Waste reduction through OSM

Construction is one of the largest waste-producing industries in New Zealand. What opportunities does off-site manufacturing (OSM) provide to reduce this load?

BY TONI KENNERLEY, DIRECTOR, PLANALYTICS NZ, AND BOARD CHAIR, PREFABNZ

IN 2014, BRANZ identified the construction industry as one of the largest waste-producing industries in New Zealand. At the time, construction and demolition (C&D) waste was considered to represent up to 50% of all waste generated, 20% of all waste going to landfill and 80% of all waste going to cleanfill.

Further BRANZ research indicated that, for every new residential build, approximately 4 tonnes of waste went to landfill.

Growth in off-site manufacturing

Over the last decade, the off-site manufacturing (OSM) sector in New Zealand has grown. Recent research into building consent data by PrefabNZ indicates that, between 2011 and 2021, the rate of prefabrication-intensive residential projects has increased by 300% and non-residential projects by 190%.

Off-site manufacturing uses precise technology, design principles and manufacturing processes to reduce or eliminate waste. OSM can contribute to the circular economy through the minimisation of waste material and recycling rates in a controlled factory environment and deconstruction at end of life for recycling or reuse.

OSM aims to reduce waste

As noted in a 2020 report by the UK's Construction Leadership Council and Green Construction Board, OSM systems encourage avoidable construction waste.

Avoidable construction waste means those materials, products or components that can be prevented from becoming waste. It includes designing out waste for new buildings by designing for better resource efficiency and for deconstruction and disassembly, efficient manufacturing processes, extending the life of buildings, disassembly for reuse and reducing surplus materials.

Significant waste reduction overseas

Internationally, research indicates that OSM methods can substantially reduce amounts of waste (by 40%) and CO_2 emissions (by 35%). Case studies comparing the use of OSM with traditional construction methods in Hong Kong identified an average reduction of construction waste by 65% using OSM.

Local OSM industry also sees waste reduction

Unfortunately, very little research on the impact of OSM on C&D waste in New Zealand is available, and applying international OSM waste-reduction experiences in a New Zealand context is problematic.

Craig Kellington is Managing Director at Smart Solution Homes, a volumetric home-builder based in Auckland that reduces waste wherever possible through the OSM process. He believes that repetition building increases the opportunities to procure better, review any waste and reduce it in the next manufacturing repetition, but he feels suppliers could do more to design out waste.

Bernie O'Fagan, owner of RM Designs in Christchurch, has extensive experience in mass timber and DfMOSA (design for manufacture on-site assembly). He notes the

potential of pods to reduce waste on site such as the use of bathroom pods in a recent build that removed leftover tiles portions, sheet off-cuts, leftover pipe runs and part-full tubes of sealant from waste bins. On other projects, he has observed waste reduced by an estimated 20% using cross-laminated timber.

Opportunities exist for waste reduction through the diverse range of OSM products available.

Government C&D waste reduction

As well as on the factory floor, waste reduction also appears to be high on the agenda for the current government. Minister for the Environment David Parker recently said that diverting construction waste from landfill is another step towards helping New Zealand become a low-waste, low-emissions economy.

Reducing C&D waste was one of two strategic outcomes signalled by the Ministry for the Environment in this year's Waste Minimisation Fund investment round.

At the same time, the Ministry of Business, Innovation and Employment's *Building for climate change* consultation identified OSM as a means of reducing construction waste through standardisation.

Kāinga Ora, New Zealand's largest landlord, similarly recognises OSM as a build solution that produces less waste. It has committed to developing an off-site plan to drive innovation across its housing delivery programme, putting in place contract partnering agreements with OSM suppliers.

Where to next?

As noted by the Ministry for the Environment in its 2019 landfill levy consultation, there are significant gaps in data regarding the quantity and type of waste disposed of in New Zealand, including C&D waste. Further research would be useful to quantify the current and potential impact of OSM systems on waste reduction and avoidance.

Enabling consumers, industry and government to better understand the scale of waste reduction possible through OSM would be a solid step towards stimulating and achieving meaningful change. What is needed now is quantification, communication, and potentially incentivisation of waste reduction and avoidance practices across the OSM and wider construction sectors.

In a country renowned for its 'number 8 wire' ingenuity, eliminating avoidable construction waste should not be beyond our reach.