

# THE BENEFITS OF WOOD IN HOUSE CONSTRUCTION

## Wood: the most renewable of all building materials

- > Growth and production of one tonne of wood absorbs a net 1.7 tonnes of CO<sub>2</sub> from the atmosphere\*.
- > Production of one tonne of steel emits 1.2 tonnes of CO<sub>2</sub> into the atmosphere.
- > A typical steel house frame emits 4.5 tonnes of CO<sub>2</sub> into the atmosphere – the equivalent to the emissions from driving 22,500 kms in an average car.
- > A typical wooden house frame has absorbed 9.5 tonnes of CO<sub>2</sub> from the atmosphere – the equivalent of 47,500 kms of driving in an average car.

(\*Based on the amount of carbon stored in the timber – making an allowance for all the energy used, and CO<sub>2</sub> produced, in its growth, harvesting and processing.)

## Timber frames mean years of CO<sub>2</sub> “in the bank”

- > Energy usage for a well-built, properly insulated home will be similar whether built with a steel or wooden frame (although steel frames will “leak” more heat than wooden frames if not properly insulated).
- > The choice of wood or steel makes the difference between starting with either a healthy CO<sub>2</sub> credit or deficit.
- > An average house uses around 10,000 kWh of energy per year for heating and lighting, which represents CO<sub>2</sub> emissions of 2.3 tonnes (based on electric power).
- > Choosing a wooden house frame will provide over four “free” years of CO<sub>2</sub> emissions.
- > Using a steel frame is equivalent to pumping an extra two year’s worth of average household CO<sub>2</sub> emissions into the environment.

## Steel and timber framing: the afterlife

- > Timber building components can be reused in other buildings or buried in a landfill at the end of their useful life. In a landfill up to 97 percent of the carbon in the wood is permanently stored off-setting CO<sub>2</sub> released by fossil fuels.
- > At the end of the building’s service life, the steel in steel frames can be recycled for other uses. This requires significant processing energy, although this is less than required to produce virgin steel.

## Wood framing is fast and adaptable

- > Timber framing provides for flexibility of design, and allows modifications and tweaks to layout during the construction process – with steel framing this is more difficult.
- > Builders are familiar with using wood, and usually prefer it. Advantages of timber reported by builders include ease of construction and quick erection times for timber frames and roofs.
- > Steel frames, however, have the advantage that construction can continue in wet weather.
- > With wood framing it may be faster to get a Building Consent because it is an acceptable solution under the Building Code but steel frames have to be proven as an alternative solution.
- > Cladding cannot be nailed on to steel frames – it has to be screwed on, unlike wood frames where cladding can be easily nailed.
- > It’s much more difficult to move support fixings for vanities, showers and kitchens in a steel-framed house than in a wood-framed house.

### Snug and sound

- > Wood is 400 times better as a thermal insulator than steel and 14 times better than concrete.
- > Solid wood has significant thermal mass properties, retaining heat from the day and releasing it at night.
- > A steel framed wall will have an overall R-value of only 46-70% of a similar wood framed wall with the same amount of cavity insulation. R-value is the measure of the total thermal resistance of a building element to heat-flow when the internal and external environments are constant.
- > A thermal break is needed when using steel to improve insulation and avoid the buildup of moisture condensation which can lead to mould.

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### Wood doesn't rust

- > All building materials used for the structure of houses in New Zealand are required to have a minimum service life of 50 years to comply with the Building Code.
- > Wood framing used appropriately in accordance with building standards, will usually far exceed this.
- > The mutual enemy of both wood and steel is moisture. Ingress of moisture into wall cavities should be minimised and the design should ensure that any moisture that does enter from leaks or condensation can drain and dry.
- > Although steel framing is normally galvanised to protect it from corrosion, steel frames are susceptible to rust where the surface coating is cut, scratched or penetrated, and from edges that have been cut.
- > Potential problems with steel frames rusting will also arise in sea-spray zones.
- > Wood treated with the appropriate level of preservative, and properly maintained, can last in service for a hundred years or more.

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### Safer choices of timber treatments

- > Modern timber treatment balances the risks of decay against the desire to use as few chemical preservatives as possible.
- > Some applications in structurally vulnerable situations require higher levels of treatment, as specified by the Building Code.
- > Most timber framing for walls, roofs and floors require either no treatment or low-level boron treatment.
- > Boron is a relatively inert and benign compound. It is recognised by environmentalists to have been used successfully and without ill-effect in the New Zealand timber preservation industry for many years.

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### Wood can take the heat

- > Average building fires reach temperatures of 700 to 1000°C.
- > Steel weakens as its temperature climbs above 230°C, retaining only 10 percent of its strength at 750°C.
- > Wood does not ignite until it reaches over 250°C. Once it catches fire, wood develops a protective insulating char layer.
- > Large timber beams have better fire resistance than unprotected steel beams of similar size because the interior of the timber remains much cooler.

(There is no such thing as a "fireproof" building. The contents of most buildings are combustible – and it is contents rather than its structural components which pose the greatest fire hazard to life and property.)

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### No shocks or surprises

- > Wood, when dry, is a natural electrical insulator and will not conduct a current or become live – the reason many power poles are made of wood.
- > Steel is a good electrical conductor and a steel frame is able to conduct a current if in contact with a live electrical source.

**Wood. For a better world.**