, effectively warming and cooling the space when needed the most.

The thermal and moisture buffering capacity of solid wood is integral to its ability to maintain a stable internal environment.

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# Nature's Carbon Fibre

## Simple

**Solid wood is strong yet flexible and durable, allowing it to weather extreme storms and ride out strong earthquakes.**

## Science

### Strength

Solid wood has a very high strength to weight ratio, providing protection in harsh environmental conditions and situations i.e. earthquakes, hurricanes, cyclones, tornadoes, and typhoons.

To confirm the strength of wood, you can look at a free standing tree, and watch how it performs in high winds. These pine trees can reach over 35 metres high, with a slender trunk and large area of branches. Yet they are able to withstand earthquakes and wind gusts of up to 100 kph. If you tried to design a structure in steel or concrete to stand up to the same forces, it would take a huge amount of material and energy.

### Fire

Solid wood also protects you in a fire. It burns at a slow rate, and doesn't melt and suddenly collapse as steel can when heated. It can also be sanded and re-used after fire.

### Maintenance

Solid wood is low maintenance, as it does not dent or mark easily, resists staining, soiling, and odour build up.

In Europe, solid wood walls last for well over 300 years with very little maintenance. Which means you have at least 300 years to put your feet up, and enjoy the maintenance free relaxation of solid wood.

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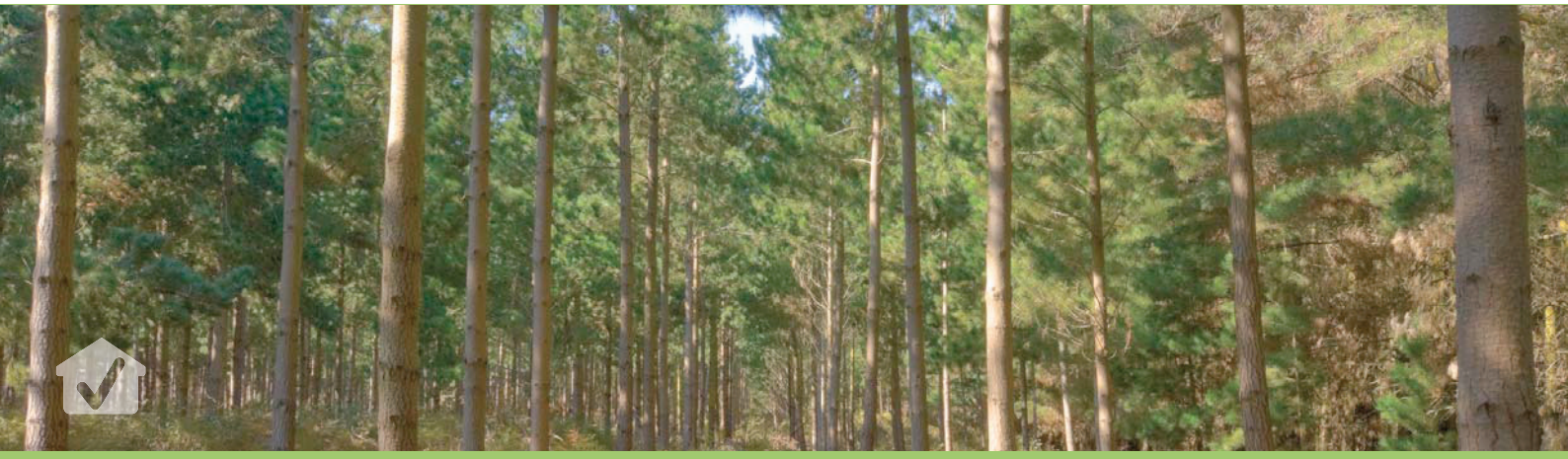

# Sustainable - Works With Nature

## Simple

**Solid wood is natural, biodegradable and locks up large amounts of $CO_2$ indefinitely. Plus it's the only renewable building resource on the planet!**

## Science

### $CO_2$ - Removing & Reducing

Solid wood buildings have the unique ability to reduce $CO_2$ in the atmosphere.

Firstly, the wood used in a solid wood building stores $CO_2$ as part of its natural composition. Trees replanted after they are harvested for solid wood buildings continue to produce life-giving oxygen while removing and storing more $CO_2$ from the atmosphere. Wood products achieve negative net $CO_2$ emissions - lower than any other building material. (Source: Building Information Foundation RTS, 2003.)

### Biodegradable

Solid wood walls are made from fast growing softwood tree plantations which, at the end of their life-cycle, can either be recycled into other products, or returned to nature as they are biodegradable.

### Renewable

Softwood plantations grow as part of a natural, annually renewable cycle that has evolved over millions of years.

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# Solid Timber - Fire Safe

## Simple

**Solid Timber is an Insulator and a poor conductor of heat and electricity. Wood is a much better insulator than steel, concrete and glass.**

**DESIGN - Consult your fire design specialist to meet particular fire safety requirements.**

## Science

### Fire

Solid wood resists fire. It burns at a slow rate, and doesn't melt and suddenly collapse as steel can when heated. It can also often be sanded and re-used after fire.

### Resistance

When wood is exposed to high temperatures it will burn and decompose to provide an insulating surface layer of char that retards further degradation of the wood. The rate of char is initially fast but as the depth of char increases, the rate of char slows because of the increasing insulation provided.

### Strength

Although wood is a combustible material, when it burns, a surface layer of char is created which helps to protect and maintain the strength and structural integrity of the remaining unburned wood beneath. Engineered pine solid wood walls have a char rate of 0.6mm per minute.

### Fact!

Most building fires are started by heat sources that ignite materials such as furnishings and items that are introduced into the building and it is these materials that emit toxic fumes that most often threaten life and limb. The building structure is usually not the first material ignited.

# Technical Facts

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# Solid Timber - Earthquake Safe

## Simple

**Solid wood construction is backed by 50 years of proven performance in New Zealand and a wealth of research to make it better than ever.**

**Solid wood has proven to be one of the safest building systems in an earthquake.**

## Science

### Elasticity and Energy Absorption

The elastic and energy absorption properties of solid wood construction make it the ideal system to use in earthquake regions. The solid wood wall planks are designed to move slightly and then return to their original position once the shaking stops. Gypsum board braced walls (timber or steel frame) cannot take the same movement without showing signs of damage. Concrete can crack under these conditions.

### History

Earthquakes in New Zealand have caused major damage to masonry buildings and even light timber framed buildings have shown damage, while solid timber buildings have emerged unscathed and required NO repair.

### Safety

Solid wood buildings can absorb severe shaking with a very low risk of injury or structural damage. Even in areas of liquefaction, provided the house was on a suspended timber floor, the houses remained safe and serviceable. By contrast, 40,000 fatalities were recorded in the 1999 Turkish earthquake, mainly in masonry and concrete buildings.

### Research

Research is continuing to further improve the performance of solid wood buildings in earthquakes.

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