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The construction revolution continues as Cross-Laminated Timber goes modular

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Waugh Thistleton's Watts Grove project raises some questions and they deliver some answers.

TreeHugger loves wood construction. We have to reduce the embodied energy of our buildings and building with wood is a great way to do this, as it stores carbon during construction instead of emitting it. Thistleton Waugh has designed and built some of the most ground-breaking, interesting and biggest projects out of wood, using Cross-Laminated Timber (CLT).

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One of their latest projects is Watts Grove, an affordable housing project being built for Swan Housing, "one of the UK's leading regeneration housing associations." It is being built by NU Living, owned by Swan, "building homes that are environmentally, socially and economically sustainable." This is a concept foreign to North Americans, but providing a mix of market and subsidized housing "means that generated income produces gift aid to make a real difference to local communities in the provision of affordable homes, care and support."

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As in Dalston Lanes, Waugh Thistleton fits in with the surroundings: "Responding to the mixed contextual setting of residential blocks, warehouses and industrial buildings, the massing of the proposed building has been broken into a number of distinct elements, varying in height."

The homes will be made from sustainably forested CLT, assembled into modules at Swan's factory in Basildon [which can be seen in this video]. They will then be fitted out with kitchens, bathrooms, finishes and fittings under factory conditions, offering a level of quality and consistency that is not normally achieved through traditional construction methods.

Here is where it gets interesting. There are many benefits to offsite modular construction, as noted by the architects here:

Expected to be constructed in 50% less time than a traditional build and at 10% less cost, Watts Grove unlocks a difficult site, and demonstrates what can be achieved with offsite construction. Drawing on the efficient production methods and the product quality developed by the manufacturing industry, this way of building uses less energy than traditional construction. Offsite production minimises the impact of the build on the neighbourhood, reducing deliveries, noise and disruption.

But here is the key point I want to discuss again.

These high quality modular homes are energy efficient and sustainable, and yet can be indistinguishable from traditionally built homes. However, **unlike a traditionally built block there will be 2,350m3 of CLT making up the structure of Watts Grove, and this will lock away 1,857 tonnes of CO2**, the building itself becoming a long term carbon store.

That's a lotta lumber.

Anthony Thistleton/ Photo Lloyd Alter/CC BY 2.0

Last year I had this debate with Anthony Thistleton, after I asked What's the best way to build in wood? I was questioning whether for it made sense to build in CLT when there were sophisticated methods of building in wood frame that resulted in thinner walls that used a lot less wood. Thistleton responded:

For most mid-rise the CLT is a structural necessity, certainly above six storeys. However the CLT also performs acoustically and thermally as well as providing fire resistance. All of these would require additional measures if we built in timber frame. We are happy that the CLT frame presents the most efficient use of material in the buildings we have completed.

And really, when you look at their portfolio, you can't argue with the facts on the ground, from their first flatpack that we covered a decade ago in Nine storey apartment built of wood in nine weeks by four workers to their Dalston Lanes. Both were built out of CLT panels assembled into 3D form on site.

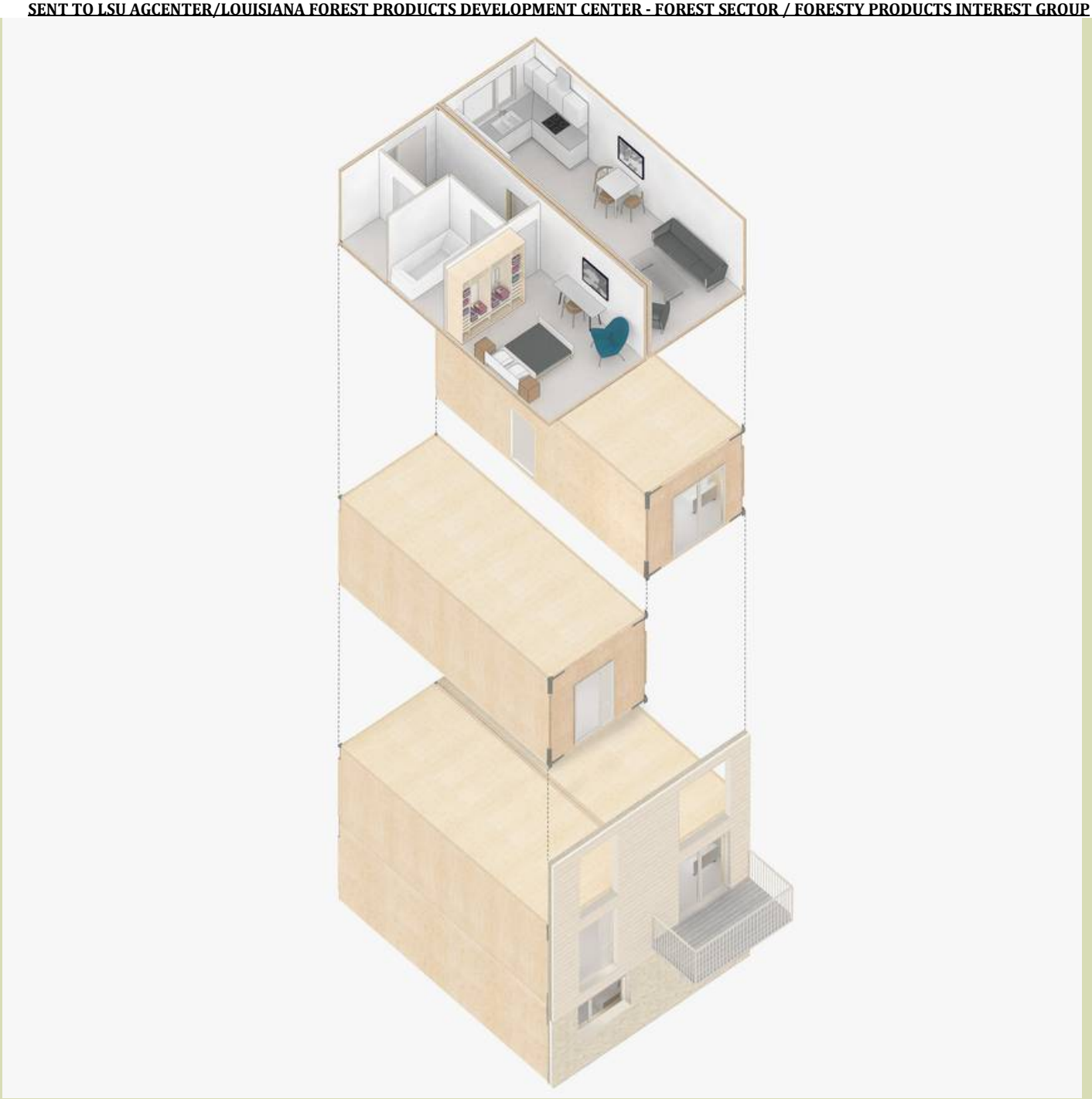
© *Waugh Thistleton Architects/ stacked boxes*

Watts Grove takes building technology to the next step, from flatpack to modular. The great benefit of modular is that you get to do all the interior work in the factory, which is much more efficient and results in much higher quality. When I was in the modular business with Royal Homes in Ontario, I used to say, "You wouldn't build your car in the driveway; why would you build your house in a field?" But there are a couple of downsides to modular, the main being that every module has its own sides, floors and ceilings, significantly increasing the amount of material used.

This is a problem with conventional stick-frame modular, but CLT is a lot more expensive. Does it make sense to double everything up with it? I would not have thought so, but Andrew Waugh says it does. For one thing, the panels are thinner (90mm) because the walls are carrying half the load. CLT also makes a very rigid box, so there is less damage during transport. Waugh tells TreeHugger that "because of the

strength and stability of the modules when they arrive in site there is no need to repair and redecorate the interior as there is with other forms of modular housing."

It is also really easy to put together: "Volumetric CLT is incredibly efficient in terms of labour. A typical two-bed apartment in light gauge steel will take hundreds of components, whereas a CLT 2-bed apartment is made up of less than a dozen panels, all precisely CNC cut." (In fact, the firm confirms that a CLT two-bedroom apartment has 18 structural components, compared to 330 in light gauge steel, not including fasteners and brackets.)



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There is another major benefit of modular housing, however it is built; in conventional construction, as Paul Simon famously described it, "One man's ceiling is another man's floor." Because of the doubling up, they each have their own ceiling and floor, significantly reducing noise and vibration transfer between units. And because of the mass of CLT, it is going to be even better than stick-frame modular.

All pretty convincing arguments. Then we are back to my original point that I raised last year, whether it made sense to go with CLT when other wood tech uses a lot less material. When I asked Sandra Frank of Swedish builder Folkhem about this, she responded, "Look at all the CO2 it is storing!" Anthony Thistleton responded to my post with a similar point, that using lots of wood is a feature, not a bug.

In terms of tree 'performance' over time, my information is that a spruce, which is the main component of CLT, is a very efficient carbon storage device, rapidly absorbing through its early growth and stabilising at the age of between 40-60 years. After this time it adds comparatively little to its mass annually. If the tree is then felled and the timber placed into long-term use, then new trees are planted and the cycle continues.

I am not entirely convinced, perhaps spending too much time listening to Mies saying, "Less is more," or Bucky asking, "How much does your building weigh?" But I absolutely concur with Andrew Waugh's final words:

Pretty much all types of factory-made housing are better than none! Bring on the construction revolution!

- London
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