Timber buildings: the key to lower emissions?

A new report by Cromwell Property Group makes a compelling case for the use of this versatile, less carbon-intensive material.

To achieve net-zero carbon emissions by 2050 the entire construction process must be redesigned. The use of timber, one of the world's oldest building materials, offers many benefits, from fewer carbon emissions to speed of construction to greater occupier demand for green assets, according to a new report published by Cromwell Property Group.

Rising global emphasis on tackling climate change, together with greater awareness of real estate's contribution to the problem, has brought about more awareness of the impact of traditional materials like concrete and steel, which have been used in construction for more than a century.

Each year, more than 6 billion sq m of buildings are constructed using carbon-intensive materials such as glass, iron, steel and concrete, states Cromwell in its *Timber buildings: Truly sustainable real estate* report.

One way of balancing the need to build against the need to control emissions is through more sustainable construction methods and this has led to a return to timber – a versatile material that can be used across all sectors. Timber buildings use less energy and emit less carbon over their life cycle than materials used for concrete-framed construction. Timber's carbon storing capacity is recognised to be superior to traditional materials.

Mass timber, an engineered timber product, supports innovative flexible design and architectural approaches. It is this flexibility, combined with its increasing popularity to both occupiers and investors, that has made cross-laminated timber (CLT) and other types of engineered timber such as glue-laminated beams and laminated veneer lumber (LVL) a viable alternative to concrete and steel.

AdobeStock/Volodymyr

The European engineered timber construction market has been growing by roughly 8% (€5 billion) a year and is expected to expand to €10 billion a year by 2030. These figures relate to multi-storey buildings only: if timber frame buildings and detached houses are also included, the size of the investable market increases significantly.

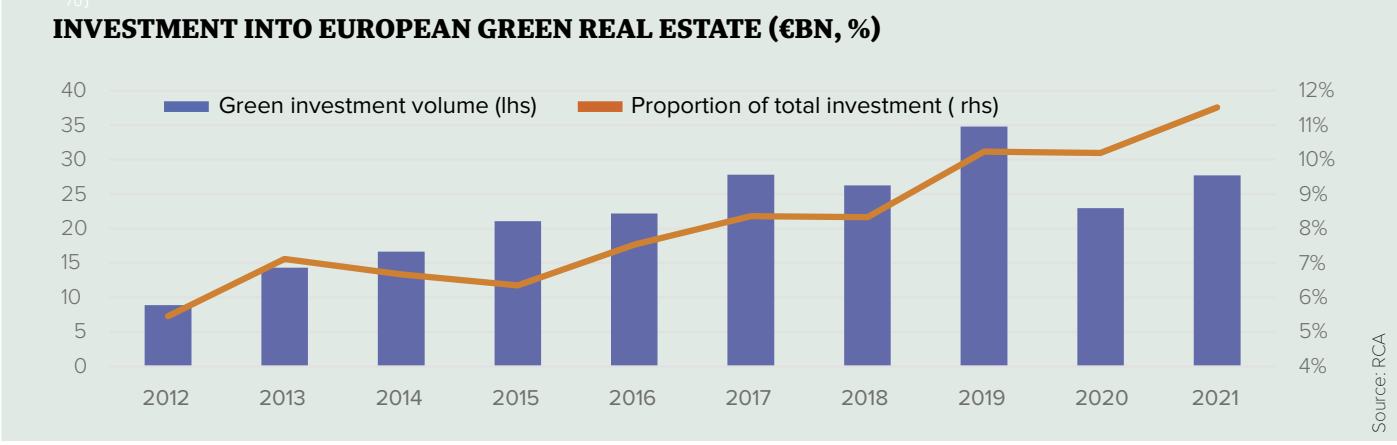
A like-for-like cost comparison indicates that timber is currently more expensive than concrete or steel, reflecting supply and demand dynamics. However, as timber construction becomes more mainstream and less specialised, costs will become more competitive as timber construction expands its market presence.

Despite its higher cost, the speed of timber construction can shift the financial balance. Mass timber buildings are roughly 25% faster to construct than concrete equivalents, mainly due to timber's lightweight nature, which allows for larger and fewer lifts, as well as the ability for building sections to be prefabricated offsite.

OFFSITE CONSTRUCTION

Prefabricated buildings involve component parts being manufactured in remote factories, transported to site, and assembled. Several studies exploring ways to improve building productivity recommend increasing this prefabrication. As well as faster construction times, prefabrication means better-quality products, less waste and lower unit costs. Other benefits include improved health and safety and reduced onsite labour requirements.

In addition, carbon emissions from



vehicles servicing prefabricated building sites can fall by up to 60%, on top of significant reductions in noise and dust pollution. As urban residential densities rise, statutory constraints on traffic disruption and construction noise and dust will become more stringent. This will accelerate the move from onsite to offsite construction, increasing the appeal of timber buildings.

DISPELLING MISCONCEPTIONS ABOUT TIMBER

Ensuring timber production is sourced from sustainably managed forests is critical. Europe's forestry stock has in fact increased by 10% since 1990 because more trees are being planted than felled as a result of management. The three largest European forests used for mass timber are located in Finland, Sweden and Austria.

These countries combined make up around a third of Europe's forestry stock and have an average growth speed of 2.75 cu m of timber per second. That means the timber used in a typical 5,000 sq m office building would be regrown within nine minutes in an Austrian forest. Older trees need to be removed because they have absorbed all the carbon they can from the atmosphere and they have to be replaced with new trees. Therefore it is a mistake to believe the use of timber will have a negative impact on the number of trees: the opposite is true.

Another misconception over the use of timber is that it is a fire hazard. As Cromwell's report explains, many tests have been conducted and there is now a great deal of evidence to show that mass timber is as safe as steel against fire to the point that it has been cleared for use in military facilities.

In a fire, CLT will char on the outside, sealing the interior and protecting it from damage, thereby maintaining the structural integrity of the building. Mass timber has inherent fire-resistance properties, but its safety can be further enhanced by fire-retardant measures such protective chemicals, plasterboard linings and surface coating.

A further advantage of timber is its attractiveness to tenants and therefore to landlords. In these post-pandemic times, when health and wellbeing are crucial considerations, occupiers increasingly want to lease space that aligns with their sustainability goals and demonstrates they value their employees.

The report quotes recent studies that show how biophilic workplace design incorporating plants and greenery can increase employee health and wellbeing by 13% and productivity by up to 8%. Another study measured the responses of subjects carrying out stress-inducing tasks in an environment devoid of timber surfaces, and one featuring timber. The results concluded that timber provides stress-reducing effects similar to the effect of exposure to nature.

As well as being aesthetically pleasing, mass timber is also a natural insulator. Timber in general has about one-third of the thermal insulating ability relative to a comparable thickness of fiberglass, about 10 times of concrete and masonry, and 400 times of solid steel. Mass timber can therefore help to reduce temperature peaks and ultimately improve operational energy performance. This creates financial benefits to occupants through lower energy costs in addition to the environmental benefits.

RENTAL PREMIUMS

Architects and interior designers are therefore encouraged to make holistic choices regarding materials, with buildings constructed from timber helping employers to attract and retain the best talent. Vasakronan, a Swedish real estate company, has found timber buildings are leased faster, attract more interest from financial institutions and receive more competitive funding arrangements from banks.

The current availability of mass timber buildings is low, which means that existing buildings have a competitive advantage in attracting occupiers and capturing rental premiums. Cromwell estimates that across European real estate, this equates to a 9% premium.

"In a market where investors are seeking to future-proof their assets, we believe interest in mass timber construction will grow significantly," says Tom Duncan, head of research and investment strategy at Cromwell Property Group. "Ultimately the success of timber buildings will be self-generating: the more timber is used, the more success stories there will be, the more the multi-faceted benefits will be evident to all. Similar to electric cars, innovation in timber construction will create so much momentum to the point where it will not seem radical at all. We will simply be left asking: why did it take so long?" ■

The challenges and opportunities of timber construction

Architect Anthony Thistleton outlines the challenges of designing buildings made from timber – and why it's worth doing it.

By **Nicol Dynes**

Waugh Thistleton Architects, founded in 1997, has devoted its practice to achieving sustainability and materially reducing the impact of both energy use and embodied energy in construction. The practice has been a pioneer in the use of timber, most notably in tall buildings, and in the use of offsite, modular methods of construction.

Murray Grove/Stadthaus, a nine-storey apartment block in London, completed in 2009, was the first ever use of engineered timber in a building of this height and it won the RIBA President's Medal for Research in 2010. This year, 6 Orsman Road, a six-storey office building in London, has been shortlisted for the 2022 UK Property Awards for its environmental credentials.

Despite these ground-breaking efforts, the uptake of engineered timber has been slower than anticipated, Anthony Thistleton, one of the founders of the practice, told *Impact*. "There's a certain inertia in the construction industry and quick innovation has never been a feature," he says. "They know what they're doing and don't have a huge appetite to learn new techniques. But once they learn about the advantages of timber they become very keen to use it."

MISTAKEN PERCEPTIONS OVER FIRE RISKS

Faster construction times and less deliveries, as well as its environmental credentials, are all aspects that make timber attractive. But the mistaken perception that wood is a fire hazard has been the biggest challenge to overcome. The tragic Grenfell Tower fire in London in 2017, in which 72 people died, has made things worse, Thistleton says: "The great irony is that if the tower had been made of CLT the fire should not have spread, but people don't know that. That event flagged a lack of diligence about fire mitigation across the building industry, highlighting the need to design and build correctly and test extensively."

Following Grenfell, as the tower's cladding was found to be responsible for the fire spreading so quickly, the UK government's knee-jerk reaction was the imposition of a blanket ban on all combustible materials on buildings' exteriors. "So CLT, which can be perfectly safe in external walls, is now banned, and this has created the wrong perception and a myth of risk," says Thistleton. "The UK, which for the previous 10 years had led the world in building timber structures, now has a static market, while European countries, the US, Canada and the Far East are accelerating rapidly.

"Now we are doing most of our work overseas because the environment in the UK is so challenging and the government is one of the least progressive in understanding the benefits of timber."

The perception issue extends to the insurance industry. In the Nordics, where using wood is an age-old tradition, and in Germany and the Netherlands, which want to be leaders in the field, insurance companies are able to assess and price policies as they do with any other high-quality building.

"In the UK the sector doesn't have the necessary understanding of the materials

> ‘The emergence of engineered timber has allowed us to create this new architecture. We’re just at the beginning of its development.’
>
> **Anthony Thistleton, Waugh Thistleton Architects**

to assess risk properly and finds it difficult to give a quote,” explains Thistleton. “If only insurance companies spoke to fire regulators, many of whom are former frontline firefighters and are able to appreciate the performance in fire when they see the materials in a building.”

PERFORMANCE DATA CAN PLACATE INSURERS

One way to assure insurers of the level of risk with timber is to give them more information about the performance of the material in the event of a fire, he says. This can be achieved through data from existing buildings and through testing. As knowledge of engineered timber spreads, premiums will become lower.

Research and innovation have played a key role in making wood stronger and safer to use. “The emergence of engineered timber has allowed us to create this new architecture,” says Thistleton. “We’re just at the beginning of its development. In future there will be new composite materials and new ways of engineering the timber.”

Despite the challenges, he is confident that the benefits of wood will lead to its wider use in the UK as well in the next few years. “We’ve been doing office buildings and we can see that it helps the health and wellbeing of people working there,” he says.

“Stress levels are lower and so is absenteeism. When wood is used in schools for autistic children it has a measurable beneficial impact on kids’ behaviour. The thing is that if people see these buildings, they want them.” ■

▲ **Above: the nine-storey tower block at Murray Grove in London was the first use of engineered timber for a building of this height. Below: 6 Orsman Road has been shortlisted for the 2022 UK Property Awards for its sustainability credentials**

Images: Waugh Thistleton Architects

‘We’re in the early stages of a long journey’

Cromwell managing director Pertti Vanhanen tells *Impact* about the importance of ESG and how timber can play its part in delivering sustainable goals.

By **Nicol Dynes**

Sustainability is in Pertti Vanhanen’s DNA. Born in Finland, where timber construction has been used for centuries, in his more than 30 years in the real estate business he has brought his environmental concerns to the heart of the various senior roles he has held in several European management organisations.

In 2020 Vanhanen left his role as global co-head of real estate at Aberdeen Standard Investments to join Cromwell Property Group as managing director Europe in January 2021. The company was already ahead of most of its peers, having issued its first Sustainability Report more than 10 years ago, but one of Vanhanen’s goals in his new role is to take its ESG commitments even further. *Real Asset Impact* posed some questions about his plans.

How well is the real estate sector dealing with ESG issues and how much more is there to do?
We’re still in the early stages of a long journey. At first all the attention focused on energy savings without thinking about the type of energy or the materials used. Now it’s obvious for younger generations looking for premises, acquisitions or investments that ESG and impact investing are key considerations.

Institutional investors are also on board, not just to comply with regulations but also because there has been a rapid change in mindset. But we still have to take big steps forward and we know the real estate sector is not the fastest mover.

New buildings are a tiny percentage of the stock out there: it’ll take 100 years to have them all at a high standard. Think of all the restrictions around listed and period buildings, which are a real challenge. So we have come a long way but there’s a long way to go.

ESG has been a focus for you since you joined Cromwell last year. What are your next goals both as a manager and a direct investor?
Cromwell is a team, not a one-man show. And it goes well beyond Cromwell as it involves the construction companies, the designers, the architects, the materials and the methods, so everyone in the chain has to be on board and we have strengthened collaboration and links with other people and organisations that are committed. Within Cromwell we have strengthened our ESG team and we always take ESG into account in our investment decisions.

Our ESG expert has a permanent seat at our investment committee and has exactly the same voice as the other executives, as well as a right to vote. An ESG specialist representative has been sitting within the Committee for many years, but now there has been a further recognition of the role and clearly defined responsibilities.

We also have ESG champions in all the primary countries we have a presence in and in the last year we have promoted individuals and also hired new people, who are keen to work for us because they can see we’re serious about it. We keep raising the bar and pushing our ESG targets higher, including the S component that is often forgotten, especially during the Russian invasion of Ukraine.

Kerimaki Church in Finland has been standing for 170 years and is the world's largest wooden church

One of the main initiatives has been the Pan-European Wooden Building Fund joint venture with Dasos Capital established last year, targeting €1 billion and beyond. How is it going and what are the next steps?

The joint venture is proceeding as planned. There is a need to educate our own people, investors and other parties and it's taking more time than I would like. Depending on how investors react, we plan our first closing in the coming months. There's been a lot of interest and conversations have been encouraging so far.

We've been contacted by investors from Canada and Australia, but mainly from European countries. We're not doing mass marketing because we're very selective as to who we choose as anchor investors. We want to make sure they're fully committed.

You have been advocating the use of timber since your days at Aberdeen. Has the time come now for a much wider use of one of the world's oldest materials?

Absolutely. Look at [Finnish supplier of renewable products] Stora Enso, which has delivered wood materials to 20,000 projects globally. Demand for timber is growing at a 10% rate in Europe, but we're still at an early stage. Everyone knows that timber is the most environmentally friendly of materials, it's more inspiring as well as healthier. But there are challenges: in the UK people still remember the Great Fire of 1666 and are concerned. So it's a journey, you have to educate people about the qualities of timber throughout the entire building life cycle and the advances that have been made.

We can massively reduce the use of steel, concrete and other non-environmentally friendly materials and use and plant more trees, which is the right thing to do. Hopefully five years from now the message will have been received loud and clear. Just think of how long timber lasts as a building material if properly maintained, longer than concrete or steel. I got married in the world's largest wooden Church, Kerimaki, on the shores of Lake Puruvesi in Finland, which has been standing for 170 years.

'Everyone knows that timber is the most environmentally friendly of materials, it's more inspiring as well as healthier.'

Pertti Vanhanen, Cromwell Property Group

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