

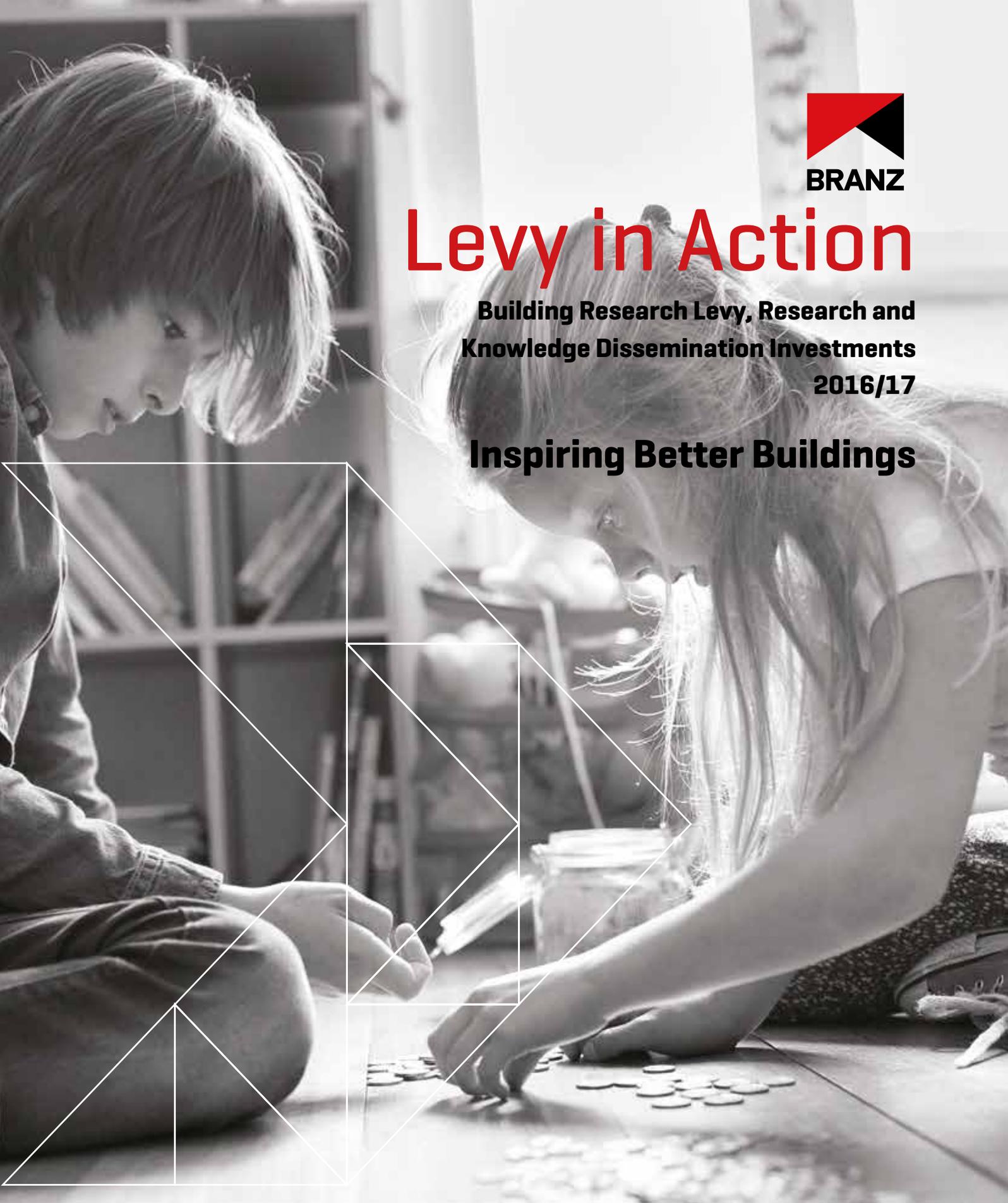


# Levy in Action

**Building Research Levy, Research and  
Knowledge Dissemination Investments**

**2016/17**

**Inspiring Better Buildings**



Building Research Levy investment

**\$13.4 million\***

At the core of BRANZ is the  
delivery of impartial and  
independent advice based on  
robust science and  
authoritative evidence



\*Forecast October 2016 subject to change



## CONTENTS

Foreword	3
Understanding New Zealand's needs and priorities	4
Our promise	
– Stewardship of the Building Research Levy	6
A robust approach to Investing the Levy	7
2016/17 Allocation Overview	8
Responding to key challenges facing New Zealand	
– investing in new ways	9
<b>Levy investment programmes</b>	
Medium density for all	11
Exceeding the minimum	19
Eliminating quality issues	27
Warmer, drier and healthier buildings	33
<b>Other Levy investments</b>	
Materials performance	42
Better buildings	43
Sustainability	44
Productivity	44
Operating environment	45
Appendix	48



## Foreword

Our vision - Inspiring the industry to provide better buildings for New Zealanders

The building and construction industry is very much front of mind just now. While the impact of the Kaikōura earthquake is still being evaluated, the Christchurch rebuild is in full swing. There are pressures around the supply of homes in Auckland and other parts of the country. Poor quality housing and buildings create problems for families and businesses. It is clear how important this industry is to our economy and society. There are things the industry is doing well as it responds to these challenges. New homes are being built at unprecedented levels, while in Christchurch, creative design combined with cutting-edge innovations in engineering is producing a more resilient city.

But for all the good things that are happening there are still things we can – and should – do better. The industry is stretched and there is poor practice. It's clear that there are gaps in our knowledge and capabilities.

The Building Research Levy investment can play an important role in addressing these gaps. But to do this well, we need new ways of tackling the issues that matter. We need to bring researchers and the industry together to tackle prominent issues.

This Levy in Action showcases the range of the work that is currently being supported by Levy investment. I'm encouraged by what I'm seeing. Early results are already changing industry practice and behaviour. We are seeing this translated into real, tangible improvements for New Zealanders.

I'm particularly enthusiastic about a new approach which is reflected for the first time in this Levy in Action. It's a new investment approach focusing hard on four core priority programmes. These programmes have been identified as pressing concerns and priorities by industry and government stakeholders. I'm sure they will resonate with you. The programmes are designed to tackle some of the most pressing issues facing New Zealand and our built environment.



The approach we are taking here is breaking new ground for BRANZ. Rather than projects that address single or stand-alone issues, the projects within these programmes will forge integrated solutions. In targeting our investment in this way we are looking to draw on teams from across New Zealand and internationally. BRANZ researchers are working alongside colleagues from universities, Crown Research Institutes, private organisations, government and industry. Our aspiration is to design and deliver research that can unlock end-to-end solutions to what can be complex problems.

As New Zealand's economy continues to grow, expectations and demands on our built environment are changing and becoming more pronounced. Building research has a key role to play in delivering better solutions which can improve the lives of New Zealanders. I am confident that the work outlined in here can help meet these challenges.

Chelydra Percy  
CEO

## Understanding New Zealand's needs and priorities

At the core of BRANZ is the delivery of impartial and independent advice based on robust science and authoritative evidence

**T**he Building Research Levy is a significant source of investment with the purpose of improving all aspects of New Zealand's building industry. Through the Levy investment, all points along the building process from design and planning, to building practise and building usage are addressed.

However, the Levy can't fund or support everything. Decisions need to be made to prioritise investment. To this end, BRANZ takes a considered, portfolio approach to investment and stewardship looking to deliberately balance investments across a range of priorities.

An important part of determining where Levy investment is made is assessing industry needs and issues through a number of key sources. This in turn plays an integral part in shaping the programmes or areas of work funded within the portfolio.

### Industry Research Strategy

The guide for Levy investment decisions is the Industry Research Strategy, Building a Better New Zealand [2014]. This was co-developed by BRANZ with Ministry of Business, Innovation and Employment (MBIE), the Construction Industry Council and the Construction Strategy Group. This high-level, collaborative government and industry strategy sets out nine core research themes. Through extensive consultation with industry and government has identified key research directions within those themes.

### Industry Needs Surveys

For more than 20 years, and more recently with MBIE, BRANZ has surveyed industry to gain insight around research and information needs. Following the 2014 Industry Needs Survey, BRANZ carried out a major review of previous surveys to determine if key trends and insights had changed and assess whether in-roads had been made. The review reinforced the focus of the Industry Research Strategy themes and suggested a strong, consistent focus of industry concerns. A new survey was conducted at the end of 2016.

### Working together to stay on top of developments

BRANZ also works hard with industry and government to stay on top of important developments in New Zealand and internationally.

### Working with industry

Connections with Industry is vital for the work BRANZ does and particularly when it comes to establishing the focus of industry research. The strong connections BRANZ has with industry means it can draw extensively on these networks to gather intelligence around emerging and ongoing industry concerns.

An important part of this is the Building Research Advisory Council (BRAC). BRAC members are drawn from across the key industry trade and professional bodies, and include representation from consumers and government. BRAC meets twice a year, but bilateral engagement with nominating bodies takes place throughout the year.

BRANZ is also a member of the Construction Industry Council [made up of senior figures drawn from industry bodies] and the Construction Strategy Group [made up of construction industry business leaders]. These two industry peak bodies provide important forums for discussions on key industry concerns.

As well as at the organisational level, many BRANZ researchers and teams are engaged directly with the industry on specific initiatives and as recognised experts on advisory groups. Researchers are consistently working with industry and government colleagues to tackle known issues and explore potential challenges that may require attention. Calls to the BRANZ industry helpline and discussions at BRANZ seminars and training events also provide great potential to talk with those on the frontline.

### Working with government

Another key source of information about needs and priorities is government. BRANZ and MBIE work closely on building and housing issues. MBIE is represented on key BRANZ groups, such as BRAC and the groups that assess research proposals seeking Levy funding. The strong relationship with MBIE helps provide important insight around policy priorities. It enables sharing of information around industry concerns. It also supports sharing of key information about future Building Code and Standards development. As BRANZ is a key provider of research in this space, this is particularly important.

Developments in the science sector can also have important implications for the focus of the Building Research Levy. As a research organisation BRANZ also monitors key developments around science

infrastructure and funding. This can influence Levy investment – for example by highlighting new or changing capabilities. A key way BRANZ stays informed about these developments is through its connections with MBIE. Relationships with universities, CRIs and other research organisations are also critical. BRANZ has ties to the Royal Society of New Zealand and is a member of the Independent Research Association of New Zealand (IRANZ).

### International issues

A watching brief around key international trends and developments facing the building and construction industry is important to keep up with global trends and developments. Some of these can have immediate and direct implications for New Zealand, such as changes to shared international Standards. Other developments can have less immediate implications. However, they may highlight opportunities or issues that New Zealand could have to contend with in future.

BRANZ researchers and scientists maintain extensive networks and many are members of specific international collaborative groups.

BRANZ membership of the CIB, the international organisation of building research providers, enables access to a wealth of other research and expertise. This includes information around the challenges facing other countries and the priorities they are focusing their efforts on.

Closer to home BRANZ is active in working with colleagues in Australia, recognising the many shared building and construction standards with New Zealand. We do this through our work with the Australian Building Codes Board.



## Our promise – Stewardship of the Building Research Levy

Ensuring the industry gets the greatest benefits possible from Levy investment

**W**ise stewardship of the Building Research Levy is a core responsibility at the heart of BRANZ. Our promise is robust decision-making processes, transparency and disciplined management of Levy investments.

BRANZ gets its research income from Building Research Levy receipts, which are directly linked to the levels and values of building consents. This means Levy income is subject to the same boom-bust cycles as the industry and must be managed carefully.

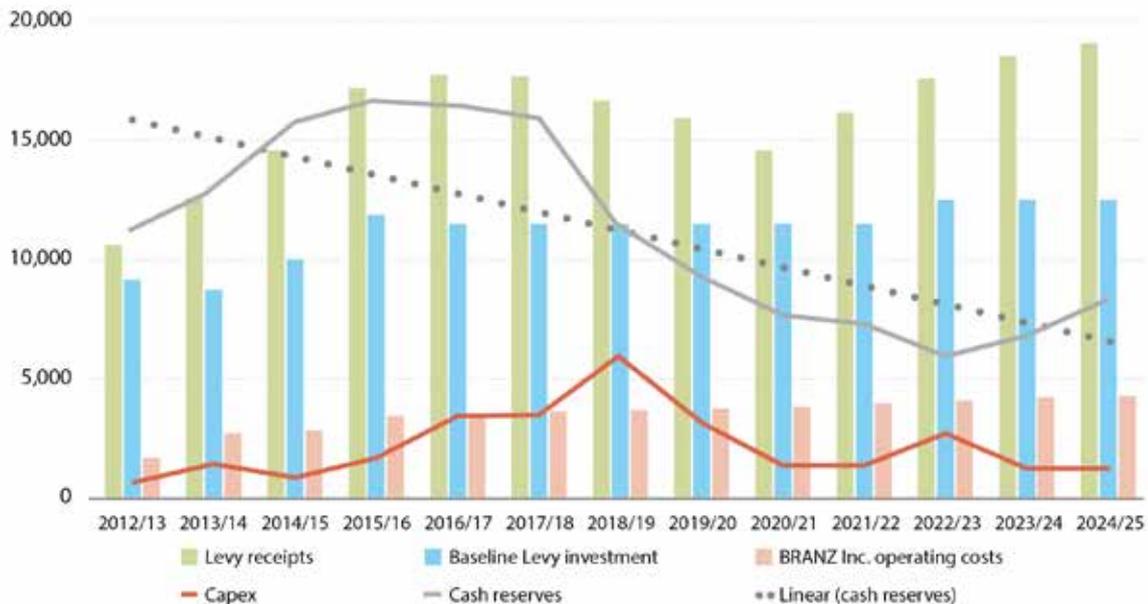
BRANZ has a long-term Levy utilisation policy in place that helps manage these ups and downs in Levy income. It uses a 10-year model to create a stable, sustainable platform for BRANZ to invest the Building Research Levy effectively. In practice, this means when Levy income increases, BRANZ is prudent around expanding its investment so that when Levy income decreases BRANZ doesn't have to make unnecessary or drastic cuts.

The policy sets out how BRANZ will effectively manage the Levy by:

- determining a Baseline Levy Investment Sum using the 10-year model. This is incorporated into the annual BRANZ Group budget for investment in Levy-funded activities;
- investing the Baseline Levy Investment Sum in internal and external research and knowledge dissemination;
- investing the Levy in an open, transparent and contestable way;
- ensuring that any investment in core internal capability is linked to BRANZ's long-term strategic priorities;
- investing so as to avoid unnecessary duplication of capability and facilities across New Zealand;
- ensuring availability of funding for maintenance and investment in property, plant and equipment; and
- maintaining appropriate cash reserves.

The long-term Levy utilisation policy is reviewed annually.

### BRANZ Inc. long-term Levy stewardship model



## A robust approach to Investing the Levy

As part of the annual process of agreeing on the long term Levy policy, the BRANZ Inc. Board determines the amount of baseline Levy investment to be spent on research and knowledge dissemination activities.

### Investment in BRANZ Ltd

BRANZ Ltd is New Zealand's primary building research provider. It has the largest group of building industry researchers in New Zealand. It is a wholly owned subsidiary of BRANZ Inc. operating predominantly out of the Judgeford campus in Wellington. The majority of its 100 staff are researchers or experts in knowledge transfer.

The annual Building Research Levy investment is split between BRANZ Ltd and external providers with a significant proportion invested with BRANZ Ltd.

To ensure work funded by the Building Research Levy is of a high quality it is subject to robust scrutiny, and proposals undergo a robust assessment process.

This process for BRANZ Ltd includes the use of independent assessors appointed by the BRANZ Inc. Board. This Levy Allocation Advisory Group (LAAG) is made up of leaders and experts drawn from the Building Research Advisory Council and wider industry. Recognising the strong connections between Levy funded research and government regulatory and policy direction, the Ministry of Building, Innovation and Employment (MBIE) participates on this advisory group. The aim is to provide independent, expert advice that can give confidence to the BRANZ Inc. Board on the focus and quality of BRANZ Ltd research.

### Investment with external providers

There is significant expertise within universities, Crown Research Institutes and independent research providers which complements BRANZ-based specialist teams. Working in partnership and collaborating with other providers is an important part of how BRANZ works to deliver best value from the Levy for New Zealanders.

Sometimes this can be external providers directly accessing investment and being contracted by BRANZ Inc. to carry out projects. Other times, it can be through these providers acting as sub-contractors to BRANZ Ltd as part of teams to deliver Levy funded work.

Primarily BRANZ Inc. seeks out external proposals is through the publication of a Research Prospectus. The Prospectus is sent out annually to the wider research community seeking proposals to help deliver on the research priorities that have been identified.

### Being an agile investor

The majority of BRANZ's research investments are delivered through the annual funding rounds described above. BRANZ also recognises the

importance of being an agile investor, able to respond to opportunities and issues outside of these cycles.

BRANZ responds quickly to emerging industry issues and invests in discrete pieces of timely work such as a publication or guidance on a pressing issue. These "out of cycle" investments can come from ideas identified and developed within BRANZ or from external organisations.

### Strategic initiatives

From time to time BRANZ also invests Levy in strategic initiatives. These are initiatives above and beyond the core baseline investment in research. They are typically focused on national, strategic opportunities and are approved by the BRANZ Inc. Board. For example, BRANZ worked with industry in the development of the Homestar rating tool. It also partnered with the design and building community in the establishment of the national specification system Masterspec. More recently, BRANZ has invested Levy in work with MBIE on the development of a new Code and Standards portal [Building Code Hub].

### Investment in the campus and assets

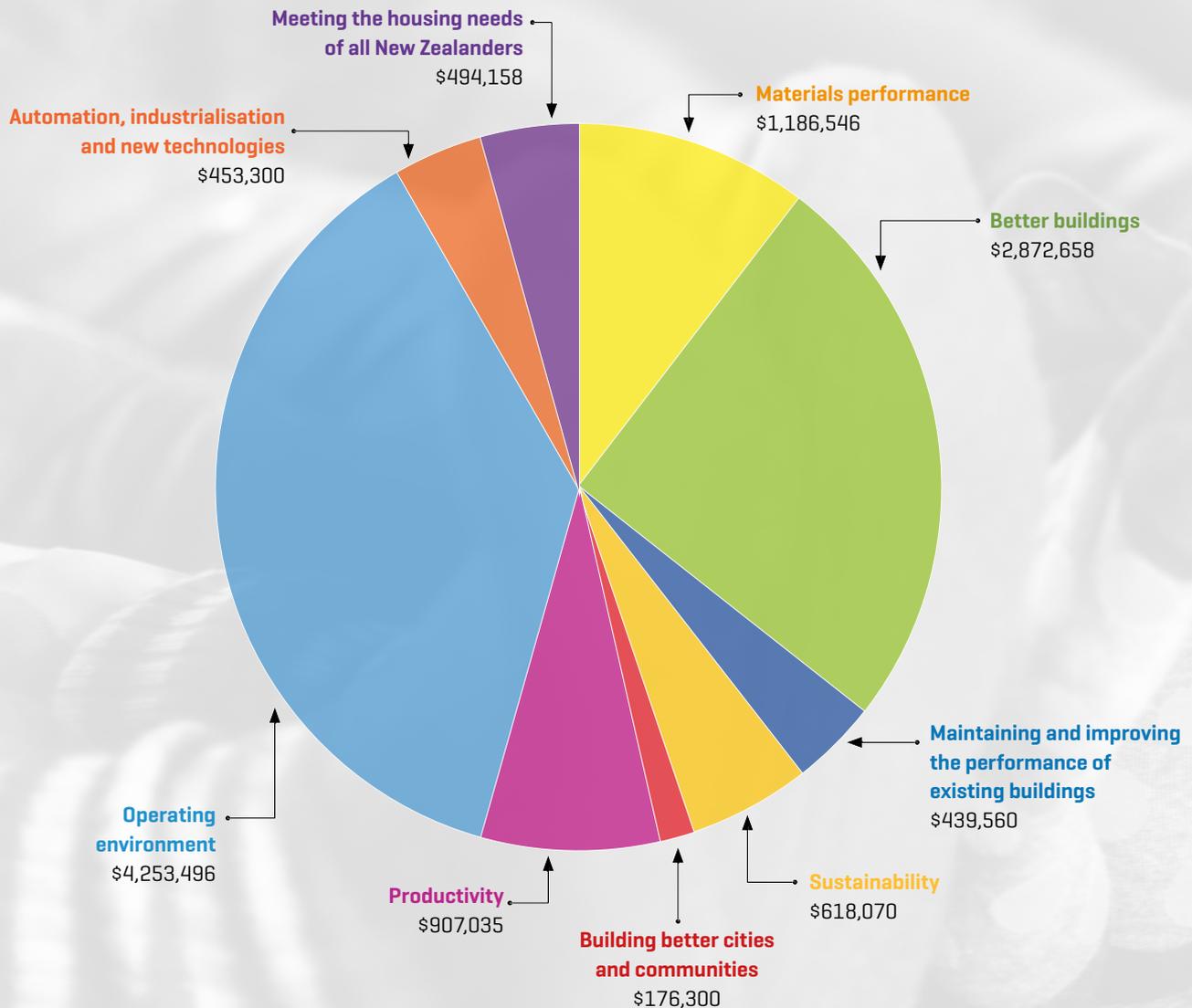
Since its establishment in the late 1960's BRANZ has invested Levy funding in the development of a specialised hub of building research capability at Judgeford, Wellington. This research infrastructure is a key national resource.

Capital investment in property, plant and equipment is undertaken at BRANZ through a cyclical process targeting progressive improvement. By understanding the value and quality of existing assets, and identifying future needs, BRANZ is able to develop a programme of capital requirements and to understand investment priorities.

A Campus and Asset management plan has been produced to shape these investments. The plan creates visibility of the potential size and scale of investment in property, plant and equipment at BRANZ over the next 10 years. This supports the Board to make individual project investment decisions in the context of the size and scale of other likely investments.

The level of capital investment required in property, plant and equipment is a key part of the long 10-year model that supports BRANZ's investment of Levy. BRANZ's Long Term Levy Utilisation policy is explicit about the importance of this capability, noting that BRANZ will effectively manage the Levy by planning for and making capital investment in internal and external facilities and capability.

# 2016/17 Allocation overview



THIS REPRESENTS THE TOTAL LEVY INVESTMENTS MADE FOR THE 2016/2017 FINANCIAL YEAR AT THE TIME OF PUBLICATION. IT INCLUDES NEW INVESTMENTS AS WELL AS BUDGETED EXPENDITURE FOR EXISTING COMMITMENTS PLANNED DURING THIS 12-MONTH PERIOD. THE TOTAL AMOUNT IS SUBJECT TO CHANGE DUE TO PROJECT VARIATIONS AND NEW INVESTMENTS MADE IN RESPONSE TO EMERGING ISSUES. IT EXCLUDES INVESTMENTS IN THE CAMPUS AND OTHER INFRASTRUCTURE ASSETS

## Responding to key challenges facing New Zealand – investing in new ways

The issues facing New Zealand require us to constantly challenge ourselves to come up with better solutions and new approaches and as part of BRANZ's strategy, we are committed to playing our part.

**W**e are working hard to stretch our thinking around how we can ensure the industry (and subsequently New Zealanders) gets the best possible benefits from Levy investment. We've look hard at what we could do better and differently. A key part of our thinking is to develop a new, more sophisticated portfolio approach to investing the Levy.

As part of this, we have made some important changes in 2016/17.

### Programmes

A new programme approach is being implemented by BRANZ in 2016/17. The purpose of the programmes is to find and develop end-to-end solutions to some of the most pressing issues currently facing the industry. The programme approach is about working harder and differently to unlock the right teams from across New Zealand and internationally. It is about bringing government, researchers and industry together to work in new ways and with new levels of investment. It is about different disciplines and expertise working together in a concerted push to make real in-roads around areas of concern. It is about thinking creatively about how science and research can inspire the industry to provide better buildings for New Zealanders.

As with any new approach we will be looking closely to assess the effectiveness of this way of working. The initial signs are encouraging. Feedback from industry and government advisory group members is showing a real enthusiasm and excitement about what could be achieved.

In 2016/17 BRANZ is investing a significant allocation of Building Research Levy in four new programmes of work. These four programmes are:

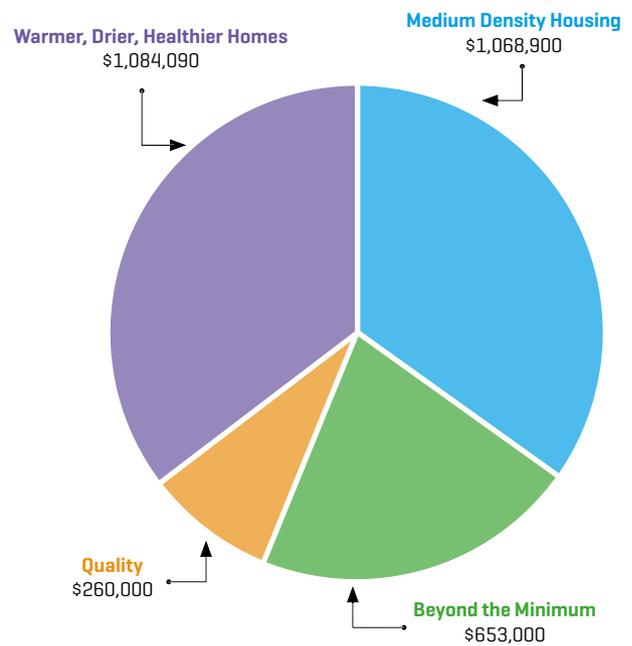
1. Giving the industry tools to deliver medium density housing that meets the needs of New Zealanders.
2. Helping consumers understand what the minimum standard means and the benefits of exceeding it.
3. Eliminating quality issues.
4. Creating warmer, drier and healthier buildings.

These programme areas were identified from Industry Research Strategy priorities through consultation with industry and government. Independent, expert support was provided to assist BRANZ with the process through which the programmes themselves were initially scoped and developed.

Each programme is also benefiting from an Expert Advisory Group. These Groups have helped refine and focus the programmes. They also have a key, ongoing role in ensuring both the research and emerging findings are firmly anchored in solutions that can be rolled out through industry and government.

### Distinct, Stand Alone Research

Looking beyond the programmes, we know distinct pieces of research into other industry needs still need support through Levy investment. This is part of BRANZ's commitment to maintaining a balanced portfolio of research investment and to maintaining investment in important research capability. These stand-alone projects must also demonstrate how they are addressing priorities from the Industry Research Strategy.





# Medium density for all





# Medium-density housing that meets the needs of New Zealanders

## Why this is a priority?

Medium-density housing (MDH) is already part of the New Zealand landscape. But looking ahead, we can see that the demand is continuing to increase, particularly in areas with high population growth. The Auckland Unitary plan will drive further activity in coming years.

New Zealand has a poor track record in building medium density housing. The costs are often high, the quality is variable, and many projects have not aged well. There is also public resistance to the concept of medium density housing.

In the absence of high quality, agreed approaches and standards, we anticipate the industry will develop solutions to the challenges of medium density housing on an ad hoc basis. This is going to be inefficient for an industry already facing productivity challenges and stretched resources. It also risks inconsistent quality and potential future problems.

There are good examples of medium density housing in New Zealand, but much of this is targeted at the high-end of the market. With much of new medium density housing targeted at addressing housing affordability pressures, high quality solutions at a lower price point are required now.

If we are to meet the future housing needs of New Zealanders then it is clear that good quality, medium density housing is going to be an important part of the answer.

## What difference will this make?

This programme will give the industry the tools it needs to build high quality, affordable medium density housing. This housing will meet the needs of the people who live in it and be accepted by the wider community.

## What are the critical success criteria for this programme?

Five key programme success criteria have been identified for this programme. These are:

1. The building industry has the technical information to enable the design of quality, affordable and desirable medium density housing;
2. The building industry has the skills needed to design and build quality, affordable and desirable medium density housing;
3. Medium density housing buildings are maintained to sustain long term performance;
4. Everyone has a shared understanding of how to optimise the journey through the building and consent process for medium density housing; and
5. There is increased acceptance of medium density housing in communities.



**Programme leader**

Kate Bryson, [Kate.bryson@branz.co.nz](mailto:Kate.bryson@branz.co.nz)

## Programme Overview

### 1. The building industry has the technical information to enable the design of quality, affordable and desirable MDH

a) What are the technical issues that affect MDH?

Defining MDH: Defining Medium Density Housing for NZ

The new MDH market – Supply side analysis

MDH construction quality survey

The new MDH Market - Demand-side Analysis

Testing Cladding for Performance in MDH

Fire Spread in Lower Roofs in MDH

Tools to Measure Liveability of MDH

Acoustic Design of MDH

Timber composite floors – Scoping

b) What are holistic solutions to the technical issues that affect MDH?

c) Are the holistic solutions to the technical issues that affect MDH practical and acceptable to end users?

d) How can the solutions to the technical issues that affect MDH be rolled out to industry to encourage their uptake?

Market Research for MDH

MDH Fact Sheets

MDH Housing Information Resource

	2016			2017			2018			2019		
	01	02	04	01	02	04	01	02	04	01	02	04
a) What are the technical issues that affect MDH?												
Defining MDH: Defining Medium Density Housing for NZ												
The new MDH market – Supply side analysis												
MDH construction quality survey												
The new MDH Market - Demand-side Analysis												
Testing Cladding for Performance in MDH												
Fire Spread in Lower Roofs in MDH												
Tools to Measure Liveability of MDH												
Acoustic Design of MDH												
Timber composite floors – Scoping												
b) What are holistic solutions to the technical issues that affect MDH?												
c) Are the holistic solutions to the technical issues that affect MDH practical and acceptable to end users?												
d) How can the solutions to the technical issues that affect MDH be rolled out to industry to encourage their uptake?												
Market Research for MDH												
MDH Fact Sheets												
MDH Housing Information Resource												

### 2. The building industry has the skills to design and build quality and affordable MDH

a) Who within the building industry will have the ability and interest to respond to the MDH need?

Industry ability and interest in responding to MDH need

b) What is the skills gap in the ability of the industry to design and build quality, affordable and desirable MDH?  
Where are the skills gaps?

c) Who are the experts regarding MDH and how do we leverage their knowledge to benefit the rest of the industry?

Leveraging MDH's Experts' Knowledge

d) How do we get the tertiary education providers to focus on the skills gap regarding MDH when training new industry participants?

e) How do we encourage the existing industry to proactively upskill to address their skills gaps regarding MDH?

	2016			2017			2018			2019		
	01	02	04	01	02	04	01	02	04	01	02	04
a) Who within the building industry will have the ability and interest to respond to the MDH need?												
Industry ability and interest in responding to MDH need												
b) What is the skills gap in the ability of the industry to design and build quality, affordable and desirable MDH? Where are the skills gaps?												
c) Who are the experts regarding MDH and how do we leverage their knowledge to benefit the rest of the industry?												
Leveraging MDH's Experts' Knowledge												
d) How do we get the tertiary education providers to focus on the skills gap regarding MDH when training new industry participants?												
e) How do we encourage the existing industry to proactively upskill to address their skills gaps regarding MDH?												

### 3. MDH buildings are maintained to sustain long term performance

a) What are the maintenance requirements for MDH?

Knowing enough to maintain: gaps in the knowledge of owners and residents around the maintenance requirements for MDH

b) What are the economic and social benefits of maintaining MDH during its lifecycle and how can we demonstrate them?

c) How do we make designers and builders aware of what they need to do to ensure that MDH buildings are maintainable?

d) The gaps in the knowledge for owners and residents around the maintenance requirements for MDH buildings and how can these be closed?

	2016			2017			2018			2019		
	01	02	04	01	02	04	01	02	04	01	02	04
a) What are the maintenance requirements for MDH?												
Knowing enough to maintain: gaps in the knowledge of owners and residents around the maintenance requirements for MDH												
b) What are the economic and social benefits of maintaining MDH during its lifecycle and how can we demonstrate them?												
c) How do we make designers and builders aware of what they need to do to ensure that MDH buildings are maintainable?												
d) The gaps in the knowledge for owners and residents around the maintenance requirements for MDH buildings and how can these be closed?												

### 4. Everyone has a shared understanding of how to optimise the journey through the building and resource consent process for MDH

a) What is the real situation surrounding the building and resource consent process for MDH, e.g. timelines and perceived barriers?

Getting MDH Through the Hoops: an evidence base on barriers and constraints involved in building and resource consents processes

b) What are the problems with the resource and building consent process for MDH, including the process and peoples' approach to the process?

c) How can we resolve the problems that are associated with the building and resource consent process for MDH?

	2016			2017			2018			2019		
	01	02	04	01	02	04	01	02	04	01	02	04
a) What is the real situation surrounding the building and resource consent process for MDH, e.g. timelines and perceived barriers?												
Getting MDH Through the Hoops: an evidence base on barriers and constraints involved in building and resource consents processes												
b) What are the problems with the resource and building consent process for MDH, including the process and peoples' approach to the process?												
c) How can we resolve the problems that are associated with the building and resource consent process for MDH?												

### 5. We have increased the acceptance of MDH in communities

a) What are the preferences of different demographics regarding MDH?

Understanding the Drivers of MDH

b) How will the changing cultural diversity impact the demand for MDH?

c) What are the perceived barriers or advantages to living in or near MDH e.g. safety and security?

MDH Liveability

d) How can we inform communities of the real benefits and costs of living in or near MDH?

e) How do we leverage our knowledge of MDH's benefits to increase its acceptance in communities?

	2016			2017			2018			2019		
	01	02	04	01	02	04	01	02	04	01	02	04
a) What are the preferences of different demographics regarding MDH?												
Understanding the Drivers of MDH												
b) How will the changing cultural diversity impact the demand for MDH?												
c) What are the perceived barriers or advantages to living in or near MDH e.g. safety and security?												
MDH Liveability												
d) How can we inform communities of the real benefits and costs of living in or near MDH?												
e) How do we leverage our knowledge of MDH's benefits to increase its acceptance in communities?												

■ Indicates work in progress

## The building industry has the technical information to enable the design of quality, affordable and desirable medium density housing

### Defining medium density housing for New Zealand

This work will provide important baseline information on medium density housing already being built in New Zealand. It will also provide definitions around what medium density housing means in the New Zealand context. It will explore who is living in these homes, who is building it, how they are being built. It will also explore known issues. The project will also look at occupant behaviour associated with medium density housing.

### The new medium density housing market – demand-side analysis

We need to have a better understanding of the future demand for medium density housing. This project will use information from existing residential preference surveys and from Statistics New Zealand to establish this. It will identify types of medium density housing, household types, regional differences. It will also look at affordability. Information from building consents and discussions with developers will also be used to estimate the cost of different types of medium density housing.

### The new medium density housing market – supply-side analysis

Delivering medium density housing requires different supply-side responses to commercial developments and stand-alone housing. We need to understand the industry's ability and appetite to supply medium density housing, including the finance and insurance industries. Questions this work will help address include:

- the number and type of medium density housing projects currently being built;
- the characteristics of success and failure;
- the opportunities for scaling up; and
- the relative importance of the different skills required such as management, designer and labour skills, as well as the role of financing and other business services.

### Medium density housing construction quality survey

A key concern identified during the scoping of this programme of work was the risks for owners, occupiers and society more widely of poor quality housing. While medium density housing construction has a track-record, it isn't great. We are keen to understand where the problems currently lie so we can help tackle these for future developments.

This project will carry out onsite surveys to identify the potential construction problems associated with designing and building medium density housing. It will explore the kinds of design features needed to make it easy to maintain these homes. It will also identify possible skills gaps in the building industry which may be contributing to quality issues.

### Building Research Levy investment

\$180,000

#### Timeframe

Due to be completed by May 2017

#### Contact

Kate.Bryson@branz.co.nz

### Building Research levy investment

\$140,000

#### Timeframe

Due to be completed by January 2017

#### Contact

Ian.Page@branz.co.nz

### Building Research Levy investment

\$150,000

#### Timeframe

Due to be completed by January 2017

#### Contact

Ian.Page@branz.co.nz

### Building Research Levy investment

\$200,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Matthew.Curtis@branz.co.nz

### **Testing claddings for performance in medium-rise buildings, in particular multi-unit residential apartments**

There are some gaps in our knowledge around how cladding systems are likely to perform when used in medium density developments. This issue was identified as a concern that should be fast-tracked in order that we can get early insight around this key area of potential risk. The research will take claddings that are likely to be used on medium-rise buildings then test them at our facility. The key areas of focus are around how weathertight they are, and also how they are likely to perform during an earthquake. The purpose of the tests is to identify any potential weak spots and the factors that may limit the performance of different claddings when used in medium density housing.

### **Medium-density housing fact sheets**

Getting information about the industry is essential if we are to take research insights and see them translated in to practice. Drawing on BRANZ's expertise at knowledge transfer to industry, this work will target architects and designers. It will provide them with the technical information they need to design quality, affordable, desirable and easily maintained medium density housing. The project will produce at least 12 easy-to-read fact sheets covering specific areas of design and construction.

### **Medium density housing information resource**

A key issue that was flagged early in the programme development was the duplication of effort that was taking place in accessing key information. Businesses and organisations interested in delivering medium density housing were having to source important information from multiple locations with a lack of co-ordination. This element of the programme addresses this problem. It will provide a focused, tailored online resource that acts as a one-stop shop for people interested in medium density housing. The resource will include relevant local and overseas information about the design and construction of quality medium density housing.

### **Fire spread from lower roofs**

The distinct risks around fire presented by medium density developments have been highlighted as an important area of focus for the programme. A first piece of work in this space is looking at risk of fire spread in medium density housing projects where there are different roof heights in the same building. This is a common design element of medium density housing. The challenge is around the risk of fire spreading from the lower roof onto the higher wall above it. At present these higher walls must be protected to prevent the spread of fire, which is both onerous and expensive. This project will identify more efficient, lower-cost ways of preventing fire spreading from lower roofs which allow greater architectural freedom while meeting Building Code requirements.

### **Building Research Levy investment**

\$360,000

#### **Timeframe**

Due to be completed by March 2018

#### **Contact**

Greg.Overton@branz.co.nz

### **Building Research Levy investment**

\$120,000

#### **Timeframe**

Due to be completed by March 2017

#### **Contact**

Margaret.Mclachlan@branz.co.nz

### **Building Research Levy investment**

\$160,000

#### **Timeframe**

Due to be completed by March 2018

#### **Contact**

Margaret.Mclachlan@branz.co.nz

### **Building Research Levy investment**

\$428,000

#### **Timeframe**

Due to be completed by March 2018

#### **Contact**

Colleen.Wade@branz.co.nz

### Market research for medium density housing projects

Research is needed to help develop the picture of who is likely to be involved in designing and building medium density housing in the future. This project looks at how these parts of the industry can be supported to deliver better homes. Specifically it considers:

- the information those involved in medium density housing currently access;
- the information that could be useful in the future; and
- how best to deliver that information.

The findings of this project will be used to develop subsequent projects to provide the industry with the information and tools it needs to build medium density housing.

### Acoustic design of medium density housing

Acoustic performance has been identified as a key area of concern for medium density living. This project aims to make a concerted push to identify what needs to be done to develop solutions around external and internal noise. It will look at domestic and international practice and will also look at how best to get information out to the industry.

### Developing tools to measure and improve the quality and liveability of medium density housing developments

The aim of this research is to provide the development community with a means to better understand and measure the quality and liveability of the homes they are building. This will help with the improvement of future designs. This work is about insight to improve the acceptability of medium density living for both future residents and surrounding neighbourhoods. Tools to help with this will be developed and applied in two case studies.

### The building industry has the skills needed to design and build quality, affordable and desirable medium density housing

Work on projects to address this critical success criteria are being developed and will begin in 17/18.

### Medium density housing buildings are maintained to sustain long term performance

#### Knowing enough to maintain: Understanding the gaps in the knowledge of owners and residents around the maintenance requirements for medium density housing

Medium density housing presents particular maintenance challenges. It tends to be multi-storey and is often governed by a body corporate. Maintenance and upkeep costs and requirements can be a barrier to acceptance of medium density housing as an option. Maintenance of stand-alone housing is an issue for New Zealand. Medium density

#### Building Research Levy investment \$60,000

##### Timeframe

Due to be completed by December 2016

##### Contact

Margaret.Mclachlan@branz.co.nz

#### Building Research Levy investment \$116,000

##### Timeframe

Due to be completed by July 2017

##### Contact

Malcolm.Dunn@marshallday.co.nz

#### Building Research Levy investment \$97,500

##### Timeframe

Due to be completed by March 2018

##### Contact

Verneyr@beaconpathway.co.nz

#### Building Research Levy investment \$90,000

##### Timeframe

Due to be completed by March 2018

##### Contact

Anne.Duncan@branz.co.nz

housing is likely to present a greater challenge. This project will identify what the residents and owners of medium density housing already know about maintaining their homes. It will then produce information and advice to fill any gaps in their knowledge. This will support improved long term performance of the homes.

### Everyone has a shared understanding of how to optimise the journey through the building and consent process for medium density housing

#### Getting medium density housing through the hoops

This project will look at the current experience of those already building medium density housing as they go through the resource and building-consent process. It will identify the barriers and constraints they experience, and the impact of these barriers. The project will also identify ways in which the consent process for medium density housing can be made easier, more responsive, more effective and more efficient.

### There is increased acceptance of medium density housing in communities.

#### Understanding Drivers of Medium Density Housing

A key issue around medium density housing is its acceptance to both future residents and the wider, local community. This piece of work will explore current attitudes towards medium density housing. It aims to understand the perceived barriers and advantages to living in or near medium density housing. It will look at both the positive and negative views of medium density housing and look in detail at the drivers of these attitudes. It will explore how these can influence the location, design and construction of medium density housing in communities.

#### Getting the benefit: Understanding how to support benefits-realisation for residents of medium density housing

The purpose of this project is to identify and quantify the benefits of medium density housing as a housing option. This could include the lower cost of medium density housing compared with standalone homes, as well as the fact that it is often closer to amenities and to inner-city workplaces.

The project will run until 2018, and will have several phases. It will start with work to identify the existing attitudes and perceptions of medium density housing. The next phase will assess insights around the pros and cons of medium density housing as a choice.

#### Building Research Levy investment

\$85,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Anne.Duncan@branz.co.nz

#### Building Research Levy investment

\$80,000

#### Timeframe

Due to be completed by April 2017

#### Contact

Anne.Duncan@branz.co.nz

#### Building Research Levy investment

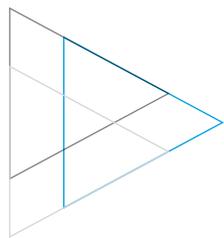
\$95,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Anne.Duncan@branz.co.nz





# Exceeding the minimum





# Exceeding the minimum

## Why this is a priority?

The building standards and code outline the minimum standards for any building. However, as compliance regimes are fixed against that level many buildings are developed up to the minimum and seldom strive to exceed the minimum standards.

Compounding this situation is the consumer preference for investing in areas that are visible over those that are not. For example, it is not uncommon to see a new house with expensive bathroom and kitchen fittings, but minimum quality plumbing behind the walls.

While the minimum is set at a level that is acceptable for the New Zealand environment, there are likely to be tangible benefits achievable by investing in better solutions that exceed the minimum standard.

Educating consumers is critical to changing behaviours around exceeding the minimum standard. Ultimately consumers have to pay. However, the industry is a critical advisor in consumers' decision making processes and will also need support to fulfil this role.

This programme will identify the significant industry, consumer and regulatory barriers that prevent the industry from striving to exceed the minimum. Its ambition is to influence the culture of the industry to embrace the challenge of exceeding the minimum standard.

Embracing the challenge of exceeding the minimum standard requires a significant behavioural shift. It will take time for the culture change to be embedded in the building industry. That's why the programme has been prioritised – it's going to take time for change to be realised.

## What difference will this make?

This programme will help both consumers and the building industry understand that the standards are a minimum only, and that there are real benefits to exceeding them. With the benefit of better information around options, the opportunity to consider higher performing buildings will be created. Over time, this can help create a more responsive market – with industry able to better meet consumer expectations, aspirations and needs.

The research carried out in this programme can also play a key role in informing future Code and standards development. For example, providing robust evidence to inform adjustments to current compliance settings.

## What are the critical success criteria for this programme?

Five key programme success criteria have been identified for this programme. These are:

1. Consumers and industry understand that the Code and standards are a minimum that must be met but can be exceeded;
2. The benefits of exceeding the minimum can be clearly articulated based on meaningful terms;
3. The barriers to exceeding the minimum have been addressed;
4. Consumers expect and demand buildings that perform to a higher standard; and
5. The industry delivers buildings that perform to a higher requirement in a cost effective way.



### Programme leader

David Dowdell, David.Dowell@branz.co.nz

## Programme Overview

### 1. Consumers and industry understand that the code and standards are a minimum that must be met or exceeded

Programme leadership

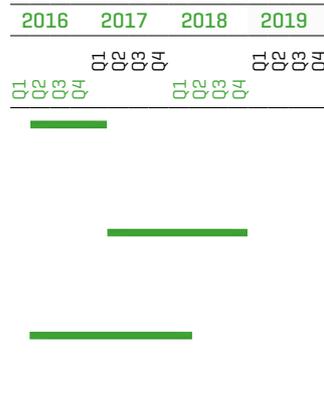
a) How do we articulate the regulatory framework in a way that is consumer friendly?

Measuring our Sustainability Progress

b) How can we explain the regulatory framework in a way that is meaningful to industry?

Design Decisions

c) How do we give industry the tools to explain to consumers about the regulatory framework?



### 2. The benefits of exceeding the minimum standard can be clearly articulated based on quantifiable terms

a) What are some examples of exceeding the minimum where the benefits can be clearly articulated and outweigh the cost?

Building to Rent

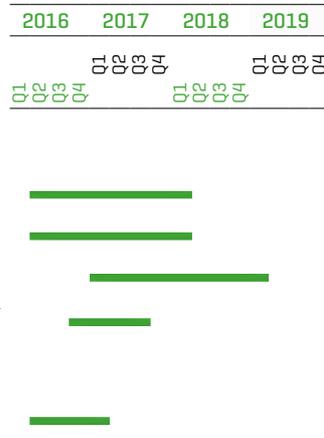
What Standards Can Be Exceeded to Provide Benefits?

Modelling our Future Residential Stock

Doing better - Assessment of NZ research for currency and impact

b) How do we help consumers understand the limits of what they have currently got?

Who Benefits from Going Beyond the Minimum?



### 3. The barriers to exceeding the minimum standard have been addressed

a) How do we encourage the industry to talk to consumers about the benefits of exceeding the minimum?

Understanding Life Cycle Design

b) Where do regulations require amendment so they don't discourage exceeding the minimum standard e.g. insulation into an existing wall?

c) How can we educate the real estate industry about the value of choices that have been made to exceed the minimum?

The Choice to Exceed

When is good enough not good enough?

d) How can we educate landlords about the value of choices that are made to exceed the minimum?

e) How can we encourage insurance companies to take investing above the minimum standard into account?



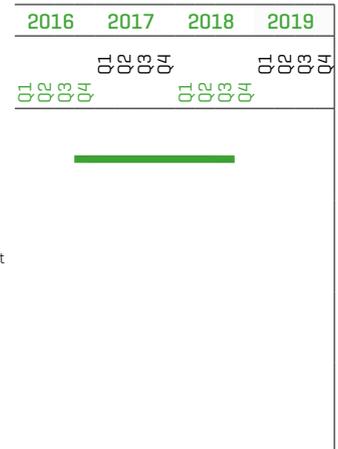
### 4. Consumers have the knowledge to request solutions that exceed the minimum standard when engaging the industry

a) How can we extend the range of tools available to help consumers find out about alternative options available beyond the minimum standard?

b) How can we help consumers request solutions that exceed the minimum by ensuring they receive targeted information at the right time?

c) How do we improve the uptake of performance measuring tools by consumers (e.g. Homestar)?

d) How do we turn the industry into an advocate for the tools and resources available to inform consumers about solutions that exceed the minimum?



### 5. Accurate advice from industry professionals is available to consumers

a) What advice is being given to consumers about exceeding the minimum standard from industry professionals?

LCAQuick Residential

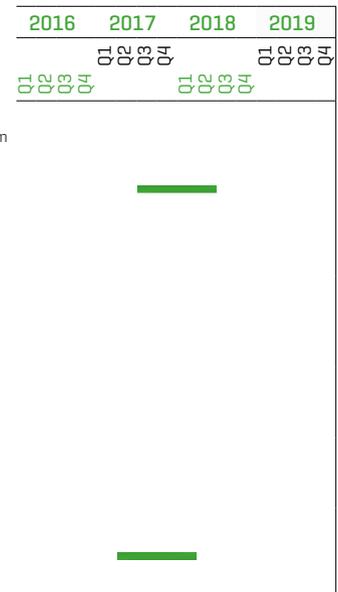
b) How applicable is the advice about exceeding the minimum standards to the New Zealand environment?

c) How current, impartial and independent is the advice that industry professionals are giving to consumers about exceeding the minimum standards?

d) What is the credibility and skills base of the industry professionals who advise consumers about the minimum standard?

e) How can the industry professionals who advise consumers about the minimum standard be educated and upskilled?

Which Structure? Assisting engineers make more informed decisions about structural alternatives going beyond current Building Code



 Indicates work in progress

## Consumers and industry understand that the Code and standards are a minimum that must be met but can be exceeded

### Design decisions

Architects and designers play a key role in determining the performance of buildings. The design and specification stages are influential in establishing likely future performance. This project will explore the information required by architects and designers to talk to their clients about the value of exceeding minimum standards and the long-term benefits this can have. This will help support better-informed decisions at the design stage. The work will explore areas such as:

- planning;
- material specification;
- building performance; and
- maintenance.

## The benefits of exceeding the minimum can be clearly articulated based on meaningful terms

### Doing better – assessing recent New Zealand research for impact

The past two decades have seen a wide range of research into different aspects of improved building performance. This has included energy efficiency (e.g. improved thermal performance) and environment impact (e.g. embodied energy and carbon, Life Cycle Assessment). It has also considered lifetime design, improvements in house condition and improvement in building performance. These have had a variety of impacts (e.g., reducing water consumption, improved health outcomes). Much of the research offers solutions and improvements to dwelling performance beyond the current levels of performance required by the Building Code.

This research explores the impact that this existing work has had and could still have. It will help identify ways in which researchers can better target and promote research-based solutions. The aim being to allow the industry and home owners to improve the performance of dwellings beyond the Building Code baseline. It will also help identify industry and consumer barriers to take-up of research-based solutions.

### Modelling our future residential building stock

Homeowners, building designers and group-home builders are beginning to realise that New Zealand homes can and should be better. However, they are also concerned about the perceived cost of exceeding current minimum Building Code requirements.

This project will help break down these concerns by calculating the life cycle cost of best practice solutions in a range of areas including:

- energy consumption;
- thermal performance; and
- social wellbeing and liveability.

**Building Research Levy investment**  
\$105,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Trevor.Pringle@branz.co.nz

**Building Research Levy investment**  
\$94,125

#### Timeframe

Due to be completed by October 2017

#### Contact

Kay Saville-Smith, Kay@cresa.co.nz

**Building Research Levy investment**  
\$150,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Brian.Berg@branz.co.nz

### Which standards can be exceeded to provide benefits

The purpose of this project is to identify where and how exceeding the minimum standards can have significant long-term benefits. These include both better long-term performance and future re-sale value. The areas in which the standards can be exceeded include:

- insulation (including acoustic insulation);
- water efficiency;
- claddings and linings;
- windows; and
- ventilation systems.

### Building to rent

Homeownership levels are falling. An increasing number of New Zealanders are spending long periods in rental accommodation. This project will look whether new rental housing should be designed differently from owner-occupied housing. It will consider where exceeding minimum standards could have long-term benefits for new rental housing. It will also look at the kinds of renovations that could be made to existing houses to make them more appropriate for renting.

## The barriers to exceeding the minimum have been addressed

### Understanding life-cycle design: Disseminating the benefits of a new technique for evaluating building design life cycle impacts

Understanding the performance of a building over its whole life is recognised as critical in helping to change the discussion around minimum requirements. BRANZ has developed a New Zealand framework, resources and a tool (LCAQuick Office) for the Whole Building Whole of Life Framework project. This provides a platform to facilitate robust, consistent calculation of building life cycle impacts in comparison with impacts of reference New Zealand office buildings. This project focusses on dissemination of this new approach in New Zealand to designers, their clients and other stakeholders. The aim is to support uptake during the building design and rating process.

### Building Research Levy investment

\$150,000

#### Timeframe

Due to be completed by August 2017

#### Contact

Anne.Duncan@branz.co.nz

### Building Research Levy investment

\$180,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Mathew.Curtis@branz.co.nz

### Building Research Levy investment

\$176,000

#### Timeframe

Due to be completed by March 2018

#### Contact

David.Dowdell@branz.co.nz

### **The choice to exceed**

This project aims to provide a better picture of the current situation around the messages the industry is giving consumers about how and why they can exceed the minimum standards. This will provide a baseline from which we can develop programmes to ensure consumers are better informed.

This project is made up of two parts:

1. Carrying out an audit of what advice is currently available to consumers and how applicable, current, impartial and independent that advice is.
2. Identifying the messages the industry currently gives to consumers about exceeding the minimum standard and the tools that are available to help consumers.

### **When is 'good enough' not good enough?**

This project will look at the choices consumers currently make about upgrade options. It explores what drives these choices and what information they use to make their choices. It considers the effect their decisions have on costs and benefits. The purpose of the project is to understand what value [if any] consumers place on building performance upgrades. It will look at areas such as insulation, windows, plumbing cladding and heating. This will provide insight around existing consumer behaviours in exceeding the minimum standards.

### **Who benefits from exceeding the minimum**

The aim of this work is to understand who actually benefits from going beyond the minimum and how they benefit. This is important as it will help inform who might have an interest in investing in or funding improvements. The work will look at the benefits that accrue to different parties - owners, occupiers, the wider community, economy, society. It is focused on residential properties.

### **Consumers expect and demand buildings that perform to a higher standard**

Work on projects to address this critical success criteria are being developed and will begin in 17/18.

### **Building Research Levy investment**

\$105,000

#### **Timeframe**

Due to be completed by July 2017

#### **Contact**

Casimir.MacGregor@branz.co.nz

### **Building Research Levy investment**

\$90,000

#### **Timeframe**

Due to be completed by March 2018

#### **Contact**

Anne.Duncan@branz.co.nz

### **Building Research Levy investment**

\$60,000

#### **Timeframe**

Due to be completed by March 2017

#### **Contact**

Anne.Duncan@branz.co.nz

## The industry delivers buildings that perform to a higher requirement in a cost effective way.

### **Adapting the LCAQuick Office tool for residential buildings**

This project will adapt BRANZ's existing LCA Quick Office tool for use with residential buildings. LCA Quick Office helps architects and designers to test, compare and evaluate the life-cycle impacts of their designs for office buildings at the concept/preliminary stage.

LCA Quick Residential will allow them to do the same for residential buildings. This will provide information about the benefits of going beyond the minimum when designing residential buildings.

### **Which Structure? Assisting engineers make more informed decisions about structural alternatives going beyond current Building Code**

Engineers have an obligation to understand the wider implications of their design decisions. There is currently a lack of succinct, robust information in New Zealand to support this. Work has been conducted in to the resilience of alternative structures to seismic events in high-rise buildings, and the life cycle costs associated with these. This project will provide an options appraisal that summarises alternative structures, relative to Code compliant structures. It will look at seismic resilience, life cycle cost and environmental impact.

### **Building Research Levy investment**

\$178,000

#### **Timeframe**

Due to be completed by August 2018

#### **Contact**

David.Dowdell@branz.co.nz

### **Building Research Levy investment**

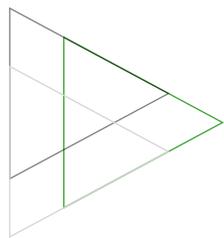
\$140,000

#### **Timeframe**

Due to be completed by March 2018

#### **Contact**

David.Dowdell@branz.co.nz





# Eliminating quality issues





# Eliminating quality issues.

## Why this is a priority?

Poor building quality has been identified as a concern for New Zealand through a number of studies. Recent examples of quality issues range from poorly installed insulation, to badly poured concrete slabs and problems with steel reinforcing.

Many quality issues with New Zealand building stock can be traced back to the practises of the industry. Often it is possible to identify simple solutions that will improve practises and prevent quality issues from occurring at a later date. Significant effort has been dedicated to offering solutions to quality issues. However, new research has shown these solutions have not always been translated into improvements in these areas. Many of the same quality issues are still occurring. With the building boom currently underway, quality issues are again in the spotlight. Steps to tackle current problems are being taken but looking ahead there is also the need to address the root cause of the problems. Lasting change is needed that extends beyond this current building cycle. This will require concerted and sustained effort. It is this opportunity that this programme is focused on. It will:

- Identify the most common quality issues;
- Identify solutions that have already been developed;
- Explore why these solutions have not resolved the issue; and
- Generate initiatives that will eliminate quality issues either through using existing knowledge in new ways or designing entirely new solutions

In many cases, simple solutions are already available but the problems continue because of deeply embedded habits within the industry. Better quality is only possible if builders can be persuaded to change the way they build.

Embedding the quality solutions will require changes to the way builders build. The way they have always operated will be challenged. It will take time to roll out the required changes across the industry. Therefore, it is important to start now so the benefits from new and existing research that addresses quality issues can be delivered as soon as possible.

## What difference will this make?

This programme will help eliminate quality issues by identifying the most common problems and the possible solutions to them. Importantly, it will look at why the industry isn't making the necessary changes and explore ways in which they can be encouraged to do so.

## What are the critical success criteria for this programme?

Six key programme success criteria have been identified for this programme. These are:

1. We have identified common quality issues that occur in the building industry;
2. We understand why the previous work to solve common quality issues has not been successful;
3. We understand how to encourage industry to change their practice;
4. We have determined the best way to reduce the incidence of common quality issues;
5. We have eliminated common quality issues by using existing knowledge; and
6. We have eliminated common quality issues by designing new solutions.



### Programme leader

Matthew Curtis, [Matthew.Curtis@branz.co.nz](mailto:Matthew.Curtis@branz.co.nz)

## Programme Overview

	2016	2017	2018	2019
	01	02	03	04
<b>1. We have identified common quality issues that occur in the building industry</b>				
a) What is a definition of quality that the industry will agree with? What is quality in buildings?				
b) What are the common quality issues for all building types? Building Pathology Materials and Characteristics of New Buildings Monitoring Industry Performance Industry Performance Measures				
c) What are the causes of the common quality issues for all building types? d) How would we prioritise the most common quality issues (based on importance, impact and size)? Prioritising quality				
<b>2. We understand why the previous work to solve common quality issues has not been successful</b>				
a) What previous work has been completed to try and solve the common quality issues? Literature Review of previous work that has been completed to try to solve common quality issues				
b) How aware are the different industry segments of the solutions that exist and how well are they being applied? c) What are the barriers that prevent the uptake of solutions? Adopting New Ways				
d) How can we encourage the industry to embrace a philosophy of continuous learning?				

	2016	2017	2018	2019
	01	02	03	04
<b>3. We understand how to encourage industry to change their practice</b>				
a) What are some good examples of successful solutions to common quality issues that we can publicise and learn from? Literature Review of good examples of successful solutions to quality issues that we can publicise and learn from				
b) Who can we work with to change industry practices? c) How will we know that industry has actually changed practices and how do we measure this? d) What are the options to work with each segment of the industry to change their practices and what are the most effective? Evidencing quality issues - what can industry data tell us? Clerk of Work (CoW) costs and benefits				
e) How can we get the industry to collectively buy in to the need to change their practices?				
<b>4. We have determined the best way to reduce the incidence of common quality issues</b>				
a) What is the existing knowledge that can be used to solve quality issues? Using existing knowledge to solve quality issues				
b) Which of the most common quality issues can be solved with existing knowledge? c) Which of the most common quality issues require new solutions? d) Who needs to be involved in the solving of the most common quality issues? e) Which of the common quality issues are "quick wins" that can be solved with little effort?				
<b>5. We have eliminated common quality issues by using existing knowledge</b>				
The specific questions are to be scoped based upon the results of achieving success criteria 1-4				
<b>6. We have eliminated common quality issues by designing new solutions</b>				
The specific questions are to be scoped based upon the results of achieving success criteria 1-4				

Indicates work in progress

## We have identified common quality issues that occur in the building industry

### What is quality in buildings?

The purpose of this project is to develop a definition of acceptable quality in different building types. This includes both compliance and aesthetic quality. The project will initially focus on generic quality problems, and then look at quality problems specific to particular types of buildings. Base data will come from a new survey on housing construction quality. The project will also assemble a panel of experts to help decide how we identify and assess quality.

### Identifying the most common quality issues using a building pathology approach

At present information about quality issues is held privately or in hard-to-access databases. The purpose of this project is to see if it is possible to develop an improved source of information about quality issues and building failures. The data will then be analysed to identify the quality issues that most commonly lead to building failure – what is known as a “building pathology”: approach. This information will make it possible to provide the industry with advice on the issues that need to be addressed.

### Prioritising quality: identifying key quality issues

Quality issues can range from relatively minor problems to those that are likely to have serious long-term impacts. This project will identify the quality issues that cause the most concern, both from the point of view of owners, and in terms of a building’s long-term durability and usability.

## We understand why the previous work to solve common quality issues has not been successful

### Finding ways of encouraging the industry to adopt new ways

Industry buy-in is essential to eliminate quality issues. However, it is human nature to resist change – particularly when we don’t understand the reasons for it. This project will look at the factors that make it more likely those working in the industry will adopt new practices and processes.

## We understand how to encourage industry to change their practice

### Evidence around quality issues – what can industry data source tell us?

Significant data is collected on the building and construction industry by a range of agencies and organisations across New Zealand. However, these individual datasets only ever tell one part of the whole story about the industry, with limited ability or infrastructure to connect data to derive new insights from it. This project explores opportunities to

### Building Research Levy investment

\$140,000

#### Timeframe

Due to be completed by May 2017

#### Contact

Ian.Page@branz.co.nz

### Building Research Levy investment

\$150,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Anne.Duncan@branz.co.nz

### Building Research Levy investment

\$180,000

#### Timeframe

Due to be completed by October 2017

#### Contact

Casimir.MacGregor@branz.co.nz

### Building Research Levy investment

\$80,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Lee.Bint@branz.co.nz

### Building Research Levy investment

\$54,150

#### Timeframe

Due to be completed by July 2017

#### Contact

Tyson Schmidt, Tyson@thirdbearing.co.nz

join existing datasets to gain these insights around building industry quality issues, and second identify 'quick wins' available to improve performance.

### **We have determined the best way to reduce the incidence of common quality issues**

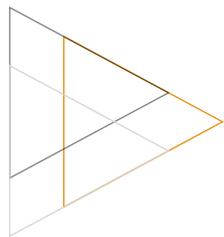
Work on projects to address this critical success criteria are being developed and will begin in early 2017.

### **We have eliminated common quality issues by using existing knowledge**

Work on projects to address this critical success criteria are being developed and will begin in 17/18.

### **We have eliminated common quality issues by designing new solutions**

Work on projects to address this critical success criteria are being developed and will begin in 17/18.







# Warmer, drier and healthier buildings

# Warmer, drier and healthier buildings

## Why this is a priority?

**O**ur building stock has had a rudimentary approach to the control of heat, air and moisture and we need to aim for more from our buildings. A multitude of factors, including modern lifestyles, new construction trends and climate change mean that the old rudimentary approach is no longer sufficient. Science needs to be put in place to inform industry how to move from rudimentary to exemplary.

This is a priority as ongoing issues with the performance of both the new and existing building stock can have a significant impact on the people living, working and learning within these buildings.

There are a wide range of physical and mental health issues that impact on the productivity and well-being of New Zealanders. Some of these can be attributed directly to the way in which our buildings perform. An inability to provide warm, dry, healthy environments is a result of poor building physics. Such examples include:

- There are a significant number of winter deaths in NZ each year from respiratory and circulatory problems. A major contributor to this is the environment provided the buildings we live and work in;
- Poor indoor environments are often associated with older houses. However, we have seen evidence that new homes are not providing adequate indoor environments either. The signs are that this situation will only get worse if there is no intervention; and
- The leaky building crisis in homes is estimated to cost between \$11 billion and \$23 billion. Leaky schools are estimated to cost \$1.5 billion to repair. Recently identified issues with roofs are now adding to this cost. New school buildings are being built with gaps in our knowledge. We aren't able to provide sufficiently robust design guidance. This risks expensive and disruptive failure.

There is an increasing amount of evidence in New Zealand-based and international literature that links poor housing / building quality with poor physical and mental health. The effects of damp indoor environmental conditions have a strong link to poor respiratory health, as well as the ability for children to learn, as evidenced in numerous local and international studies.

Recent research has shown that New Zealand buildings are becoming more and more airtight. They have reached levels that require ventilation solutions to be included to avoid moisture problems and keep indoor air pollutants below levels recommended by the World Health Organisation. As this trend continues the potential for problems to develop will increase over time.

## What difference will this make?

The work under this programme combines to focus on the provision of solutions that will allow buildings to be warm, dry and healthy over their lifetime. It will also provide the information we need to improve comfort, temperature and heating to support better health outcomes. This is fundamental research that will create new solutions to existing problems and pre-empt future issues.

## What are the critical success criteria for this programme?

Four key programme success criteria have been identified for this programme. These are:

1. There is a shared understanding of the issues that prevent our current homes and buildings being warm, dry and healthy;
2. Solutions to developing warmer, drier, healthier homes and buildings in New Zealand have been successfully identified;
3. Industry understands the knowledge, ways of implementing the solutions and the benefits provided; and
4. Owners, suppliers and users of homes and buildings have the knowledge and understanding to make effective decisions in producing and maintaining warm, dry, healthy environments.



### Programme leader

Mark Jones, [Mark.Jones@branz.co.nz](mailto:Mark.Jones@branz.co.nz)

## Programme Overview

### 1. There is a strong understanding of the issues that prevent our current buildings being warm, dry and healthy.

a) What are the external moisture issues that prevent our current buildings being warm, dry and healthy?

Testing Cladding for Performance in MDH

Risk Assessment retrofit wall insulation

b) What are the internal moisture issues that prevent our current buildings being warm, dry and healthy?

Monitoring Conditions and Air Flows in Roofs

New Zealand's Experimental Buildings

Getting Homes Dry

c) What are the ventilation-related issues that prevent our current buildings being warm, dry and healthy?

Airtightness trends, impacts and energy saving opportunities

Roof Design Pathways

Occupant Ventilation - Behaviour

Airtightness of Apartments

Environmental conditions and fungal exposure

d) What are the indoor environmental quality-related issues that prevent our current buildings being warm, dry and healthy?

Indoor Air Quality Knowledge in NZ

Exploring the Indoor Environment in Schools & Homes (University of Otago, Massey University & GNS)

Project 1: School Monitobox - using low cost equipment on large scale sample of classrooms across NZ

Project 2: Nature of indoor air pollution in NZ homes & garages

Project 3: Exposure to indoor air pollution at school

The potential impact of energy-saving building design on occupant health (Unitec)

Identifying the sources and characteristics of particulates and VOCs in NZ residential dwellings [CRL]

Keeping our children warm and dry: Evidence from Growing Up in New Zealand (University of Auckland)

Environmental conditions and fungal exposure

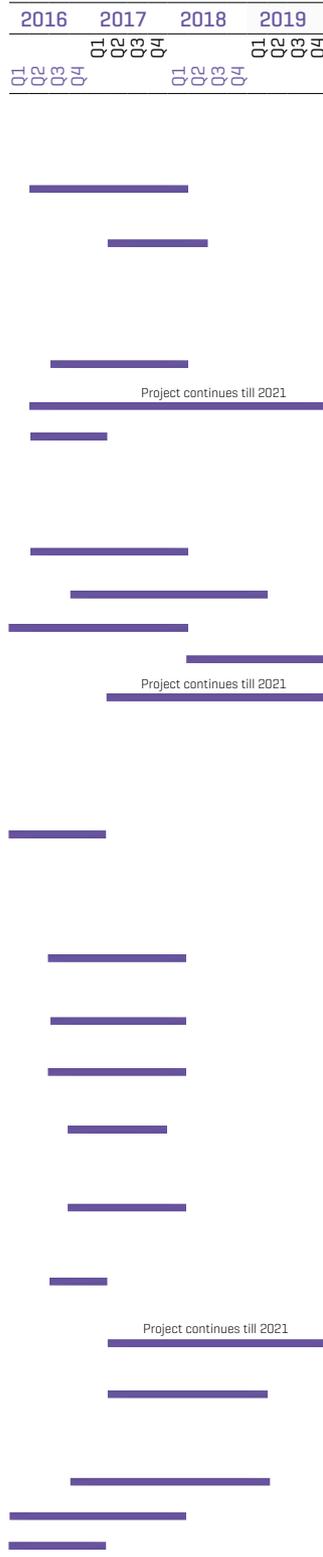
Indoor Air Quality in Higher Performance Homes - pilot

e) How do we prioritise and address these issues?

Roof Design Pathways

Occupant Ventilation - Behaviour

Indoor Air Quality Knowledge in NZ



█ Indicates work in progress

### 2. Solutions to developing warmer, drier, healthier buildings in New Zealand have been successfully identified.

a) What are the solutions to addressing external moisture issues that prevent our current buildings being warm, dry and healthy?

Weather-tightness of Mid-Rise Buildings

WUFI Development

Ridge & Fascia Vent Design and Performance

b) What are the solutions to addressing internal moisture issues that prevent our current buildings being warm, dry and healthy?

Interstitial Moisture in Roof Cavities

Simulate the Airflow of a Roof with Detailed Roof Geometry

NZBC E3 Internal Moisture Verification Method

WUFI Development

c) What are the solutions to addressing ventilation-related issues that prevent our current buildings being warm, dry and healthy?

Ventilation Performance in Large Span Roofs

Ridge & Fascia Vent Design and Performance

Airtightness trends, impacts and energy saving opportunities

Energy Efficient Ventilation

Simulate the Airflow of a Roof with Detailed Roof Geometry

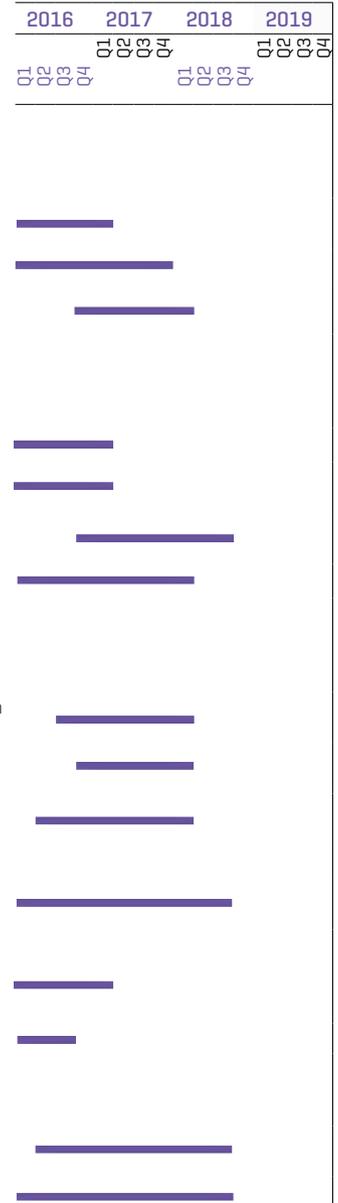
d) What are the solutions to indoor environmental quality-related issues that prevent our current buildings being warm, dry and healthy?

PCO Research

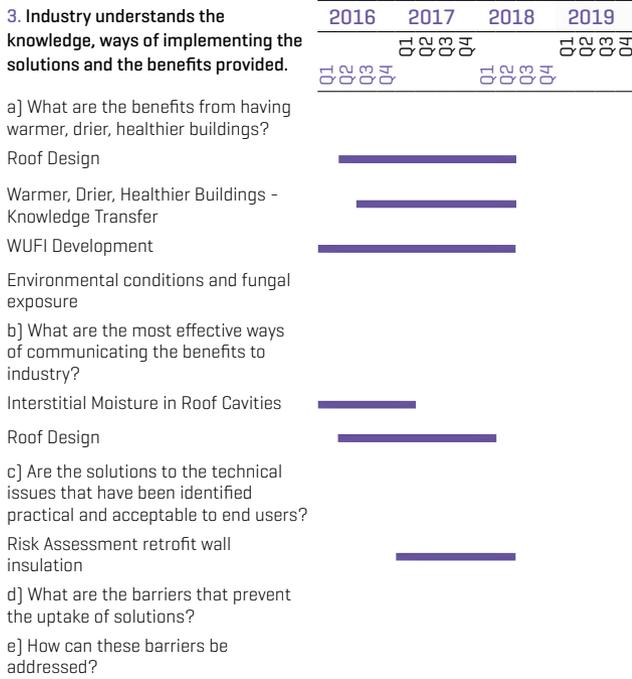
e) What previous work has been completed to try and solve these issues?

NZBC E3 Internal Moisture Verification Method

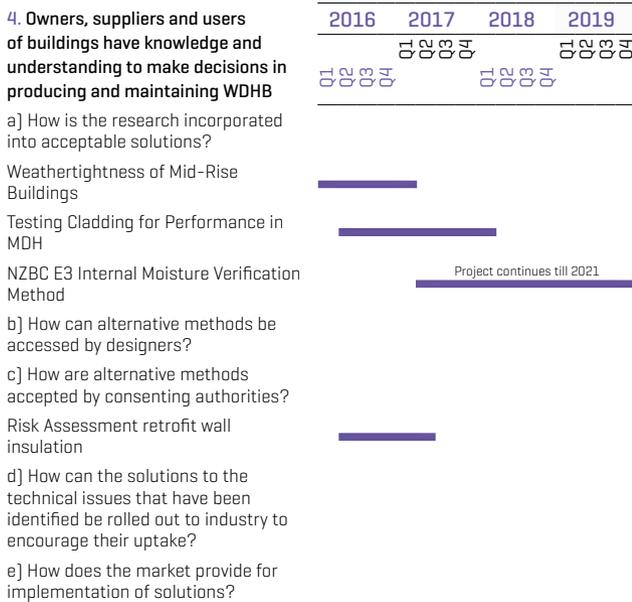
Energy Efficient Ventilation



**3. Industry understands the knowledge, ways of implementing the solutions and the benefits provided.**



**4. Owners, suppliers and users of buildings have knowledge and understanding to make decisions in producing and maintaining WDHB**



Project continues till 2021

### There is a shared understanding of the issues that prevent our current homes and buildings being warm, dry and healthy

Work on projects to address this critical success criteria are being developed and will begin in 17/18.

### Solutions to developing warmer, drier, healthier homes and buildings in New Zealand have been successfully identified

#### Airtightness trends, impacts, and energy saving opportunities

This project will expand the current data on airtightness to include homes built since 2010 by using “blower door” tests on newer properties to test their airtightness. The results will be used to create a national database that can be used to develop ways of mapping, simulating and improving building performance. The project will also carry out tests on older houses to find out the best way of preventing heat loss and improving energy efficiency.

#### Monitoring conditions and air flows in roofs

At present we have little information about the ventilation rate and moisture levels in gable and skillion-type roofs. This applies to both residential and commercial roofs. This project will develop methodologies to assess roof performance and provide data to help us understand the physical process behind roof cavity issues. In the long-term the project may lead to a roof airtightness database similar to the house airtightness database. This data will then be able to be applied to help optimise design approaches for roofs.

#### Roof design pathways

This project will develop a tool to provide guidance to designers and architects on how to design roofs that are properly ventilated whatever the location, climate, design and internal conditions. The project will also help us understand why some roofs fail, and provide the industry with strategies they can use to avoid failure.

#### Testing in the field - expanding BRANZ's experimental building programme

This project will expand BRANZ's experimental building programme by building identical “test huts” in Central Otago, Christchurch and Auckland as well as in Wellington. These huts will be used for long-term experiments on building elements. They will initially be used to look at the issues that arise when using absorbent claddings over a cavity. This initial project will provide information about the long-term performance of a range of different cavity configurations, surface coatings, insulation and internal wall linings.

#### Building Research Levy investment

\$420,000

#### Timeframe

Due to be completed by March 2017

#### Contact

Stephen.McNeil@branz.co.nz

#### Building Research Levy investment

\$420,000

#### Timeframe

Due to be completed by March 2017

#### Contact

Stephen.McNeil@branz.co.nz

#### Building Research Levy investment

\$72,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Stephan.Rupp@branz.co.nz

#### Building Research Levy investment

\$210,000

#### Timeframe

Due to be completed by March 2019

#### Contact

Manfred.Plagmann@branz.co.nz

#### Building Research Levy investment

\$445,000

#### Timeframe

Due to be completed by March 2018 (and then ongoing)

#### Contact

Greg.Overton@branz.co.nz

### Getting homes dry

This purpose of this project is to find out the typical range of humidity levels in New Zealand homes. It will identify where poor operation of the house may be causing high humidity levels, and whether those houses form a distinct group.

### The potential impact of energy-saving building design on occupant health

Residential building design is evolving to reduce energy demands, carbon dioxide emissions and to reduce heating costs to occupants. However, as buildings become more airtight, there can be a general deterioration of indoor air quality. If indoor air quality is compromised by certain design initiatives in terms of chemical contaminants, then it is likely that bio-contaminants may also thrive in this environment. The outcomes of this research will be to provide guidance on ventilation in the home environment. It will identify the sources and concentration of harmful substances.

### Identifying the sources and characteristics of particulates and volatile organic compounds in New Zealand residential dwellings

Volatile organic compounds [VOCs] are known to cause poor air quality. However there has been little research carried out on the sources, compositions and concentrations found in homes in New Zealand. VOCs emitted from housing materials vary greatly in both number and concentrations. They can be found in numerous building materials including: glues, paints and varnishes, epoxies, fillers, carpets, veneers and woods.

This project will use a dynamic chamber system to capture and identify the compounds and origins of some of the more invasive VOC substances. Dynamic chamber studies have the advantage of providing both emission composition and emission rates under determined environmental conditions. Where possible means of VOC reduction and /or mitigation will be identified and evaluated. The ultimate project deliverable will be a database identifying materials and associated VOCs and their health effects.

### Keeping our children warm and dry: evidence from Growing up in New Zealand

Growing Up in New Zealand is a flagship New Zealand longitudinal research resource. It consists of data collected about child health and wellbeing, psychosocial and cognitive development, education, family and whanau, culture and identity, and societal context. This project will pilot an indoor climate measurement protocol within the Growing Up in New Zealand "Leading Light" children's schools and homes.

This will provide valuable insight and understanding of the determinants of poor indoor climate, and the health and education outcomes associated with indoor climate. The project will support the development and testing of a process for measuring indoor climate in classrooms and homes. It will develop a protocol to utilise simple

### Building Research Levy investment

\$75,000

#### Timeframe

Due to be completed by March 2017

#### Contact

Andrew.Pollard@branz.co.nz

### Building Research Levy investment

\$94,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Terri-Ann Berry, Tberry@unitec.ac.nz

### Building Research Levy investment

\$100,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Tana Levi, T.levi@crl.co.nz

### Building Research Levy investment

\$100,000

#### Timeframe

Due to be completed by February 2017

#### Contact

Susan Morton, S.morton@auckland.ac.nz

monitors to make individual-level measurements of temperature, humidity and carbon dioxide (CO<sub>2</sub>) in each cohort child's classroom and home.

The advantage of adding this measurement onto an existing cohort study is that these measures will be linked to previously-collected information about the family, home and school environments. It also links to individual detailed descriptions of each child's health and development (collected via self-report and via abstraction of data from routinely collected records of primary care visits and hospital admissions). This will provide unique insight around the impact of the indoor climates of our schools and homes on New Zealand's children.

## Industry understands the knowledge, ways of implementing the solutions and the benefits provided

### Ventilation performance in large-span roofs

Long-running skillion-type roofs are becoming more common in schools and other institutions. However, there are concerns that they do not allow moisture to be removed effectively because of high air-flow resistance. This project will provide recommendations and solutions about free air-gap height, and whether any additional ventilation openings are required.

### Ridge and fascia vent design and performance

Using an experimental rig this project will establish if and how water can enter the roof via ventilation openings. It will use wind pressure and rain simulation for outside water. It will use a simulated condensate on the inside of vents for the internal moisture source. The vent designs will be varied to establish best designs by looking at options such as thermally isolated baffles, vent shape for condensate run-off etc. The project will assess whether there is an issue. If this proves to be the case, it will provide design and/or installation guidelines for fascia and ridge vents to prevent water intrusion into roofs through vents.

## Owners, suppliers and users of homes and buildings have the knowledge and understanding to make effective decisions in producing and maintaining warm, dry, healthy environments

### Roof design

Roof design can be complicated. It must balance structural requirements with the demands of the environment and the climate, weathertightness, the ideal slope and aesthetic considerations. Drawing on insight and evidence from other research in this programme, this project will involve producing a series of fact sheets about roof design and cladding. These will be followed by a more comprehensive resource that will provide independent and impartial advice about all roofing types.

### Building Research Levy investment

\$360,000

#### Timeframe

Due to be completed by July 2018

#### Contact

Manfred.Plagmann@branz.co.nz

### Building Research Levy investment

\$187,000

#### Timeframe

Due to be completed by September 2018

#### Contact

Manfred.Plagmann@branz.co.nz

### Building Research Levy investment

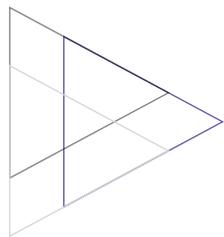
\$165,000

#### Timeframe

Due to be completed by March 2017

#### Contact

Trevor.Pringle@branz.co.nz







## Distinct, stand-alone research

**B**RANZ also invests Building Research Levy in work beyond the four priority programmes outlined in this document. This is part of BRANZ's commitment to maintaining a balanced portfolio of research investment and to maintaining investment in important research capability.

Each project is mapped against the research priority themes from the Industry Research Strategy, Building a Better New Zealand.

**A full list of all continuing projects in 16/17 is provided in Appendix 1.**

**Details of new projects beginning in 16/17 are provided here.**

## Materials performance

### **A durability evaluation framework for innovative materials**

Durability is a key element of the Building Code. The durability requirements for New Zealand are different to many other countries. This work aims to develop a framework to assess the compatibility and durability of innovative building materials and systems. It aims to provide answers to some key questions. These include:

- What properties are essential to long-term durability and must be assessed?
- How do we assess them?
- How do we interpret results according to service conditions and are they compatible and durable for use on buildings?

On the back of this research it will be possible to develop new guidance and technical solutions. This will support the use of new materials, methods, and techniques for design, construction, renovation, and maintenance.

### **Corrosion in the Bay of Plenty environment**

The Bay of Plenty environment is complicated by marine and geothermal/volcanic influences. It is an area of population growth for New Zealand with many new buildings forecast in coming years. This work will investigate the interactions of construction materials and buildings with this unique and challenging environment. It will then produce updated, critical environmental information for the development of new buildings and infrastructure assets in this fast-growing region.

### **Building Research Levy investment**

\$625,000

#### **Timeframe**

Due to be completed by March 2021

#### **Contact**

Zhengwei.Li@branz.co.nz

### **Building Research Levy investment**

\$230,000

#### **Timeframe**

Due to be completed by September 2019

#### **Contact**

Zhengwei.Li@branz.co.nz

## Better buildings

### New editions of BRANZ publications

BRANZ produces publications for the industry as a key mechanism for transferring research findings in to practice. This initiative supports the review of five of key publications. They are:

- LEVEL – Heating and Ventilation
- LEVEL – Plumbing
- LEVEL – Electrical Design
- Good Practice Guide – Texture Coated Claddings
- Good Practice Guide – Internal Linings

The review and development of new editions of these publications follows a comprehensive annual review process which is undertaken by both BRANZ and industry bodies and organisations. The new editions will be released in both hardcopy and digital formats.

### Fire-safe use of timber construction

Wood is becoming increasingly popular for surface linings, while a range a new structural timber systems, such as cross-laminated timber, are also now available. This project will look at the fire safety issues associated with both timber linings and structural timber systems. It will also develop technical solutions to address these concerns and help ensure that these products meet Building Code requirements.

### Design of hybrid timber structures for multi-storey and medium density housing applications

There is a growing interest in building multi-storey timber buildings, particularly ones that incorporate light timber framing (LTF). This interest is heightened as New Zealand responds to demand for new, higher density housing in urban centres such as Auckland. This work will look at ways of integrating different structural systems, such as concrete, steel, post-tensioned or cross-laminated timber. The aim is to help make light timber framed buildings more resilient in the event of natural hazards.

### Reducing earthquake damage to irregular light timber framed (LTF) buildings

A BRANZ survey of more than 100 light-timber-framed (LTF) homes affected by the 2011 Christchurch earthquake found that those with regular structures suffered less damage than those with structural irregularities. This project will identify the types of structural irregularities that are likely to perform well in an earthquake and those that are likely to lead to significant damage. This research will provide new insights to better inform the design community.

### Building Research Levy investment

\$98,000

#### Timeframe

Due to be completed by March 2017

#### Contact

Margaret.Mclachlan@branz.co.nz

### Building Research Levy investment

\$837,000

#### Timeframe

Due to be completed by September 2020

#### Contact

Colleen.Wade@branz.co.nz

### Building Research Levy investment

\$300,000

#### Timeframe

Due to be completed by August 2018

#### Contact

Angela.Liu@branz.co.nz

### Building Research Levy investment

\$385,000

#### Timeframe

Due to be completed by March 2018

#### Contact

Angela.Liu@branz.co.nz

## Sustainability

### **New Zealand best practice energy / thermal simulation**

The project will develop a methodology, and associated tools, to improve thermal simulation for buildings. It will support analysis of whole building energy consumption, thermal comfort, and indoor environmental quality. The purpose of this is to enable the designer to go beyond the specific construction details that define the Building Code's minimum practice.

The aim is to improve consistency, reliability and trust in best practice design solutions through better modelling. This in turn means industry will be able to design warmer, drier, healthier, homes for consumers without the need for expensive energy heating systems.

### **Residential water use**

Water is expected to become an increasingly scarce commodity in the future. However, there is little information about how water is used in New Zealand homes. This project will look at how water is currently used, and how water-conscious New Zealanders are. It will also provide a benchmark for residential water use that will allow regional comparisons, and identify opportunities for water efficiency.

### **Building Research Levy investment**

\$140,000

#### **Timeframe**

Due to be completed by August 2017

#### **Contact**

Brian.Berg@branz.co.nz

### **Building Research Levy investment**

\$270,000

#### **Timeframe**

Due to be completed by June 2018

#### **Contact**

Lee.Bint@branz.co.nz

## Productivity

### **Monitoring industry performance**

This project supports ongoing monitoring of the performance of the building industry. It focuses in particular on productivity, providing an update our previous productivity numbers and explaining to the industry what they mean. These new figures will also be used to update the BRANZ construction dashboard. This is an interactive summary of key indicators that explain the current state of the industry, and forecast future changes. Access and use of this resource supports the industry to benchmark its own performance and identify areas for improvement.

### **New House Owners' Satisfaction Survey**

BRANZ's annual New House Owners' Satisfaction Survey has been running since 2011. This is a valuable resource for monitoring the performance of builders of new residences. It provides key insights around how well industry is meeting consumer expectations and aspirations. It is one of the few measures of quality available. This project will allow BRANZ to run the survey for the next five years.

### **Building Research Levy investment**

\$180,000

#### **Timeframe**

Due to be completed by March 2021

#### **Contact**

Matthew.Curtis@branz.co.nz

### **Building Research Levy investment**

\$250,000

#### **Timeframe**

Due to be completed by March 2021

#### **Contact**

Matthew.Curtis@branz.co.nz

## Operating environment

### New Zealand Housing Review

The aim of this project is to scope and initially develop a comprehensive, one-stop shop for research and insight about housing in New Zealand. A wide range of information is available about New Zealand housing. However, this information is contained on the whole in distinct datasets that are held across a number of different public and private organisations. This work aims to pull together these key sources of information in to a single resource, providing a holistic picture around the state of housing in New Zealand. The project will in turn create new opportunities for analysis of trends and inter-relationships – providing a richer picture than has previously been possible.

### Providing maintenance schedules free to industry and consumers

BRANZ has developed a web-based maintenance schedule tool which provides detailed information for builders and their customers around the maintenance requirements for new homes. The tool aims to tackle a key contributor of poor housing in New Zealand – poor understanding of what is needed to maintain the materials and systems that make up properties. This investment supports the re-development of this tool and enables it to be made freely available – the aim being to support industry to provide a better service to more New Zealand consumers.

### Valuing the role of construction in the New Zealand economy

Working with the Construction Strategy Group and the Construction Industry Council (CIC) this project will provide an update of economic analysis of the construction sector in New Zealand last carried out in 2011. The aim is to provide key information about the value and significance of the sector, ensuring the profile of the construction industry is up to date.

### Virtual Clerk of Works – quality assurance for the built environment

Assuring 'as built' quality is in everyone's best interests. In recent times efforts to solve quality problems have focused on checking whether the design and build complies against applicable codes and standards. This is largely done via the product assurance framework and the building consenting process managed by Building Consenting Authorities (BCAs). In addition, the Licensed Building practitioner scheme has been introduced.

If the outcome sought is 'evidenced as-built quality' and a real assurance of a performing building (and not a liability), then the approach needs to shift. By focussing on capturing the evidence that would support any current or future determination, it may be possible to facilitate virtual inspection alongside critical on-site inspections.

BRANZ is investing in the development of a new solution, capable of identifying potential critical and quality failure points inherent in individual builds. The toolset would identify potential risk and quality failure points inherent in individual builds, provide a build-specific check list, and functionality. This would perform the traditional "clerk of works" function on each build.

By collating data from each instance of use, BRANZ will also develop a significant build quality dataset.

### Building Research Levy investment

\$191,000

#### Timeframe

Due to be completed by May 2017

#### Contact

Anne.Duncan@branz.co.nz

### Building Research Levy investment

\$40,000

#### Timeframe

Due to be completed by May 2016

#### Contact

Margaret.Mclachlan@branz.co.nz

### Building Research Levy investment

\$50,000

#### Timeframe

Due to be completed by September 2016

#### Contact

Andrea Simpson, andrea@ascnzlimited.com

### Building Research Levy investment

\$220,000 (initial development funding in 2016/17)

#### Timeframe

Phase one to be completed by March 2017, further phases to follow as tool is developed, refined and piloted.

#### Contact

Richard.Capie@branz.org.nz





## Appendix - All projects underway in 2016/17

For further information on the programmes please contact the programme leaders. All other enquires about other projects should be sent to [research@branz.org.nz](mailto:research@branz.org.nz).

### Medium-density housing that meets the needs of New Zealanders

	Building Research Levy Investment
Defining medium density housing for New Zealand	\$180,000
The new medium density housing market – demand-side analysis	\$140,000
The new medium density housing market – supply-side analysis	\$150,000
Medium density housing construction quality survey	\$200,000
Testing claddings for performance in medium-rise buildings, in particular multi-unit residential apartments	\$360,000
Medium-density housing fact sheets	\$120,000
Medium Density Housing information resource	\$160,000
Fire spread from lower roofs	\$428,000
Market research for medium density housing projects	\$60,000
Acoustic Design of Medium Density Housing	\$116,000
Developing tools to measure and improve the quality and liveability of medium density housing developments	\$97,500
Knowing enough to maintain: Understanding the gaps in the knowledge of owners and residents around the maintenance requirements for medium density housing	\$90,000
Getting medium density housing through the hoops	\$85,000
Understanding Drivers of Medium Density Housing	\$80,000
Getting the benefit: Understanding how to support benefits-realisation for residents of medium density housing	\$95,000

### Exceeding the minimum

	Building Research Levy Investment
Design decisions	\$105,000
Doing better – assessing recent New Zealand research for impact	\$94,125
Modelling our future residential building stock	\$150,000
Which standards can be exceeded to provide benefits	\$150,000
Building to rent	\$180,000
Understanding life-cycle design: Disseminating the benefits of a new technique for evaluating building design life cycle impacts	\$176,000
The choice to exceed	\$105,000
When is 'good enough' not good enough?	\$90,000
Who benefits from exceeding the minimum	\$60,000
Adapting the LCAQuick Office tool for residential buildings	\$178,000
Which Structure? Assisting engineers make more informed decisions about structural alternatives going beyond current Building Code	\$140,000

### Eliminating quality issues.

	Building Research Levy Investment
What is quality in buildings?	\$140,000
Identifying the most common quality issues using a building pathology approach	\$150,000
Prioritising quality: identifying key quality issues	\$180,000
Finding ways of encouraging the industry to adopt new ways	\$80,000
Evidence around quality issues – what can industry data source tell us?	\$54,150

### Warmer, drier and healthier buildings

	Building Research Levy Investment
Airtightness trends, impacts, and energy saving opportunities	\$420,000
Monitoring conditions and air flows in roofs	\$72,000
Roof design pathways	\$210,000
Testing in the field - expanding BRANZ's experimental building programme	\$445,000
Getting homes dry	\$75,000
The potential impact of energy-saving building design on occupant health	\$94,000
Identifying the sources and characteristics of particulates and volatile organic compounds in New Zealand residential dwellings	\$100,000
Keeping our children warm and dry: evidence from Growing up in New Zealand	\$100,000
Ventilation performance in large-span roofs	\$360,000
Ridge and fascia vent design and performance	\$187,000
Roof design	\$165,000

### Distinct, stand alone projects continuing in 2016/17

#### Materials performance

	Building Research Levy Investment
A durability evaluation framework for innovative materials	\$625,000
Corrosion in the Bay of Plenty environment	\$230,000
Materials within geothermal environments	\$489,000
Building resilience	\$720,000
Materials performance-testing methodologies	\$1,553,000
Structural adhesives	\$465,000
Positional material deterioration over the building envelope	\$540,000
Effects of absolute humidity on plasterboard bracing	\$124,000
Simkin: Scholarship	\$75,000
Jones: Scholarship	\$75,000
Van Tran: Scholarship	\$45,000
Tariq: Scholarship	\$75,000

## Better buildings

## Building Research Levy Investment

New editions of BRANZ publications	\$98,000
Fire-safe use of timber construction	\$837,000
Design of hybrid timber structures for multi-storey and medium density housing applications	\$300,000
Reducing earthquake damage to irregular light timber framed (LTF) buildings	\$385,000
Simulating the airflow of a roof with detailed roof geometry	
Whole house R-values	\$430,000
Indoor air quality knowledge in New Zealand	\$80,000
Energy-efficient ventilation	\$440,000
Occupant behaviour – ventilation and temperature	\$476,000
Removal of fungal spores and unwanted allergens from indoor air spaces using ultra-violet light	\$100,000
Weathertightness	\$350,000
Interstitial moisture in roof cavities	\$330,000
WUFI development	\$470,000
Non-residential rainwater and greywater feasibility	\$333,000
Performance-based fire safety engineering – limiting fire spread by design	\$1,673,000
Warmer, drier, healthier buildings – knowledge transfer	\$73,000
Passive fire protection guide – workshop	\$20,000
Good practice guide – non-structural components	\$98,000
Flood it – reducing flood effects on New Zealand dwellings	\$384,000
Tensile strength of screwbolt anchors at slab corners	\$5,000
Specific design for light timber framed buildings	\$620,000
Natural hazards platform pallet racking	\$20,000
Seismic response of buildings – cost/benefit of increased resilience	\$793,000
Input to MBIE Engineering Advisory Group	\$71,000
Code of Practice for suspended ceilings	\$32,000
Improving home building quality	\$15,000
Thompson: Scholarship	\$75,000
Taptiklis: Scholarship	\$75,000
VUW Summer Research Scholarship	\$3,000
Marriot: Scholarship	\$20,000

### Maintaining and improving the performance of existing buildings

Building Research  
Levy Investment

2015 House condition survey	\$900,000
The potential for over-cladding Stage Two: Is there an economic case?	\$150,000
Effects of proprietary mechanised home ventilation systems on health	\$88,000
Bedford: Scholarship	\$75,000
McGowan: Scholarship	\$20,000

### Sustainability

Building Research  
Levy Investment

New Zealand best practice energy / thermal simulation	\$140,000
Residential water use	\$290,000
Environmental profiling	\$1,053,000
Maintaining ALF 3.2	\$40,000
Materials and characteristics of new buildings	\$400,000
Measuring the value of sustainability and resilience features in housing	\$450,000
Construction waste	\$28,000
Ghose: Scholarship	\$75,000
Coughlan: Scholarship	\$38,000
Duff: Scholarship	\$20,000

### Building better cities and communities

Building Research  
Levy Investment

Revised legal frameworks for ownership of land with multiple dwellings	\$50,000
Mixed-use urban planning and development	\$60,000
Value uplift in New Zealand cities	\$96,000
Delivering affordable accessible housing for better cities and communities	\$67,000
The case for urban development authorities in urban regeneration	\$106,000

## Productivity

### Building Research Levy Investment

Monitoring industry performance	\$180,000
New House Owners' Satisfaction Survey	\$250,000
Mapping the roles of the building and construction industry	\$157,000
Industry performance measures	\$320,000
Improving build quality and productivity through demonstration on-site of common construction details and how to build them	\$45,000
ArchEng 2016	\$55,000
Miller: Scholarship	\$75,000
Shahzad: Scholarship	\$75,000
Leadership through future thinking	\$250,000

## Operating environment

### Building Research Levy Investment

New Zealand Housing Review	\$459,000
Providing maintenance schedules free to industry and consumers	\$40,000
Valuing the role of construction in the New Zealand economy	\$50,000
Virtual Clerk of Works – quality assurance for the built environment	\$1,750,000
BRANZ Research Levy Forecasts	\$34,000
Advisory Services	\$300,000
BUILD magazine	\$883,000
BUILD Magazine to Industry Apprentices (BCITO & ITAB)	\$33,000
BRANZ Find	\$56,000
Level website	\$72,000
Webinars [various]	\$90,000
Seminars [various]	\$435,000
Annual Publications Review	\$32,000
Builder's Mate	\$150,000
Guideline	\$30,000
Bulletins	\$150,000
Weathering Site	\$30,000
Durability Verification Database	\$10,000
Building Controls [expert input in to Code and Standards development]	\$300,000

Continued...	
Funding of the Building Research Library	\$279,000
Preparing for the next version of H1	\$450,000
Asbestos contaminated soils	\$175,000
MyCodeHub Stage 2 – BRANZ input and expertise	\$17,000
B-RISK user support	\$220,000
Engineering basis for reaction to fire properties of internal surface linings	\$62,000
Seismic design of screwed timber joints	\$200,000
When did disruption become a good thing?	\$81,000
Residential safety systems aiming to reduce falls from heights	\$140,000

### Automation, industrialisation and new technologies

Building Research  
Levy Investment

Assessing the value of traceability to New Zealand construction	\$170,000
BRANZ 3D and 4D library	\$200,000
Support for the national BIM initiative	\$120,000
BIM acceleration: industry training	\$5,000
BIM acceleration: government as a client	\$46,000
BIM case studies	\$15,000
Specific design for multi-storey light steel framed housing	\$80,000
Zero net energy schools	\$40,000
Developing the concrete sector's 10-year research roadmap	\$20,000
Patel: Scholarship	\$75,000

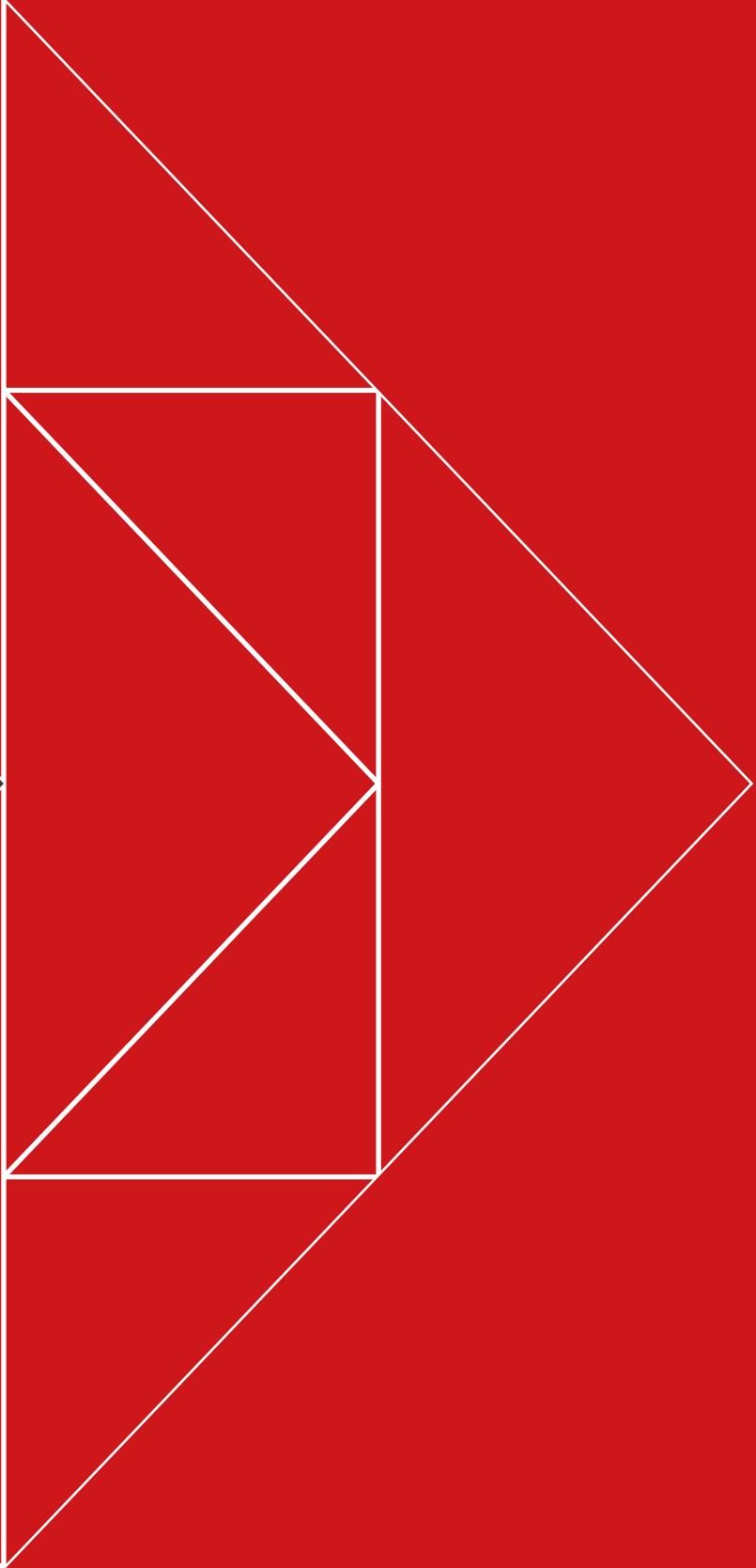
### Meeting the housing needs of all New Zealanders

Building Research  
Levy Investment

Good homes for low-income tenants	\$1,100,000
Community housing and the building industry: procurement for affordable housing	\$95,000
The New Zealand rental sector	\$283,000
Henning-Hansen: Scholarship	\$75,000







**BRANZ** Incorporated  
1222 Moonshine Road, RD1, Porirua 5381, New Zealand  
T +64 4 237 1170 F +64 4 237 1171  
branz@branz.co.nz  
www.branz.nz