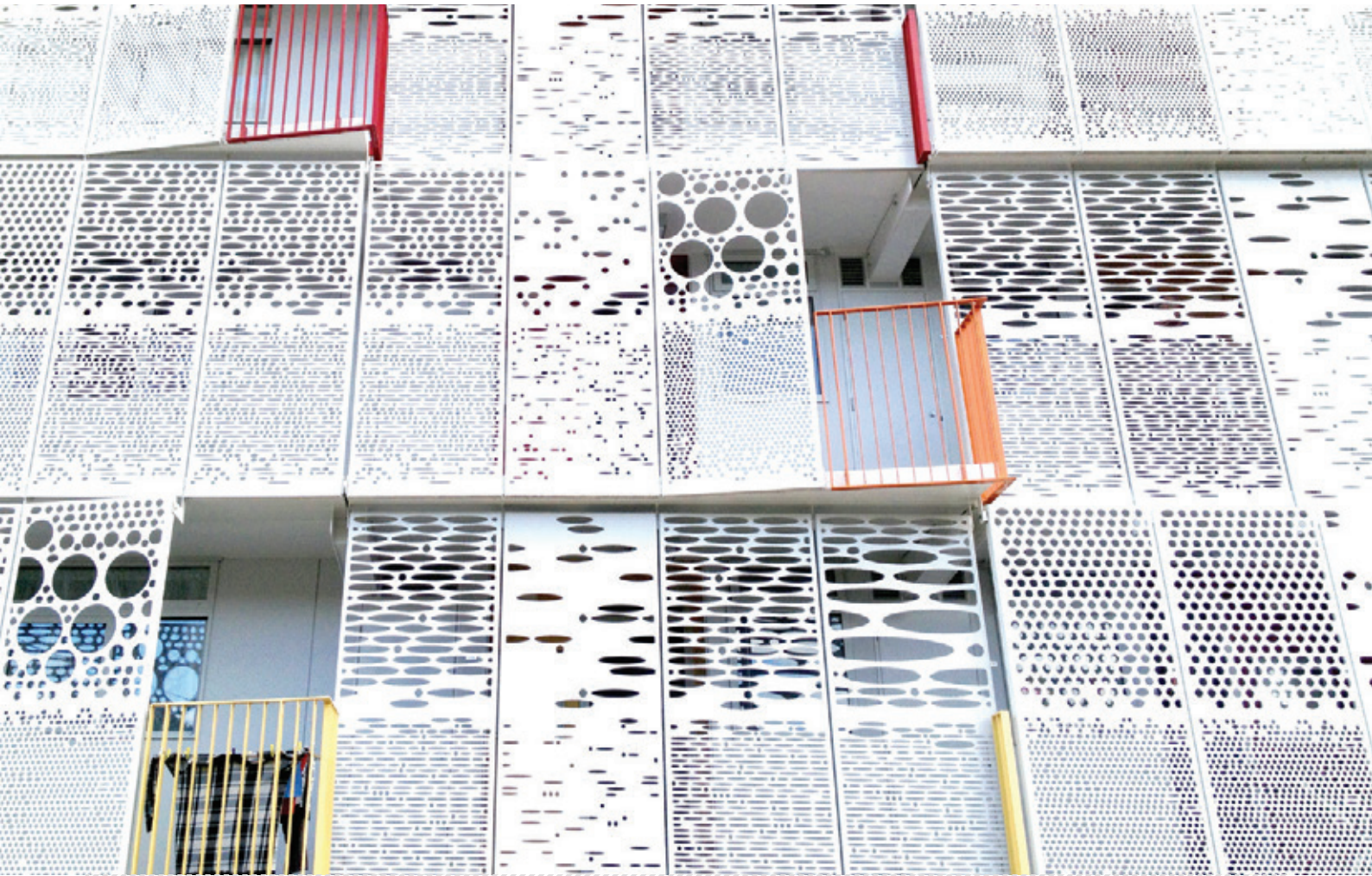


**Prefab<sup>NZ</sup>**

The heart of innovative construction



Levers for

**PREFAB**

How offsite construction can deliver better cost-effective housing to more New Zealanders



# PREFACE

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This report has been prepared for the Ministry of Business, Innovation and Employment (MBIE) by Pamela Bell from PrefabNZ Incorporated, with input and assistance from Chris Kane (Sector Trends and Innovation, MBIE).

PrefabNZ facilitated a Roundtable Discussion with representatives of group builders and established prefabrication manufacturers on Levers for Prefab in October 2014. The Roundtable was hosted by Registered Master Builders Association (RMBA) and supported by the Productivity Partnership within the Ministry of Business, Innovation and Employment (MBIE). The Levers for Prefab Roundtable is the key action point from the PrefabNZ Value Case for Prefab (2014), supported by BRANZ and the Productivity Partnership (MBIE).

PrefabNZ was established in 2010 as the hub for prebuilt construction in New Zealand (NZ). PrefabNZ is a non-profit member-based incorporated society representing specifiers (architects, designers, and engineers), producers (manufacturers, builders and distributors) and building professionals (quantity surveyors, building officials and researchers).

[www.prefabnz.com](http://www.prefabnz.com)



Images – all courtesy PrefabNZ  
Cover main image – Newtown Park Apartments  
Cover small images – Stanley Modular, Smart House (Laing Homes) and Snug at HIVE CH, HIVE CH (Home Innovation Village Christchurch) [www.homeinnovation.co.nz](http://www.homeinnovation.co.nz)

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# EXECUTIVE SUMMARY

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To cut to the chase – New Zealand’s construction “pipeline” is bulging with Auckland’s latent housing demand, Christchurch’s recovery, weather tightness remediation, and seismic strengthening.<sup>1</sup> We have heard repeatedly that business-as-usual just won’t cut the mustard.<sup>2</sup> New Zealand’s construction industry must both rise to the challenge of increased demand and improve the way it does business – it must do more and it must do it better.

One way to improve construction productivity is to pre-build parts of a building away from the final site in controlled conditions.<sup>3</sup> Prefabrication, or offsite construction, is well researched internationally and established in many countries around the world, particularly northern Europe and Scandinavia. In New Zealand, we have been prefabricating smaller parts as well as complete buildings for over 200 years. Evidence indicates that more focus is needed on the medium-sized typologies of panelised (2D) and volumetric (3D) construction.<sup>4</sup>

It is timely that we now see several of the country’s largest home builders moving into panel and volume production.<sup>5</sup> This is significant because the early adopters of prefabrication from the 1960s onwards have typically been small nimble companies led by visionary entrepreneurs and in several cases, by Dutch immigrants.<sup>6</sup> They have also been family-based companies involving several generations.<sup>7</sup> There

have been very few early adopters of panel and volumetric construction, with the stand-out being Stanley Modular who took on the Carters Modular facility in Matamata fifteen years ago.<sup>8</sup>

This is important because we are now at the crucial point of witnessing the ‘first followers’ – substantial followers who are investing \$10 million in manufacturing equipment<sup>9</sup> – followers that have the power to create a fully-fledged movement<sup>10</sup>. The design and construction industry in New Zealand is potentially at the ‘tipping-point’ of delivering better value to clients and importantly to embattled first-time homeowners.

It is now vital that we learn from the early adopters and first followers of prefabrication and smooth their path by identifying the levers for prefab and acting on eliminating challenges and creating opportunities. Established residential builders identified the three levers for prefab of scale, liability and show-and-tell:

1. Scale is collaborating on both demand- and supply-side to improve consistency of workflow
2. Liability is clarifying the regulatory compliance process
3. Show-and-tell is communicating prefab benefits to change perceptions

A work programme based on these three levers forms the basis for future outcomes. The first of these is the Levers for Prefab Action Plan research programme between PrefabNZ, BRANZ, MBIE and industry partners such as Spanbild. The five-staged programme covers charting prefab through infographics, manufactured building systems regulation guidance, pipelines for social and retirement housing, and the launch of a competition for an open-source prebuilt component suitable for multi-unit housing.

The success of the Levers for Prefab roundtable relies on the associated work programmes that will now ensue. The commitment areas of the stakeholders are:

- **MBIE** provides regulation guidance and lays out housing strategy priorities including affordable housing and continuing work begun by the Productivity Partnership
- **BRANZ** continues to advocate for increased efficiency in construction in order to deliver added value to clients and the general public as users of the built environment
- **RMBA** is focused on keeping members up to date, future-proofing skills and creating linkages across future-focused builders as well as those content with the status quo
- **PrefabNZ** is a member-based peak body for offsite construction pushing for increased uptake of prebuilt technologies through research, advocacy and information

Together we can encourage change through sharing of information, actions and inspired precedents.

#### Footnotes:

1. Construction Pipeline Report 2, NZ Building and Construction Productivity Partnership (2014)
2. Value Case for Prefab, PrefabNZ with BRANZ + Productivity Partnership (2014)
3. Prefabrication and Modularisation: Increasing Productivity in the Construction Sector, McGraw-Hill (2011)
4. Kiwi Prefab: Prefabricated Housing in New Zealand, P. Bell (2009)
5. Mike Greer Homes in joint venture with Spanbild (Concision 2014) and Stonewood Homes with Arrow International for bathroom pods (Construction Components 2014)
6. Such as De Geest and Lockwood.
7. Such as Keith Hay Homes, Touchwood and also Lockwood
8. Stanley has gone on to deliver the most innovative volumetric and panel projects in the country, including the Chateau Tongariro extension (2005) and Elam Hall at the University of Auckland (2012).
9. Concision (2014)
10. Derek Sivers TED Talk 2010



Bad Aibling, Germany

# BACKGROUND AND CONTEXT

New Zealand's design and construction industry is documented in a number of key reports as highlighted in this section. International reports link productivity, prefabrication and digital technology (building information management) as three ways forward for improvements in reducing time and remedial work, and creating more collaborative environments for cost-savings and delivering better quality and value to both clients and end-users (Prefabrication and Modularisation: Increasing Productivity in the Construction Industry, McGraw-Hill 2011).

Prefabrication, also known as prefab and/or offsite manufacture, is an approach to constructing the built environment that has been at the leading edge of innovation for a number of years. It simply means manufacturing and assembling whole buildings or substantial parts of buildings in controlled conditions prior to installation at their final

location. Prefabrication spans from small components, two-dimensional panels, three-dimensional volumes through to complete buildings, including hybrid mixtures of these types or with traditional.

Internationally there are growing global trends towards more use of offsite construction. Prefabrication

uptake is measured in a number of ways at a point in time and can be loosely summarised in the table below.

Additionally, BRANZ estimates that 28% of all new commercial building work uses prefabricated components.<sup>11</sup> It is clear from this international overview that NZ

Uptake of prefabrication (Housing Sector only). Source : PrefabAUS + PrefabNZ		
<b>Australia</b>	3%	With an ambition to achieve 10% of the market by 2020
<b>UK</b>	4%	Prefab housing makes up less than 4% of new buildings (2005)
<b>Spain and France</b>	5%	In France this figure is rapidly increasing due to strict building green codes
<b>Germany</b>	20%	Increasing due to speed, quality and user demand for sustainable construction
<b>New Zealand</b>	32%	Mostly wall framing, roof trusses, windows and joinery (BRANZ 2013)
<b>North America</b>	33%	Up to 1/3 all new single-family houses are modular or manufactured
<b>Japan</b>	35%	Prefabrication seen as a medium to high-end product
<b>Finland</b>	50%	Quality focus for prefabrication, long acceptance of prefabrication
<b>Sweden</b>	90%	Quality focus for prefabrication, panelised housing is the norm

has potential gains if it is to learn from Scandinavian and Northern European countries that face similar weather and population conditions.

## Why now?

The Productivity Partnership's National Construction Pipeline (2014) shows construction reaching a 40 year high in 2016-2017 with \$35 billion of work in progress. This unprecedented demand creates the need for more efficient construction solutions to deal with a constrained workforce and product manufacture.

New Zealand needs more quality cost-effective housing – 30,000 houses are needed urgently in Auckland and Canterbury.<sup>12</sup> Construction demand is increasing by 10% per year for the next four years – past booms show that when construction demand goes up, quality goes down.<sup>13</sup> At the cusp of 2015, the uptake of prefabrication has been likened to an 'explosion' with a much wider range of prebuilt products entering the market.

This is in part attributed to the work that PrefabNZ has led around delivering a portal website, email newsletters, setting up the first Home Innovation Village in Christchurch (HIVE CH), regional industry events with site visits, annual conference with hands-on interactive manufacturing and project sites, plus close affiliation with the national Kiwi Prefab: Cottage to Cutting Edge exhibition,



Smart House (Laing Homes) at HIVE CH

### Footnotes:

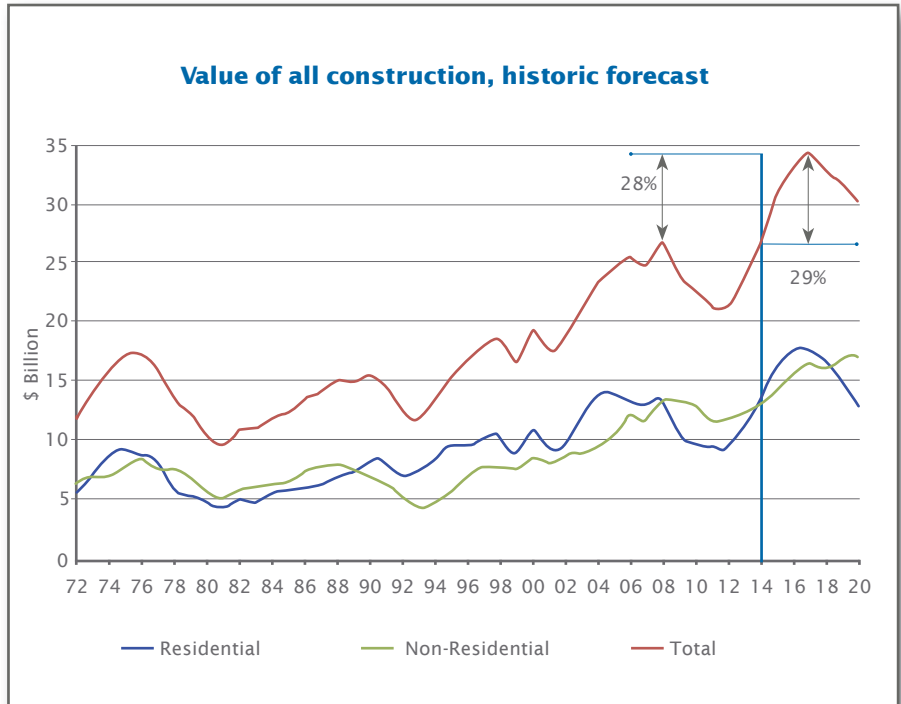
11. What's hot and what's not, M. Curtis in Build 145, December 2014 / January 2015, p61
12. Value Case for Prefab, PrefabNZ (2014).
13. Ibid.

book, and representing offsite on the Construction Industry Council (CIC). PrefabNZ ongoing work programmes build on results to date and focus on more public outreach through showcase housing in Wellington (HIVE WN), engineered timber and export markets, as well as further action-oriented research programmes on technical issues to reduce barriers to uptake.

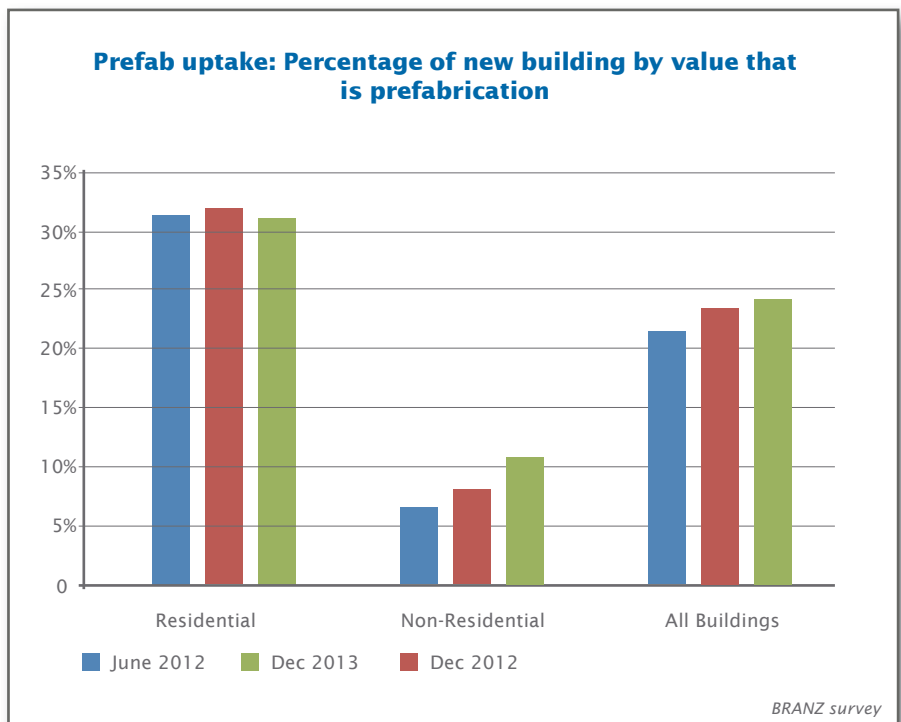
BRANZ’s work to quantify the historical uptake and future potential of prefabrication can be seen in Prefabrication and Standardisation Potential in Buildings (2014). They estimate \$2.95 billion of prefabrication currently occurs in New Zealand each year, most of which is in the area of wall and roof framing. This indicates the market is already relatively substantial, but limited to a small number of components. Based on the additional parts of buildings that can be prebuilt relatively easily, they estimate up to \$5 billion of prefabrication can be done each year, an increase of \$2 billion.

### Why focus on prefab?

A 1% increase in labour productivity is worth \$300 million to the NZ economy according to Valuing the Role of Construction in the New Zealand Economy (Price Waterhouse Coopers 2011). This is a similar finding to BERL’s 2003 report that a 10% increase in labour productivity would increase GDP by \$2 billion – roughly 10%



Source: National Construction Pipeline, Productivity Partnership 2014



Source: SR312, BRANZ 2014



increase in construction sector productivity = 1% increase in GDP.

A renewed focus on productivity led to the industry and government joining together from 2011 - 2014 in the Building and Construction Productivity Partnership which set the goal of achieving a 20% improvement in productivity by 2020. Leading reports from the Partnership included the Research Action Plan (2012) that identified prefabrication and the need to reduce barriers to its uptake.

The Building a Better New Zealand: Industry Research Strategy (2012) is a collaborative outcome between BRANZ, MBIE, the Construction Industry Council (CIC) and the Construction Strategy Group (CSG). Nine research themes include areas that prefabrication contributes to in boosting productivity, introducing new technologies, meeting housing needs and building better cities.

PrefabNZ was formed by industry in 2010 as a non-profit member-based association to lead information, education and collaboration around prebuilt construction. The goal of PrefabNZ remains to increase the uptake of prefabrication to 40% of all building components by 2020. The PrefabNZ Prefab Roadmap for New Zealand 2013-2018 (2012) further sets out an action plan for the industry as well as summarising related research findings.



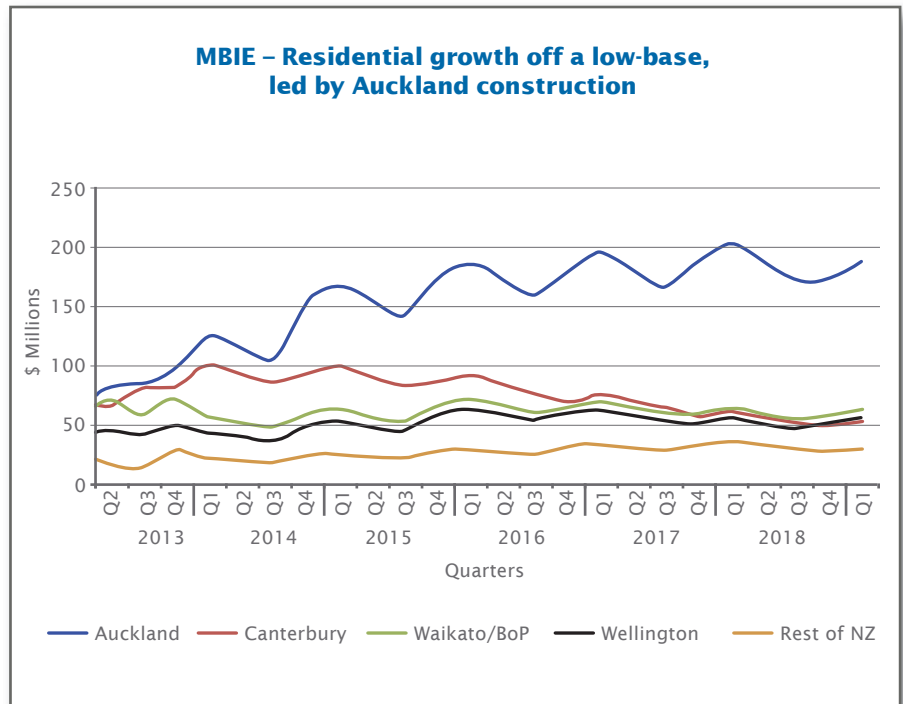
Koch, Germany

## Prefab Roadmap

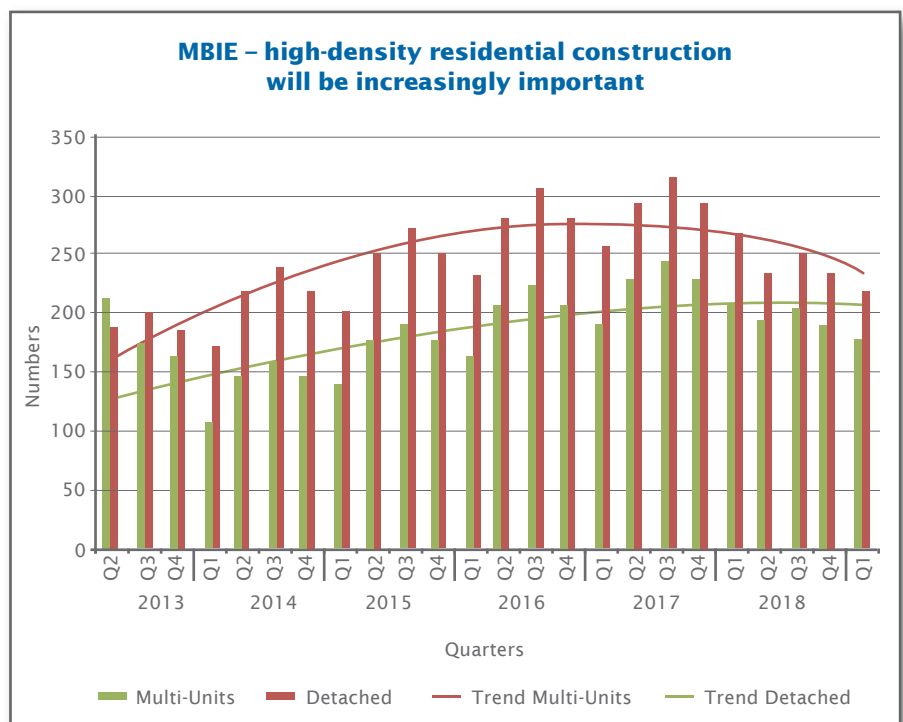
- In 2013, PrefabNZ identified four key issues inhibiting the uptake of prefabrication:
  - Broadening perceptions through information to combat misconceptions
  - Connecting with clients to increase market size
  - Assisting innovation to market
  - Spreading technical knowledge to increase awareness.
- The Roadmap for Prefab identified five action areas:
  - Research
  - Communication
  - Dissemination
  - Education
  - Demonstration.
- The outcomes and outputs, relative priority, and stakeholders continue to drive work in progress with leadership primarily from PrefabNZ [www.prefabnz.com](http://www.prefabnz.com), BRANZ [www.branz.co.nz](http://www.branz.co.nz) and MBIE / Productivity Partnership [www.buildingvalue.co.nz](http://www.buildingvalue.co.nz).

## A Value Case for Prefab

The Prefab Roadmap also pointed to the creation of a Value Case for Prefab as a key action to address the challenge of historical misconceptions associated with the prefab term. The Value Case quantifies potential benefits of prefabrication in monetary terms.



MBIE, 2014



MBIE, 2014

While it is difficult to assess increased social and environmental benefits alongside economic benefits, it is acknowledged that quality, sustainability, design, safety and reduced time are all ways to save money in the medium term – and saving money is the primary up-front focus of New Zealand construction clients.

The Value Case goes on to quantify that the hybrid (bathroom pod and wall panel assembly) method can save about 15% in total construction cost - \$32,000 for a 157m<sup>2</sup> house. Coordinated procurement can result in further cost savings – more than two tenders adds substantial tendering costs to industry's bottom line, and effective material procurement can remove \$15,000 from the cost of a standard house.

More efficient production can result in time and cost savings, as well as increased quality – prefabrication can remove \$25,000 from the cost of a standard house. Prefab and offsite construction is most effective when applied to deliver multiple units – precision sub-assemblies can save 15% of total construction cost.

## Why Levers for Prefab?

The Value Case for Prefab concludes with recommendations for Action Steps and four focus areas of benchmarking, process, procurement and training. The first step is an industry roundtable to prioritise the approaches to pent-

up housing demand. This led to the Levers for Prefab Roundtable with Productivity Partnership / MBIE hosted by Registered Master Builders Association (RMBA) in October 2014. The purpose of the roundtable was to invite large-scale residential builders, both those using larger prebuilt methods and those using traditional components, to gauge their feedback on challenges, successes and opportunities for using more prefabrication. Industry feedback

was needed to extend, reinforce and update the Roadmap and Value Case action points, as well as gather industry support for follow-on research proposals.

This Levers for Prefab white paper documents the findings of the roundtable discussion and subsequent action points which will go on to inform targeted action-oriented research led by PrefabNZ and MBIE with other stakeholders in 2015 and beyond.



# OPTION GENERATION

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## Top Three Levers for Prefab:

PrefabNZ, Productivity Partnership (MBIE) and Master Builders (RMBA) invited large-scale residential builders and established prefabrication manufacturers to a Roundtable Discussion (October 2014) on Levers for Prefab – the group discussed residential construction and feedback focused on barriers, opportunities and successes with the top three areas for action identified as scale, liability and show-and-tell. Aspects of these are listed below and flow-on action points are tabled in the following section alongside outcomes, stakeholders and beneficiaries.

## Scale = collaborating to improve consistency of workflow

- Increasing consistency of construction industry work through boom and bust is an area for common action between government and industry.
- Consistent visible pipeline of work will enable investment in innovative prefabrication and offsite manufacture methods but the procurement process must be appropriate to the construction industry in terms of deliverables, timeframes and risk apportionment.
- Government procurement of large-scale repetitive units, such as houses, schools, healthcare units etc. can benefit from prefabrication methods. Procurement would need to take a triple bottom-line perspective, taking into account qualitative benefits such as health-and-safety, local jobs, low maintenance, and other social benefits such as reduced noise and disruption to neighbours.
- Government procurement methods would benefit from internal MBIE construction expertise to ensure an industry appropriate procurement process is proposed and followed.
- There is potential for MBIE work on construction industry relevant procurement processes alongside industry stakeholders, such as the Construction Strategy Group (CSG) and Construction Industry Council (CIC).
- Collaboration amongst builders and manufacturers will enable supply chain improvements and access to cheaper material prices.
- Collaboration amongst builders and manufacturers could enable a factory-share environment to produce prefabricated panels for distribution and retail, much like pre-nail frame and truss.
- A visible pipeline of social housing and retirement housing demand could be developed alongside Community Housing Aotearoa (CHA) and Retirement Villages Association (RVA) to enable prefabricated solutions to be tailored to these housing sector needs.

## Liability = clarifying the regulatory compliance process

- There is a need to smooth complexity within the prefabrication consenting process – in particular the building consent process, product certification, inspections regime, and licensed building practitioner (LBP) scheme compliance.
- Product versus Building Work needs clarification – with implications for building consent process, inspections and liability.
- Inspections regime needs clarification based on the distinction between self-inspection for product manufacture or local body certification for building work, hence LBP.
- Multiproof needs more flexibility to enable a wider variety of housing plans to be preapproved as based on a set of standard materials and junctions, with varying plan outcomes – this flexibility needs to be clearly and widely communicated to industry.
- Liability for Licensed Building Practitioners for prefabricated elements (components, panels, volumes) needs clarification.
- Joint Venture guidelines – a set of suggested joint venture arrangements and supporting contracts would be useful as guidance documents to specifiers and manufacturers for ways to work together.
- Shared Intellectual Property – open book details of components and panels with associated costings has been requested by industry as a way to directly compare different prefabricated systems for client consideration.
- Shared open source standard construction details for different types of panels could be developed alongside the current work on Building Information Modelling (BIM) via the BIM Acceleration Committee. [www.buildingvalue.co.nz/BIM-in-NZ](http://www.buildingvalue.co.nz/BIM-in-NZ)



Huber & Sohn, Germany

## Show & Tell = communicating prefab benefits to change perceptions

- Home Innovation Village (HIVE) display show-housing is a key way for a wide range of clients, industry and government to experience construction types.
- Specific advantages around panelisation and communicating the successes of the early adopters needs to be shown – such as web-based time-lapse videos of traditional versus panelised construction methods.
- Clearer benefits need to be communicated to consumers around the knowns (quality, cost, time, sustainability, design etc.).
- Clearer benefits need to be quantified and communicated to builders around increasing quality, lowering risk, reducing weather delays, greater turnover and profitability from more house completions.
- Developers need to understand prefabrication, its range of typologies and associated benefits.
- Banks need to understand prefabrication and mortgage lending criteria needs to match transportable housing provision.
- A web and print based patternbook is a tool to communicate a range of prefabricated housing options with side-by-side comparison – also providing opportunities for consent preapproval, thus reducing liability for clients.
- A permanent HIVE could showcase traditional and prefabricated housing solutions of a range of types, designs, materials, configurations and price ranges – located near the area of highest growth potential – noting that other countries have similar facilities<sup>14</sup>.



Home Innovation Village Christchurch (HIVE CH)

### Footnotes:

14. <http://www.bauzentrum-poing.de/de/Startseite/HiddenContent/general>

# WORK PROGRAMME

The Levers for Prefab are expanded as action points with outcomes, stakeholders, beneficiaries and timeframes.

Levers for Prefab	Action Plan	Outcomes	Stakeholders	Beneficiaries	Timeframe
<b>Scale = collaborating to improve consistency of workflow</b>					
Boom and Bust	Control centralised procurement away from Boom times and procure instead in Bust times	Smoothed demand to enable job security, skill retention, and quality consistency	Industry leaders CIC / CSG, MBIE	Clients, Design + Construction Supply Chain	5-10 years
Government procurement process appropriate to construction methods	Reduce number of tenderers and use full team planning at project inception for innovative methods to be explored	Opportunity to showcase innovative design and construction methods	CIC / CSG, MBIE	Government as Client, Taxpayers, General Public, Design + Construction Supply Chain	2-5 years
Government procurement process assesses qualitative benefits	Enable quantity surveyors to cost according to time-savings, increased safety, reduced waste, and other socio-environmental benefits	Innovative prebuilt methods used to deliver buildings, esp. multi-unit schools, hospital rooms, corrections facilities etc.	MBIE, Min Health, Min Education, Min Corrections, CIC members (PrefabNZ, NZIQS etc.)	Government employees, Taxpayers, General Public, Design + Construction Supply Chain	2-5 years
Government procurement incorporates MBIE construction expertise	Encourage guidelines that Government procurement best practice could consult MBIE on building works	Opportunity to streamline process, as well as showcase innovative methods	MBIE, Min Health, Min Education, Min Corrections, etc.	Government employees, Taxpayers, General Public, Design + Construction Supply Chain	1-2 years
Supply chain improvements	Small and medium builders have clear mechanisms to engage with each other to gain the buying power of larger organisations	Savings on building materials through access to partners and contracts for bulk buying agreements and joint venture arrangements	CIC members (PrefabNZ, RMBF, CBANZ, BIF etc.), CSG, MBIE	Clients, Builders, Manufacturers	1-2 years

Levers for Prefab	Action Plan	Outcomes	Stakeholders	Beneficiaries	Timeframe
Factory-share environment	Small and medium manufacturers have clear mechanisms to engage with each other to gain the buying power of larger organisations	Access to high start-up investment technology through collaboration amongst manufacturers, eg. to move from frame-and-truss to closed panel	CIC members (PrefabNZ, BIF etc.), CSG	Clients, Builders, Manufacturers	1-2 years
Visible pipeline of social housing demand	Social housing sector providers present clear future demand for housing units over next 3, 5, 10 years	Coordinated collaborative supply of social housing, with opportunities for cost efficiencies using prebuilt parts	PrefabNZ, Community Housing Aotearoa (CHA), BRANZ	Social housing tenants, providers, design and construction supply chain	3-6 months
Visible pipeline of retirement housing demand	Retirement housing sector providers present clear future demand for housing units over next 3, 5, 10 years	Coordinated collaborative supply of social housing, with opportunities for cost efficiencies using prebuilt parts	PrefabNZ, Retirement Villages Association (RVA), BRANZ	Retirement housing tenants, providers, design and construction supply chain	3-6 months

### Liability = clarifying the regulatory compliance process

Clarify when a prebuilt part is Product (pre-presented in factory) vs Building Work (consent in factory as well as at site)	Prebuilt manufacturers work with MBIE Determinations and building officials to develop categorisation of prebuilt parts esp. panels	Guidance documentation to manufacturers of prebuilt parts to clarify risk, responsibility and compliance	MBIE (Determinations), PrefabNZ (Members), BRANZ, BIF	Designers, architects, engineers, manufacturers, builders, building officials, MBIE (Determinations) + Multiproof team	3-6 months
Inspections regime clarified for Products vs Building Work	Prebuilt manufacturers work with MBIE Determinations and building officials to clarify inspections of prebuilt parts esp. panels	Guidance documentation with self-inspection process or template for a quality assurance / management system	MBIE (Determinations), PrefabNZ (Members), BRANZ, RMBA, CBANZ	Designers, architects, engineers, manufacturers, builders, building officials, MBIE (Determinations) + Multiproof team	3-6 months
Liability around products and LBP clarified	Prebuilt manufacturers work with MBIE Determinations and building officials to clarify liability / risk / LBP for prebuilt parts esp. panels	Guidance documentation with clarity around liability (as industry terms its risk)	MBIE (Determinations), PrefabNZ (Members), BRANZ, RMBA, CBANZ	Designers, architects, engineers, manufacturers, builders, building officials, MBIE (Determinations) + Multiproof team	3-6 months



Levers for Prefab	Action Plan	Outcomes	Stakeholders	Beneficiaries	Timeframe
More flexibility in Multiproof communicated	Clarify where flexibility currently lies or could lie in future and communicate to industry	Greater uptake of Multiproof and wider understanding of tool	MBIE (Determinations), PrefabNZ (Members), BRANZ, RMBA, CBANZ, NZIA, ADNZ	Designers, architects, engineers, manufacturers, builders, building officials, MBIE (Determinations) + Multiproof team	3-6 months
Joint Venture guidelines	Bring designers, manufacturers and builders together to determine best practice for repetition of design and manufacture	Contract templates for joint venture structures for design / manufacture of prebuilt parts, and best communication structure across all associations	PrefabNZ, Anthony Harper, BRANZ, NZIA, ADNZ, BIF, RMBA, CBANZ	Designers, architects, builders, manufacturers, construction lawyers	6-12 months
Open source prebuilt details	Manufacturers share offsite construction joint details for both their products, and differing products	Downloadable BIM details of prebuilt components, panels and volumes	PrefabNZ, MBIE, BRANZ (BIM Acceleration Committee), BIF	Specifiers, manufacturers, distributors	6-12 months

### Show & Tell = communicating prefab benefits to change perceptions

Home Innovation Village showcasing prebuilt construction	Secure site for developer and project group to design and build medium-density affordable housing using a range of prebuilt components, panels and volumes – communicate project via media channels and partners	Enable public, industry and government to touch-and-feel prebuilt construction exemplars – breaking down misperceptions and educating about quality, time-savings, safety and sustainable attributes	PrefabNZ, MBIE, WCC, BRANZ, Pure Advantage, and many industry partners	Public, first-time home-owners, local government, central government, specifiers and producers	1-2 years
Time-lapse videos	Use the moving image as a powerful tool to educate those who can't visit a building site by documenting HIVE and PrefabNZ Member work	Visually compare traditional with prebuilt and host on websites / TV	PrefabNZ, MBIE, WCC, BRANZ, Pure Advantage, and many industry partners	Public, first-time home-owners, local government, central government, specifiers and producers	1-2 years

Levers for Prefab	Action Plan	Outcomes	Stakeholders	Beneficiaries	Timeframe
Consumer education	Develop a recognised media voice for innovation in the built environment via a regular TV show or newspaper / web column	Established media channels showcase prebuilt exemplars to explain benefits of quality, time-savings, safety, sustainability etc.	PrefabNZ, Imagination TV / Mediaworks (Grand Designs NZ), Consumer magazine, Pure Advantage	Public, first-time home-owners, local government, central government, specifiers and producers	1-2 years
Builder education	Develop an appropriate medium to educate or upskill builders	Established builder communication channels showcase benefits and explain processes	PrefabNZ, BRANZ, Progressive magazine, PlaceMakers, BIF, RMBA, CBANZ, BCITO	Builders, clients / first-time homeowners, specifiers, producers	1-2 years
Developer education	Extend the Value Case for Prefab work to include multi-unit and commercial buildings to show economic benefits	Established developer communication channels explain quantitative benefits	PrefabNZ, NZIQS, Property Council, NZGBC	Developers, clients / first-time homeowners, specifiers, producers	1-2 years
Bank education	Work with financial and banking institutions to develop a reduced risk approach to enable first-time homeowners to access borrowing for transportable housing	The five major banks understand the prebuilt industry delivery methods and access to traditional mortgages	PrefabNZ, Kiwibank, Heavy Haulage Association (HHA), five major banks, BRANZ, financial lending companies	Clients, first-time homeowners, specifiers, producers	1-2 years
Web and print pattern-book of prebuilt homes	A tangible, visually stunning publication of precompact and affordable housing appropriate for small sections and infill sections, esp. Auckland	Reduced risk for consumers to purchase a pre-consented and prebuilt home from a pattern-book	PrefabNZ, CIC (ADNZ, NZIA, NZIQS etc.) BRANZ, Pure Advantage	Clients, first-time homeowners, specifiers, producers	1-2 years
Permanent HIVE	Develop a permanent housing showcase village to enable a wide range of visible housing choice for consumers	Consumer education and visible choice	PrefabNZ, CIC / CSG, BRANZ, MBIE, Consumer NZ	Clients, first-time homeowners, specifiers, producers	5-10 years

Levers for Prefab takes the opinions of several large residential builders and reiterates the importance of action areas from the Value Case for Prefab,

as scale (procurement), liability (regulation process) and show-and-tell (benchmarking). The immediate next steps are for the short-term action points to be grouped under

the Levers for Prefab Action Plan research programme with BRANZ and industry partners.

# MONITORING AND SUCCESS

*Success is when prefabrication is mainstream* – Brent Mettrick, Stonewood Homes, Levers for Prefab Roundtable (October 2014)

The roundtable uncovered two notable areas to watch – one is on the ground in the incremental change from pre-nail to panel, and the other is the club of first followers with their ability to share learnings around the core group of early adopters.

The ones to watch are those leading the uptake of prefabrication – those like Stanley Group who have been doing it for 15+ years in true Kiwi style, those like Stonewood Homes who have travelled the world researching intensively and now making moves into bathroom pod production, and those like Spanbild who are joining forces with others to invest \$10 million in manufacturing equipment alone to change the way housing can be delivered by panels rather than frames.<sup>14</sup>

There are many others creating prefab visibility – Keith Hay Homes providing three generations of affordable housing and recently integrating top-notch designs from high-end architecture, architect-designed housing like High Performance Homes which provides a system for more energy efficient living, and locally-made products of international acclaim such as Cross-Laminated Timber (CLT).



PlaceMakers frame and truss facility, Auckland

#### Footnotes:

- <sup>14</sup> Spanbild and Mike Greer Homes have created a new joint venture manufacturing company trading as Concision to produce panels for floors, walls and ceilings. Stonewood Homes has joined with Arrow International to create Construction Components to manufacture bathroom pods.

There is widespread interest and engagement with innovative prefabrication design and construction methods by the specifiers (architects, engineers, designers), as well as equally widespread resistance and complacency to change by the producers (builders and manufacturers). As a result there are relatively few early adopters.

The industry is moving (albeit slowly) towards an evolution in manufacturing as led by early adopters such as Stanley Group and increasingly visible manufacturers like Stonewood (modular bathrooms) and most importantly by visible joint ventures and manufacturing investment capacity such as the panelisation plant by Concision (Spanbild with Mike Greer Homes).

Under the umbrella of PrefabNZ, together these businesses are reaching a tipping point in understanding of the merits of building more parts away from the construction site. Where once pre-nailed roof trusses and wall frames were the latest technology (1950s) and are now commonplace, one day traditional construction in New Zealand will be using panels that enable a weathertight building to be completed in a matter of days. This change in technology could be in as little as five years.

It is only when prefabrication is mainstream that PrefabNZ and the wider industry stakeholders

will have succeeded. This is the ultimate goal. In the short-term, the industry needs to smooth the way to ensure that the early adopters are not rejected by the market due to forces beyond their control.

PrefabNZ and MBIE can continue to work together to ensure a smooth regulatory transition in terms of clarifying liability, risk, building work and product requirements for the building consent process. It is essential that the industry work alongside government to support the growing success of these early adopters. It is imperative that the early adopters survive and thrive and pull the rest of the industry along with their momentum.

Key measures will focus on acting now and measuring inputs that can be tracked over time such as the following:

- changes in uptake of prebuilt components, panels and volumes
- changes in size of prefabrication manufacturers and builders, including joint ventures
- changes in manufacturers using in-house quality assurance alongside compliance regimes
- changes in availability of open-source prefabricated components and technical details
- changes in decision-makers commissioning and developing projects using prefab parts
- changes in visibility of prefab through a variety of media online, print and built showcases

Action may look like market focused workshops, published pipelines, infographics that chart success and enable re-measuring to take place in a meaningful way – together with show-and-tell events, case studies, websites, magazines and newsletters. These are the tools that will be used to deliver the Levers for Prefab action points.

Supporting the establishment and growth of the prefabrication community in New Zealand will enable our children to access a wider range of higher quality and cost effective housing options. This is what success will look like.



High Performance House with Warmframe (HIVE CH)

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