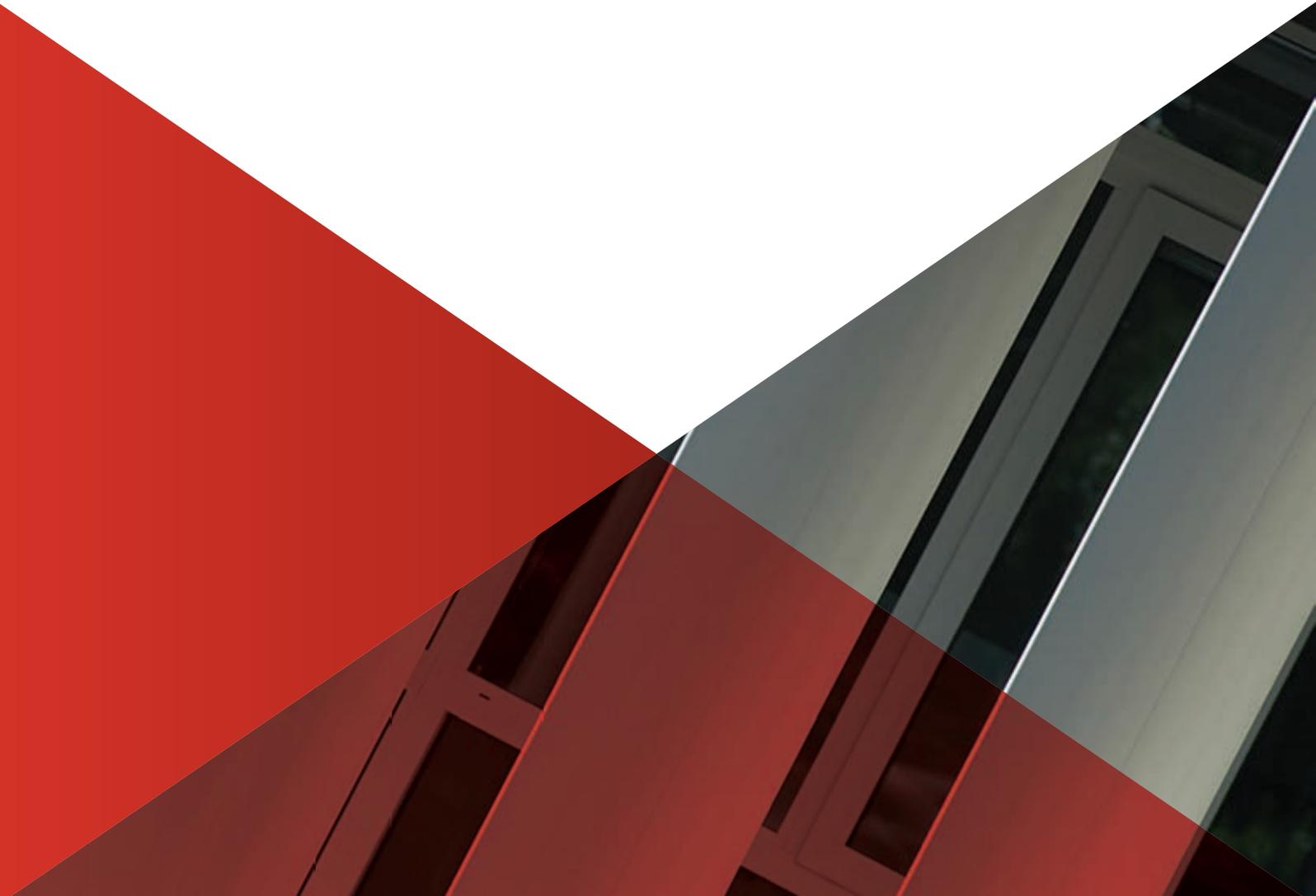




Investing in Better Buildings for New Zealand

Building Research Levy in Action – Investment 2014/15



funded research

\$10.3m

Contents at a glance

The new projects funded in 2014/15 are summarised in this booklet under the 9 themes from Building a Better New Zealand.

-  **BETTER BUILDINGS**
-  **MATERIALS PERFORMANCE**
-  **MAINTAINING AND IMPROVING THE PERFORMANCE OF EXISTING BUILDINGS**
-  **SUSTAINABILITY**
-  **AUTOMATION, INDUSTRIALISATION AND NEW TECHNOLOGIES**
-  **OPERATING ENVIRONMENT**
-  **PRODUCTIVITY**
-  **MEETING THE HOUSING NEEDS OF ALL NEW ZEALANDERS**
-  **BUILDING BETTER CITIES AND COMMUNITIES**



Foreword – Dr Helen Anderson

BRANZ Chair

The Building Research Levy funds a wide range of projects, developing innovative solutions and supporting the education and development of the building profession.



These in turn help the building industry deliver better buildings for New Zealanders.

This booklet gives a brief outline of projects funded by the Building Research Levy in the 2014/15 investment funding round. It includes projects undertaken by BRANZ and other research providers.

This investment is being used to support projects that will help the building and construction industry deliver more quality homes and buildings. It will stimulate ever better use of materials and building systems and contribute to greater understanding of the challenges facing our industry.

With the rebuild of Canterbury and housing and economic growth in other parts of New Zealand, expectations and demands on the building industry will continue to grow.

The ideas and solutions developed in the projects outlined here will help meet those expectations.

The investments outlined in this publication are aligned to priorities contained in *Building a Better New Zealand*, the new Industry Research Strategy. This Strategy, launched in September 2013 is co-owned by MBIE, BRANZ, the Construction Industry Council and the Construction Strategy Group. We are proud to support this pan-industry research strategy.

As well as investing within the BRANZ Group, Building Research Levy is also invested with research organisations from across New Zealand. This means we can draw on the extensive expertise that exists within universities, Crown Research Institutes and independent research providers. In 2014 we launched a new research prospectus targeted at these organisations. I'm delighted that we had such a positive response with over 90 expressions of interest. As a result BRANZ has been able to increase Levy investment to tackle gaps in the *Building a Better New Zealand strategy*.

A handwritten signature in blue ink that reads "Helen Anderson". The signature is fluid and cursive, with a long horizontal line extending from the end.

Helen Anderson
Chair

Contents

Foreword – Dr Helen Anderson BRANZ Chair	3
01 BETTER BUILDINGS	6
Solving Roof-Moisture Problems	6
Improving the resilience of non-structural building components	7
New Good Practice Guides	8
Revision of NZS 3603 – the Timber Structures Standard	8
Tackling indoor moisture problems – understanding the role of occupant behaviour	9
Building Basics – New Zealand Building Code Protection from Fire	10
Supporting the use of alternative water sources in non-residential buildings	10
Existing Projects continuing in 2014/15	11
02 MATERIALS PERFORMANCE	12
Exploring the use of Cross-Laminated Timber for Building Construction in New Zealand	12
Improving homes – optimising insulation around the perimeters of floor slabs	13
Tackling material failure in Geothermal Environments	14
BRANZ Scholarship – Audsley Jones	14
BRANZ Scholarship – Gye Simkin	14
BRANZ Scholarship – Samia Ali Tariq	15
BRANZ Scholarship – Van Tran	15
Existing Projects continuing in 2014/15	15
03 PERFORMANCE OF EXISTING BUILDINGS	16
2015 House Condition Survey	16
A new series of Good Repairs Guides	17
Effects of proprietary mechanised home ventilation systems (MHVS) on health	18
Improving decision-making about existing homes (renovate or retire) at the level of a neighbourhood development	18
Seismic Improvement of Unreinforced Masonry Cavity Walls	19
Existing Projects continuing in 2014/15	19
04 SUSTAINABILITY	20
Helping with the thermal design of houses – updating the ALF online tool	20
Insight in to the materials and characteristics of new buildings	21
Measuring the value of sustainability and resilience features in housing	22
BRANZ Scholarship – Agneta Ghose	22
BRANZ Scholarship – Sara Wareing	22
BRANZ Scholarship – Victoria Toner	23
BRANZ Scholarship – Sally Coughlan	23
Existing Projects continuing in 2014/15	23

01 Better buildings

Buildings are fundamental to our way of life. They are the foundations of our economy and represent the majority of fixed assets in New Zealand.

Improving the quality, function and performance of our buildings is a vital foundation for supporting New Zealand's economic growth.

Providing good-quality buildings, including housing, schools, and workplaces is important for all New Zealanders.

The research topics set out in the Better Buildings theme are:

- Resilient buildings
- Moisture in buildings
- Indoor air quality and moisture control
- Ventilation
- Acoustic performance
- Fire

Solving Roof-Moisture Problems

What is driving this research?

Moisture accumulation inside roofs can cause considerable damage to buildings requiring expensive repairs. It can be a particular issue with some types of buildings such as schools. This project will help determine the causes and impacts of internal moisture and identify solutions to prevent these problems from happening.

What is it going to achieve?

The aim is to reduce the risk of internal moisture problems occurring in roofs across the New Zealand building industry. By understanding what is creating internal moisture issues then designers and builders will be able to come up with solutions to prevent problems happening in the first place. The work will also help tackle existing problems.

What will success look like?

This project will be successful when the root causes of roof-moisture problems are understood and the industry is able to prevent or mitigate the problem. Ultimately, success will be measured by significant roof moisture problems being a thing of the past in New Zealand buildings.

How much Building Research Levy is being invested?

\$250,000

What is the timetable?

The project is due to be finished by March 2017.

Want to know more?

Manfred Plagmann

Manfred.Plagmann@branz.co.nz

\$3,026,164

Total investment in 2014/15

Improving the resilience of non-structural building components

What is driving this project?

The Canterbury earthquakes and the 2013 Seddon earthquakes have highlighted the damage and disruption that can be caused by the failure of non-structural building components such as internal fixtures and fittings. Yet despite the risk to both property and human life, it's become clear that practice around the design and installation of non-structural building components varies considerably. This project will address the lack of consistent, agreed guidance that exists. It aims to improve the design and installation of non-structural components and help minimise future risks to both new and existing buildings.

What is it going to achieve?

The project will bring together key industry representatives – project managers, architects and designers, engineers, manufacturers and installers of non-structural components – to develop best practice guidance around the design and installation of non-structural components. It will produce agreed guidance on existing and new approaches that can be taken to reduce the risk of the failure of non-structural components in events such as earthquakes.

What will success look like?

Success will be measured by take up and adherence to the guidance by industry. This in turn will be reflected in improved performance of non-structural elements during future events. The aim is to ensure that the damage and disruption witnessed in recent years isn't repeated.

How much Building Research Levy is being invested?
\$168,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Margaret McLachlan

Margaret.McLachlan@branz.co.nz



New Good Practice Guides

What is driving this project?

Good Practice Guides provide the building and construction industry with up to date information and guidance on approaches to a wide range of industry practice.

A thorough review of existing Good Practice Guides took place during 2013/14 and a number of new and revised editions will be published this year. These publications are particularly timely given the increase in building activity.

What is it going to achieve?

Four new good practice guides will be funded by this investment. They are:

- Membrane Roofing (last published in 1999)
- Profiled Metal Wall Cladding (last published in 2005)
- Timber Cladding (updating the 2nd edition from 2006)
- Tiling (last published 1996).

Good Practice Guides aim to help improve industry performance and ultimately lead to better buildings being constructed and maintained.

What will success look like?

Success of this investment will be seen through high levels of take up and use of the Guides across industry. The ideas and guidance contained in the publications will become accepted as good practice as industry practitioners learn from the best of their peers.

How much Building Research Levy is being invested?
\$70,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Margaret McLachlan
Margaret.McLachlan@branz.co.nz

Revision of NZS 3603 – the Timber Structures Standard

What is driving this research?

The Timber Structures Standard, NZS 3603, is the foundation design standard for timber structures in New Zealand. Importantly, the standard helps underpin NZS 3604 – the Standard that sets out New Zealand's approach to timber framed buildings. The current NZS 3603 standard is 20 years old and has been identified by industry and government as in need of an update. It currently contains no provision for several new technologies that are now widely used in the building industry such as engineered timber products. Updating the Standard will help enable these new products to be more readily used in New Zealand.

What is it going to achieve?

The funding is to support new research that will feed in to the updated Standard. The nature of that research is currently being finalised.

The funding will also help fund expert participation in the Standards Review Committee.

What will success look like?

This project will contribute to the publication of a nationally and internationally recognised standard on timber structure design. The Standard itself will provide the basis for better access to the New Zealand construction market for timber technologies.

How much Building Research Levy is being invested?
\$TBC

What is the timetable?

The project is due to be finished by March 2017.

Want to know more?

Roger Shelton
Roger.Shelton@branz.co.nz

Tackling indoor moisture problems – understanding the role of occupant behaviour

What is driving this research?

A survey of ventilation and moisture in new homes showed that 30% of new homes failed to reach World Health standards for ventilation. Moisture problems were evident in most of these. Indoor moisture problems are also prominent in building failure investigations, making up approximately 15% of cases.

The effectiveness of ventilating a residential home is largely dependent on the behaviour of the occupants. However little is known about how people behave in their homes and the impact that this can have on internal moisture. In order to get a better idea about why homes have moisture issues, occupant behaviour – in particular the opening/closing of doors and windows – needs to be understood. For example, internal doors determine how many ventilation zones exist in a house at any given time. Currently it is assumed that there is only one zone. If this assumption is not true then the home ventilation solutions for New Zealand homes won't be effective.

What is it going to achieve?

This project will help reverse the growth in indoor moisture and associated health and building deterioration costs. More immediately, this project will ensure that ventilation solutions for New Zealand homes are more in tune with occupant expectations and habits.

What will success look like?

The project will provide new insight in to how people behave in their homes. On the back of this information better approaches to ventilation can be developed. In turn, this will mean dryer, healthier homes.

How much Building Research Levy is being invested? \$90,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Manfred Plagmann

Manfred.Plagmann@branz.co.nz



Building Basics – New Zealand Building Code Protection from Fire

What is driving this project?

Building Consent Authorities (BCAs), architects, designers and engineers have identified difficulties with the new Protection from Fire Acceptable Solutions C/AS1-7 and C/VM1. These documents have a different structure to the old ones, with each property type (risk group) being covered by one section.

Several new test methods and quantifiable performance criteria must be achieved, which is a departure from the previous documents. This has led to difficulties and confusion amongst architects, designers, some fire engineers, BCAs and engineers.

What is it going to achieve?

The Building Basics publication will provide clarity and examples for those BCAs, architects, designers and engineers who have found the new fire documents difficult to understand and use effectively.

What will success look like?

Improved delivery of the Building Code provisions around protection from fire and in particular more consistent approaches across industry.

How much Building Research Levy is being invested?

\$95,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Margaret McLachlan

Margaret.McLachlan@branz.co.nz

Supporting the use of alternative water sources in non-residential buildings

What is driving this research?

Almost all non-residential buildings are totally dependent on the water reticulation network. Designers of new buildings and building and facilities managers responsible for existing structures are interested in the feasibility of installing alternative water sources into these buildings. As shown by the Christchurch earthquakes, where 80% of the city's water and sewerage network was severely damaged in the 2011 earthquakes, there is a need for greater water resilience in buildings. There is also interest in how alternative water sources can reduce the burden on existing sources of water.

What is it going to achieve?

The project will help establish whether it is feasible to bring grey-water recycling systems and/or rain water harvesting to New Zealand's non-residential buildings. Depending on the outcomes of the research, tools will be created to help industry assess their options.

This work will help New Zealand progress towards improved water sustainability through these systems.

What will success look like?

The project will be successful if there is an improved understanding of what is feasible, including better information disseminated through existing resources such as Green Star rating tools. In future years, the impact will be visible through an increase in the uptake of rain water harvesting and grey water recycling systems.

How much Building Research Levy is being invested?

\$360,000

What is the timetable?

The project is due to be finished by March 2016.

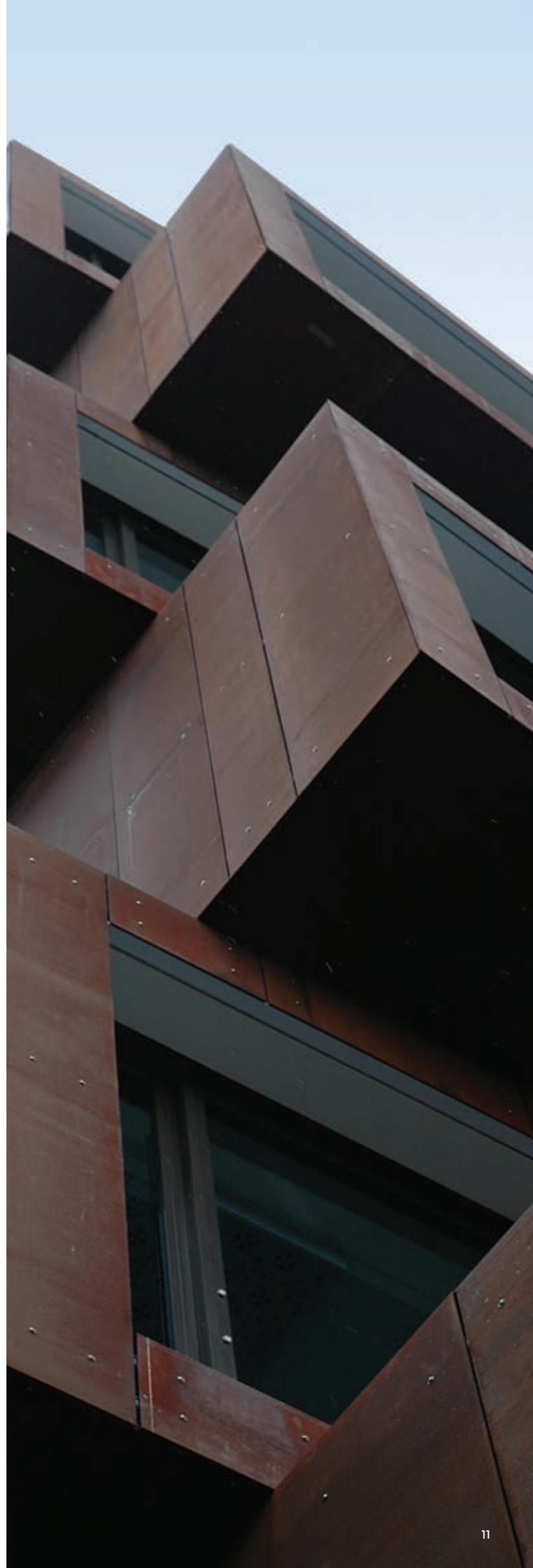
Want to know more?

Lee Bint

Lee.Bint@branz.co.nz

Existing Projects continuing in 2014/15

- New insight into building moisture and indoor environmental quality
- Research around vapour controls in walls
- Work focusing on subfloors and roofs: moisture management, corrosion prevention, thermal performance
- Probabilistic analysis around the performance of house roofs under wind load
- Specific design for Light Timber Framed buildings
- Support for CCANZ on a project exploring acoustics and concrete
- Earthquake Resilience (For Low-rise and Residential Buildings)
- Seismic response of buildings – Cost/Benefit of increased resilience
- Input to MBIE Engineering Advisory Group
- Provision for research to support developments emerging from the Canterbury Earthquake
- Analysis of uneven bracing stiffnesses in houses
- Work revisiting concrete floor slabs
- Co-funding with the New Zealand fire service looking at childcare centres and their risk from fires
- Work with industry and MBIE in developing a Code of Practice for suspended ceilings
- Analysis to better understand whole house R Values
- Support for Pre-Masters students at Victoria University of Wellington
- Work on approaches to limit fire spread by design
- Analysis of the effectiveness of passive fire protection
- Analysis on improving the design of buildings for fire



02 Materials performance

Research into materials and their performance is an area that is consistently rated as an innovation priority.

We need to clearly understand how the materials used in our built environment perform, both as distinct products and as part of increasingly complex systems.

As the range of materials used in the built environment continues to change, the opportunities presented by investing in materials performance are significant – both within New Zealand and for businesses looking at the export potential of their ideas.

Understanding how materials will perform is an important foundation stone in helping underpin the development of new and innovative products that will meet the requirements of the New Zealand Building Code.

Exploring the use of Cross-Laminated Timber for Building Construction in New Zealand

What is driving this research?

Cross Laminated Timber (CLT) is an engineered wood product that has been gaining increasing interest within the construction industry.

The New Zealand timber industry has progressed towards adopting it here with small quantities manufactured since 2012.

But there has been very limited research on the technical and commercial acceptability of CLT within the New Zealand building industry.

What is it going to achieve?

This scoping project will look at the potential applicability of CLT in New Zealand building structures. It will identify areas of the Building Code needing possible upgrade/extension in the future. These are steps that will be important to enable designers and builders to fully consider use of this product. The overall ambition is to provide the building industry with greater options around the use of timber materials.

What will success look like?

This project will provide important clarity on the scope for CLT in New Zealand and help set out the programme of work to support the development of relevant guidance on CLT use.

How much Building Research Levy is being invested? \$69,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Asif Iqbal

Asif.Iqbal@branz.co.nz

\$1,171,901

Total investment in 2014/15

Improving homes – optimising insulation around the perimeters of floor slabs

What is driving this research?

Currently there are 20,000 new houses built every year with slab-on-ground floor systems. These floor slabs have either no insulation applied to the slab or only have rigid foam insulation under the slab itself. The majority of existing floor slabs do not have insulation and the only practical way to improve their thermal performance is to add perimeter insulation. A previous project developed a thermal break solution for floor slabs but recent changes requiring floor slabs to be tied to foundations have now made that solution more difficult to implement. A new solution is required.

What is it going to achieve?

The aim is to set out options around perimeter insulation which fit with these new requirements. The project will develop buildable solutions which can be profiled to industry alongside information about the benefits of perimeter insulation. This means improved information and choices around flooring options, and subsequently better insulated homes for New Zealanders.

What will success look like?

This project will support an increase in the development and use of perimeter insulation systems by industry. Ultimately, it will lead to new housing having effective perimeter insulation which underpins improved thermal performance.

How much Building Research Levy is being invested?
\$250,000

What is the timetable?

The project is due to be finished by March 2016.

Want to know more?

Ian Cox-Smith

Ian.Cox-Smith@branz.co.nz



Photo: Patrick Reynolds Photography.

Tackling material failure in Geothermal Environments

What is driving this research?

Some unexpected, fast, premature failures of both materials and protective coating systems in New Zealand's geothermal regions have come to light. These have taken place in both residential and commercial settings and on new construction as well as existing buildings. These failures can be both expensive and potentially dangerous. It is clear that better understanding is needed of the impact of geothermal environments on the building materials that are specified for use in these areas.

What is it going to achieve?

This project will clearly define how the materials used in the built environment will perform in New Zealand's geothermal regions.

Using this information, technical guidance will be developed to help ensure that optimal materials for buildings and infrastructure are specified. This will take in to account factors such as durability to natural hazards, but also important issues such as affordability and buildability.

What will success look like?

Industry will adopt the technical guidance to underpin construction projects that are being designed and delivered in geothermal regions. As a result of this information being available and used, there will be an improvement in the performance of building materials – notably through a decline in failure rates.

How much Building Research Levy is being invested?

\$425,000

What is the timetable?

The project is due to be finished by March 2017.

Want to know more?

Zhengwei Li

Zhengwei.Li@branz.co.nz



BRANZ Scholarship – Audsley Jones
University of Canterbury, PhD

Audsley's research is looking at the behaviour of buckling restrained braces, compositionally and in interaction with surrounding members. From her analysis, design guidelines will be developed for engineers to design buckling restrained braces, the connections and the surrounding members. A testing protocol will also be introduced for buckling restrained braces designed outside the scope of the guidelines.



BRANZ Scholarship – Gye Simkin
University of Auckland, PhD

Gye's research involves installing next-generation sensors to monitor the performance of concrete buildings. This will allow real-time data to be collected and analysed through construction, operation and maintenance. Ultimately, he is looking at whether a warning system could be put in place to provide an alert around developing problems before failure limits are reached. This would have application for example after a natural disaster with the critically damaged structures able to be identified immediately.



BRANZ Scholarship – Samia Ali Tariq
University of Canterbury, PhD

Use of glass recycled waste in construction is an attractive option in New Zealand because of the large available quantities. However, minimisation of costs incurred in additional processing is essential - otherwise the glass waste materials may become too expensive to be used. Samia's research is investigating the practical application of a high volume of recycled glass wastes in the production of high-flow and self-compacting concrete. It has a particular focus on the fresh and long-term properties of the material.



BRANZ Scholarship - Van Tran
AUT, PhD

Van's research aims to map the economic value of waste. Instead of focusing exclusively on consumption patterns, Van's work is examining the broader effects of such economic value on the whole building/construction system – from briefing to procurement, to design and construction, to refurbishment, and finally to demolition. The research will better position the New Zealand construction industry to reduce waste coming from construction sites. Existing Projects continuing in 2014/15.

Existing Projects continuing in 2014/15

- Maintenance and development of weathering sites located across New Zealand
- Development of a durability verification database
- Refinement and development of New Zealand's corrosivity map
- Research in to improving resilience – notably how materials and systems can be made more resilient
- New testing methodologies for materials performance
- Co-funding to support the development of a CCANZ led Concrete Construction Course picking up new learnings to support the Canterbury rebuild



Performance of existing buildings

85% of the current building stock will still be with us in 2025.

The statement above makes it immediately apparent that the existing stock is a critical item in the nation's future.

In a typical year more buildings are renovated than are built, so existing stock is a key focus of building owners and the building industry.

The 2010 House Condition Survey (carried out every 5 years as part of a 20-year survey programme) jointly funded by BRANZ and MBIE/the former Department of Building and Housing has found that:

- 41% of houses were in good condition and well maintained
- 59% in moderate or poor condition
- 25% of houses had defects that needed attention within 3 months.

Whether making homes warmer and drier, improving the conditions of public buildings or upgrading commercial buildings, improving the performance of existing buildings is a key issue for many New Zealanders.

2015 House Condition Survey

What is driving this research?

The House Condition Survey is the pre-eminent resource for monitoring the condition of New Zealand's 1.3 million existing standalone homes.

It provides an up to date assessment of the condition of homes from across the country. It includes rental properties and this next Survey should also provide particular insight in to changes in the post-earthquake Canterbury region. The House Condition Survey also documents "real-world" long-term materials performance, and the consequences of materials selection and specification. Survey data also allows evaluation of the consequences of workmanship on longevity.

What is it going to achieve?

The 2015 House Condition Survey will provide current information on trends in stock condition, owned versus rented properties, rural versus urban properties, materials performance and weak links in building systems. This information will be used by many different organisations – in industry and government – to provide insight in to the changing nature of New Zealand's housing stock.

What will success look like?

The new House Condition Survey will be produced, with strong support from both industry and government. The information in the Survey will add to the knowledge that exists in New Zealand about housing and how it is meeting the needs of New Zealanders. This in turn will inform government and industry as they make decisions around the policies, products and services that will impact on the current and future housing conditions of New Zealanders.

How much Building Research Levy is being invested?

\$900,000

What is the timetable?

The project is due to be finished by March 2017.

Want to know more?

Nick Marston

Nick.Marston@branz.co.nz

\$496,356

Total investment in 2014/15

A new series of Good Repair Guides

What is driving this project?

Good Repair Guides provide practical advice on repairs. They are tailored to the less-experienced generation of builders who do not have the broad range of knowledge and practical experience seen in more experienced tradespeople. The first series of Good Repair Guides were very well received by industry, with strong demand for additional information across a number of new topics.

What is it going to achieve?

Each Guide explains the causes of common problems and gives comprehensive descriptions of how to repair them. This series will cover topics such as:

- Tiled showers
- Timber floorboards
- Repairing damaged tiles
- Slat decks
- Subfloor timbers
- Paths and driveways
- Balustrades, steps and stairs.

The information in the Guides supports tradespeople as they carry out repairs to existing properties. Access to the latest information helps improve the performance and practice of the industry at a time when there is a big upswing in demand. There is considerable need for repair information on the back of properties damaged in recent natural disasters.

What will success look like?

This series will be successful through high levels of take up and use of the Guides across industry. Both industry and building owners will benefit from these publications as the standard of work being done in these areas improves through higher-quality work.

How much Building Research Levy is being invested?

\$124,000

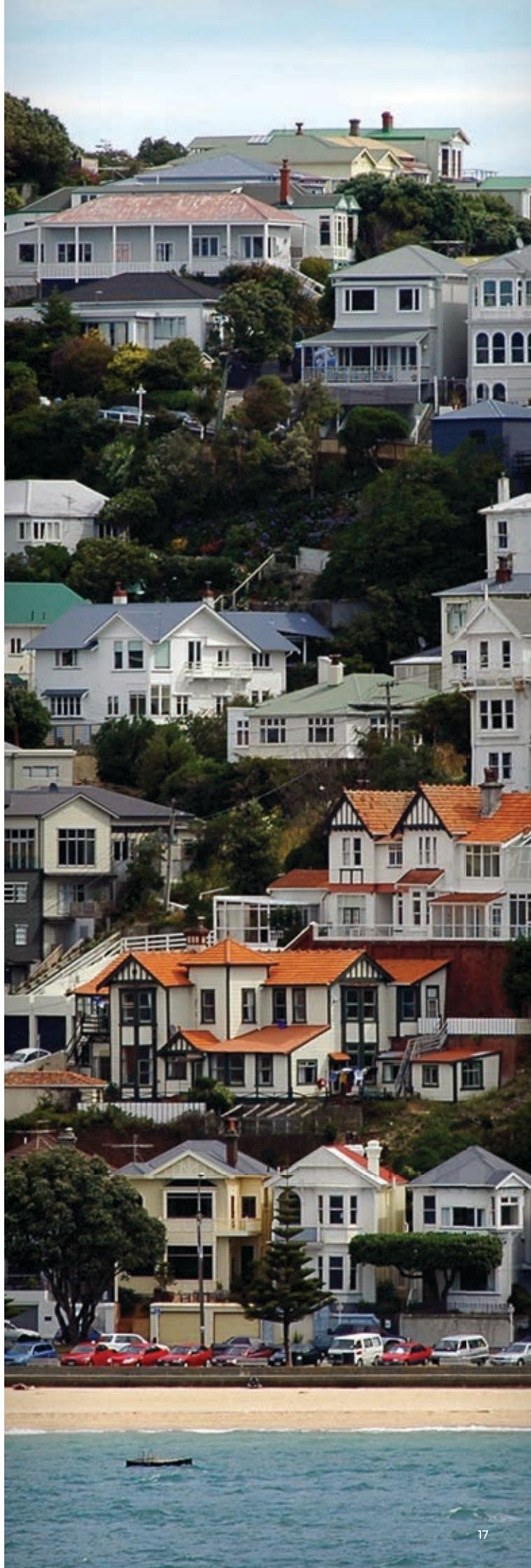
What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Margaret McLachlan

Margaret.McLachlan@branz.co.nz



Effects of proprietary mechanised home ventilation systems (MHVS) on health

What is driving this research?

House Condition Surveys have repeatedly found existing New Zealand residential housing to have high levels of damp and mould, both of which have been found to contribute to poor health outcomes. This project will test whether the performance of existing residential buildings, and in particular their ability to protect occupant health, can be improved by installing mechanised home ventilation systems.

What is it going to achieve?

An estimated 250,000 New Zealand homes have had MHVS installed in the past 20 years. The cost of such systems ranges from \$1500 to \$4000 for an average-sized house, comparable to the cost of installing insulation and/or energy efficient heating. However, we do not know whether or not MHVS improve human health. This study represents a unique opportunity to use large-scale data to investigate whether MHVS improves health outcomes, from primary-care level (pharmaceutical prescriptions) through morbidity (hospital admissions) and death. Further, while outdoor air pollution and particulate levels each have documented associations with circulatory illness, relationships between indoor air quality and circulatory health have not been explored.

What will success look like?

The research will provide new insight into the effects on health, if any, of the different sub-types of ventilation systems being used in New Zealand. Results will be reported by age group, sex, ethnicity, socio-economic status and region, as well as dwelling era and style.

If any system or system type is found to have significant health benefits, the next stage would be to carry out a more detailed cost-benefit analysis. In the event that any system or system type was found to have adverse effects on health, the intention would be to work with industry to address the problem.

How much Building Research Levy is being invested?
\$88,289

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Christine Groves

christine.groves@otago.ac.nz

Improving decision-making about existing homes (renovate or retire) at the level of a neighbourhood development

What is driving this research?

There is a gap in present knowledge and practices around retiring existing housing stock. While previous research has been undertaken on the benefits of retrofit, limited work has been undertaken on the case to retire homes, particularly in a New Zealand context. In addition, most housing retrofit work has been undertaken from a housing technical perspective and does not include an overlay of homeowner and developer perspective and the differing development environments.

What is it going to achieve?

This research project seeks to develop a structured comprehensive approach to decision making around retrofit or retiring housing. Working with a real-life example, the Tamaki regeneration in Auckland, the research will be working alongside Nga Iwi Katoa (representing community) and the regeneration project.

It will come up with a more widely replicable model for decision making based on home quality, social, institutional and economic criteria.

What will success look like?

The research wants to provide the basis for better decisions around retiring or renovating homes. In particular, it aims to create the basis for improved and more transparent decision making over whether homes should be renovated or retired. As a result of this, both home owners and builders/developers would have an improved capacity to make decisions about retirement of existing homes based on robust data.

How much Building Research Levy is being invested?
\$102,388

What is the timetable?

The project will be completed by June 2015

Want to know more?

Vicki Cowan

vickic@beaconpathway.co.nz

Seismic Improvement of Unreinforced Masonry Cavity Walls

What is driving this research?

Unreinforced masonry (URM) buildings with cavity walls were constructed in New Zealand primarily between 1880 and 1935. Severe structural damage and major collapse of URM buildings with cavity wall type construction was observed during post-2010/2011 Canterbury earthquake inspections. This type of construction performed significantly worse in comparison to solid URM construction in resisting earthquake forces.

This form could pose a major and widespread seismic risk to the people of New Zealand. Cost-effective techniques to address this risk are required.

What is it going to achieve?

The main objective of this project is to establish seismic retrofit solutions for URM cavity wall construction that will cost effectively reduce the risk to life and preserve New Zealand heritage townscapes. A further objective is to develop background understanding regarding the construction practices used for URM cavity walls, and to identify typically occurring failure modes.

What will success look like?

New guidance and information about retrofitting URM cavity walls will be widely available and used in New Zealand.

This guidance will set out industry-accepted solutions for interconnecting individual URM leaves. This will allow structural engineers to be familiar with these best-practice designs and contractors to understand the required implementation. Also owners of vulnerable buildings will have strong guidance when seeking advice on how to seismically improve their buildings.

Overall success will be seen in effective seismic strengthening of the thousands of buildings in New Zealand that are built using URM cavity walls.

How much Building Research Levy is being invested?
\$65,000

What is the timetable?

The project will be completed by March 2015

Want to know more?

Dr Dmytro Dizhur
ddiz001@aucklanduni.ac.nz

Existing Projects continuing in 2014/15:

- The publication of a Designing for Maintenance Guide
- Investment in the development of the Homestar Single Rating Tool for Houses



Sustainability

The building and construction industry is a significant source of economic growth and prosperity.

According to the United Nations Environment Programme, the industry accounts for 10% of the world's GDP and 7% of the world's jobs. However, to achieve this, the industry places high demands on the environment, being responsible globally for approximately:

- 40% of annual natural resource consumption
- 30% of energy consumption
- 30% of greenhouse gas emissions
- one quarter of all timber use.

In New Zealand, construction and demolition waste may represent up to 50% of all waste generated nationally.

Commercial buildings account for around 9% of total energy use and 21% of New Zealand's electricity use, which costs New Zealand businesses around \$1.25 billion every year.

Although the industry has made good progress in recent times towards becoming more sustainable, we still face some significant challenges.

Sustainability and the built environment is also an increasingly strong component of many countries approaches to improving resilience to natural hazards and climate change.

Helping with the thermal design of houses – updating the ALF online tool

What is driving this project?

The ALF (Annual Loss Factor) tool is a free online aid to the thermal design of houses. It is presented in a step-by-step format providing a simple method of calculating the energy performance of conventional New Zealand houses.

ALF provides a verification method for determining the Building Performance Index (BPI), which can be used to show compliance with the Energy Efficiency Clause H1 of the New Zealand Building Code.

Since becoming a web tool and being cited in the New Zealand Building Code, the use of ALF has continued to increase. It has become a valuable service provided to the design and architecture community, with more than 14,000 unique visitors to the ALF website in 2013.

However, as necessary with all tools, ALF 3.2 requires ongoing maintenance and support.

What is it going to achieve?

This investment will ensure that ALF is up to date with the latest developments and that it continues to provide a reliable service to designers and architects.

What will success look like?

ALF is an important resource and this will ensure that it can continue to be accessed with confidence by users. The funding will support any changes to ALF so that it can remain up-to-date with the latest information and so that it can continue to provide a method for Building Code compliance.

How much Building Research Levy is being invested? \$40,000

What is the timetable?

The project will be ongoing with this funding through to March 2019.

Want to know more?

Andrew Pollard

Andrew.Pollard@branz.co.nz

\$862,345

Total investment in 2014/15

Insight in to the materials and characteristics of new buildings

What is driving this research?

Requests are frequently received from manufacturers, government and researchers about the materials used, building forms, and amenity features of new buildings. By surveying new housing, alterations and additions and non-residential buildings, researchers can gather valuable data on these features that is not available from official sources.

This information improves the understanding and response to what is currently happening in the industry, and the movement of new products and designs.

What is it going to achieve?

This project will gather insight from a sample size of 1,200 new houses, 400 dwelling additions and alteration consents, and 400 non-residential buildings per year over the course of the project.

The project will enable a better understanding of the types of materials used in new housing and non-residential buildings.

This is an important evidence base for the market, regulators and policy makers. For example, the survey information could help understand changes in different forms of construction (such as greater use of prefabrication) or changes in demand and use of materials.

What will success look like?

This project will provide high quality information about the changing nature of the building industry. This in turn will be available to support planning for the future and potential changes in regulation and practice.

How much Building Research Levy is being invested?

\$400,000

What is the timetable?

The project is ongoing with funding through to March 2019.

Want to know more?

Ian Page

ian.page@branz.co.nz



Measuring the value of sustainability and resilience features in housing

What is driving this research?

Incorporating sustainability and resilience features within a house adds to its performance, but how are these improvements valued?

There is a gap in understanding what the financial and sustainability value is to the developer, builder or home owner of various measures. Examples such as better-than-code insulation, double glazing, water conservation, solar water heating, air and water heat pumps, other heating, efficient lights and house orientation.

Questions are also being asked about the costs and benefits of making housing more resilient against, for example, floods, impact damage, or of using more durable materials with lower maintenance costs. There is a gap in understanding what value going “beyond Code” could be delivering.

What is it going to achieve?

This project is an important piece of the sustainability and resilience picture that is currently missing. At present, decisions are being made around different products and systems that may be sub-optimal or decisions are being made with poor understanding about the overall benefits that could accrue. This project will provide an evidence base for improved decisions around investing in sustainability and resilience features.

What will success look like?

The project will help builders, designers and specifiers to make better informed choices around the costs and benefits of these features for new and existing housing.

This in turn will support optimal uptake of these features to deliver improved retrofit of existing stock as well as better informed decisions around features that can be included in new housing.

How much Building Research Levy is being invested?
\$450,000

What is the timetable?

This project is due to finish by March 2016.

Want to know more?

Lynda Amitrano

Lynda.Amitrano@branz.co.nz



BRANZ Scholarship – Agneta Ghose
Massey University, PhD

Agneta's research is looking at the environmental impacts of refurbishment in commercial buildings using life cycle assessment. Refurbishment of old buildings can go beyond simply improving their appearance, and sustainable refurbishment is an increasingly important consideration. These refurbishments contribute equally to economic and environmental performances by lowering energy use during the building's operational phase. Internationally, there is a rise in developing passive and low-energy buildings. However, refurbishment has its own challenges.



BRANZ Scholarship – Sara Wareing
Victoria University, Masters

Sara's original intent was to investigate which option was most effective in treating fuel poverty experienced by the elderly - increased insulation or more efficient heating. However in starting the project, it became apparent that there were many different definitions of fuel poverty, and the variance between them was too great to ignore. The project is now aimed at exploring the different definitions of fuel poverty and the quantifiable differences between them.



BRANZ Scholarship – Victoria Toner

Victoria University, Masters

Pocket parks and green spaces within CBD's are important for workers and residents. However creating usable and comfortable spaces can be difficult because surrounding buildings can make these spaces shady and windy affecting their overall thermal comfort. Victoria is developing a tool which enables professionals in the construction industry to compare urban forms which can take in to account the surrounding outdoor thermal comfort. This will shift the design of outdoor thermal comfort to a more sophisticated method based on simulation programs allowing design trade-offs to be quantified.



BRANZ Scholarship – Sally Coughlan

Massey University, PhD

Sally is undertaking a comprehensive assessment of small and medium enterprises in the New Zealand construction industry and current methods in place, both domestically and internationally, for environmental profiling. From this overview of SMEs and options for environmental profiling, solutions to barriers will be developed then piloted and evaluated on selected case studies in the construction industry.

Existing Projects continuing in 2014/15:

- A baseline research project which will measure our sustainability progress
- Development of a framework to underpin Environmental Profiling
- Support for the development of an Australasian environmental profiling scheme
- The ongoing development and maintenance of the Level sustainability website
- Research into the specifications for high performing houses
- BRANZ Scholarship: Brian Berg. Masters research assessing embodied energy in the early stages of the design process
- BRANZ Scholarship: Tavis Creswell-Wells. Masters research to develop a range of urban form scenarios that enable ultra-high performance passive commercial buildings



Automation, Industrialisation and New Technologies

New technologies have the potential to significantly boost productivity.

New technology development is happening at an unprecedented pace. It is possible to see how the power of technology can be applied to the building and construction industry and transform the way it works.

There is an increasing need in the industry for improved familiarity and competence with advanced manufacturing processes, management, quality control and emergent technologies that either support or disrupt the current methods and technologies. These anticipation of improved productivity, improved quality, ease of use, control and other specific proprietary benefits.

While the opportunities presented by new technologies are promising, the learning curve required to develop existing practices and capitalise on this promise is significant.

An important component of this theme of Building a Better New Zealand is drawing on international experience and lessons. It is recognised that an important focus should be making the most of lessons learnt in other countries. This approach can enable New Zealand to identify new approaches that could make a real difference if they could be applied in the domestic environment.



BRANZ Scholarship – Yusef Patel
University of Auckland, PhD

Yusef's research is looking at the advantages and disadvantages of current international and domestic innovations in digital fabrication (CNC routers, robotics, 3D printers, etc). He has a particular focus on exploring the types of construction innovation that could be relevant to the New Zealand market. His work is investigating how to increase productivity and quality through utilizing existing high value manufacturing technology.

Reducing heat loss from the facades of commercial buildings

What is driving this research?

Reducing heat loss from the facades of commercial buildings has become important in many countries where escalating energy costs mean much more stringent performance requirements.

These demands have highlighted the need for retrofit solutions to improve existing buildings. Designers are struggling to find ways to adapt existing designs to meet new performance requirements. This project will enable New Zealand industry to lift its performance standards for building facades. This is important as the demand for improved performance is already growing and it is also likely that performance requirements will become more stringent here in future.

What is it going to achieve?

The project will improve the understanding of the extent of heat loss from facades. It will also help identify which facades work best in New Zealand and highlight key thermal bridging paths. Better thermal bridge modelling will be carried out and a thermal imaging service will be developed to support building designers. Designers will in turn be in a better position to up-skill and incorporate façade thermal performance into their design briefs.

What will success look like?

The project will deliver an improved understanding of façade thermal performance. It will influence changes in industry practice and the work will feed directly in to future standards development. The end result will be that industry will be able to improve the ways heat loss is managed.

How much Building Research Levy is being invested? \$280,000

What is the timetable?

The project is due to be finished by March 2017.

Want to know more?

Ian Cox-Smith

Ian.Cox-Smith@branz.co.nz

\$501,050

Total investment in 2014/15

National BIM initiative

What is driving this research?

Building Information Modelling (BIM) is changing the face of construction globally. By using new computer systems and models which support new forms of collaboration and working, BIM is delivering significant improvements in productivity and opening up new opportunities for improved buildings. BIM is making such an impact that in some countries, BIM is being mandated by governments in the delivery of major public building projects.

This national initiative, being carried out in conjunction with the industry/government Productivity Partnership, aims at accelerating the uptake of BIM in New Zealand.

What is it going to achieve?

The investment will fund New Zealand specific research to support the growth in BIM in this country. It will help deliver:

- key building blocks for BIM uptake
- a BIM Handbook showing how BIM can be aligned with existing systems and practices
- demonstrate the implications and gains made by builders, designers and their clients from real-life use of BIM.

What is success going to look like?

Success will see greater uptake and use of BIM in New Zealand, in particular in the first instance around medium-larger commercial style developments. The initiative will play an important role in supporting a step-change in BIM literacy, with more businesses and clients able to take advantage of the opportunities that BIM use can present.

It will support a more productive sector, with BIM identified as a key opportunity to lift the relatively poor levels of existing productivity in the construction industry.

How much Building Research Levy is being invested?
\$750,000 (\$250,000 per annum)

What is the timetable?

This is a three year initiative.

Want to know more?

David Sharp

David.Sharp@branz.co.nz

Existing Projects continuing in 2014/15:

- Developing BRANZ's use of BIM (Building Information modelling) - 3D Detail Solutions (Stages 1 & 2)



06 Operating environment

An effective operating environment is essential to the industry's prosperity.

The operating environment is the external environment in which the building and construction industry operates and includes the regulatory environment (domestic and international) and the underlying economic conditions.

The importance of an operating environment that provides optimal conditions for effective market participation and activity underpins many other aspects of research.

An improved one-stop shop for information

What is driving this research?

There is a wealth of information and knowledge that is gathered through calls to the BRANZ technical helpline. The helpline currently receives around 3,500 phone calls per year. This project is looking to take the information that is constantly developed to help respond to this daily interaction with industry and make it more readily available.

What is it going to achieve?

The project will develop an industry-wide resource, drawing together in one place a helpful index of key material.

What will success look like?

Industry and members of the public who are seeking technical information will be able to use this resource to quickly and easily find the information they need. Key, topical information gaps will be plugged, meaning that less time will be used trying to hunt down relevant technical solutions.

How much Building Research Levy is being invested?

\$199,000

What is the timetable?

The project is due to be finished by March 2015.

Want to know more?

Margaret McLachlan

Margaret.McLachlan@branz.co.nz

\$2,681,000

Total investment in 2014/15



BRANZ Scholarship – Brian Guo
University of Auckland, PhD

Brian's research is focused on health and safety management in the construction sector, a key issue for the New Zealand industry. The aim of this project is to develop a framework of construction safety indicators that fit the New Zealand construction environment.

Existing Projects continuing in 2014/15

- Ongoing publication of BUILD magazine
- Support for the 2014/15 "ARCHENG" initiative, bringing together architecture and engineering students to foster a shift in culture around joint working
- Investment, alongside MBIE, in the development of a business case around a single, authoritative online portal for the building industry ("BUGLE")
- Publication of Guideline
- Publication of Bulletins
- Publication of Builders Mate
- The development and running of a number of Industry seminars on key topical issues
- The delivery of the 0800 Technical Helpline
- Investment to provide expert input in to the ongoing development of the Building Code and Standards (above and beyond individual projects).
- The maintenance and development of the Building Industry Library
- Analysis of building industry consenting and Levy forecasting
- Provision of BUILD to BCITO
- Industry Research Strategy development and support
- Annual reviews of BRANZ publications
- Support for Building Research Levy communication



Productivity

Boosting productivity in the building and construction industry is a national priority.

In 2010, the Building and Construction Sector Productivity Partnership, a joint venture between industry and government, was established through the then Department of Building and Housing to address low productivity in the industry.

Research shows productivity, or output per hour worked, in the industry is declining compared with construction industries in other countries and with most other sectors of the New Zealand economy. This poor performance has meant that the industry has become a drag on economic growth and performance.

A shared goal by industry and government through the Productivity Partnership is to improve construction industry productivity by 20% by 2020.



BRANZ Scholarship – Garry Miller
University of Auckland, PhD

Garry's research is seeking to address the problem of the relatively poor productivity performance of the building and construction sector. The particular focus of his research is on information flows and he is exploring how improvements to the quality of information flows (e.g. accuracy, reliability, predictability) will deliver performance improvements for all parties.

Industry Performance Measures

What is driving this research?

The industry-government Productivity Partnership has highlighted a number of gaps in the provision of timely and meaningful information about how the building industry is tackling its productivity challenges. In particular it is clear that better information is required about how improvements in quality can be measured. Insight is also needed about how these improvements will flow through to areas such as affordability.

What is it going to achieve?

This work will produce meaningful measures of performance and quality and will help provide a better understanding of productivity changes.

It will highlight the role that the use of Key Performance Indicators (KPIs) and other management tools can make in improving the viability and productivity of individual businesses.

A Performance measures dashboard will be developed for the BRANZ website – this will provide up-to-date information on industry and firm performance that can be accessed by designers and builders.

What is success going to look like?

New and better ways of measuring performance and quality will be developed. The dashboard tool will be used by builders, designers and home owners. The end goal is a resource to help industry make better informed decisions about design choices based on an improved understanding of how these choices affect affordability and performance.

How much Building Research Levy is being invested? **\$320,000**

What is the timetable?

The project is due to be finished by March 2016.

Want to know more?

Ian Page

ian.page@branz.co.nz

\$601,295

Total investment in 2014/15



BRANZ Scholarship – Johannes Dimyadi
University of Auckland, PhD

Johannes is looking at the interface between Building Information Modelling (BIM) and regulatory requirements and rules.

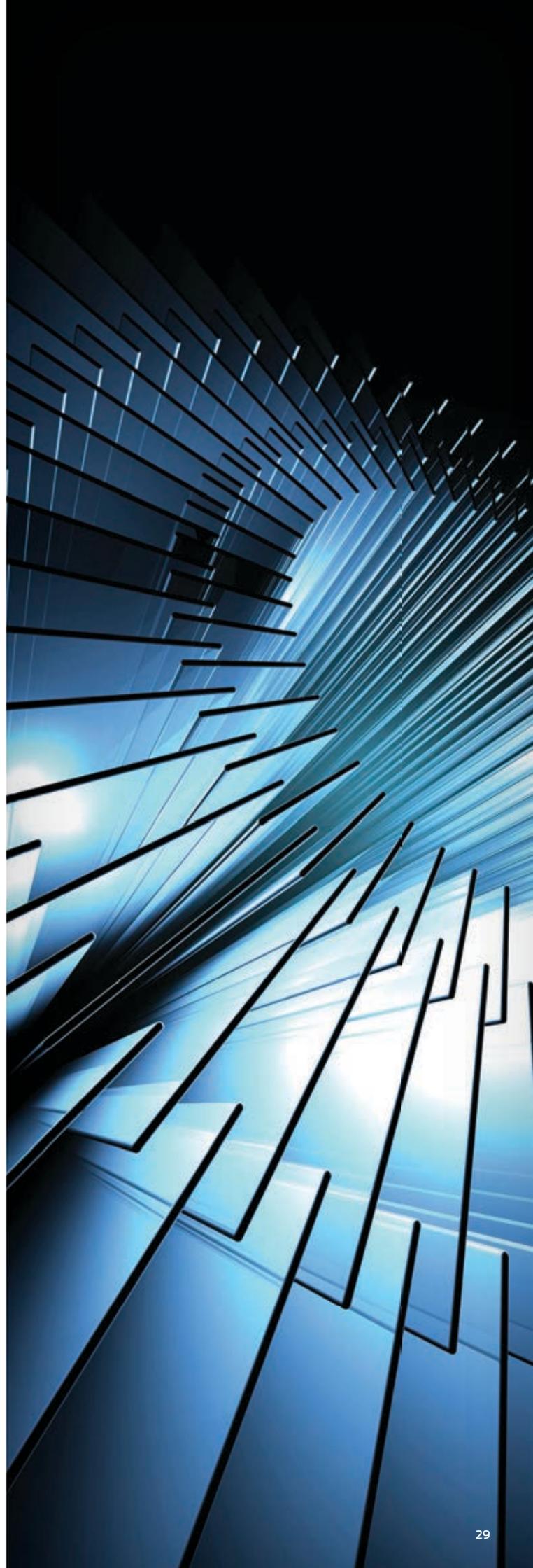
This research will provide insight in to the potential for a practical and relatively easy method for compliance checking by extracting building information automatically. It is also looking at the possibilities around encoding the New Zealand Building Code into a computable representation for the compliance checking process.

BRANZ Scholarship – Wajiha Shahzad
Massey University, PhD

Wajiha is looking at onsite project productivity levels achieved through the use of prefabricated building systems and comparing these with those achieved using traditional systems. She is looking at both archival research and also drawing on case studies of recently completed institutional and commercial projects in Auckland.

Existing Projects continuing in 2014/15

- SME productivity project (investment with the Productivity Partnership in research being carried out by the NZIER)
- New House Survey – what's working, what's not
- Investment with MBIE and the Natural Hazards Research platform into the Resilient Organisations Collaborative research programme
- Support for productivity research through Massey, AUT and Auckland Universities
- BRANZ Scholarship: Priyanka Raina. PHD research looking at a rational basis for setting up a monetary retention regime for construction contracts



Housing affordability/Meeting the Housing Needs of New Zealanders

As New Zealand's population grows and changes, so do our housing needs.

It is forecast that New Zealand's population will reach 4.8 million people by 2021. But this growth is not expected to be distributed evenly amongst the regions – the populations of our cities are growing, particularly in the “golden triangle” (Auckland, Tauranga, Hamilton).

This will create particular pressures as housing markets change – some areas will face higher demand that could exacerbate existing affordability problems, while others may even see the housing market decline as the population falls.

Housing affordability is a particularly pronounced issue at present in some markets in New Zealand. In 30 districts across New Zealand either the median price of a home is greater than 5 times median income, or the median mortgage is greater than 50% of take-home pay. There is a strong government and industry focus on increasing housing supply and improving quality and supply for the rental market.

Demographic change, future housing demand and implications for the residential property market

What is driving this research?

New Zealand households are relying increasingly on the rental market for housing. In 2013, renter households accounted for 32% of the total housing market or 500,970 households.

Understanding this market, the characteristics of renter households, and the implications of these trends on future rental demand is important for the construction of new dwellings. It will influence typology and configuration.

What is it going to achieve?

The research will focus on understanding the demand for rental housing at the bottom end of the market and the barriers currently limiting the ability of housing providers to meet this demand.

It will improve the understanding of the rental housing needs of New Zealanders. It will look at the implications of the demographic characteristics of households on the future demand for dwellings by typology, tenure, configuration and location. It will provide an analysis of the drivers of tenure change, and projections of tenure change by household composition, age, and the aging population.

The outcomes of the research will improve industry's knowledge of:

- The implications of New Zealand's changing population on the types of housing that needs to be built; and
- The barriers to the delivery of new housing that caters for the bottom end of the market.

What will success look like?

It will improve understanding of changes in New Zealand's housing market, in particular the growing renter market segment, and the implications of these changes for both industry and policy makers.

Key outcomes will include:

- An improved understanding on where renter households live
- Trends in the location, typology, and cost of the rental housing stock
- Characteristics and distribution of renter households in greatest housing needs

\$737,293

Total investment in 2014/15

- Whether low income private sector renter households are clustering together within the region
- Whether dwelling typology has had an impact on renter housing affordability.

Ultimately this project will be successful if the construction industry is better able to meet the needs of New Zealanders wanting or needing good quality rental housing, especially at the bottom end of the market.

How much Building Research Levy is being invested?

\$94,250

What is the timetable?

The project will be completed by the end of March 2015.

Want to know more?

Ian Mitchell

ian.mitchell@livingstonassociates.co.nz



The impact of regulation on housing affordability

What is driving this research?

While there are many factors that can impact on housing affordability, regulatory factors are often flagged. At present, limited evidence exists to substantiate the impact (if any) that regulatory policies and practices by local and central government are having.

What is it going to achieve?

It will identify the major regulatory costs associated with materials, land and building costs. It will then look more closely at quantifying the impact of any major regulatory costs that are identified.

Using this evidence base, the implication of regulatory factors will be able to be set out in more detail.

Local and central government will then be able to use this research to better understand the impact of regulatory practices on housing affordability.

What will success look like?

Success will see research produced that can provide for a better-informed discussion around the impact that regulation is having on housing affordability. If the research identifies areas of impact, then it will be possible to look more closely at the costs and benefits of the regulation involved and make choices accordingly. Ultimately, a stronger basis for optimal regulatory practice can be supported.

How much Building Research Levy is being invested? \$80,000

What is the timetable?

The project will be finished by March 2015.

Want to know more?

Brendon Ward

brendon.ward@masterbuilder.org.nz

Meeting the housing needs of multi-generational households

What is driving this research?

An increase in multi-generational family households is a population trend in a number of western countries. The rise is due to:

- the cultural expectation of new migrants
- young adults waiting longer to leave their family home
- adult children returning to their parents' homes
- an increase in grandparent families
- more elderly parents coming to live with their children.

It is expected that these will also be a feature of New Zealand's multi-generational households. However differences will arise with Maori and Pasifika households, and new household arrangements as a consequence of the Canterbury earthquakes.

This research will examine the implications of an increase in multi-generational households on the intensification strategies promoted in both Auckland and Canterbury. The regions will achieve more compact urban forms largely by the provision of smaller housing units (one and two bedroom apartments and townhouses).

What is it going to achieve?

It will provide new insight in to the needs of multi-generational households with respect to their housing. This information will help ensure that the building industry has the insight it needs to deliver the housing types needed as New Zealand's demography continues to change.

An improved understanding of multi-generational households in New Zealand will not only help with a fuller understanding of the types of new housing that need to be built, but it will also help support with knowledge of the changes that are required to existing dwellings to accommodate this growing household type.

What will success look like?

This project will be successful if there is an improved understanding of the changing needs of New Zealand households and the building industry is using this information to respond to changing expectations and demands.

This would lead to better provision of both new and existing housing that cater for this segment of the market. Overseas research suggests links to important gains around health, education and wellbeing across all generations in the household.

How much Building Research Levy is being invested?
\$89,643

What is the timetable?
The project will be finished by April 2015.

Want to know more?
Dr Penny Lysnar
p.lysnar@auckland.ac.nz

Existing Projects continuing in 2014/15

- Work on approaches to good homes for low income tenants
- Co-funding, with MBIE, on a CRESA led-project looking at housing downsizing
- Support for a CRESA-led project on Resilience
- Fire research looking into the effectiveness and accessibility of emergency fire exits





Better cities and communities

Cities are home for most New Zealanders.

As such, thriving, sustainable cities and settlements are integral to New Zealand's long-term wealth and wellbeing. New Zealand is a highly urbanised country, with approximately 87% of its population residing in urban areas.

Over the next 20 years, it is forecast that 75% of new construction will be in Auckland or Christchurch. It is therefore critical that the understanding of high-performing urban environments reflects the importance of these habitats to our society and economy.

New Zealand cities look set to continue to evolve as population changes begin to take hold. Changes will be seen in terms of rising numbers, characteristics (such as age) and changing expectations and aspirations.

Research developed under this theme will help address the changing needs of how New Zealanders are choosing to live, work and play.

Learnings from SCIRT – unlocking new innovations to improve our cities, towns and communities

What is driving this research?

Improving innovation in the construction industry is key to building not just better buildings, but better cities, towns and communities.

However, current understanding of innovation in the construction industry is mixed. As a result although many organisations know that they should be innovating, they do not always have the understanding to do so.

This project will examine, disseminate and monitor innovations being produced by the Stronger Christchurch Infrastructure Rebuild Team (SCIRT). It will assess whether selected innovations are suitable for wider New Zealand construction industry adoption.

Why SCIRT? The Canterbury earthquakes resulted in substantial damage to housing, commercial buildings and infrastructure. Innovative thinking and processes were required for rebuilding Christchurch infrastructure. Capturing, assessing and evaluating the SCIRT innovations for wider industry adoption is the focus of this project.

What is it going to achieve?

This project will systematically assess the SCIRT innovations for wider New Zealand construction industry adoption. It will categorise the innovations being produced (process, product, organisational) and assess the impacts of these innovations on different KPI's (time, cost, quality, H&S, improved skills etc.).

What will success look like?

The project will be successful if the innovative approaches to building and construction being developed by SCIRT are able to be adopted more widely across New Zealand.

How much Building Research Levy is being invested? \$94,000

What is the timetable?

Due to the ongoing tracking of KPIs, this project will be carried out through 2015, with an end date of March 2016

Want to know more?

Robert Finch

robert.finch@canterbury.ac.nz

\$265,800

Total investment in 2014/15

Better Acoustically Performing Structural Connections

What is driving this research?

More medium and high density housing is being designed and built in towns and cities. The transfer of noise between apartments and terraced housing is a well-known issue in many existing buildings. This research will look at developing some practical solutions to this problem.

What is it going to achieve?

The project aims to supply more design options, enabling taller light-framed systems to be built with fewer design compromises. This will also help ensure that buildings remain serviceable after extreme seismic events, something that the finance and insurance industries currently encourage.

In particular, the work will focus on terraced housing, where significant growth can be expected in New Zealand's main centres, particularly for timber framed buildings.

What will success look like?

The design community will have access to an inter-tenancy housing structural connection system which can achieve the structural and acoustic insulation performances required by end users.

This research will ultimately support the construction of high quality medium and high density housing in the urban environment.

How much Building Research Levy is being invested?
\$93,000

What is the timetable?

The project will be complete by the end of March 2015

Want to know more?

Grant Emms

grant.emms@scionresearch.com



Novel hybrid damping devices and design techniques for damage-avoidance seismic response of high-density urban housing

What is driving this research?

There is increased demand for higher density urban housing in New Zealand.

While most of the housing stock responded well in the Canterbury earthquakes low to medium rise apartments buildings are subject to much higher demands and consequently suffered much more damage in Christchurch.

This type of structure will be key to further economically sustainable and cost-effective development of major cities over the next 20 years.

This project will therefore address both “Building Better Cities and Communities”, but also addresses “Housing Affordability” by aiming to reduce the cost of damage resilient construction techniques.

What is it going to achieve?

This project will develop damage-avoidance and energy dissipation devices, design methods and systems to enable low-to-no-damage (L2ND) medium rise structures. Secondly, it aims to develop resilience to earthquake demands with immediate post-event occupancy after a large earthquake. These goals require several intermediate steps and specific gaps in knowledge to be addressed.

The outcome of this work will allow buildings of any construction medium, whether it is steel, reinforced concrete or timber/LVL, to be designed with confidence by a consultant.

What will success look like?

A key objective of this work is to not only develop new devices and systems, but also to put these solutions into a readily available, easily understood format for uptake. In other words, the results and details must be translated to engineering and construction industry members so that they can be used properly, effectively and as part of standard practice.

If the project is successful then it will help reduce the cost premium of L2ND structures, particularly for medium-rise structures. This will

lead to economically sustainable, New Zealand developed solutions that enable L2ND structures for homes, businesses or mixed use.

How much Building Research Levy is being invested?

\$35,000 (BRANZ funding is part of a wider programme of investment and will be used to support the experimental test regime and production of energy dissipation devices).

What is the timetable?

The duration of this project proposal is 18 months. Initial results are expected to be available early in 2015, with more detailed experimental results and design recommendations coming in the second year of the project.

Want to know more?

Geoff Rodgers

geoff.rodgers@canterbury.ac.nz

Existing Projects continuing in 2014/15:

- Analysis around delivering Successful Urban Intensification in Auckland

Contact Details

If you would like further information about investment of the Building Research Levy or the projects in this publication please get in touch:

Research Strategy Group

BRANZ Inc
1222 Moonshine Rd, RD1
Porirua 5381
Private Bag 50908
Porirua 5240
New Zealand

T +64 4 237 1170
F +64 4 237 1171

research@branz.co.nz
www.branz.org.nz

Investing in Better Buildings for New Zealand

Building Research Levy in Action – Investment 2014/15