

Another Architecture N°65 December 2016—January 2017

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How to use cats
in architecture

Reinventing a
German village

Building high-
rises in wood



BP 817109661141267
EUR 1995 GBP 14 CHF 30 CAD 29.50
USD 1995 JPY 3990 KRW 40000

Zaha Hadid's Port
House is a beacon in
the Antwerp harbour

All Aboard!

Tall in Timber

Building high-rises in wood is becoming increasingly widespread. In Stockholm, plans are being made for a 34-storey apartment building.

Text
Giovanna Dunmall

Dalston Lane apartments in London, UK, by Waugh Thistleton.
Photo Daniel Shearing





Timber's



Wenlock Road Apartments in London, UK, by Hawkins Brown.
Photos [Jack Hobhouse](#)

time has come, at least in architecture. But it's not just growing as this century's material of choice for sustainability- and innovation-minded architects. Recent advances in engineering have improved its strength and stability so much that designers and builders are able to go bigger and taller than ever before.

In the UK, CLT (cross laminated timber) buildings are growing in number and height, in part due to relatively liberal building regulations but also thanks to a progressive attitude towards timber, especially in the East London borough of Hackney where it was former mayor Jules Pipe's material of choice. In fact the first 'tall timber building of the modern age' and the tallest timber building in the world

Patch22 apartment building in Amsterdam, the Netherlands, by Tom Frantzen.
Photos [Luuk Kramer](#)



'Housing and climate change are the two issues of our age'

at the time was built in Hackney back in 2008. The nine-storey Stadthaus (aka Murray Grove) was designed by London-based practice Waugh Thistleton and completed in an astounding 49 weeks.

Andrew Waugh is a founding director of the firm and one of CLT's most impassioned early adopters and pioneers. Currently, the practice is completing the largest (by volume) CLT building on the planet, the ten-storey, 121-apartment Dalston Lane, also located in Hackney, and even more excitingly, it recently started working with the new housing arm of British financial services company Legal & General. The latter has just opened an 800,000-m² modular housing factory in Yorkshire in

North England that will create 400 to 500 new jobs and be the first UK factory to manufacture CLT. It will go online in the early autumn.

A huge promoter of the virtues of CLT in terms of not only sustainability, but also speed of erection and the unusually quiet and dust-free construction environment, Waugh's enthusiasm is infectious. 'CLT building sites are happy, quiet and clean,' he says. 'You don't have the noise of jackhammers, grinders and cement mixers because essentially you are putting up prefabricated parts with cordless screwdrivers.' One of the most significant environmental advantages offered by CLT construction in Waugh's view is the 80 per cent reduction in construction traffic and trucks. 'The majority

of the pollution in London is from tarmac and tyres and as we are making bigger and heavier buildings now, and digging ever deeper or demolishing structures, there's more of it.'

A far less researched benefit of timber buildings relates to well-being, however. Waugh lives in a timber building he designed in London and says that the hygroscopic properties of the material (where moisture is absorbed and released as humidity levels change in the atmosphere) make it feel like a 'more natural humane space than a concrete structure'. Rot or fungi are not a problem as the wood has been kiln-dried to remove almost all water, but in places like Australia, where 'insects and termites will eat anything', the >



The Tree apartment tower in Bergen, Norway, by Artec.
Photos [Treindustrien](#)



timber can be painted with boron for the first couple of metres to prevent this.

Medical research on the health benefits of living and working in wooden structures is also starting to emerge. A research project carried out by the Austrian Styria region's timber cluster (Holzcluster Steiermark) at a school in Ennstal in central Austria, for example, makes the health case for timber strongly. Two classrooms were clad in timber from floor to ceiling and filled with wooden furniture. Pupils using the two rooms were monitored for a year for heart rate and stress levels alongside pupils of the same age and grade following lessons in two standard classroom environments. The tests showed that

the heart rates of the children in the all-timber classrooms dropped by 10 beats a minute (equivalent to two hours of cardiovascular activity a day) compared to their standard classroom counterparts and that their heart rates continued to go down during the day.

Despite these many advantages, Waugh acknowledges that building in timber presents some serious challenges. 'Resistance of timber buildings against wind is actually the most important design factor. You are building a structure that weighs a fifth of a concrete building so the strength to resist wind load is always an issue.' The solution, he says, is to design buildings that are robust in their plan. 'So rather than a long, thin building facing the

**'CLT
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wind like a sail, you avoid that and look to the plan to give you robustness.'

For Dalston Lane, the practice is using 3,852 m² of CLT for the building's external, party and core walls, floors and stairs, making it what is called a pure CLT building. The design is a C-shape with an internal courtyard and lift cores in each internal corner. 'Those lift cores give the building its firmness, they act as the trunk,' he says. But also making sure the 'walls, cores and floor slabs act together in unison to give a real stiffness to the plan' is imperative.

'Important concerns with any building are fire, water and structure,' continues Waugh. 'These are the things you need to be aware



Brock Commons student residence in Vancouver, Canada, by Acton Ostry.
Photos [Acton Ostry Architects Inc.](#) and [University of British Columbia](#)



of in terms of longevity.' If water sits on top of timber for a long time it generally only penetrates the surface. 'With concrete you would have to replace all the rebar or your steel will go rusty, with timber you just take out the bit that has been damaged, paint it with resin or boron, and replace it.'

On paper fire sounds like it would be a huge issue for wood but it is much less so than one would assume. Typical softwood performs well under fire and chars at a rate of circa 0.7 mm per minute, says Waugh. 'So we put an external layer, almost like a sacrificial layer, on the structure knowing that the first 25 mm will last at least 20 minutes.' Other materials, such as double layers of plasterboard, are also added

to increase fire resistance, especially on fire-fighting cores.

For years now, Waugh Thistleton has designed every project based on the assumption that it's going to be built in timber, but Waugh admits that they are still learning. 'It's a brand new material so we are trying to understand how the material influences the architecture.' This is a point also raised by Alex Smith, an Associate at London-based practice Hawkins Brown and project architect for Wenlock Road, aka The Cube, a 6,750-m² scheme with an alluring twisted cruciform plan that uses a hybrid timber-steel structure.

Smith is clear that CLT has serious sustainability advantages but doesn't believe

one needs to be a purist. 'Architecture can be driven by the limitations of the structural proposal, but that's not the most exciting way to design buildings because people don't understand what those limitations are when inhabiting these spaces,' he says. 'I think hybrid solutions represent a way of blending the two together to allow ambitious architecture to happen in a more sustainable way.'

But it isn't just in the UK that timber is on the rise in every sense. In the Netherlands architect Tom Frantzen says there 'is no strong wood tradition for structural purposes anymore' but his recently completed seven-storey Patch 22 project overlooking a canal in a former industrial >



HoHo office tower in Vienna, Austria,
by RLP Rüdiger Lainer + Partner



Haut apartment tower in Amsterdam, the
Netherlands, by Team V Architecture and Arup.



area of northern Amsterdam (which he developed as well as designed) defies that trend with a load-bearing structure made almost entirely of pinewood CLT and laminated pinewood. Its contemporary chalet-meets-warehouse façades are clad in Douglas fir. 'We chose timber because it is one of the few renewable building materials, but there were other reasons too,' he says. 'It's exceptional to use wood in this way in the Netherlands so we knew it would attract a lot of attention. We wanted to offer something different during the recession since people had stopped buying.' Frantzen doubts wood will become the new concrete in the Netherlands any time soon, but says 'it

will become a more accepted alternative to concrete and popular with clients who like the look, feel and smell of wood.'

Elsewhere in the world some of the most interesting timber projects include the 14-storey Tree in Bergen, Norway, which is the world's tallest timber building at this moment; the 18-floor student residence in Vancouver by Acton Ostry Architects, which will overtake it after its completion in 2017; the 22-floor Haut tower in Amsterdam (2019); the 25-storey HoHo in Vienna (2018); and then, if it goes ahead, the 34-storey HSB Landmark project in Stockholm, expected to be completed in 2023. Is a super-tall timber building on the horizon any time sooner? Waugh believes we can go to

about 20 storeys in pure CLT right now (and is working with Cambridge University's Centre for Material Innovation to go even higher), whereas Vancouver-based architect Michael Green says higher is possible, yet with the use of some steel. Back in 2011 his practice MGA designed a 30-storey timber building that used what Green calls mass timber (CLT and other laminates) and steel beams. In a bid to advance discussion and debate he made the design available to all via a creative commons licence.

More recently, a 35-storey building MGA proposed for a Paris project didn't make it beyond the competition stage. Why? 'It was deemed too tall for its site,' says Green. 'The challenge has always been one of perception



HSB apartment tower in Stockholm, Sweden, by C.F. Møller.

more than one of science or engineering; how the public perceives what is possible is actually my hardest job. It is about education and inspiration.'

Waugh is more reticent. 'The more tall timber buildings are designed and not realized, the less credibility timber architecture and engineering has. And it becomes about style or individuals. What we need to do is eschew the notion of style and say that this is not about an aesthetic, but about a fundamental sea change.'

Both Waugh and Green do agree, however, on the fact that the focus shouldn't only be on height. 'In many respects we are not advocates of building too high in any material,' says Green. 'There is a point where buildings

are treated as warehouses for people and create strange social distancing that is not appropriate for city building.' Waugh believes furthermore that skyscrapers aren't necessarily the best buildings for the 21st century. 'They are terribly inefficient in terms of services and internal usage and around their bases. If you build lower you can build denser.'

Given that concrete production accounts for 5 per cent of the world's greenhouse gas emissions, wooden buildings from responsibly harvested sources are, and should be, first and foremost about combating climate change. 'Housing and climate change are the two issues of our age,' agrees Waugh. 'As architects you need to be addressing these

things head on, not carrying on with a 20th-century notion of architecture.' Green is of the same mind and believes Vancouver has been a world leader in building in timber in North America but that the United States is fast catching up. 'When the United States gets into any game it has the skill to become a leader,' he says. 'For this to happen though, one simple fundamental thing needs to be acknowledged: climate change is real and being impacted by the actions of man. Changing the way we build our cities, not just by choosing wood, is critical to addressing climate.' Choosing timber is a pretty good start. —