

Who decides which materials to use in new buildings?

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With increasing production of timber from New Zealand's forests, there are enormous opportunities for increased use of timber as a structural material for innovative and prestigious buildings, ranging from houses and apartments to large commercial and recreational buildings, as well as bridges and industrial structures.

The benefits to the New Zealand government and timber industry are many, including:

- Adding value to a renewable New Zealand resource
- Creation of employment opportunities in cities and regions
- Creation of carbon sinks to assist compliance with Kyoto protocol
- Reduced dependence on imported materials and fossil fuels
- Development of export markets using New Zealand design expertise and materials
- Demonstrating structural capabilities of New Zealand timber products

If the timber industry or the government or others want to encourage increased use of wood as a structural material in new buildings, we need to answer the question

“Who decides which materials to use?”

The answer is not simple because there are so many players involved.

In a traditional building contract, the prospective **Owner** of the building determines the needs of the future **Occupier** then goes to the **Bank** or to borrow money, and engages an **Architect** who makes a design to meet the owners needs, in consultation with the **Structural Engineer** and other experts. The completed drawings are used by the **Quantity Surveyor** who makes a cost estimate and advises on possible savings. The drawings, specification and schedule of quantities are put out to open tender, and the successful **Building Contractor** is awarded a contract for construction. The **City Council** is involved in issuing a building consent and in monitoring construction.

All of the players in this system may be involved in selection of the structural materials and finishing materials, at different stages of the project.

There are many different variations on the traditional approach described above, with the players mixed up in many different ways. For example the contractor may be the owner acting as a developer, with no occupier in mind, or the contractor may engage the architect and structural engineer to design different parts at different times. In some new contractual arrangements, all parties work together and share both the risks and the potential profits.

The decision on selection of materials may be based on a combination of many factors including

- cost of construction
- availability of materials
- promotion by materials suppliers
- knowledge and preference of the designer
- what has worked in the past
- ease of construction
- performance in daily conditions
 - appearance
 - colour
 - thermal performance
 - durability
 - acoustics or vibrations
 - deflections
- performance in extreme conditions:
 - earthquake resistance
 - extreme weather
 - fire safety
- expected cost of maintenance
- environmental factors, sustainability

Different aspects will have different significance at different times. For example, some players may be reluctant to use timber following recent problems relating to weather-tightness and wood quality, which have been dealt with by government agencies. In situations like this, education and promotion are needed if future decisions are to be based on science rather than on perception.

Key Players

The construction industry is a major New Zealand industry with strong traditions, healthy competition and well established procedures. Changes in the industry occur slowly unless there are strong incentives for change. Most buildings are constructed with borrowed money, so the lending institutions and the insurance industry also have to be comfortable before significant changes occur.

The **structural engineers** are key players, because regardless of what materials or structure is wanted by the owner or builder or architect, the building will not get consent and be built unless the structural engineer can demonstrate that the structure and structural materials meet the requirements of the New Zealand Building Code. Consulting structural engineers are in a very competitive business environment so they are not able to explore a lot of new ideas unless commissioned by their clients.

The **owners** are key players because they pay the bills; and can instruct other players to follow directions to achieve certain results. Owners or investors without a special commitment to timber have no incentive to build in timber unless there are demonstrated positive benefits, especially in cost, appearance and functionality. These need to be clearly demonstrated through education and positive case studies.

Any change in building materials or building methods will only become viable or popular if there are a significant number of successful applications in the market place, to provide confidence for others to follow. This is where the timber industry and the government can provide leadership.

It is no surprise that several very large timber buildings have been built by timber industry players for their own storage, processing or office facilities, because as owners, they can make these decisions at the very start of the design process. There is nothing to stop the timber industry from constructing more timber buildings if they are satisfied that they are getting what they need in the final analysis.

Government Influence

As the owner of many major capital developments, the government is in a unique position to influence material selection in new buildings. It would be politically difficult for government to require that more timber be used in new buildings, but it would be very easy to require that a timber alternative be considered for all new government-funded buildings. For a small increase in design fees, architects and structural engineers would be enthusiastic about making a timber design to compare with more conventional materials in significant projects.

The benefits of this approach are that

- The comparative cost of timber and other materials will be clearly seen for a wide range of projects.
- The cost of the extra design time will be small in comparison with the potential savings from more competitive design and construction practices.
- The results of these comparisons will identify strengths and weaknesses in timber solutions, and identify topics for necessary research.
- Public money will not be wasted constructing timber buildings unless they have been shown to be cost effective.
- Designers will become familiar with designing in timber, even if all their timber designs are not built in the first instance.

Some building owners already engage designers to compare alternative structures in steel and concrete, for example, in multi-storey building developments, so this approach is already accepted in the building industry.

Industry Organisations

One more factor affecting the opportunities for more timber in buildings is the lack of a single focussed organisation encouraging research, promotion and development of timber as a building material.

All sectors of the construction industry obtain confidence from leading-edge research into building performance issues including wind, fire and earthquake resistance, noise control, thermal behaviour and durability. If the construction industry is to embrace greater use of timber, there is also a need for design aids to provide confidence on many aspects of timber usage, including structural design, durability, acoustics, sustainability, passive solar architecture etc.

The New Zealand building industry is very competitive. The major structural materials such as steel and concrete have coherent organisations which support research, technical advice and promotion activities, of the kind which are not easily available to designers wanting to use timber.

There is no New Zealand-wide organisation promoting the use of timber in new buildings, funding research into timber solutions, or providing the technical base which designers will need. Forest Research plays a useful role in researching the quality of timber and wood products, supporting building code developments, and testing of new assemblies and products. The Building Research Association of New Zealand is involved in strength and safety of houses and other timber buildings, but has to maintain a material-neutral stance in many projects. The Timber Industry Federation publishes the Timber Design Guide which is useful but not enough on its own. The New Zealand Timber Design Society is a club of enthusiasts who make a large impact for their small numbers, but the combined efforts of all these groups does not compare well with organisations representing the competing materials.

Summary

In summary, three steps which would encourage a significant increase in timber use in new buildings are as follows:

1. Companies in the timber industry should ensure that timber is used for the design of all new buildings over which they have control.
2. The government should specify that an alternative design in timber is carried out for all new buildings which they commission.

The timber industry should establish an organisation to support research, technical advice and promotion activities for use of structural timber in buildings.