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Image credit: Concision

## OFFSITE MANUFACTURING IS WAITING IN THE WINGS OF NEW ZEALAND'S CONSTRUCTION SECTOR, READY TO HELP TACKLE THE KEY ISSUES FACING BOTH THE SECTOR AND THE COUNTRY. WHAT WILL IT TAKE TO PUSH MODULAR METHODS INTO THE MAINSTREAM?

A HUGE DEMAND FOR AFFORDABLE housing and a generational shift in how urban Kiwis want to live, means New Zealand's offsite construction sector is poised to move into the mainstream.

With rising material costs and labour shortages preventing the country from meeting the need for quality, affordable housing at speed, industry insiders believe offsite manufacturing (OSM) methods, also known as modular or prefabricated construction, can and should become a more common way of building here.

OSM refers to the process of building components or complete structures for a project in a factory, then transporting them to the final site where they are assembled or simply connected to services.

There are three types of OSM: 1D which is manufacturing simple tilt slab and framing components; 2D which is more complex panellised and flatpack structures assembled on site; and 3D which where whole modules, such as townhouses, apartments or hotel rooms are built in a factory and transported to site.

New Zealand has a long, pioneering history in some types of prefab construction, particularly in 1D and there is a steadily growing sector of 2D businesses here, to add to the likes of Keith Hay Homes, G.J. Gardner and Universal Homes which have been working to an offsite modular model for years.

Scott Fisher, CEO for Prefab NZ, a non-profit member organisation that advocates for offsite manufactured construction, says there are some smart operators in the 1D and 2D spaces in this country, particularly in the OSM of

secondary minor dwellings and panellised systems. They range from niche businesses to large operators such as Concision, Clever Core and Hector Egger New Zealand.

The scale and capital required for 3D modular constructions means there are no manufacturers in New Zealand, but an increasing number of developments are importing fully prefabricated modules from offshore companies.

One of those is Vietnam-based TLC Modular, that supplied factory-built, site-ready modules for New Zealand's first-ever modular hotel, the Cosa Hotel in Christchurch. TLC Modular has two more modular hotel projects in the pipeline in Auckland and Napier, as well as residential pipeline projects in the Auckland suburbs of Northcote, Papakura and Hobsonville Point.

TLC's New Zealand CEO Chris Aiken says New Zealand is perfectly positioned to embrace offsite building methods and must do so if there is any hope of disrupting an "inefficient" high cost (especially multi-unit) construction sector and meeting the huge demand for affordable and public housing.

"The cost of construction in New Zealand is running well ahead of that of our colleagues internationally." Aiken thinks that the long-term consistent undersupply lifts the price of existing homes, that in turn lifts the price of new builds as they are benchmarked against that price point. This leads to a cost-plus model which is fertile ground for high costs, he says.

The cost-plus pricing model of a traditional build means that about 30 percent of the cost of a new house goes on waste, inefficient processes, and red tape and quality issues, says Aiken. "And the customer doesn't have a choice but to pay."

He says modular manufacturing would shift the sector to a price-based costing model where the final build cost is based more on the global manufacturing cost. Once there's an expectation that a new home costs a certain amount, there is pressure on the builders to make it for that price, and no more. "That's where innovation comes from."

The automotive and IT hardware sectors are example of this dynamic in other markets.

A 2019 McKinsey report, *Modular Construction: From projects to products*, estimated that modular manufacturing can speed up construction by 50 percent and reduce costs by 20 percent on a global scale.

"That 20 percent saving is based on international construction benchmarks, but New Zealand has some of the highest construction costs in the world, so we should reasonably expect better cost reductions than that," says Aiken.



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### THE INFILL SOLUTION

Auckland's housing demand could be the proving ground for modern modular construction with the National Policy Statement on Urban Development 2020 (NPS-UD) requiring councils to encourage infill housing developments and the Auckland Unitary Plan allowing for an additional one million homes within metropolitan boundaries.

Aiken says meeting that number will require intensive infill housing and building up, particularly around utilities such as train stations, both of which OSM would be able to do much more quickly and efficiently.

"There's no disruption to traffic, the neighbours or the community, when work is done off-site. Look at the dramatic disruption Auckland construction projects are causing to some suburbs. It might be a nice outcome, but it's a tough few years to get there for those around it," says Aiken.

Figures from Prefab NZ show 91 percent of all new houses have defects; another traditional construction problem OSM could solve. Building with precision standardised methods and materials removes the likelihood of errors and excess. It also improves consistency for consumers.

For example, Aiken says at each stage of manufacturing in the TLC plant, everything is tested, checked, date stamped and photographed. "A warranty actually means something."

### ADVANTAGES BEYOND COST

Another advantage of offsite construction is that it can improve sustainability - an ever-present concern for builders as the country moves towards its goal to reduce net emissions of greenhouse gases to zero by 2050.

Prefab NZ's Scott Fisher says sustainability must be factored into the entire life of a building and OSM more easily allows that.

"You start with thinking how the building will be built, then look at the materials that will be used, then how the building will perform and if it's efficient. And you'll have to look at how the building is dismantled at the end of its life.

"If you have a good understanding of how it was assembled using mechanical fixings, there's a higher probability it can be disassembled and recycled or repurposed."

Fisher believes offsite manufacturing could also improve health and safety, and labour retention issues. With labourers working indoors in a controlled, organised environment not only is it likely to appeal to a wider range of people as a career option, it's likely to keep skills and knowledge in the sector for longer.



Image credit: Concision





Artist's impression: TLC Modular

“You hear a lot of builders say they won’t be doing it past the age of 40 because their back and their knees have gone. But if you go to an offsite manufacturer the machines are doing the heavy lifting, plus you’re in a warm, dry, organised working environment.”

As the industry grows, he says, it also will need to be supported by labour with other, more diverse skill sets in transportation and logistics as the focus shifts from moving multiple small lots of basic materials to transporting complex, large building components.

## STATE OF THE NATION

Aiken believes OSM in New Zealand is thriving and, with the right support, has plenty of scope to grow exponentially and become a mainstream part of construction.

There are, however, still hurdles to clear, not least the perception that OSM construction is less attractive, unimaginative and not built to last. Too many Kiwis associate it with the likes of cold, rickety prefab classrooms and portacoms.

“It’s important to realise that those were policy failures, not building failures. Most were used well past their use-by date,” Fisher says, adding that it takes only a quick Google search to realise the huge variety of design and use for OSM buildings.

There are other regulatory wrinkles to iron out, particularly around finance and insurance, says Fisher. “They haven’t quite got their heads around how to manage risk around offsite construction, but I think solutions will follow quickly as the industry moves into the mainstream.”

Consenting has also been challenging, with buildings manufactured in one region but assembled in another, causing complications with councils. Recent changes to the Building Amendment



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Act have addressed that by creating an alternative approval pathway.

Minister for Building and Construction Poto Williams explains: “Modular component manufacturers may choose to become certified to produce building components within a defined scope of practice. These manufacturers will have access to a streamlined building consent pathway, which will support housing supply and affordability, and improve trust and confidence in the building sector.”

Williams says the government does recognise the role modular and prefabricated construction can play in boosting productivity, while reducing costs.

“Public perceptions about the quality and safety of offsite manufactured buildings have been a significant barrier to adopting modular construction.

“The new voluntary modular component manufacturer certification scheme will contribute to more use of modular construction processes by

ensuring consumers have confidence in the participating, certified manufacturers, and their construction methods and products.

“The new modular component manufacturer certification scheme will provide confidence that the certified manufacturers are robust, well-resourced and focused on quality,” Williams says.

The minister adds that the government is also backing offsite construction through its agencies, such as Kāinga Ora, which she says are “increasingly looking to use modular component manufacturers and offsite manufacturing when they do construction work.”

Fisher says the new consenting process is a “game-changer” and agrees Kāinga Ora’s commitment to OSM is important, but he’d like to see the government also commit to research and development and a strong pipeline of work that would encourage more players into the sector.

“There are a few people sitting on the sidelines who see the opportunities but before they’ll invest \$20 million into a plant, they need to know there’s a pipeline of work,” Fisher says.

Aiken has previously worked alongside government agencies as former chief executive of HLC overseeing the development of Hobsonville Point. He believes the government commitment to innovative OSM is “bold”, but he’d like to see ongoing changes to the policy environment that are “inclusive and permissive to all sources of supply” while remaining safe for consumers.

He adds that it is also up to the whole industry to collaborate and innovate to crack the housing cost and supply equation. “That way everybody ends up with a slice of a much bigger pie. It’s healthy to have an open and competitive sector. That’s how markets get innovation, become efficient and priced correctly.”

Aiken believes it’s the next generation of home buyers who really understand the advantages of OSM.

“They have a trust and expectation that something can be built in a factory and shipped locally and globally. They are used to a platform model for goods and services that you personalise - like your phone. It doesn’t take much web searching for them to see this is happening in other parts of the world and they don’t understand why we aren’t using these cost-efficient building systems in New Zealand. So they don’t naturally trust the existing system.”

The rising number of baby boomers is also driving demand for a different type of house. “They’re downsizing and looking for more controlled ways of living to enjoy this stage of life,” he says.