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# ANNUAL REVIEW

## 2022

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OUR VISION IS TO CHALLENGE  
AOTEAROA NEW ZEALAND TO CREATE  
A BUILDING SYSTEM THAT DELIVERS  
BETTER OUTCOMES FOR ALL.

*BRANZ - the Building Research Association of New Zealand - is a multi-faceted science-led organisation. We use independent research, systems knowledge and our broad networks to identify practical solutions that improve Aotearoa New Zealand's building system performance.*

*BRANZ is driven by the knowledge that, to thrive as a society, New Zealanders need a built environment that is safe and healthy and performs well.*

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## SHINING A LIGHT

The BRANZ Annual Review 2022 shares how our knowledge and insights have been shining a light in the building and construction sector this year.

We celebrate the **bright spots**, including the glow of prestigious awards, and report on how BRANZ's **laser-focused research** has helped solve real-world problems. Our **full-spectrum approach** working collaboratively across the building system has been contributing to system-wide change.

We share progress on how our work has been **illuminating the path to a better future**, casting light on the challenge of our shared climate change response. We also showcase some of the actions that have been **lighting the way** for BRANZ as an organisation as we embarked on a major campus redevelopment and deepened our own sustainability journey.

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# CHAIR AND CHIEF EXECUTIVE WELCOME

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## *Welcome to the BRANZ Annual Review 2022.*

With the global pandemic well into its third year, there is no question that everyone – people, organisations and communities – is having to dig deep into their resilience reserves. As some wit noted, ‘I didn’t realise 2020 was going to be a trilogy!’

In this situation, it can be easy to lose sight of what has been accomplished as attention is so often captured by what has not. Therefore, it is even more important to seek out and acknowledge the bright spots that illuminate progress still being made.

BRANZ’s work towards lifting the performance of Aotearoa New Zealand’s building system continues apace. While supporting industry transformation is a worthy goal in and of itself, it is a means to an end. Our endgame is to improve the lives of the people of New Zealand. In short, our work should translate into a built environment that improves the lives of the people who live there, work there or enjoy it. This is the big picture that keeps us striving for this goal each and every day. The pandemic and the social distress it has caused have only sharpened our resolve and focus.

We are immensely proud of the BRANZ team. Our people have calmly and confidently kept our work on track despite a myriad of distractions. As a result, our work programme has been minimally impacted by COVID-19, for which we are truly grateful. But while this is satisfying for BRANZ as an organisation, it is of vital importance to the building and construction industry as a whole.

It is no secret that the industry is facing a raft of challenges, many fuelled by the pandemic. By necessity, responding to building material shortages, price increases, rapid inflation and supply chain issues is the industry’s immediate focus. However, industry transformation momentum – particularly in the interests of helping the country achieve its climate change targets and environmental goals – cannot be allowed to stall as a result.

BRANZ is in a unique and privileged position to have the bandwidth to take a helicopter view, to look beyond the pandemic and maintain transformation momentum. Unsurprisingly, the industry is currently focused on negative factors and is drawing parallels with the economic downturn of 1990–1991. As a science-based organisation, BRANZ can point to evidence of the counterfactual. Our stock in trade is testing hypotheses against a range of perspectives. In this way, we remain a moderating force for a stressed industry facing volatility.

For more than 20 years, the same issues have been canvassed in our biennial Industry Insights Survey. These are:

- building regulations, codes and standards
- weathertightness
- building sustainability
- innovation
- training and skill development.

Reading the latest survey results, it would be easy to become disillusioned or frustrated or to lose heart. The issues themselves are exceedingly complex. The potential solutions are multi-faceted and require time and commitment to achieve. There are no quick and easy fixes.

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*BRANZ is in a unique and privileged position to have the bandwidth to take a helicopter view, to look beyond the pandemic and maintain transformation momentum.”*

But dig deeper into those issues and solutions, and a different, more positive picture emerges. Broken down into stages or steps, you often find that there *has* been progress – and significant progress in some cases.

Look no further than the following pages for evidence of this. They detail how BRANZ work has contributed to developing net-zero energy public housing, to reducing the carbon footprint of school buildings, to producing more-sustainable concrete and more.

In addition, there has been a genuine and sustained shift in industry attitudes and work practices towards health and safety – including a laudable focus on mental wellbeing – as well as climate change. Stronger client-centric relationships between the build team and client are resulting in better discussions about who carries risk. In addition, fairer procurement models and time-and-risk mitigations like early contractor involvement are improving the buildability of designs.

In isolation, these may seem like small steps, but collectively, they add up to a new way of working and results that are transformational. These stories are just a small snapshot of the work being done. They do, however, serve as a salient reminder that transformation is a journey, not just a destination.



BRANZ's focus on providing meaningful, evidence-based and practical solutions is one of the many ways we work towards better outcomes for all. We are chipping away on multiple fronts, both big and small.

This commitment is perhaps well illustrated this year by our role leading the Environment workstream for the Construction Sector Accord. Collaborating with cross-sector experts, BRANZ delivered the Environment Roadmap for Action.

The roadmap is a practical guide to the mindset required, the sorts of things we can change and what can be achieved through our collective actions. It focuses on comparatively small measures that will compound to create the necessary momentum for change. It also clearly highlights that every business – across the *entire* building system – has a role to play.

Transformation can also sometimes require system players to take a leap of faith to do what might seem counter-intuitive at the time. Doing the right thing, rather than the easy thing, can be hard.

The revisions to the building requirements in the H1 *Energy efficiency* Acceptable Solution are a case in point. While there are concerns that increased insulation will add cost and stress at a time when the industry is already under strain, higher performing buildings are ultimately in everyone's interest.

BRANZ will continue to provide the tools and encourage the industry to embrace transformation – to make whatever improvements they can as quickly as they can, rather than waiting for regulation.

If the industry is to transform, a longer-term view must be taken. It may be a cliché, but 'short-term pain for long-term gain' is sometimes a necessity. The robust scientific enquiry and deep thinking that BRANZ brings to the sorts of tough decisions required to drive transformation can help give the industry confidence to take that leap of faith.

BRANZ has proven itself capable of keeping an eye on the horizon while simultaneously working on the here and now. Part of our role is to help the industry see how the dots are joined, showing how today's actions are contributing to tomorrow's bigger, more audacious goals.

We are a consistent voice driving change and finding practical solutions to problems that, in their entirety, could seem overwhelming. Most importantly, we are increasingly leveraging our skills, knowledge and connections to benefit the entire building system, of which the building and construction industry is one part.

This year's annual review shines a light on examples of work of which BRANZ is proud and that illustrate progress towards transformation across the building system. These stories also highlight the symbiotic nature of our work – projects that are shaped by the needs of the industry and practical solutions that are often developed in collaboration with system players.

We invite you to read and reflect on the many ways BRANZ continues to serve the industry and champion change for good.



Nigel Smith  
Board Chair

Chelydra Percy  
Chief Executive Officer





**BRIGHT SPOTS** IN THE YEAR

## ADVISING ON CLASSROOM VENTILATION TO FIGHT COVID-19

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*BRANZ is committed to collaboration to improve indoor air quality. Sharing knowledge can enhance our understanding about the health effects that poor indoor air quality has and how we might reduce these. Therefore, BRANZ supported the establishment of the New Zealand Indoor Air Quality Research Centre. Its launch in late 2021 was fortuitous. The new centre was perfectly positioned to issue expert advice on how best to ventilate classrooms ahead of the school year and Omicron's rise.*











*The IAQRC advises opening windows to remove or reduce airborne viruses.*

There are invisible dangers harbouring in the air inside some buildings that mean people might not be as safe indoors as they believe. Assembling the best minds in the country on ‘all things indoor air quality’ is helping to propel research in the field. This is in a bid to better understand the health effects and to find solutions to improving poor indoor air quality.

Experts from seven leading research organisations came together to form the Indoor Air Quality Research Centre (IAQRC): BRANZ, GNS Science, NIWA and the universities of Canterbury, Massey, Otago and Victoria. The mission of the IAQRC is to advance the understanding of indoor air quality in New Zealand by coordinating research, sharing knowledge and resources and issuing practical public advice.

With a vision to reduce health risks associated with poor indoor air quality, the IAQRC had its first opportunity, advising the Ministry of Education about minimising COVID-19 transmission indoors. A subcommittee of IAQRC members assembled to provide practical guidance.

The IAQRC urgently highlighted the importance of taking simple but underappreciated measures like opening windows, especially on different walls, to remove or reduce particles that may be carrying the virus. A cross-draft exchanges air in the room with fresh air in about 10 minutes.

Teachers were provided advice to keep windows open and external doors ajar to increase classroom ventilation with the aim of stopping or slowing the spread of the virus.



*Researching how indoor air quality affects health, Dr Caroline Shorter from the University of Otago and BRANZ's Dr Manfred Plagmann test lung function in home environments.*

Keeping rooms at or above 18°C can also help protect occupants. In colder weather, good ventilation practices need to be balanced with keeping rooms at a comfortable temperature. At colder temperatures, airflow works differently, and it is possible to maintain good ventilation with windows only partially open.

Now that COVID-19 is becoming endemic, ventilation is a key measure to provide ongoing protection against this disease and to improve student cognitive performance while learning.

As well as viruses, bacteria and mould that can lurk in indoor air, potentially causing sickness, many of the materials that homes and furnishings are made from can release gaseous contaminants. Occupant activities such as cooking or heating using unflued gas appliances can create breathable tiny particles carrying toxic chemicals.

Many materials in the home can contribute to a greater or lesser degree to the pollutant exposure of its occupants. Such materials can range from deteriorating asbestos-containing products to newly installed flooring, upholstery or carpet.

BRANZ is contributing to improving indoor air quality by developing and testing methods to help the understanding of compounds released by timber degradation and contaminated building materials in the home.

This and other IAQRC initiatives will ultimately improve the air that New Zealanders breathe at home, school and work.

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[➔ READ MORE](#)

» [iaq.org.nz](http://iaq.org.nz)



## SHOWCASING LOW-CARBON NET-ZERO ENERGY HOMES ON THE WORLD STAGE

*As research partner on a new Kāinga Ora - Homes and Communities development, BRANZ's science-led advice about the design's carbon and thermal performance inspired New Zealand's largest landlord to change direction. The design team pivoted to target the Passive House standard and net-zero energy outcomes. Ngā Kāinga Anamata - meaning homes of the future - is scheduled to start construction in 2022 and shines a light on how lower-carbon building is transformative for both people and planet. In fact, it was a best-practice example of low-carbon building, sustainability and potential industry transformation in the built environment at the UN Climate Change Conference last year.*

An energy-efficient design featuring high levels of insulation will help residents of Ngā Kāinga Anamata stay warm in winter, cool in summer and healthy all year, with minimal need for heating.

BRANZ was proud to collaborate with Kāinga Ora and its industry partners throughout the design process, helping build the case for low-carbon, more thermally efficient homes for public housing customers. The 30 apartments of the Auckland sustainability-innovation pilot will be in five buildings made from different structural systems to test their performance over time.

Our scientists conducted a performance assessment on each of the five designs. Evaluations were made for life cycle cost and carbon, passive thermal performance and energy efficiency. BRANZ scientists also estimated construction waste, evaluated internal and interstitial moisture and made risk assessments for long-term durability.

BRANZ findings meant design decision making evolved to be prioritised around science-based recommendations to decarbonise and improve occupant health and wellbeing. Now, each building is on track to achieve Passive House certification and be net-zero energy.

With monitoring of the five buildings systems planned over time, the successes and challenges of Ngā Kāinga Anamata will continue to be shared publicly. The aim is to inspire the change to low-carbon and net-zero energy buildings in line

with the Ministry for Building, Innovation and Employment (MBIE) Building for Climate Change programme.

This aspirational public housing is set to transform the lives not only of its residents but many more people beyond its walls.

### IN THE GLOW OF THE GLOBAL SPOTLIGHT: NGĀ KĀINGA ANAMATA

At the UN Climate Change Conference COP26, this sustainable public housing pilot on which BRANZ partnered was one of only 17 building initiatives worldwide showcased in the virtual pavilion Build Better Now. The exhibition highlighted the relationship between the built environment and climate change, both as part of the problem and the solution. Online visitors from around the world toured the sustainable Ngā Kāinga Anamata development, learning how net-zero energy buildings can mitigate climate change.

 [READ MORE](#)

- » [virtualpavilion.co/nga-kainga-anamata](https://virtualpavilion.co/nga-kainga-anamata)
- » [kaingaora.govt.nz/ngakaingaanamata](https://kaingaora.govt.nz/ngakaingaanamata)

## SEEING ENERGY HARDSHIP IN A NEW LIGHT

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*Energy hardship is a reality of life for some Kiwis that the government is working to address. This year, BRANZ shared our expertise to influence the development of a new definition – putting energy hardship at one end of the spectrum and energy wellbeing at the other. By putting the spotlight on energy wellbeing, our hope is to focus stakeholders’ minds on this goal.*

Many Kiwi homes are cold and damp. In fact, more than 130,000 households cannot afford to keep their homes warm enough.<sup>1</sup> This challenging experience falls under the current definition of energy hardship. With its associated health outcomes ranging from asthma to high blood pressure and more severe winter illness in the elderly, energy hardship can be life-threatening for already vulnerable people.

As a science-led research organisation, we know that being able to measure an issue and track it over time is a key step towards tackling it. In addition, based on our interactions with community groups addressing energy needs, we know that the term ‘energy hardship’ can be disempowering for the people it affects.

With this expertise, experience and stakeholder connections, BRANZ is well placed to help shape the national conversation on energy hardship. When MBIE invited us to help prepare a public consultation on the issue that sought to agree a definition and associated metrics, we responded.

BRANZ advocated for a descriptive definition that was broad enough to be enduring and could also meet the needs of a range of organisations. When MBIE announced its final definition, it was clear that our feedback had been incorporated.

MBIE proposed a spectrum with energy wellbeing at one end and energy hardship at the other. BRANZ supported this shift from a definition that has negative disempowering connotations for those it affects to one including the more positive and aspirational concept of energy wellbeing.

*Energy wellbeing is defined as when individuals, households and whānau can obtain adequate energy services to support their wellbeing in their home or kāinga. Energy hardship is when these services cannot be obtained.*

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 [READ MORE](#)

» [mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-hardship/defining-energy-hardship](https://mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-hardship/defining-energy-hardship)

1. MBIE (2021) *Defining Energy Hardship: A discussion document on defining and measuring energy wellbeing and hardship in Aotearoa*



*A camera is used to livestream a BRANZ fire test to clients watching remotely.*

## TESTING TIMES SEE PRODUCT TESTS MOVE ONLINE

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*BRANZ is an established market leader with a reputation for excellence and independence in testing building materials, products and systems for fire safety, durability and performance. When COVID-19 restrictions prevented clients from visiting BRANZ to observe product testing, we began livestreaming fire tests online. Virtual test observation proved so successful it is now part of an enhanced product offering that is a particularly popular option for some offshore clients.*

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*Not being able to travel due to COVID-19 restrictions meant we had to find a way to stay connected to our projects. Videoconferencing meant we could observe fire tests and ask questions in real time. Together with BRANZ, we learned to adapt to the new normal along the way. In the end, it was a great experience, given the challenging environment.”*

THANH HUYNH, R&D ENGINEERING SERVICES DIRECTOR,  
KNAUF GYPSUM (MELBOURNE)

Fire testing represents a significant investment for clients, and many choose to observe tests in person to see for themselves how their building product or system performs when exposed to fire.

When the pandemic hit, BRANZ had to find new ways of working with clients, particularly those based offshore.

Accordingly, like many businesses adapting to remote working during the pandemic, our fire testing team began offering services online. The team found that videoconferencing enabled it to provide clients with an excellent level of service. This involved sharing streaming video from multiple camera angles as well as close-up photos of test specimens and key test data with clients.

By sharing photographs showing information such as temperature readings at regular intervals, the BRANZ team could keep clients fully informed throughout the duration of a product test. The team could then discuss

developments of note with clients live by using the audio or text chat function.

Feedback from clients has been positive. While most say they would prefer to observe a test in person, videoconferencing is enabling them to be present from the comfort of their own surroundings.

For our offshore clients who need to conduct multiple tests across a product line, videoconferencing offers a cost-effective convenient alternative to in-person test observation. It can also help reduce travel costs, save time and avoid carbon emissions associated with flying.



## CELEBRATING AWARD-WINNING SCIENCE

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*Everyone at BRANZ plays a part in the successful delivery of our building science research. There were two occasions this year when BRANZ research captured the limelight with prestigious awards, proving to be bright spots for the entire organisation to celebrate.*

An important factor in achieving science excellence means starting with a good question – the first principle of the scientific method.

BRANZ carries the responsibility of investing funding under the Building Research Levy Act 1969 for, ‘the purposes of promoting and conducting research and other scientific work in connection with the building construction industry’. The direction of our research is steered by the responsibility of solving worthy questions emanating from real-world experience.

Our most recent research awards recognise true examples of answering the right and relevant questions – ones involving both health and safety – demonstrating how science excellence improves the lives of New Zealanders.



### LINKING HOUSING AND HEALTH IN RUTHERFORD MEDAL-WINNING WORK

Researchers at the ground-breaking He Kāinga Oranga - Housing and Health Research Programme – including BRANZ Principal Scientist Dr Manfred Plagmann – were awarded the 2021 Rutherford Medal by the Royal Society Te Apārangi. This is the nation’s top research honour.

He Kāinga Oranga has shown how simple straightforward housing improvements to cold, damp and unsafe conditions can significantly reduce rates of infectious, respiratory and cardiovascular disease and death. This has sparked government attention and resulted in meaningful policy and law changes such as winter energy grants, improved rental home standards and the Warm Up New Zealand campaign.

Dr Plagmann, a co-director at He Kāinga Oranga, has been its building physicist for 5 years and contributes his expertise in building performance-related topics. His current focus on the University of Otago, Wellington-led programme is understanding the role that bacterial and fungal metabolites play in the respiratory health of home occupants. Dr Plagmann’s work with He Kāinga Oranga is a critical thrust in BRANZ’s *Warmer, drier and healthier homes* research programme.

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➔ READ MORE

» [healthyhousing.org.nz](https://healthyhousing.org.nz)



## HELPING COUNCILS MANAGE EARTHQUAKE RISK HONoured TWICE AT THE RISK EXCELLENCE AWARDS

Whether councils should close earthquake-prone facilities such as libraries and pools forms the basis of a decision-making framework for which a BRANZ-led project won two top risk awards.

At RiskNZ's 2022 Risk Excellence Awards, the *Managing earthquake-prone council buildings* project team headed by BRANZ Social Scientist Michael Nuth won the Risk Initiative of the Year Award. The Stronger Together in Partnership Award recognised the research team's collaboration, engagement and communication.

The Risk Excellence Awards recognise the gold standard in leadership, innovation and resilience in situations of risk or challenge.

Researchers talked to several territorial authorities to understand decision-making drivers and how engineering risk information was interpreted, evaluated and acted upon. The resulting framework can help councils navigate their legal obligations while balancing the risks and benefits of closing earthquake-prone public buildings.

On the project, BRANZ collaborated with Resilient Organisations; Kestrel Group Ltd; the University of Canterbury; the Institute of Law, Emergencies and Disaster; and the Massey University Joint Centre for Disaster Research.

### ➔ READ MORE

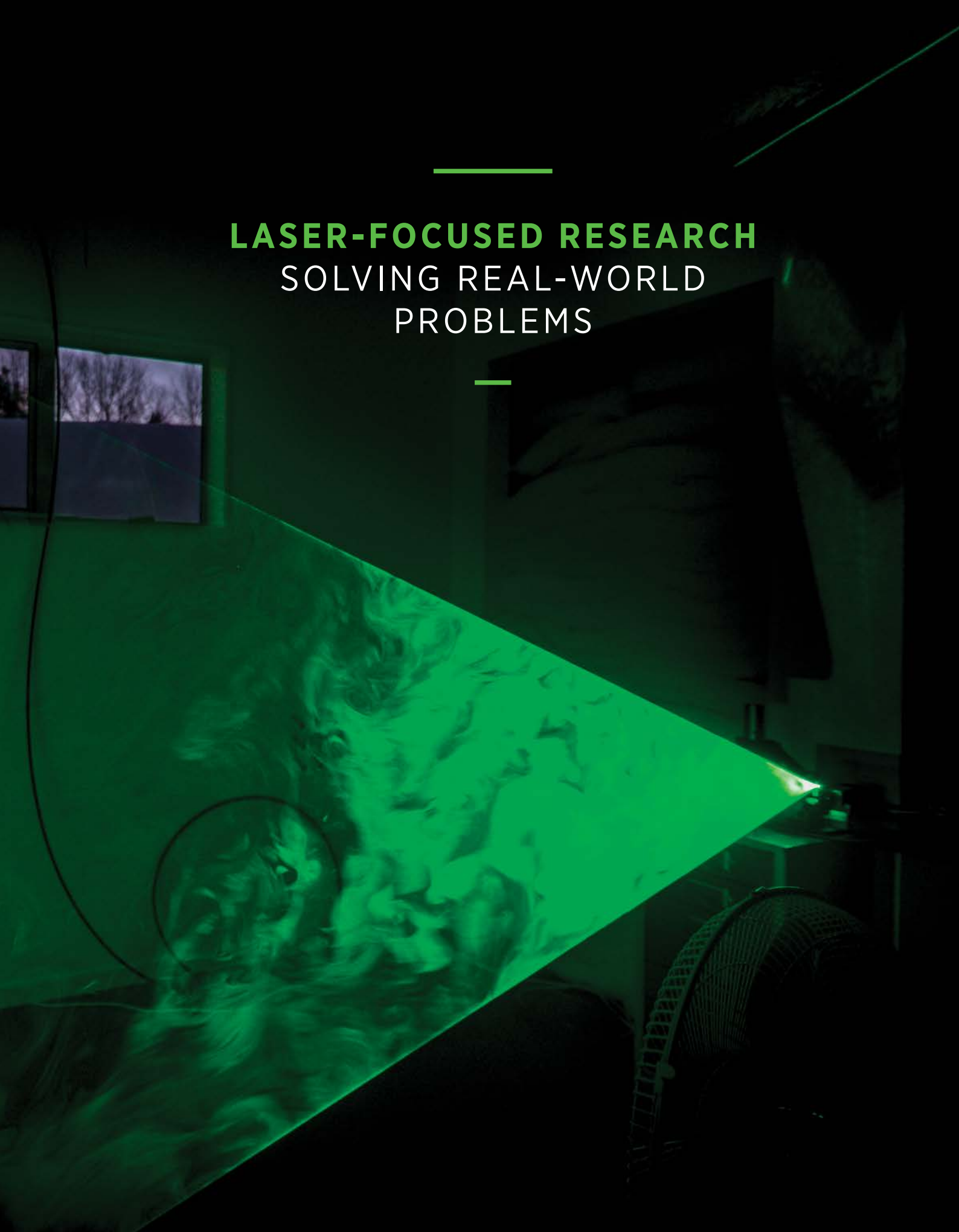
- » BRANZ Research Now: Seismic resilience #2 *Managing earthquake-prone council buildings*
- » BRANZ Study Report SR463 (2021) *Managing earthquake-prone council buildings: Balancing life safety risks and community costs*



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**LASER-FOCUSED RESEARCH**  
SOLVING REAL-WORLD  
PROBLEMS

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## TESTING SOLAR WATER HEATING FOR HOMES

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*There are some 1.8 million households in New Zealand using hot water, which is heated instantly by gas or stored in an electric hot water cylinder connected to the national grid. But is there a way to heat water using cleaner greener methods? An exciting study by BRANZ scientists on photovoltaic hot water systems has been investigating the performance of an innovative low-carbon low-cost technology. It is anticipated that, over time, the environmentally friendly technology being trialled would significantly reduce household energy bills and help the country reduce its carbon footprint.*

Rinsing off beneath a solar shower on a camping holiday is probably the closest most people have come to experiencing hot water heated by the sun. Experiments initiated this year at BRANZ show that the power of the sun can be used to provide for all the water heating in summer for a large household.

Innovative solar photovoltaic (PV) systems provide a simple solution for home water heating. They convert solar energy on roof panels into electrical energy that is used to heat the water in the hot water cylinder. Another heating element connects to the traditional electricity supply for times when the sun is not available.

Water heating is one of the largest single sources of energy use in the home, and lower-carbon PV systems have minimal costs to run after installation. They can be retrofitted, are easy to install with minimal roof penetrations compared to solar thermal energy systems and are low maintenance and silent to operate.

With the emphasis of climate change targets on using renewable energy sources, there is likely to be growing interest in PV systems in the near future. Anticipating the

market realities ahead, we knew industry professionals and the public alike will look for hard data on the benefits of PV technology.

Accordingly, our scientists have been comparing three PV systems of varying sizes to a traditional hot water system. They have been siphoning water from each system's cylinder daily to mimic standardised household usage patterns, while collecting data over each of the four seasons. These measurements include temperature, water flow, PV power output and national grid energy consumption used to supplement the PV systems when needed.

Performance of the PV systems will also be assessed on their energy savings, ease of retrofitting, return on investment and carbon footprint.

Mid-project results are proving favourable. Data from the largest PV unit has shown that a sunny summer day in Wellington will easily provide enough solar energy to meet the hot water needs of a four-person household. This is without using grid-supplied electricity – or the camp shower.

*Previous page: Laser technology is used by BRANZ to show airflow when researching ventilation in homes.*

## REDUCING THE CARBON FOOTPRINT OF CONCRETE

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*Concrete is the most widely used building material in the world, but it is also one of the larger contributors to the carbon footprint of modern buildings. BRANZ partnered with Concrete NZ on expert research that has promising findings for the manufacture of lower-carbon concrete.*

Concrete has been poured into buildings for centuries and is still a staple building material today. Its challenge is the generation of large volumes of greenhouse gas emissions in the manufacture of its traditional binding agent, Portland cement.

To reduce this carbon footprint, Portland cement is being substituted abroad with materials that have lower embodied carbon. Use of these supplementary cementitious materials (SCMs) can result in environmental benefits, improved performance and cost advantages.

In countries with larger heavy industry, SCMs recycled from industrial production include blast-furnace slag, fly ash and silica fume. Here in New Zealand, the sector has been assessing the potential of natural materials instead. These include volcanic glass, pozzolans from ash, silica and pumice from volcanic regions.

Another hurdle has been the lack of a reliable test for predicting the strength and durability of concrete incorporating different types and quantities of natural SCMs – essential for designers and contractors. Research by the University of Canterbury with funding from Concrete NZ and BRANZ has addressed this. Researchers investigated test methods and materials, comparing performance with international norms and standards.

Results released this year are promising. Concrete with SCMs can take longer to gain compressive strength, but replacement of 30 percent Portland cement with SCMs

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*The results from this Concrete NZ and BRANZ research project into supplementary cementitious materials will play a hugely important role in the New Zealand concrete industry achieving its net-zero carbon objectives by 2050.”*

ROB GAIMSTER, CHIEF EXECUTIVE OFFICER, CONCRETE NZ

can achieve reasonable strength and superior durability properties in some cases. Crucially, results showed this could reduce embodied carbon by as much as 20 percent.

With estimated current SCM replacement in New Zealand below 10 percent, these findings should help overcome a major technical barrier to greater adoption.

Researchers recommend revising the current standard relating to SCMs in concrete and adopting an alternative classification system to assess performance. This should lead to increased use of SCMs and – ultimately – lower embodied carbon in concrete in the built environment.

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 [READ MORE](#)

- » [BRANZ External Research Report ER66 \(2021\)  
\*Removing the barriers to the use of significant levels of SCMs in concrete production in New Zealand\*](#)



## INCREASING THE FIRE SAFETY OF TIMBER HOMES AND BUILDINGS

*Advances in engineered wood products alongside efforts to build more sustainably with lower-carbon materials are resulting in the increased use of timber in new-build homes, but its combustibility poses a serious peril. If fire strikes, structural timber that has been burnt can cause the loss of a building's stability, increasing risk to property and people – both occupants and firefighters. BRANZ has published new research to guide fire engineers on fire-safe design for timber building elements.*

Timber in the form of engineered wood products such as laminated veneer lumber and cross-laminated timber is becoming increasingly popular for building. These mass timber products are being used for structural elements such as beams, columns and walls, while exposed timber linings are being used on ceilings and walls for aesthetic reasons.

In the event of a home or building catching alight, timber can literally add fuel to the fire, increasing the danger of building collapse.

To research the safer use of timber in building to minimise this risk, BRANZ collaborated on research with the University of Canterbury, the Fire Research Group and OFR Consultants. The 4-year project targeted two distinct uses of timber: structural timber systems within buildings and timber linings.

Investigations into structural timber systems showed how fire behaved on large cross-section timber beams and columns and that charring protected the timber's structural core.

Critically, the research showed that connection types between timber elements lost their structural integrity at different temperatures and extents. The choice of connection used – whether exposed steel plates, bolts, dowels or screws – is therefore crucial in designing for optimal fire safety.



*BRANZ Senior Fire Technician Aman Kumar tests an engineered wood product to help understand its expected performance in a real fire.*

### WHAT IS MASS TIMBER BUILDING?

Mass timber – short for ‘massive timber’ – building features engineered wood products such as laminated veneer lumber and glue-laminated and cross-laminated timber. These products are used for manufacturing large solid wood panels as well as columns and beams used for structural purposes in walls, floors and roofs.







Research results have been plugged in to BRANZ's B-RISK fire design software for industry use, providing predictions around fire behaviour of cross-laminated timber in structural timber systems.

Our desktop and experimental research focused on timber linings highlighted the importance of their quantity and location in fire-safe building design, deepening industry knowledge from previously published studies.

Together, these findings will help inform changes to the Building Code around the use of mass timber for structural elements, walls and ceilings. This includes giving consideration to the building's occupancy rates and the location of use within the building.

Our fire research supports improvements in the passive fire protection of buildings, with this greater understanding optimising fire-safe timber building design and reducing risk to lives in the event of fire.

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[➔ READ MORE](#)

- » *Build 184 (June/July 2021) Fire performance of mass timber joints*
- » *BRANZ External Research Report ER67 (2021) Pyrolysis model for mass timber: B-RISK theory*
- » *BRANZ External Research Report ER68 (2020) Passive fire protection of cross laminated timber*

*Left: Exposed structural timber and linings have become increasingly popular in ceilings and walls, and BRANZ's research is helping inform their fire-safe design.*

## UNDERSTANDING A NEW WALL SHEETING MATERIAL

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*New Zealanders expect and deserve to have confidence that their building materials are fit for purpose. When new materials are introduced, data from overseas experience often provides useful reference information, but studies specific to New Zealand must be carried out to confidently assess performance under local environmental conditions. A BRANZ study assessed the performance of magnesium oxide board as an alternative wall sheeting material under local environmental conditions.*

As well as its availability, lining material made with magnesium oxide (MgO) cement board is proving popular for being cost-effective, fire resistant and light in weight. The board is being used for internal wall linings, claddings and as the outer layer in structural insulated panels.

MgO board has been available locally for about a decade. Its relative newness means there is not yet a New Zealand specific or accepted international standard to control its production in New Zealand. This means there is potential for variation in composition – and therefore performance – in boards from different suppliers.

There have been both Kiwi and overseas observations of performance issues with some MgO board products. Examples include some cases of disintegration and cracking and corrosion of metallic building elements in contact with the board.

Over 2 years, BRANZ tested a selection of MgO board products to understand any performance variation in different boards available in New Zealand as well as compared to a fibre-cement board.

Results suggested two clear subtypes of board amongst those tested, differentiated primarily by the level of chlorine content. This made for differences in performance under some exposure conditions – an observation in line with the findings of researchers overseas. In other conditions, all boards performed similarly and were comparable to fibre-cement.

The research found MgO board performs adequately if used in a suitable application that takes into account its properties and environmental conditions. For example, some MgO boards performed well following exposure to freeze-thaw and soak-dry conditions, whereas others did not. These findings have been shared publicly.

The recommendations will help anyone specifying or substituting with the board or involved in the building consenting process to use it successfully and deliver better-performing buildings. BRANZ's work joins a growing international body of research that will ultimately improve understanding, use and trust of MgO board for safer and more durable buildings.

## ASSESSING THE STRUCTURAL RESILIENCE OF SCHOOL BUILDINGS

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*When a flood meant classrooms at a Taupō school were earmarked for demolition, it presented an opportunity to test their structural performance should another force of nature strike: an earthquake. Results from BRANZ testing gave the Ministry of Education a rare insight into the resilience of some 200 school buildings, offering both building performance and financial positives.*

Every cloud has a silver lining, and this includes the rainclouds that drenched Tauhara College in Taupō in November 2020, rendering many of its classrooms unusable.

Making the best of a bad situation, the property owner – the Ministry of Education (MOE) – saw the opportunity to destructively test the buildings before demolition.

The standard classroom block design from the 1970s, known as CEBUS, is widely used in MOE's property portfolio with around 200 in existence. Any earthquake strengthening of this design to meet Building Code requirements – or even demolition – would be costly.

The weather event at Tauhara College offered a unique opportunity for real-world full-scale testing of condemned classrooms. The aim was to understand how the CEBUS design would perform when subjected to a horizontal force such as an earthquake compared to desktop engineering calculations.

MOE came to us for structural testing, which demonstrates how building products and systems perform when subjected to external forces. These include earthquakes or strong winds as well as forces associated with normal use such as occupancy or external vibrations.

The research was part-funded by Te Hiranga Rū QuakeCoRE, the New Zealand Tertiary Education Commission-funded research centre for earthquake resilience.

BRANZ structural engineers applied a roughly 2 tonne horizontal load – about the weight of a large car – to the timber portal frames of a vacant classroom to monitor how it deflected.

The frames as part of the wider building system performed significantly better than engineering calculations determined. We also extracted frames for further testing under laboratory conditions.



Results proved that CEBUS classrooms have a significantly greater capacity to withstand horizontal loading than the engineering calculations indicated. Importantly, they easily meet the requirements for a building in a high seismic area and wind exposure location.

The critical value for the client was our ability to test in situ, giving precious data from a real-world environment. MOE now has pertinent information about the structural resilience of a significant proportion of its property portfolio. This frees up investment for other aspects of its building stock performance.

The research has been pivotal in MOE's decision that CEBUS classrooms around the country are worthy of retaining – a far more sustainable outcome than upgrading or demolition.

The other silver lining in this cloud is for Tauhara College: the flood-damaged school is now undergoing a major rebuilding programme.

*BRANZ provided important information about the seismic resilience of a standard classroom design in which thousands of children learn. Our structural testing on classrooms is a potent example of how BRANZ transforms insightful research into trusted, accessible and actionable knowledge.*

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 READ MORE

» [branz.co.nz/structural-testing](https://branz.co.nz/structural-testing)



*A thermal imaging camera is used to identify where a high level of timber framing is leading to heat loss.*

## INVESTIGATING THE THERMAL PERFORMANCE OF WALLS IN NEW HOMES

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*New BRANZ research has shed light on a key risk to building warm, dry, healthy homes – excessive timber framing in the construction of walls jeopardising the performance of insulation. High levels of framing through which heat can escape was found to be widespread, potentially affecting every new home. This evidence has galvanised the industry to work together and solve the issue.*

Healthier homes make for healthier people, and it is sufficient insulation, ventilation and heating or cooling that makes for a healthy living environment in New Zealand houses.

Research has found a core ingredient of that mix – insulation – is being compromised by high levels of timber framing in the walls of new homes. Timber reduces the space for insulating materials and creates a pathway for heat to escape in a phenomenon known as thermal bridging.

The research investigated the extent of thermal bridging in external timber-framed walls of 47 new homes in four New Zealand cities.

The results were published in 2021 and shared across the industry in BRANZ's most popular webinar to date, attracting some 1,200 online attendees throughout New Zealand and Australia.





Results showed that timber framing made up 34% of a wall on average, and ranged from 24–57%. This exceeds the 14–18% percent framing content generally assumed by regulators and the industry for compliance calculations.

The findings indicate that even the minimum level of thermal performance required for walls of new builds may not be achieved. This results in houses being colder and harder to heat, risking increased condensation and surface mould.

The research sought to understand the drivers across the building system causing such high rates of framing. Interviews were conducted across the board with frame and truss manufacturers and cladding producers. Thermally weak points in current house construction were also highlighted, including uninsulated corners, wall junctions and mid-floors.

The research concluded that it is not feasible to significantly reduce the percentage of framing in standard walls of 90 mm thickness and still meet structural requirements for weathertightness and wind.

The researchers' report outlined a number of alternative construction methods with timber frames that have been successfully trialled in New Zealand in recent years. These methods resulted in much better thermal performance in new builds without compromising other aspects of building performance.

The findings and recommendations have sparked discussions between practitioners in the industry about practical, cost-effective and innovative solutions for framed walls. The focus is now firmly on developing alternative construction methods with better thermal performance for warmer, drier, healthier homes.

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### ➔ READ MORE

- » BRANZ External Research Report ER53 (2020) *Measuring the extent of thermal bridging in external timber-framed walls in New Zealand*
- » BRANZ Research Now: Warmer drier healthier #2 *Measuring the extent of thermal bridging in external timber-framed walls in New Zealand*
- » *Build* 182 (February/March 2021) *Moving beyond the bridge*
- » BRANZ Thermal Bridging Calculation Tool [branz.co.nz](https://branz.co.nz)

*Left: Poor thermal performance caused by high levels of timber framing can contribute to increased condensation and mould, even in new-build homes.*





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OUR **FULL-SPECTRUM**  
**APPROACH** ACROSS THE  
BUILDING SYSTEM

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## INFORMING BUILDING REQUIREMENT CHANGES FOR GREATER ENERGY EFFICIENCY

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*Improving the energy efficiency of buildings is an integral part of New Zealand's response to climate change. Applying our science, we have been able to assist the government to make significant revisions to its building requirements, turning this policy into reality. We are pleased that our evidence base enabled an informed choice and action that contributes to the government's wider emissions reduction plans.*

Initiatives are under way across government and industry to reduce emissions from building and construction as part of the nationwide solution to tackle climate change. The steps being taken to reduce emissions have two objectives: reduce the embodied carbon of buildings and reduce operational emissions such as from energy and water use.

Buildings designed for energy efficiency aim to be warmer, drier and healthier with positive health and wellbeing outcomes for their occupants. They are also less costly to run and have lower carbon emissions in their operation and over their lifetime.

To make homes like this a certainty of the future, MBIE has substantially increased the minimum requirements for insulation applying to all new homes and new buildings up to 300 m<sup>2</sup>. These are thermal performance revisions

of the design construction details used to demonstrate compliance with the Building Code, known as an Acceptable Solution. The revisions comprise the 5th edition of the H1 *Energy efficiency* documentation and are the most significant changes to the Acceptable Solution across all New Zealand climate zones in a decade.

Given the transformative value of higher-performing buildings on both people and the environment, BRANZ has supported these regulatory changes from the start.

For decades, BRANZ's research has provided an independent evidence base supporting regulatory and policy decision making by government. In this instance, BRANZ scientists contributed their technical expertise to the thermal performance revisions for three of the four housing elements impacted by revised regulations: windows, floors and roofs.







For example, we updated the reference data for the minimum thermal performance requirement for windows, which doubles in some climate zones. This has been tabulated in the Acceptable Solution changes and is set to drive decision making about window design, framing materials and glazing options.

BRANZ scientists also investigated slab-on-grade flooring systems for the documentation changes. This involved assessing international standards, consolidating them for the New Zealand context and modelling data for new reference tables.

*BRANZ is actively contributing to the long-term government vision that, by 2050, building-related emissions are near zero and buildings provide healthy places to work and live for present and future generations.*

Our expertise also assisted for roof insulation. For the new minimum R-value requirements of R6.6 for roofs across all six climate zones, we provided valuable guidance in the form of a correction equation. This is used in calculations for roof spaces where reduced insulation is installed at the edge of a horizontal ceiling under a sloping roof.



*The new generation of energy-efficient building regulations for new homes will help cold, damp, unhealthy homes become a thing of the past.*

We are also equipping the industry with practical guidance for achieving compliance. Our range of guidelines is supporting the industry transition to the revised regulations as we help usher in a new generation of energy-efficient building regulations aimed to protect the generations ahead.

### HOW BRANZ UPDATED 20-YEAR-OLD WINDOW DATA FOR THE WHOLE INDUSTRY'S BENEFIT

Farewell to the standard aluminium windows that have been a feature of New Zealand housing since the 1970s and a warm hello to thermally efficient window frames and glazing in new homes.

A new thermal performance table of data BRANZ developed is included in the Acceptable Solution revisions and will be referred to industry-wide for window design decisions in all new homes.

To produce the table, BRANZ collaborated with the Window & Glass Association of New Zealand to update two-decade-old figures using computer-modelling. We used data from windows and doors specified for new-build homes in 2021, ranging from toilet windows to ranchsliders, including double and triple glazing options on the market.

The result is a current and practical reference table on which the building and construction industry will soon be relying daily to help make all new homes warmer, drier and healthier.



*BRANZ Technician Sheng-Huei Huang tests the thermal performance of insulation, the minimum requirements for which are increasing significantly for roofs.*

#### ➔ READ MORE

- » *Build 188 (February/March 2022) Building Code changes 2021*
- » *MBIE (2021) HI Energy Efficiency Acceptable Solution HI/ASI*

## SUPPORTING INDUSTRY DECISION MAKING WITH THE NATIONAL CONSTRUCTION PIPELINE REPORT

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*The National Construction Pipeline Report is a key tool used by the government and the building and construction sector to forecast future work and improve resilience. It is helping decision makers to identify priorities for investment and agree on initiatives for system-wide collaboration to meet the needs of the nation.*

The building and construction sector is Aotearoa New Zealand's fourth-largest employer and makes an important contribution to gross domestic product. In 2020, the sector employed 280,000 workers<sup>2</sup> and the industry was valued at an estimated \$42.6 billion.<sup>3</sup>

The significance of the industry in providing national infrastructure, much-needed housing and jobs means that scanning the horizon is critical to the industry's success in meeting the needs of New Zealanders.

For the past 9 years, MBIE has turned to BRANZ and private research company Pacifecon to develop the National Construction Pipeline Report. Building consent data – a key component of the analysis – illuminates the construction activity ahead and provides a useful indicator of New Zealand's overall economic health.

Decision makers in the industry have come to rely on the report to give them the most accurate forecast of activity to support their future planning.

In compiling the report, BRANZ analysed consent data from councils across the country. Analysis confirmed the actual value of building activity for the 2021 financial year and projected the value of the industry's work for the next 6 years.

The report also included forecasts broken down for residential, non-residential and infrastructure activity at both regional and national levels.

By having a single national perspective of the sector's combined work pipeline, industry players can work together. This includes being able to align supply chains, anticipate skills demands and manage scarce resources effectively – all for the good of the country.

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 [READ MORE](#)

» [National Construction Pipeline Report \(2021\)](#)  
[mbie.govt.nz](https://mbie.govt.nz)

2. BRANZ/Pacifecon/Stats NZ data

3. MBIE (2021) *National Construction Pipeline Report*

## EVALUATING THE DURABILITY OF NEW MATERIALS

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*New innovative building materials can offer a range of benefits over traditional options, but will they stand the test of time? Proving the durability of a new material is a requirement under the Building Code and a complex task, so in February, BRANZ launched a simple framework that can be used to evaluate the durability of any new building material. This is the trailblazing result of 5 years of in-depth research, equipping the whole industry with an elegant and simplified solution.*

The building and construction industry uses a vast array of materials: metals, ceramics, polymers, composites and natural materials. For many of these traditional building materials, durability is a proven, with some having been in use for decades – even centuries.

Today, new materials are engineered to be low-carbon, fire resistant, earthquake resilient or even self-healing. Proving the durability of such materials is a challenging requirement under the Building Code. With emphasis now on achieving industry zero-carbon targets, it has never been more critical, because assessing durability is a key factor in determining a building's whole-of-life carbon emissions.

Identifying the industry need for a consistent and systematic approach to testing, BRANZ pioneered a framework that can be used to evaluate the durability of any new material.

The framework is made up of two interconnected parts: a structurally phased evaluation procedure and a general approach for developing testing schemes. Technical support for users includes evaluation factors, methods, models and material service-life datasets.

We also developed a specialist testing facility, with advice from the University of Auckland. This involved building a weathering rig designed to test materials under simulated, adjustable conditions within an accelerated time period. Materials can be rotated to follow the sun and sprayed with a variety of solutions to test their reaction to solar irradiation and common air contaminants.

“

*This comprehensive framework covers a wide range of building materials. It will be very useful for professionals working in the building and construction industry and a valuable reference for a wide range of people in New Zealand.”*

PROFESSOR WEI GAO, DEPARTMENT OF CHEMICAL & MATERIALS ENGINEERING, UNIVERSITY OF AUCKLAND

BRANZ's innovative new framework has broad application. It will be used by our building scientists to appraise new products and is available for free on our website. This means manufacturers can test their own products before going to market – ultimately giving consumers confidence that their building materials have been built to last.

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 [READ MORE](#)

- » [BRANZ Study Report SR464 \(2022\) \*Durability evaluation framework for new building materials\*](#)
- » [BRANZ Research Now: Materials #1 \*Durability evaluation framework for new building materials\*](#)



## SUPPORTING BETTER MENTAL HEALTH IN THE INDUSTRY

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*Our earlier research showed mental health and suicide to be major issues facing our industry. This year, new research with a wider lens across all industry occupations illuminated the full extent of the issue and the demographic groups most at risk. This new perspective will enable targeted interventions and more-effective development of tailored support.*

In the ground-breaking 2018 BRANZ study *Mental health in the construction industry*, we highlighted that construction workers were more likely than the rest of the workforce to lose their life to suicide.

A catalyst for action, our research prompted the establishment of workplace mental health programme MATES in Construction (MATES) in New Zealand in 2019.

MATES trains construction workers in offering mental health support to their colleagues and asking for help when they are struggling themselves.

Now, MATES has data from two new studies published this year, which it is using to target its interventions more effectively.

The first of these studies shows workers in the construction industry are more than twice as likely to commit suicide as workers in other industries. Men aged 20–24 are at highest risk, and Māori men are also significantly over-represented in the statistics.

The study also refines the occupations making up the construction industry, with an expert working group of industry professionals and researchers agreeing on an expanded definition of occupations. This means MATES can reach out to more people who may need support.

The second study shows the MATES training programme is having a positive impact. It found that, after taking part in MATES training, construction workers are more confident in noticing distress in colleagues and more competent in encouraging them to seek support.



*New Zealand construction industry workers are more than twice as likely to lose their life to suicide than the rest of the workforce. Men aged 20–24 are most at risk.*

The study also found the training was helping to improve the self-reported emotional wellbeing of those who took part in the study. The better the workers felt about their wellbeing, the more likely they were to seek help themselves.

MATES has attracted significant government funding this year. The Australian-originated programme also received international acclaim from the World Health Organization when it was held up as an example of best practice in suicide prevention in its new implementation guide.

“

*What this new research shows is that we may have been undercounting the number of suicides in the industry. This information will help to offer more targeted support as we now have a more detailed picture of the scale and who is affected.”*

VICTORIA MCARTHUR, CHIEF EXECUTIVE,  
MATES IN CONSTRUCTION



*New research this year is helping MATES target interventions more effectively, such as the general awareness training programme it delivers to construction workers.*

Research is one of four pillars in the MATES operating model, which is why our support has been so important in informing its approach to addressing industry mental health and wellbeing.

To be successful, suicide prevention initiatives like MATES rely on consistent data, including demographic information. Accurate industry data is critical to monitoring suicide trends and providing a baseline for assessing the effectiveness of suicide prevention initiatives.

By providing evidence that aids MATES to take action on suicide prevention, BRANZ is supporting workers to help themselves and their colleagues towards better mental health – and potentially saving lives.

#### GET SUPPORT

- » **MATES in Construction** – 0800 111 315: 24/7 helpline
- » **Need to talk?** Free call or text 1737 any time for support from a trained counsellor
- » **Lifeline** – 0800 543 354 (0800 LIFELINE) or free text 4357 (HELP)
- » **Suicide Crisis Helpline** – 0508 828 865 (0508 TAUTOKO)
- » **Healthline** – 0800 611 116
- » **Samaritans** – 0800 726 666

#### ➔ READ MORE

- » BRANZ External Research Report ER65 (2021) *Construction industry suicides: numbers, characteristics, and rates*
- » Mates in Construction (2021) *MATES in Construction New Zealand: A longitudinal assessment of suicide prevention programme for construction workers*
- » [mates.net.nz](https://mates.net.nz)

*Right: MATES supports construction workers to be more confident in noticing distress in colleagues and more competent in encouraging them to seek support.*







## BUILDING A CLOSER RELATIONSHIP WITH THE STEEL SECTOR

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*Strengthening our connection to others is an embedded way of working at BRANZ. It is a shared ethos by which we commit to working across the building system to communicate, share expertise and together deliver a better building system for all. As climate change targets loom, this approach has underpinned the development of a closer working relationship with HERA (Heavy Engineering Research Association), our sister organisation in the steel sector.*

Enjoying new regular meetings, team members at both BRANZ and HERA have been growing professionally by sharing expertise in engineering, materials and environmental challenges.

A joined-up building and construction industry is imperative to any chance of meeting our shared climate change targets. Accordingly, BRANZ aims to strengthen connections with the steel sector, and closer engagement with HERA is integral. In 2021, BRANZ and HERA actively committed to working together to support the building and construction industry.

Working collaboratively strengthens research conducted by both organisations and helps avoid duplication. A closer relationship is developing effective information sharing and a more proactive approach to industry issues, enabling safe and durable building products and practices.

HERA is introducing a raft of measures in a long-term framework that aims to make steel a significant global low-carbon option. These measures feature a commitment to greater recycling and searching for an alternative to the greenhouse gas-intensive technologies that are critical to steel production.

HERA has launched a carbon-offset programme and plans to investigate how to extend steel's lifespan in structural building applications. HERA is also proposing a material passport scheme for structural steel that would lead to confident and safe reuse, promoting a circular economy.

A closer working relationship means we can share our expertise on the zero-carbon built environment to support this work. Other BRANZ work such as our long-term corrosion investigations and research into steel portal frames used in residential bracing systems also has the potential to be leveraged through a closer working relationship.

Furthering our steel sector links, BRANZ also sits on the Sustainable Steel Council. The council comprises industry leaders committed to the circular economy and New Zealand's low-emissions future, with a programme of work that supports New Zealand's steel sector.

The aim of these initiatives is to forge a stronger relationship with the sector over time – a relationship as strong as steel.

## CREATING A ROADMAP TO A SUSTAINABLE FUTURE FOR THE INDUSTRY

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*A roadmap for greater sustainability in the building system sets the direction for the industry by providing a clear action plan to work together to achieve the nation's environmental aspirations and zero-carbon targets. BRANZ is proud to have actively supported its delivery.*

Faced with any challenging journey, charting a course is wise. With hundreds of thousands of people on that journey, it is essential.

About 10% of New Zealand's total workforce was employed in the building and construction sector in the year ended June 2021.<sup>4</sup> By 2050, everyone in the sector will need to be contributing to a building system that meets the government's commitment to a net-zero carbon economy. A goal on the nearer horizon is reversal of adverse environmental impacts from construction by 2030.

Currently, however, the average new house build is multiple times over the greenhouse gas emissions budget of 2050 allowances. Meeting them will take a reinvention of the whole building system – from resource usage, design and construction methods to materials production and building site waste.

The newly launched Construction Sector Environment Roadmap for Action from the Construction Sector Accord shows the way forward, signposting the sustainable practices and the whole system buy-in required.

The Accord is an industry and government initiative working on key challenges facing the sector. BRANZ Chief Executive Officer Chelydra Percy led the Accord's Environment workstream and the BRANZ team that collaborated with cross-sector experts to develop the roadmap.

Aspirational and challenging, the roadmap's strength is its focus on practical measures that all businesses can take to improve environmental performance – today. However,

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*The size and scale of what is being asked of our sector is huge. It will take determination, steadfast commitment and courage to achieve the level of change required. The first step in any radical change is the creation of a movement and the joining of forces. We need to come together to light that spark – each and every one of us has a part to play.”*

CHELYDRA PERCY, CHIEF EXECUTIVE OFFICER, BRANZ

most importantly, it outlines the mindset shift required across the entire building system to enable the sector to contribute meaningfully to New Zealand's 2050 climate change and environmental ambitions.

The roadmap identifies four priority areas – changing mindsets, scaling up, incentivising and aligning and demonstrating impact – with a series of actions for each. These include upskilling, improving the use of recycling, collecting impact data and ensuring policy and finance are supporting the roadmap goals.

The roadmap will be a foundation of the Accord's work programme over the next 3 years. BRANZ is well placed and committed to using our influence, networks and role as a science-led organisation to support this important work.

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 [READ MORE](#)

» [branz.co.nz/about/construction-sector-accord](https://branz.co.nz/about/construction-sector-accord)

4. MBIE (2021) *Building and Construction Sector Trends Annual Report*







A dark, dense forest with a path leading through the trees. The trees are tall and thin, with bare branches. The ground is covered in a thick layer of brown pine needles. The lighting is dim, creating a somber and mysterious atmosphere.

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**ILLUMINATING THE PATH** TO  
A BETTER FUTURE

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## RAISING SCIENCE LITERACY IN SCHOOLS

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*For a busy teacher, the option of borrowing fun hands-on science resource kits designed to engage children on topics that cover the whole primary science curriculum is a windfall. Providing this helpful service to participating primary schools is charitable trust House of Science. BRANZ is excited to have entered a 3-year sponsorship of a House of Science kit that educates students in our region on topics close to our heart: insulation and solar energy.*









*Students at Te Kura Kaupapa Māori o Te Rito in Ōtaki learn about heat energy with a thermal imaging camera from a BRANZ-sponsored House of Science kit.*

Sharing our love of science with the next generation is proving as much a highlight for us at BRANZ as the children opening our House of Science kit.

The Hot Stuff/Te Wera Hoki resource kit we sponsor is available to schools and kura in Kāpiti, Horowhenua and Manawatū. The main focus of this kit is heat energy and its transfer. Experiments include using a thermal imaging camera to detect and measure temperature differences and changes in classroom objects. This is the same technology we use in our thermal bridging assessments to understand a building's insulation performance.

Students also study the importance of solar energy as a source of electricity in the future, as we are doing at BRANZ. Other science resource kits support learning about weather, earthquakes, DNA, microbes, pollination and climate change – all while developing children's critical thinking skills.

The bilingual kits have information in te reo Māori and English for both students and teachers and at least five hands-on experiments catering for students up to Year 8. They are easy to use – everything a teacher needs is in a kit. After a fortnight's use, House of Science volunteers collect the kit from the school and then clean, check and restock it ready to go out to another school.

The aim of House of Science is to see every child in New Zealand become scientifically literate. This means they have a clear understanding of science concepts and processes when they encounter them in their daily lives.

Established in 2013 by Chris Duggan, an ex-secondary school science teacher dismayed by students' lack of science skills when they arrived at college, the House of Science initiative now operates in 17 regions. There are about 100 schools in each, with schools paying a modest membership fee to use the service. The kits are regularly reviewed to be kept up to date with current research and national interest.

We think House of Science is doing an impressive job of getting the children of Aotearoa New Zealand excited about science and is well worthy of support. We hope our sponsored kit inspires something from childhood that is common among BRANZ employees: a fervent and lifelong love of science.

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➔ [READ MORE](#)

» [houseofscience.nz](https://houseofscience.nz)

## HELPING SCHOOLS GO EASY ON THE ENVIRONMENT

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*How to tread lightly on the Earth now forms part of the curriculum and culture in schools. As the Ministry of Education works towards making every classroom in which students learn adhere to this same ethos, BRANZ is proud to have helped.*

This year, MOE worked with us to help its understanding of the carbon consequences of a sample of typical school buildings in four towns and cities.

Using LCAQuick – a free life cycle assessment tool BRANZ developed to help designers better understand the potential environmental impacts of their designs – we calculated a carbon footprint for each. This measure considers the manufacture and transport of building materials, construction practices and waste management as well as maintenance and replacement of products during a building’s lifetime. It also includes simulated day-to-day energy use and the carbon implications at end of life.

The results offered valuable comparisons between levels of greenhouse gas emissions for different building types and building elements. Spotlighting the carbon hotspots has helped MOE understand where to focus for lower

carbon outcomes as it continues to trial better, more-sustainable practices in innovative school building pilot projects.

The set of recommendations we provided with our carbon footprint calculations will assist MOE’s exploration of lower-carbon strategies right from the start of the planning process. This includes decision making about whether to retrofit existing buildings or build lower-carbon new buildings. Such information will help MOE deliver on its environmental action plan for school property.

MOE has the second-largest Crown property portfolio after Kāinga Ora. It has some 15,000 buildings at around 2,100 state schools and kura across Aotearoa New Zealand.

We know that helping MOE’s self-schooling in sustainability will also be a huge tick for the decarbonisation of New Zealand’s broader built environment in the years to come.

“

*BRANZ is a recognised expert in building industry carbon measurement and reduction methodologies. Its findings have helped the Ministry analyse its current building performance and highlight ways to reduce carbon, ranging from changes in materials selection to more-strategic interventions.”*

PUNYA CHANDI, INVESTMENT ANALYST,  
MINISTRY OF EDUCATION



## BOOSTING TOMORROW'S PRODUCTIVITY WITH GREATER UPTAKE OF TECHNOLOGY

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*Each time a construction company sends up a drone to inspect hazardous areas of a site, it saves time and money and reduces risk to workers. Harnessing the power of technology to perform tasks like this can significantly boost productivity. Through researching and sharing the best steps for readying an organisation to adopt technology, BRANZ hopes other enterprises can do so more easily.*

Discovering what makes fertile ground for the uptake of digital and technological advances meant examining the use of technology such as drones, computer modelling and artificial intelligence by local tech-savvy companies.

It also meant exploring how ready the industry is for the new and emerging technologies disrupting traditional ways of working so others can fast-track their adoption – and ultimately boost productivity.

The research project *Technology adoption roadmap for the New Zealand construction sector* began in 2019. Extensive data collection included an international literature review, a state-of-play survey of 428 architectural, engineering and construction organisations, 38 indepth interviews and five case studies.

These were deep dives into the technology adoption and digital transformation journeys of five large construction companies. Their technology included computer-aided design, cloud-based technology, global positioning systems, building information modelling, internet of things, smart sensors and virtual reality, with interest in automation, artificial intelligence and digital twinning.

Insights generated will prove helpful for industry planning. For instance, the top-performing engineering and construction companies in terms of technology adoption had over 100 employees and were ahead of their smaller peers by about 30% in technology readiness.

Cost and client interest mainly influence businesses' decisions on whether to introduce technologies. Innovation was driven by project need, followed by the lure of greater productivity.

Findings highlighted that digital literacy is central to technological transformation. It identified skill gaps in the industry – building information modellers, data analysts, software programmers and digital project managers. Industry investment in capability building and skills training will be the most impactful enablers to technological and digital competence.

The research team from the University of Auckland, Callaghan Innovation and Victoria University of Wellington is now working on a roadmap for how to implement technologies, featuring the core capabilities a business needs for success. This will incorporate a key recommendation, which is to take a systemic approach. This means evolving a business model with a people-focused talent strategy, an operational plan and a culture of technology adoption.

With pressure on the industry to alleviate the housing crisis and deliver major infrastructure, this advice about how to work smarter, not harder brings timely guidance.

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 [READ MORE](#)

- » [BRANZ External Research Report ER71 \(2022\) \*Technology implementation: What does the future hold for construction?\*](#)

## INVESTING IN THE BUILDING PROFESSIONALS AND RESEARCHERS OF THE FUTURE

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### UPSKILLING CONSTRUCTION PROFESSIONALS' CARBON KNOW-HOW

*For the industry to deliver zero-carbon buildings, it needs a workforce knowledgeable about carbon and why it matters. BRANZ collaborated with Massey University to equip a new generation of construction professionals with the skills, knowledge and financial support to reduce carbon emissions and mitigate the effects of climate change.*

The 2021 academic year was the inaugural year for the new master's degree programme on which we collaborated with Massey University and provided financial support to eight students. Targeted at building and construction professionals, the master's degree in construction aims to strengthen the sector's capability to tackle the challenges of climate change.

Research projects undertaken by the students ranged from investigating how virtual reality can help designers understand a building's impact on surrounding environmental conditions to design management for reducing construction waste.

With most participating students already working in a range of industry professions since completing the programme, they are sharing their new knowledge with colleagues across their workplaces.

Both BRANZ and Massey University are encouraged by the initial success of the master's programme. It is receiving wider awareness and recognition across the university and industry and internationally.

### FUNDING INNOVATIVE EARLY-CAREER RESEARCHERS

*We have made funding available annually for outstanding postgraduate scholars in tertiary institutions since 2005. The BRANZ scholarship programme brings diversity to our portfolio of investments, supports innovative research and invests in the next generation of research talent.*

Seventeen students on BRANZ's scholarship programme are currently conducting research work towards their master's or doctorate qualifications. Congratulations to Shannon Griffiths from Victoria University of Wellington who completed her master's in architecture this year.

Shannon's research sought to develop the interaction between panellised mass timber structures and the planning of a contemporary activity-based workplace at urban mid-rise scale. The research explored various methods of using mass timber in these contemporary workplaces, developing three prototype designs for a commercial building in central Wellington.

One of Shannon's designs applied panellised layered arched mass timber structures. This design demonstrated that mass timber can be a sustainable, attractive and appropriate material for urban mid-rise construction for the commercial sector.

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 [READ MORE](#)

» [branz.co.nz/investing-research/building-research-scholarships](https://branz.co.nz/investing-research/building-research-scholarships)









## ENABLING AN INDUSTRY-WIDE RESPONSE TO CLIMATE CHANGE

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*New thinking and operating are critical for the building and construction industry to adapt and meet New Zealand's climate change targets, delivering a sustainable built environment for the next generations. As a leading enabler of the changes needed for a decarbonised future, this year we continued our zero-carbon research, industry collaboration and educational outreach. We launched dynamic new low-carbon design tools and an informative webinar series and took the lead on construction waste management with some of the country's largest public developers.*

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The goal of BRANZ's future-focused programme *Transition to a zero-carbon built environment* is that the building and construction industry is delivering net-zero carbon buildings in an affordable way by 2050. This is the year by which the government has committed the country to being carbon neutral.

Buildings are responsible for an estimated 16–20% of New Zealand's greenhouse gas emissions – putting pressure on the building and construction industry to drastically change the way it works.

We equip key industry players with the knowledge they need to address climate change with the appropriate change in their part of the building system. This includes knowledge about how to make carbon-informed decisions about building design, materials and construction methods as well as innovating low-carbon solutions in these areas.

### COLLABORATING ON IMPORTANT ZERO-CARBON RESEARCH IN THE NEW ZEALAND CONTEXT

BRANZ's *Transition to a zero-carbon built environment* programme launched in 2020 and is a catalyst for an industry-wide response to climate change. Within the programme, there are 31 projects under way seeking to understand optimal solutions for a zero-carbon built environment in Aotearoa New Zealand.

Some are being led by BRANZ, such as trialling innovative water heating systems to find the best low-carbon solutions for New Zealand homes and upskilling industry professionals in zero-carbon building. Other Building Research Levy-funded research projects are being led by providers such as Massey University, Concrete NZ and the University of Auckland.

### LAUNCHING NEW TOOLS FOR LOW-CARBON BUILDING DESIGN

This year, BRANZ has launched an expanded suite of updated and digital tools responsive to industry need. New tools CO<sub>2</sub>RE, LCAPlay and CO<sub>2</sub>MPARE have been made freely available on our website alongside updated versions of LCAQuick and CO<sub>2</sub>NSTRUCT.

*Action against climate change is urgent and requires leadership across the industry. We are leveraging more than two decades of research in sustainable building to help lead the way and help others step up.*

The tools help designers and architects calculate the carbon footprints of building designs. They provide comparative embodied carbon data for building materials and elements like walls, roofs and floors. Designs can be played with and fine-tuned digitally to achieve the lowest carbon outcomes – well before a hammer is lifted on a construction site.

BRANZ supports the tools' use with free online training sessions and ongoing support to help users apply the tools on their projects.

### UPSKILLING INDUSTRY WITH OUR EDUCATIONAL OUTREACH

BRANZ research has shown that carbon literacy in the industry was proving a barrier to changing traditional processes, products and technology to low-carbon options. We have therefore invested in new educational content such as videos and publications to build carbon know-how.

We released a series of five short videos on reducing operational and embodied carbon in buildings as an introduction to the subject for a wide audience. Topics included identifying where carbon is in a building, materials selection to reduce carbon and how to build considering solar design.

Registrations to our four-part webinar series The Carbon Challenge numbered over 2,000 and included architects, designers, builders, building officials and engineers. Webinar presentations were followed by interactive online workshops to cement understanding and create industry connections.

Feedback on the series was positive. Participants left with both a better understanding of the importance of reducing carbon emissions in building and construction and practical ways to reduce embodied and operational carbon in the design of buildings.





Climate change threatens the built environment in many parts of Aotearoa New Zealand. BRANZ's Transition to a zero-carbon built environment programme is driving industry-wide behaviour change to help mitigate the effects.

### LEADING TO SOLVE CONSTRUCTION WASTE

On average, 4 tonnes of waste are generated in the construction of a typical house in Aotearoa New Zealand. It is estimated that construction and demolition waste accounts for a third to a half of all waste going to landfills and cleanfills. The environmental impact of landfills is a likely contribution of some 4% of New Zealand's total greenhouse gas emissions.<sup>5</sup>

To help clean up these concerning statistics, BRANZ has been assisting key partners from central and local government and the industry by undertaking a waste hui to bring these groups together. This included government agencies responsible for the construction of a large number of buildings across Aotearoa New Zealand. The solution-focused meeting involved sharing ideas and strategies to minimise construction waste. The group seeks to enable behaviour change across industry to help reduce construction and demolition waste.

BRANZ has also partnered with Unitec through external research investment to examine plastic waste in construction. This project seeks to work with the construction sector to develop, communicate and implement practical on-site solutions to reduce plastic waste.

These have been significant steps towards facilitating connections and addressing construction waste – yet another pathway BRANZ is building to enable and champion the industry to reach the goal of a zero-carbon 2050.

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#### ➤ READ MORE

- » *Build 188* (February/March 2022) *A brighter future*
- » [branz.co.nz/environment-zero-carbon-research/framework](https://branz.co.nz/environment-zero-carbon-research/framework)

5. Statistics reported in *Build 188*









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**LIGHTING THE WAY**  
**FOR BRANZ**

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## ADVANCING CAPACITY AND CAPABILITY WITH OUR CAMPUS REDEVELOPMENT

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*On a drizzly morning in October 2021, a haunting karakia rang out across the BRANZ campus. Kaumātua from mana whenua Ngāti Toa joined us to pay tribute to the old laboratories and workspaces that were making way for new to acknowledge their legacy and bless the work ahead.*

With that celebration of circularity – the old begetting the new – we officially began a 3-year redevelopment of our campus. This work is laying the foundations for advanced research and commercial testing capability to benefit Aotearoa New Zealand for decades to come.

For more than 50 years, BRANZ has forged a reputation for quality research and the ability to enable advancements in building methods and performance standards. With New Zealand’s building and construction landscape evolving ever more rapidly, it is essential that BRANZ has appropriate facilities to maintain this reputation.

As a result, purpose-designed office workspaces and two new laboratories – for fire and structural research and testing – are being built to significantly enhance BRANZ’s research and testing capacity and capability.

For BRANZ, it is not just about *what* has been designed and built, it is about the *how* and the *why*.

### **BUILDING FOR THE LONG TERM**

BRANZ has a clear vision: *Challenging Aotearoa New Zealand to create a building system that delivers better outcomes for all.* When it came to planning for the campus redevelopment, we saw a unique opportunity to deliver on that vision for the benefit of the industry – and our people.

Traditionally, the costs of construction usually dominate building decisions. Yes, it is a vital factor, but it fails to account for the value a building offers over the course of its lifetime. Other considerations such as the impact a building has on the people who live or work in it also need to be addressed. Given this is a once-in-50-year project for BRANZ, we looked at things differently.

We followed BRANZ’s established planning framework, which outlines a series of six principles that guide all our decisions. In designing and building the new campus, we have ensured that it:

- expresses our capability
- encourages collaboration
- is fit for purpose
- is future-proofed
- is environmentally sustainable
- is financially sustainable.





*After years in the planning, we broke ground on a 3-year redevelopment of our campus in October 2021.*

## **SET UP FOR SUCCESS**

Collaboration has also been at the forefront of our approach to procurement and project governance. For example, we have benefited from involving our contractor far earlier than is the norm. Working alongside the design team in the preliminary stages of the redevelopment, the contractor has advised on staging, material use and buildability. This input has positively impacted the understanding of the project risks and enhanced the ultimate design.

In contracting the construction phase, we applied the principles of the Construction Sector Accord and Government Construction Procurement Guidelines, which ensure risk sits where it can be best managed. BRANZ believes this has not only ensured a fairer outcome about who carries risk but has also reduced friction and encouraged a strong collaborative response to problem solving as the project progresses.

We are benefiting from the appointment of an independent engineer to the contract as part of best practice to ensure fairness and impartiality for all involved in the construction phase.

Another factor that has helped BRANZ to de-risk the construction process has been to undertake forward procurement of materials and plant as much as possible. This has successfully mitigated cost escalation, proving a useful buffer to inflation and the impact of supply-chain delays and interruptions brought by the COVID-19 pandemic.

BRANZ has also prioritised developing a great relationship with the build team. This collaborative approach has resulted in a genuine problem-solving partnership and better outcomes for all project participants.



**NEW CUTTING-EDGE RESEARCH LABORATORIES**

BRANZ is committed to identifying practical solutions that improve New Zealand’s building system performance. Our new fire and structures laboratories will enable BRANZ to undertake advanced research and testing at scale and in close-to-realistic – but controlled – conditions.

The new fire laboratory will provide the facilities to advance understanding of how modern building practices impact on fire risk. This includes large-scale calorimetry testing in which our fire scientists assess the heat release rate of a fire by the measurement of the oxygen consumed by the fire. Replicating multi-storey buildings, research of building systems or materials as tall as 3–4 storeys under

the simulation of different fire events will be possible. A safe viewing area will allow BRANZ to showcase our research and testing capability.

Meanwhile, our new structures laboratory will provide enhanced capability and capacity for structural research and testing of building products and systems at medium scale, which complements other capability within New Zealand.

The BRANZ campus redevelopment is being completed in phases with expected delivery milestones over the next 12 months. After years of planning, it is exciting for our team to be a step closer to having cutting-edge facilities in which to continue to practise our world-leading science.



*New buildings under construction include state-of-the-art fire and structures laboratories.*

## SUSTAINABILITY IN THE SPOTLIGHT

BRANZ’s aim is to become a net-zero emissions business by 2035 – if not before. With this firmly front of mind, we are working through a detailed process to understand what being a truly sustainable organisation means to us. Meanwhile, we continue to take actions to reduce our carbon footprint and this year reached a significant milestone on this journey.

### ACHIEVING NET CARBON ZERO CERTIFICATION

The sustainability highlight for the year was undoubtedly becoming certified net carbon zero after an independently verified monitoring programme.

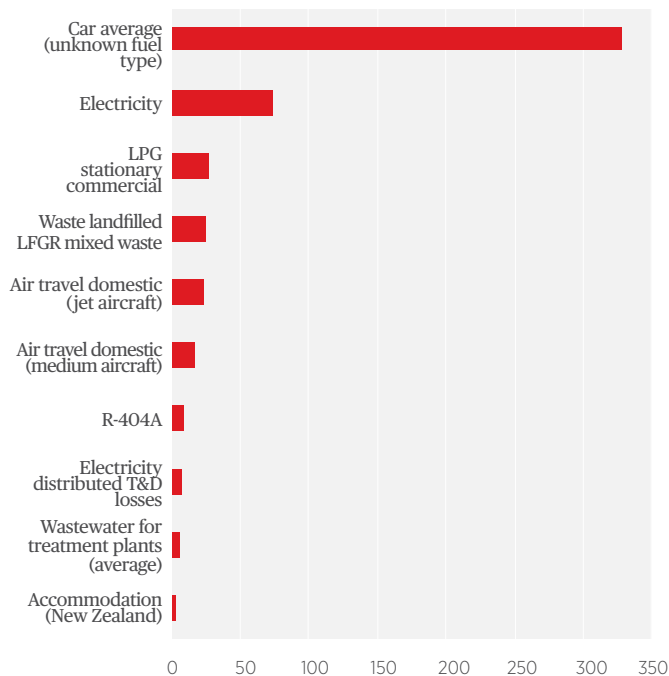


Toitū net carbonzero certification – formerly carboNZero – is a milestone we reached after 5 years of measuring our greenhouse gas (GHG) emissions and putting strategies in place to reduce and offset our impacts. Our remaining emissions are offset through the purchase of verified carbon credits to achieve a neutral balance.

The certification meets and exceeds international environment management best practice (ISO 14064-1) and is accredited by the Joint Accreditation System of Australia and New Zealand. With Toitū certification, BRANZ joins a collective of organisations leading the way towards a lower-carbon future.

### ANNUAL ASSESSMENT OF OUR CARBON FOOTPRINT

Our carbon footprint for the 2021 calendar year was 527.40 tonnes of carbon dioxide equivalents, with the graph below showing the breakdown of that total.



Top 10 sources of emissions for BRANZ in the 2021 calendar year.

Abbreviations: LPG = liquefied petroleum gas, LFGR = landfills with gas recovery, R404A = refrigerant 404A, T&D = transmission and distribution.

The largest level of GHG emissions for which we are responsible is generated by BRANZ people commuting to work. We occupy a semi-rural location with an absence of public transport. Commuting emissions for 2021 were calculated based on average car fuel consumption and an estimated total of 1.23 million vehicle kilometres. Commuting will likely continue to be a significant source of emissions in the near to medium term. Therefore, reducing this figure is also the key to unlocking our 2035 ambitions.

## GREENHOUSE GAS EMISSIONS 2017-2021

The table below shows BRANZ’s annual GHG emissions over the 5 years of monitoring as part of attaining our net carbon zero certification in 2021. Note the lower indirect GHG emissions from transportation in 2021, similar to 2020, largely because of travel restrictions in the COVID-19 pandemic response.

	2017 Base year	2018	2019	2020	2021 Certification base year
Direct GHG emissions and removals (known as Scope 1)	58.75	119.11	116.96	30.91	47.35
Indirect GHG emissions from imported energy (known as Scope 2)	68.13	68.91	69.41	70.13	73.49
Indirect GHG emissions from transportation, staff commuting, accommodation and water supply (known as Scope 3 and Scope 3 Additional)	608.99	879.22	593.1	361.90	406.56
<b>Total gross emissions</b>	<b>735.87</b>	<b>780.84</b>	<b>779.47</b>	<b>462.94</b>	<b>527.40</b>

Figures are shown as tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e)

## REDUCING OUR CARBON EMISSIONS TO LIGHTEN OUR CARBON FOOTPRINT

We have identified 13 projects in our Emissions Management and Reduction Plan to target the areas in which we can make the biggest difference.

In this first year of implementation of the plan, we are evaluating options for the installation of eight electric vehicle charging stations. Other projects over the longer term focus on increasing our vehicle fleet of hybrid or electric vehicles and eventually eliminating internal combustion engines in this fleet and in our rental vehicles.

Air travel is another area of focus for emissions reduction. For domestic flights, employee travel on jet planes will be encouraged over flights on smaller aircraft. With borders having reopened, the carbon impact of international travel will again be an important consideration in whether to book flights, especially given the increased uptake of videoconferencing in workplaces.

## OUR WIDER SUSTAINABILITY INITIATIVES

Our aim is to decarbonise BRANZ’s activities wherever possible while remaining operationally effective. Broader sustainability steps we are taking include:

- incorporating sustainable design elements into our campus redevelopment
- progressing our sustainable procurement programme – in 2021, we initiated an inaugural third-party supplier sustainability analysis programme, starting with memberships such as Telarc and Toitū
- making recycling or reuse options available
- continuing to reduce the use of non-renewable, non-recyclable and non-reusable materials
- using environmentally friendly products wherever possible
- offering more recyclable packaging options in our on-site café
- monitoring our electricity consumption
- increasing transparency of our sustainability activity, plans and performance in our reporting and on our website
- membership of sustainability-focused organisations The Aotearoa Circle and the Sustainable Business Council.

We also continue our work in sustainability leadership in the building and construction sector by providing resources, science, experience and networks to help the sector play its part in achieving national carbon goals.



## DISCOVERING THE BIODIVERSITY IN OUR OWN BACKYARD

The place BRANZ calls home is a 5 hectare campus between the rural community of Moonshine Valley to the north and busy State Highway 58 to the south. Campus buildings are surrounded by planted areas, a wetland and naturally vegetated terrain, with an unnamed tributary of the Pāuatahanui Stream running through.

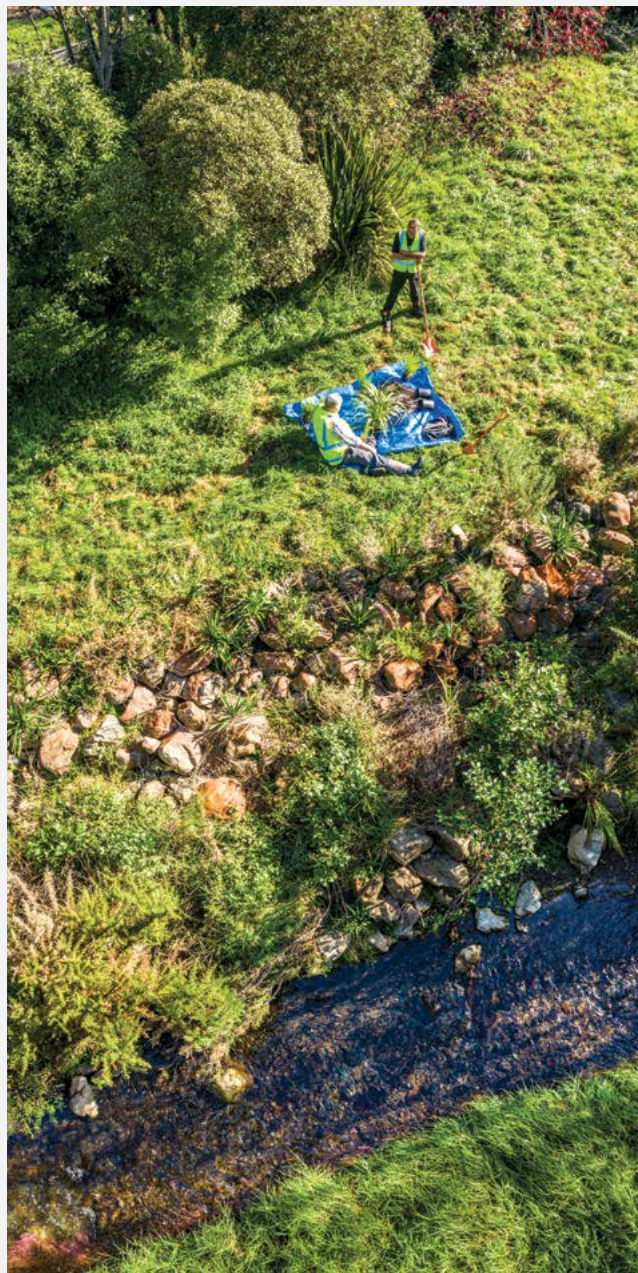
To understand the ecological value of our own backyard before we began construction on our campus redevelopment, we voluntarily commissioned an expert consultancy to prepare the BRANZ Campus Biodiversity Survey.

What was uncovered includes 65 indigenous and 127 exotic plant species in addition to classified pest plants and many more that require control to help native life flourish.

The stream – where the water quality was found to be good, verging on excellent – is home to many species of eel, particularly long-fin eels. It features four types of indigenous fish and one exotic species. These include at-risk and declining species such as kōaro and inanga.

The biodiversity survey did not include a formal bird survey, but 18 species of bird – indigenous and exotic – were observed, including tūi, miromiro (tomtit), pīpīwharau (shining cuckoo) and pīwakawaka (fantail).

Understanding the ecological value of our campus is helping guide us on how best to protect and enhance it. We are currently considering the survey recommendations with a view to developing and implementing an ecological management plan. This plan will set out actions against weeds and pest animals, on planting more indigenous vegetation and on enhancing the habitat to attract more native birds, lizards and invertebrates.



## BRANZ DIRECTORS

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*BRANZ Incorporated (Inc.) and BRANZ Limited (Ltd) are governed by directors with extensive building and construction, science, business and public sector expertise. Five directors are elected by the Building Research Advisory Council (BRAC). These elected board members can appoint up to three independent directors. There were seven directors as at 31 March 2022.*

### **NIGEL SMITH — CHAIR**

**FROM 1 SEPTEMBER 2021 TO PRESENT**



Nigel Smith has over 30 years' experience in the Aotearoa New Zealand construction industry and manages a franchise building company. Nigel holds positions on various boards, including as a director of several Canterbury-based building companies and the Registered Master Builders Association. He was a founding trustee of Construction Health and Safety New Zealand. Nigel joined the BRANZ Board in 2019.

### **DR HELEN ANDERSON, QSO — CHAIR**

**FROM 26 JUNE 2013 TO 31 AUGUST 2021**



Dr Helen Anderson is an independent director of several organisations and former Chief Executive of the Ministry of Research, Science and Technology. She is Chair of Scion and Studio Pacific Architecture Ltd. Helen is also a chartered fellow of the Institute of Directors in New Zealand. Helen served on the BRANZ Board from 2011–2021.



*From left to right: Alan Bickers, Lesley Haines, Lisbeth Jacobs, Nigel Smith (Chair), Chelydra Percy (CEO), Stephen Titter (Deputy Chair), John Brockies, Mike Sang.*



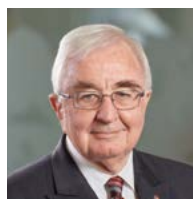
**STEPHEN TITTER – DEPUTY CHAIR**



Stephen Titter combines many years of practical financial and investment experience. Formerly a senior partner and board member of Ernst & Young, he is now a director/trustee on several boards, including the American Chamber of Commerce in NZ Inc.,

Foundation North, Haumaru Housing and the Selwyn Foundation. Stephen is also a business strategy advisor for large private companies and their shareholders, a member of the Institute of Directors in New Zealand and a chartered accountant. Stephen joined the BRANZ Board in 2014.

**ALAN BICKERS, MNZM, JP**



Alan Bickers has had a long career in civil engineering, management, consulting and governance. He is experienced in building regulatory functions, including building consents and compliance. He is a Distinguished Fellow of the Institute of Directors

in New Zealand and a past-President and Distinguished Fellow of Engineering New Zealand. Alan was the formative Chair of the Building Practitioners Board and Chair of the Plumbers, Gasfitters and Drainlayers Board and until recently was Chair of the Ministry for Primary Industries Partnership Programme for Engineered Timber Buildings. Alan joined the BRANZ Board in 2015.

**LESLEY HAINES**



Lesley Haines has an extensive public sector background, including senior roles at Treasury, MBIE and the Department of the Prime Minister and Cabinet. Lesley is a trustee of New Zealand economic research organisation

Motu. Lesley joined the BRANZ Board in 2014.

**JOHN BROCKIES**



John Brockies is an independent director of consultant engineers Resolve Ltd, national vocational education institution Te Pūkenga and NorthTec Ltd. He is Chair of WBL Ltd and Te Manawataki o Te Papa civic redevelopment project and Waiari

water infrastructure project in Tauranga. John's past board appointments include those in commercial construction, infrastructure and joint-venture projects, and he spent 20 years in chief executive and chief operating officer roles. John joined the BRANZ Board in 2019.

**DR LISBETH JACOBS**



Dr Lisbeth Jacobs has 20 years' business leadership and corporate strategy experience in addition to deep knowledge of materials engineering and product research. Formerly General Manager, Innovation and Sustainability at Fletcher Building, she is currently

Global General Manager, Animal Management at Gallagher. Lisbeth is also Honorary Consul of Belgium to New Zealand. Lisbeth joined the BRANZ Board in 2020.

**MIKE SANG**



Mike Sang has 20 years' experience working with and on boards as a non-executive director. He has also been a chief executive and chief financial officer across multiple sectors, including seven years as Chief Executive of Ngāi Tahu Holdings. Mike is on the boards of Orion

New Zealand and the Government Superannuation Fund Authority. Mike joined the BRANZ Board in August 2021.



## REGISTER OF INTERESTS

Disclosure of significant shareholdings only, not shares held by family trusts, as at 31 March 2022.

Director name	Directorships
<b>Nigel Smith</b>	Jennian Homes Canterbury South Registered Master Builders Association Milestone Homes National Ltd Mstone Holdings Ltd Ashborn Management Ltd Ashborn Investments Ltd NSR Investments Ltd
<b>Stephen Titter</b>	American Chamber of Commerce in NZ Inc. Guildford Investments Ltd Hahei Consulting Ltd Selwyn Foundation Haumarū Auckland Ltd Foundation North <i>Other relevant interests</i> Business Strategy Advisor, Jennian Group
<b>Alan Bickers</b>	Jayal Enterprises Ltd
<b>John Brockies</b>	Resolve Group Ltd Waiari PAB Walworth Ltd New Zealand Institute of Skills and Technology
<b>Lesley Haines</b>	Motu Economic and Public Policy Research
<b>Lisbeth Jacobs</b>	Northpower Ltd Gallagher Group Ltd <i>Other relevant interests</i> Honorary Consul of Belgium
<b>Michael Sang</b>	Orion NZ Government Superannuation Fund Authority

Standard disclosure statement affirmed at the beginning of every Board meeting:

*It is recognised that some members of the BRANZ Board represent companies or organisations or interests that are, or may be, in competition with those of other Board members. Meetings of the BRANZ Board and communications between members of the Board will not be used as a forum for unlawful collusion or anti-competitive conduct.*

## REMUNERATION

Directors' remuneration for the BRANZ Group is reviewed biennially. The Board seeks independent advice to help with this process. A proposal to increase fees paid to directors from \$28,400 to \$30,000 but retain all other existing remuneration levels was outlined at the BRANZ Inc. Annual General Meeting on 6 August 2021. At its subsequent meeting on 27 August 2021, the Board confirmed this proposal. The Board also agreed to retain the rates for the Building Research Advisory Council honoraria.

Board role	Directors' fees per annum
Chair	\$56,700
Deputy Chair	\$30,000
Director	\$30,000
Committee Chair	\$6,550
Representative on external board	\$6,550

## EXECUTIVE LEADERSHIP TEAM

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*BRANZ's top management team comprises eight senior leaders who provide strategic direction and set the organisational culture. It is a strong collective leadership body that is leading BRANZ into co-creating enduring solutions for better building system performance.*



**CHELYDRA PERCY**  
**CHIEF EXECUTIVE OFFICER**

Chelydra Percy joined BRANZ as Chief Executive Officer in 2013 following leadership roles within science, innovation and commercial organisations. These included

Callaghan Innovation, Scion (New Zealand Forest Research Institute), the Electricity Supply Industry Training Organisation and Telecom. Chelydra is a graduate of Victoria University of Wellington, a Companion of Engineering New Zealand and Vice-President of the International Council for Research and Innovation in Building and Construction. Chelydra is an active participant in a number of key organisations such as the Construction Sector Accord, The Aotearoa Circle and the Business Leaders' Health and Safety Forum.

**MIKE EVANS**

General Manager, Consultancy Services

**CLAIRE FALCK**

General Manager, System Transformation

**JANET GERITZLEHNER**

General Manager, People and Capability

**DR CHRIS LITTEN**

General Manager, Industry Research

**KAETRIN STEPHENSON**

General Manager, Corporate Services

**SUNIL SURUJPAL**

General Manager, Digital and Technology

**LINDA VEKULA**

Personal Assistant to Chief Executive Officer/Company Secretary

## BUILDING RESEARCH ADVISORY COUNCIL

*The Building Research Advisory Council (BRAC) plays a vital role in ensuring BRANZ's accountability and responsiveness to the New Zealand building and construction industry. It has 18 members representing 13 nominating bodies from the industry and trades, the business sector, consumers and the government.*

BRAC advises on industry issues for BRANZ's consideration and elects five of BRANZ's directors. BRAC meets twice a year.

In 2021/22, BRAC welcomed two new members:

- John Gardiner, representing the Building Industry Federation
- James le Page, representing Consumer NZ.

The following members completed their terms on BRAC in 2021/22:

- Bruce Kohn, representing the Building Industry Federation
- Bill Whitley, representing Consumer NZ.

Name	Nominee of
<b>Kieren Mallon – Chair</b>	Registered Master Builders Association
<b>Jon Williams – Deputy Chair</b>	Property Council New Zealand
<b>Richard Arkinstall</b>	New Zealand Specialist Trade Contractors Federation
<b>Ewan Brown</b>	New Zealand Institute of Architects
<b>Graham Burke</b>	New Zealand Specialist Trade Contractors Federation
<b>Rohan Bush</b>	Kāinga Ora
<b>Carol Caldwell</b>	Engineering New Zealand
<b>Paul Campbell</b>	Engineering New Zealand
<b>Mike Craig</b>	New Zealand Certified Builders
<b>John Gardiner</b>	Building Industry Federation
<b>Sanjesh Lal</b>	Registered Master Builders Association
<b>John Malthus</b>	Business New Zealand
<b>Ian McCormick</b>	Local Government New Zealand
<b>James le Page</b>	Consumer New Zealand
<b>John Sneyd</b>	Ministry of Business, Innovation and Employment
<b>Don Tilbrook</b>	Civil Contractors New Zealand
<b>Karl Wipatene</b>	New Zealand Institute of Architects
<b>Vacant</b>	Business New Zealand

### HONORARIA

BRAC role	Honorarium per meeting
<b>Chair</b>	\$2,900
<b>Members</b>	\$1,200



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**FINANCIAL PERFORMANCE**  
IN FOCUS

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# FINANCIAL PERFORMANCE

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*BRANZ continues to position itself to be able to adjust its investment plans and their pace through a variety of economic conditions. Throughout the year, we carefully progressed our work and strategy implementation to adapt to the ever-changing economic and operating environment.*

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 economic cycles as the industry.

Over the past 7 years, BRANZ has positioned itself to be able to invest in and support industry research through economic cycles in a careful, transparent and considered way. BRANZ does this through its Long-Term Levy Utilisation Policy, which helps manage these ups and downs in Levy income. It uses a 20-year model to create a stable sustainable platform for BRANZ to invest the Building Research Levy effectively.

In practice, this means that, when Levy income increases, BRANZ is prudent around expanding its investment. Then when Levy income decreases, BRANZ does not have to make unnecessary or drastic cuts.

This enables BRANZ to adjust its plans and pace of investment while still maintaining its core commitment to a high-performing industry. By taking a careful and considered financial approach, BRANZ made moderate adjustments to research investment in the year to maintain financial stability in an uncertain economic environment.

## LONG-TERM LEVY UTILISATION POLICY

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

- determining an investment sum using the 20-year model to incorporate into the annual BRANZ Group budget for investment in Levy-funded activities
- investing in research activities (operating and capital expenditure) in both internal and external capability
- 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 through robust mechanisms to help ensure that quality investments are made and to avoid unnecessary duplication of capability and facilities across New Zealand
- ensuring availability of funding for maintenance and investment in property, plant and equipment.

The Long-Term Levy Utilisation Policy is reviewed every 3 years and was last reviewed in 2021.

## OUR 2021/22 FINANCIAL PERFORMANCE

The BRANZ Group derives its total income from a combination of the Building Research Levy and commercial services.

Total income for 2021/22 was \$38.58 million, consisting of:

- \$30.4 million from the Building Research Levy to fund industry research and knowledge transfer
- \$7.7 million from commercial services
- \$0.48 million of other income.

This compares with \$32.19 million for the previous year. The increased income in 2021/22 was derived from additional Building Research Levy resulting from heightened industry and consent activity.

Expenditure directly managed for 2021/22 was \$27.12 million. This was used to operate the business, directly deliver research outcomes and testing services, inform the industry and invest with other research providers. Expenditure in the previous year amounted to \$26.96 million.

Specific investment in research with BRANZ Ltd and other research providers amounted to \$13.51 million, which was similar to the previous year.

In 2019/20, as host of National Science Challenge 11 (NSC 11): Building Better Homes, Towns and Cities, BRANZ was contracted for a further 5 years with associated funding of \$24.3 million. By 31 March 2022, contracts were under way and \$14.53 million had been invested.

A breakdown of the BRANZ Group financial results can be viewed on subsequent pages.

## CASH RESERVES

The BRANZ Group has investment in cash reserves of

\$43.29 million as at 31 March 2022. This balance includes \$2.43 million of NSC 11 funding that has yet to be spent.

During the year, the Board approved a new BRANZ Group Treasury Policy, which replaced the BRANZ Group Investment and Reserves Policy. The BRANZ Group Treasury Policy recognises that, as a result of the investment in the campus redevelopment at Judgeford, BRANZ will move from being wholly cash in funds to a mixed profile of cash in funds and debt. The policy states how BRANZ will manage its treasury activities and protect cash flows within an environment of control and compliance within approved limits and according to stated objectives.

All funds and the level of cash reserves are held in accordance with the BRANZ Group Treasury Policy.

## FUNDING FOR INVESTMENT IN PROPERTY, PLANT AND EQUIPMENT

BRANZ funds the maintenance and development of facilities at Judgeford and elsewhere in New Zealand. The Campus and Asset Management Plan was refreshed and adopted by the Board in February 2020 and ensures that our facilities meet industry research and testing needs for the future.

The plan identified over 15 projects that are required to retire, replace and refurbish ageing property, plant and equipment over the next 5 years with an estimated investment of around \$50–55 million. The most significant element of this plan is the campus redevelopment at Judgeford.

The investment case for the construction stage of the campus redevelopment project was approved by the Board during the year. The investment case included the provision of access to a funding facility of up to \$25 million from Westpac New Zealand Ltd, which is secured on the assets of the Group. As at 31 March 2022, no drawdown had been made on the facility.

During the year, \$8.07 million was invested in the campus redevelopment projects.



*Building Research Association of New Zealand Inc.*

## SUMMARY STATEMENTS OF COMPREHENSIVE REVENUE AND EXPENSES

For the year ended 31 March 2022

	Group	
	2022	2021
	\$	\$
<b>Operating income</b>		
<b>Revenue from non-exchange transactions</b>		
Building Research Levy Act levies	30,398,955	23,902,702
<b>Revenue from exchange transactions</b>		
Commercial work fees	7,696,430	7,585,545
	<b>38,095,385</b>	<b>31,488,247</b>
<b>Other income</b>		
Interest received	479,096	688,253
Gain on disposal of assets	1,766	8,658
	<b>480,862</b>	<b>696,911</b>
<b>Total income</b>	<b>38,576,247</b>	<b>32,185,158</b>
<b>Expenditure</b>		
Personnel costs	13,368,346	13,188,994
Other operating costs	13,746,762	13,769,905
<b>Total expenditure</b>	<b>27,115,108</b>	<b>26,958,899</b>
<b>Surplus before income tax</b>	<b>11,461,139</b>	<b>5,226,259</b>
Income tax benefit	61,387	220,786
<b>Surplus for the year</b>	<b>11,522,526</b>	<b>5,447,045</b>
<b>Total comprehensive revenue and expenses for the year</b>	<b>11,522,526</b>	<b>5,447,045</b>

*Building Research Association of New Zealand Inc.*

## SUMMARY STATEMENTS OF CHANGES IN NET ASSETS/EQUITY

For the year ended 31 March 2022

	Group		
	Foreign currency translation reserve \$	Retained earnings \$	Total equity \$
Balance at 1 April 2020	22,391	48,407,456	48,429,847
Movement for year	7,225	5,447,045	5,454,270
<b>Balance at 31 March 2021</b>	<b>29,616</b>	<b>53,854,501</b>	<b>53,884,117</b>
Balance at 1 April 2021	29,616	53,854,501	53,884,117
Movement for year	(1,131)	11,522,526	11,521,395
<b>Balance at 31 March 2022</b>	<b>28,485</b>	<b>65,377,027</b>	<b>65,405,512</b>

Building Research Association of New Zealand Inc.

## SUMMARY STATEMENTS OF FINANCIAL POSITION

As at 31 March 2022

	Group	
	2022	2021
	\$	\$
<b>Assets</b>		
<b>Current assets</b>		
Cash and cash equivalents	8,508,581	4,260,377
Term deposits	34,780,000	30,900,000
Corporate bonds	0	1,827,550
Other current assets	7,233,549	5,769,706
<b>Total current assets</b>	<b>50,522,130</b>	<b>42,757,633</b>
<b>Non-current assets</b>		
Property, plant and equipment	21,378,338	13,563,182
Intangible assets	741,377	2,287,859
Term investments	0	800,000
Deferred tax assets	53,584	62,776
<b>Total non-current assets</b>	<b>22,173,299</b>	<b>16,713,817</b>
<b>Total assets</b>	<b>72,695,429</b>	<b>59,471,450</b>
<b>Liabilities</b>		
<b>Current liabilities</b>		
Trade and other payables	3,157,811	1,641,165
Other current liabilities	3,946,887	3,790,091
<b>Total current liabilities</b>	<b>7,104,698</b>	<b>5,431,256</b>
<b>Non-current liabilities</b>		
Other non-current liabilities	185,219	156,077
<b>Total non-current liabilities</b>	<b>185,219</b>	<b>156,077</b>
<b>Total liabilities</b>	<b>7,289,917</b>	<b>5,587,333</b>
<b>Equity</b>		
<b>Total equity</b>	<b>65,405,512</b>	<b>53,884,117</b>
<b>Total equity and liabilities</b>	<b>72,695,429</b>	<b>59,471,450</b>



*Building Research Association of New Zealand Inc.*

## SUMMARY STATEMENTS OF CASH FLOWS

For the year ended 31 March 2022

	Group	
	2022	2021
	\$	\$
Net cash from/(used in) operating activities	13,248,264	6,646,570
Net cash from/(used in) investing activities	(8,827,454)	(6,665,964)
Increase/(decrease) in cash and cash equivalents	4,420,810	(19,394)
Unrealised losses on foreign currency accounts	(172,606)	0
Cash and cash equivalents at 1 April	4,260,377	4,279,771
<b>Cash and cash equivalents at 31 March</b>	<b>8,508,581</b>	<b>4,260,377</b>

*Building Research Association of New Zealand Inc.*

## NOTES TO THE SUMMARY FINANCIAL STATEMENTS

For the year ended 31 March 2022

### 1. REPORTING ENTITY

Building Research Association of New Zealand Incorporated (Inc.) (the Parent) is an incorporated society registered under the Incorporated Societies Act 1908 and domiciled in New Zealand. The address of the Parent's registered office is 1222 Moonshine Road, Judgeford, Porirua.

The consolidated summary financial statements of Building Research Association of New Zealand Inc. as at and for the year ended 31 March 2022 are presented and comprise the Parent and its subsidiaries (together referred to as the Group).

Building Research Association of New Zealand Inc.'s primary purpose is promoting scientific or industrial research for the building and construction industry.

These summary financial statements and the full financial statements were authorised for issue by the Board of Directors on 30 June 2022.

### 2. BASIS OF PREPARATION

#### Statement of compliance

The summary financial statements are an abridged version of the full financial statements. Their purpose is to provide an overview and as such do not provide an understanding as complete as the full financial statements. The disclosures included in these summary financial statements have been extracted from the full financial statements.

The full financial statements have been prepared in accordance with generally accepted accounting practice in New Zealand (NZ GAAP). As the primary objective of the

Parent and the Group is to promote scientific or industrial research for the building and construction industry rather than making a financial return, the Parent and the Group are public benefit entities for the purpose of complying with NZ GAAP. The financial statements of the Group comply with public benefit entity standards.

#### Basis of measurement

The summary financial statements are prepared on a historical cost basis. The accounts are prepared on a going-concern basis.

#### Presentation currency

These summary financial statements are presented in New Zealand dollars (\$), which is the functional currency of the Parent and BRANZ Ltd. BRANZ Pty Ltd's functional currency is Australian dollars.

#### Prior-period restatement

Where necessary, comparative figures have been restated to facilitate comparison and to comply with current-year classifications.

### 3. CONTINGENCIES

The Group had no contingent liabilities as at 31 March 2022 (2021: none).

### 4. FUNDING FACILITY

During the year, BRANZ entered a funding agreement with Westpac New Zealand Ltd. Under this wholesale development facility, which is secured on the assets of the Group, BRANZ can access credit of up to \$25 million to fund the redevelopment of the Judgeford campus. As at 31 March 2022, no drawdown had been made on the facility.

## 5. RELATED PARTIES

Group entities	Country of incorporation	Ownership interest	
		2022 %	2021 %
BRANZ Ltd	New Zealand	100	100
BRANZ Pty Ltd	Australia	100	100

Building Research Association of NZ Inc. charges rent to BRANZ Ltd for the use of property, plant and equipment as well as for its share of the Group CEO remuneration costs and other advisory services provided. In 2022, this amounted to \$2,046,516 (2021: \$2,052,891).

BRANZ Ltd charges fees for research work and administration services carried out for Building Research Association of New Zealand Inc. BRANZ Ltd also charges Building Research Association of New Zealand Inc. for its share of the Group executive management team costs, provision of accounting, IT, support, health and safety and quality services and its share of insurance and marketing costs. In 2022, the fees for research work and share of management services amounted to \$13,665,122 (2021: \$13,654,752). In the Group accounts, these charges are eliminated on consolidation.

All charges are reviewed and approved by the Board on an annual basis.

BRANZ contracts with construction and research organisations to which BRANZ directors are either related or are also directors. Transactions undertaken with these organisations are entered into on an arm's length basis. Where the director has proximity to the transaction, disclosure is made. During the current and prior year, there were no transactions with related parties.

## 6. NATIONAL SCIENCE CHALLENGE (NSC 11)

NSC 11 funds are paid to BRANZ Ltd on a quarterly basis by the Ministry of Business, Innovation and Employment. The funds received are held in funds received in advance in the statements of financial position until paid out to research and services providers. Funds received in advance are recorded as a current liability as BRANZ has an obligation to return all funding not spent and for which contractual liabilities have not been incurred at the date of termination or finalisation of the contract.

Movement in funds received in advance is as follows:

	Group	
	2022 \$	2021 \$
As at 1 April	2,250,279	1,975,507
Funding received during the year	4,860,000	4,860,000
Funding applied during the year to:		
- Governance group meetings	(109,500)	(99,583)
- NSC 11 cost of undertaking research	(4,571,117)	(4,485,645)
As at 31 March	<b>2,429,662</b>	<b>2,250,279</b>

## 7. SUBSEQUENT EVENTS

No significant subsequent events have occurred after balance date.

These summary financial statements are approved for and on behalf of the Board of Directors on 30 June by:



**Nigel Smith**  
Board Chair



**Stephen Titter**  
Audit and Risk Management  
Committee Chair





# INDEPENDENT AUDITOR'S REPORT TO THE MEMBERS OF BUILDING RESEARCH ASSOCIATION OF NEW ZEALAND INCORPORATED

## OPINION

The summary financial statements on pages 76 to 81, which comprise the summary statements of financial position as at 31 March 2022, the summary statements of comprehensive revenue and expenses, summary statements of changes in net assets/equity and summary statements of cash flows for the year then ended, and related notes, are derived from the audited consolidated financial statements of Building Research Association of New Zealand Incorporated (the "Incorporated Society" or the "Group") for the year ended 31 March 2022.

In our opinion, the accompanying summary financial statements are consistent, in all material respects, with the audited financial statements, in accordance with FRS-43: Summary Financial Statements issued by the New Zealand Accounting Standards Board.

## SUMMARY FINANCIAL STATEMENTS

The summary financial statements do not contain all the disclosures required for full financial statements under generally accepted accounting practice in New Zealand. Reading the summary financial statements and the auditor's report thereon, therefore, is not a substitute for reading the audited full financial statements and the auditor's report thereon.

## THE AUDITED FINANCIAL STATEMENTS AND OUR REPORT THEREON

We expressed an unmodified audit opinion on the audited financial statements in our report dated 30 June 2022.

## THOSE CHARGED WITH GOVERNANCE RESPONSIBILITIES FOR THE SUMMARY FINANCIAL STATEMENTS

Those charged with governance are responsible on behalf of the Group for the preparation of the summary financial statements in accordance with FRS-43: Summary Financial Statements.

## AUDITOR'S RESPONSIBILITIES

Our responsibility is to express an opinion on whether the summary financial statements are consistent, in all material respects, with the audited financial statements based on our procedures, which were conducted in accordance with International Standard on Auditing (New Zealand) (ISA (NZ)) 810 (Revised): Engagements to Report on Summary Financial Statements.

Other than in our capacity as auditor, we have no relationship with, or interest in, the Incorporated Society or any of its subsidiaries. Partners and employees of our firm may deal with the Incorporated Society on normal terms within the ordinary course of trading activities of the business of the Incorporated Society.

Chartered Accountants  
Wellington  
30 June 2022

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**BUILDING RESEARCH**  
LEVY INVESTMENTS

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## LEVY INVESTMENTS IN 2021/22

*The Building Research Levy plays a key role in improving all aspects of New Zealand buildings. BRANZ is committed to ensuring New Zealanders receive the greatest possible benefits from Levy investments. To do this, BRANZ is responsible for providing effective stewardship of the Levy. This demands robust decision-making processes, a commitment to transparency and disciplined management of the Levy investments.*

### BRANZ'S PORTFOLIO

The building and construction industry impacts New Zealand's economy and environment and people's wellbeing. BRANZ, along with other research organisations, carries out research to better understand the nature of particular issues and their underlying root causes. This allows us to challenge the building system to deliver better outcomes for all.

The table sets out the BRANZ research portfolio themes.

### BRANZ research portfolio themes



**Low-carbon economy** – Reduced emissions of greenhouse gases from the built environment and construction sector over the whole of a building's life cycle. BRANZ is supporting this through its *Transition to a zero-carbon built environment* programme of work.



**Thriving cities, regions and communities** – Improved people-focused urban environments that respond to the needs of communities at the neighbourhood, town, city or regional level. BRANZ is supporting this area through its research into medium-density housing.



**Resilience of built environment** – Reduced risks to buildings from natural hazards to improve life safety and post-event economic and social recovery. BRANZ plays a role through supporting research to improve seismic performance and through its *Building fire-safe densified housing* programme.



**Quality and performance of homes and buildings** – Improved performance of buildings to meet or exceed customer and/or Building Code requirements. BRANZ's *Warmer, drier and healthier homes* programme supports efforts to provide New Zealanders with warm, dry, healthy homes. Additionally, evidence from BRANZ research informs regulation and standards relating to building performance.



**Vibrant industry** – A high performing building and construction sector. BRANZ supports the industry through a wide range of research such as mental health and the provision of information and education.



**Meeting NZ's population needs** – Future requirements for the number, types of buildings and occupants' experience of buildings that supports and enhances community wellbeing. BRANZ is supporting research including scoping a building stock model.



**Housing affordability** – Informs debate about the cost of buying, building or renting buildings or leading to reduced cost of building and/or operating buildings while maintaining or improving building quality. BRANZ supports research into this area including the Building Better Homes, Towns and Cities research stream *Affordable housing for generations*.



The Building Research Levy investments for 2021/22 follow. Note that these amounts are subject to change.

Shaded content denotes projects led by external partners.

Research investment	Total budget \$
<b>Thriving cities, regions and communities</b>	
Communities under construction	254,000
High-density housing for people and communities	135,000
<b>Resilience of built environment</b>	
A real-world investigation: seismic performance of precast floors	245,000
B-RISK continuous integration verification and validation stage II – end-user approach	168,000
B-RISK support 2021–24	212,000
Building fire-safe densified housing programme – communications and dissemination 2021–24	289,400
Building fire-safe densified housing programme – leadership 2020–24	361,000
Corrosion in the Bay of Plenty environment	504,815
Densified housing: reliability analysis of fire resistance requirements	136,600
Earthquake-prone public buildings: balancing life safety risks/community costs	169,000
Fire performance of hollowcore floors	480,000
Fire-safe use of timber construction II	1,120,000
Fire safety of combustible façades in New Zealand	1,169,750
Fire safety quality processes in the New Zealand built environment	507,000
Indoor pollutants in buildings exposed to fire	122,000
Industry knowledge of building assembly fire performance evaluation	215,000
International guidelines for fire design of timber buildings	89,000
Lithium batteries: fire risks associated with buildings	78,250
Non-structural elements national capability	50,000
Recast floors	1,053,161
Scholarship Mohamed Mostafa PhD – Precast floors and torsion	75,000
Scholarship Gordon Chen – Steel beam-column connections in fire	75,000
Scholarship Jono MacIntyre – Predicting structural fire severity – update	75,000
Scholarship Kirill Panov – Metallic materials in geothermal environments	75,000
Scholarship Mikhail Gedyma – Seismic performance and hybrid bracing	75,000
Scholarship Nicole Allen – Multi-volcanic hazard impacts	75,000
Seismic design of low-rise and mid-rise hybrid residential buildings	1,100,000

Research investment	Total budget \$
<b>Quality and performance of homes and buildings</b>	
Building Energy End-use Study 2.0 – addressing energy demand	500,000
BRANZ monitoring network	745,000
Building a team with He Kāinga Oranga	588,922
Building for wellbeing	837,000
Can materials durability contribute to future carbon-zero buildings?	87,100
Chemical contamination of building materials	804,384
Compliant materials verification	329,500
Durability verification database 2021–24	41,000
Durability within wall cavity and subfloor space	278,500
Eliminating quality issues programme: communication and dissemination 2021–24	9,500
Eliminating quality issues programme: leadership 2020–24	155,000
Emerging structural insulated panel types for residential construction	1,600
Fungal exposure in New Zealand homes	214,950
Household Energy End-use Project 2 – energy insights from our homes	2,795,000
High-performance assemblies	90,000
Home performance – SCOPE	120,000
House insulation guide	160,000
Housing and wellbeing: analysis of new housing survey data	205,776
Indoor Air Quality Research Centre for New Zealand	545,000
Metal corrosion in timber: 15-year benchmark and beyond	1,000
Model buildings for the next generation of the New Zealand Building Code	1,387,050
New Zealand's experimental buildings	395,000
Mould: finding the invisible – phase 1 investigation	277,000
Performance of magnesium oxide boards	169,000
Plumbing and drainage guide – new edition 2019/20	70,000
Pollutant levels in modern homes	192,000
Potential unintended consequences of high-performance construction	964,000
Preservative treated timber outgassing	649,000
Programme leadership	650,000

Shaded content denotes projects led by external partners.

Research investment	Total budget \$
Retrofit insulation	200,675
Scholarship Griffin Cherrill – Internal moisture from thermal bridges	50,000
Scholarship Shannon Griffiths – Mid-rise commercial timber construction	20,000
Scholarship Ting Yen Khor – Pre-contamination of wallboard with fungi	20,000
SIPs – durability, seismic and fire performance	620,000
Smart ventilation and indoor environmental quality	895,065
Streamlined compliance through generic product specs (scoping)	289,500
Structural adhesives	1,054,500
The future of national housing surveys: towards a collaborative approach	64,000
Thermal performance of houses is in the detail	196,475
Towards durable timber structures – phase 2	1,140,000
Transition to high-performing buildings	150,100
Warm roofs – understanding recent trends in New Zealand	96,000
Warmer, drier, healthier homes: communications and dissemination 2021–23	180,000
<b>Vibrant industry</b>	
2021–22 Bulletins, Research Nows, Fact sheets	160,000
Bulletins 2022–25	452,000
Advisory services 2021–24	1,028,000
ArchEngBuild 2021	44,134
Automated Building Code compliance checking for prefab designs	130,442
Building information modelling user and client surveys 2021	23,000
BRANZ Levy forecast 2021–24	413,000
Build magazine 2021–24	2,820,000
Building controls 2021–24	990,000
Education 2021–24	1,710,000
Guideline 2021–24	90,000
How do clients choose a quality builder?	131,100
Improving design management	330,000
Improving the uptake of mental health support	94,980
Mapping the consumer landscape 2020/21	150,000



Research investment	Total budget \$
Materials and characteristics survey 2021–24	310,000
Mindset barriers to system change	63,000
Monitored at work? Real-time employee monitoring technology	139,274
MyBRANZ knowledge and digital knowledge transfer	1,408,000
New house owners' satisfaction survey 2021–25	226,800
New house survey (update) 2020–22	340,000
Pilot: Future design thinking for construction – advanced manufacturing and prototyping for design partnership	99,000
Plastic waste on construction sites: a cooperative approach	171,885
Scholarship Armano Papageorge – Semi-autonomous off-site construction	75,000
Scholarship Gerard Finch – Prefab architecture	82,000
Supply chain research dissemination	18,810
Targeted suicide prevention	132,059
Towards effective use of technology: improve performance of construction	200,000
<b>Meeting NZ's population needs</b>	
Scholarship Beth Noble – Autism and lighting	75,000
Towards a New Zealand building stock model (scoping)	170,000
<b>Housing affordability</b>	
Affordable housing for generations	158,000
Future landlords	339,800
New Zealand's private rental sector 2021	249,918
Scholarship Sam O'Brien – Application of inclusionary housing practices	20,000
Scholarship Nic Guerrero – The campaign for rent controls	20,000
<b>Low-carbon economy</b>	
2016/17 residential water use	696,468
Beyond Code seismic design – assessing the climate change case	47,900
Bio-based materials – New Zealand wood fibre insulation (proof of concept)	447,600
Building capability to help transition industry to zero carbon	95,000

Shaded content denotes projects led by external partners.

Research investment	Total budget \$
Carbon budget model sensitivity	61,009
Climate impacts of medium-density housing expanded assessment tool	144,475
Digital enablement for green building product purchases	114,845
Energy-plus carbon certificates for dwellings	100,000
Environmental impacts of new construction processes	1,000
Future of work: what do we need to know, transition to zero carbon	847,200
Get ready! Preparing building and construction businesses for the transition to zero carbon	383,000
Housing stock strategies for meeting New Zealand's 2050 carbon target	187,600
Innovative low-carbon residential water heating solutions	391,150
Is the Code fit for a changing climate?	174,800
Keeping carbon current	485,000
Low-carbon built environment science leadership 2020–21	160,000
Low-carbon retrofit solutions for our changing climate	399,500
Low-impact buildings	2,118,060
Marginal abatement cost curves – scoping	170,000
Marginal abatement cost curves – phase 2	341,800
Measuring our sustainability progress (second update)	226,500
Next-generation carbon footprinting tools (scoping)	153,800
Pathways to net-zero buildings in communities	150,440
Reducing greenhouse gas emissions in communities	220,350
Roadmap for evaluating building performance for low-carbon houses	109,600
Scholarship Emily Newmarch – Designing low-carbon architecture in New Zealand	75,000
Scholarship Rosa Gonzalez – Carbon case for resilient design	75,000
Supplementary cementitious materials in concrete production	150,000
Transition to zero-carbon programme – communications and dissemination	290,000
Transition to zero-carbon programme – leadership 2019–24	490,000
Zero-carbon built environment science – leadership 2021–24	454,300



*BRANZ team, December 2021*





## THANK YOU

In this year's annual review, we shone a light on what we have valued, achieved, learned and will carry forward.

Thank you to all the people in the BRANZ team who - during such a challenging year - generously contributed their energy, time, talent and passion to drive progress on the BRANZ vision.

I also want to honour the work of the BRANZ directors, who provided the guidance and wise oversight that you see when good governance shines through. We farewelled long-term Chair Dr Helen Anderson and welcomed Nigel Smith into this role - a transition that was seamless.

Finally, thank you to everyone across the building industry, research community and government who continued to create and welcome opportunities to collaborate with us. These relationships create the constellation of stars by which we navigate our way forward.

**Chelydra Percy**  
Chief Executive Officer

## ABOUT THE PHOTOGRAPHER

Rob Suisted is an award-winning New Zealand photographer. Passionate about nature, he is acclaimed for his landscape, wildlife and aerial photography. Rob regularly shoots features for *New Zealand Geographic* magazine, has created 18 books and has over 20 images on New Zealand bank notes. Rob has worked with BRANZ in the past, and this is his first BRANZ annual review.

» [naturespic.co.nz](http://naturespic.co.nz)

## THANK YOU

We wish to thank the following organisations for supporting the photography in the BRANZ Annual Review 2022:

- Hawkins Construction
- MATES in Construction
- New Zealand Farm Forestry Association
- South Wairarapa District Council
- Te Kura Kaupapa Māori o Te Rito
- Whitby Collegiate.



BRANZ Inc.

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