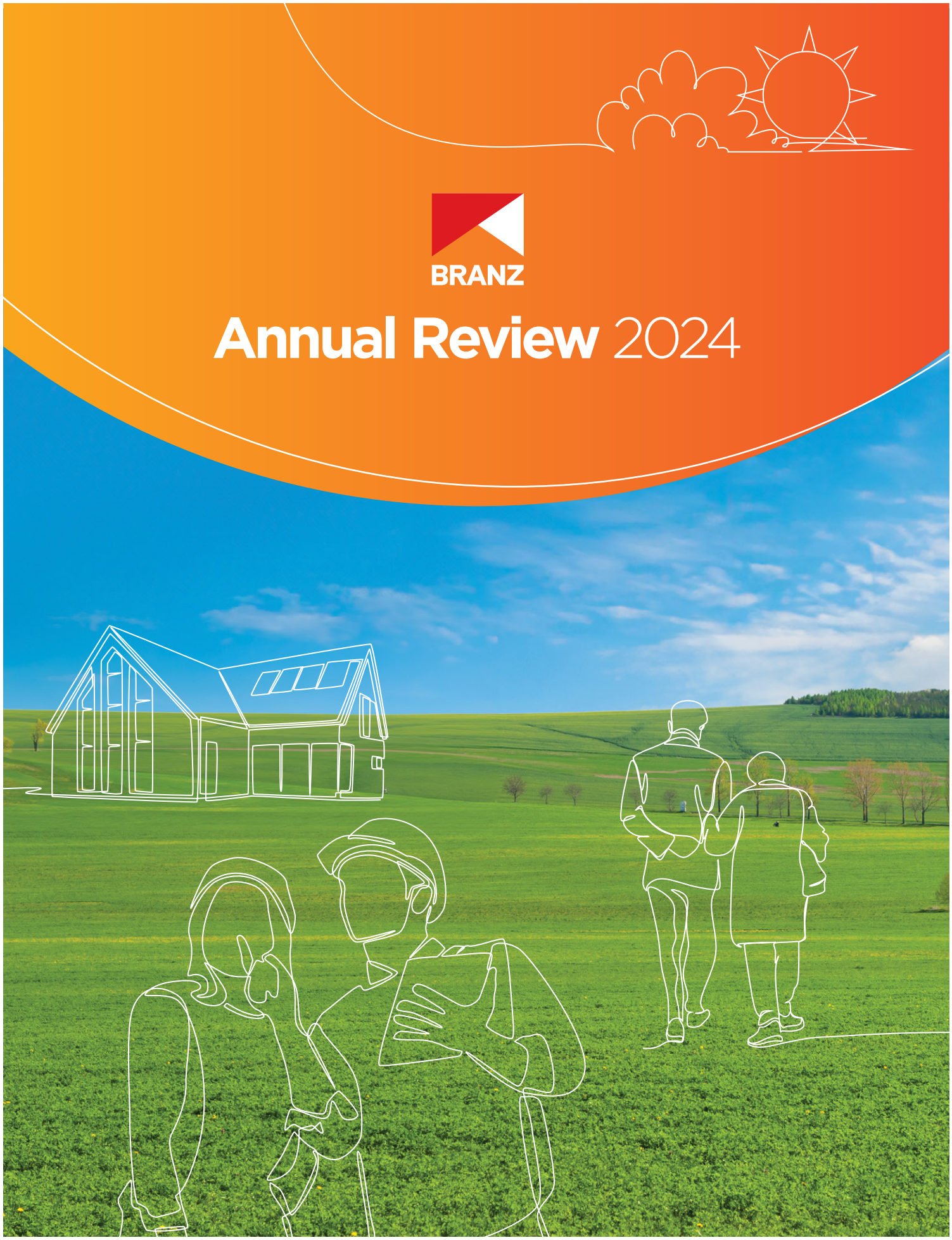
BRANZ

Annual Review 2024



This year, we're proud to collaborate with 193 organisations. Ngā mihi nui.

Aalborg University • Abodo • ACC • Air Infiltration and Ventilation Centre • Aliaxis • Alzheimers New Zealand • Apex Interiors • Archiland • Architectural Designers New Zealand • Arup London • Association of Building Compliance • Association of Wall and Ceiling Industries • ASURNZ • Auckland Council | Te Kaunihera o Tāmaki Makaurau • Auckland University of Technology | Te Wānanga Aronui o Tāmaki • Aurecon • Australian Government • Axon Consulting • BCITO • Beacon Pathway • Beca • Benton • Biodet • Brevity • Bruce Klein Consulting • Build Back Better Aotearoa New Zealand • Building Better, Homes, Towns and Cities National Science Challenge • Building Innovation Partnership • Building Officials Institute of New Zealand • BuildLink • Buller District Council • Busch Joinery • Callaghan Innovation • Carlielle Kitchens • Centre for Cocreated Ageing Research • Centre for Research, Evaluation and Social Assessment • CentrePort • Cerema • CGW Consulting Engineers • Christchurch City Council • Climate Change Commission | He Pou a Rangi • Codify Asset Solutions • Community Housing Aotearoa | Ngā Whararau o Aotearoa • ConCOVE Tūhura • Concrete New Zealand • Construction Sector Accord • Construction Health and Safety New Zealand • CORT Community Housing • Dice Solutions • Dunedin City Council | Kaunihera a-rohe o Ōtepoti • East Coast Suspended Ceilings • EBOSS • Eco Design Advisor • Education New Zealand • Energy Efficiency and Conservation Authority | Te Tari Tiaki Pūngao • Engineering New Zealand | Te Ao Rangahau • Environmental Product Declaration Australasia • Environmental Innovation Centre • Ferrier Research Institute • Fire and Emergency New Zealand | Whakaratonga Iwi • Fire & Rescue New South Wales • Fire Research Group • Forman Commercial Interiors • Frame and Truss Manufacturers' Association New Zealand • FrameCAD • Fraunhofer Institute for Building Physics • Gisborne District Council | Te Kaunihera o Te Tairāwhiti • GNS Science |Te Pū Ao • Green Gorilla • Habitat for Humanity • Hamilton City Council | Te Kaunihera o Kirikiriroa • Health New Zealand | Te Whatu Ora • Health Research Council of New Zealand • Heavy Engineering Research Association • Hector Egger • Helfen • HERA Foundation • Hilti • Holmes Solutions • Home Performance Advisor • Hush Interiors • Incite • Indoor Air Quality Research Centre New Zealand • Inside Collab • Institution of Fire Engineers • Insulation Association of New Zealand • Insurance Council of New Zealand | Te Kāhui Inihua o Aotearoa • International Energy Agency • Interni Contracting • Jasmax • Junk Run • Kāinga Maha • Kāinga Ora – Homes and Communities • Katoa • Kestrel Group • Lee Brothers Cabinets & Joinery • Lifemark • Livingston and Associates • Māori Women's Welfare League • Marsh New Zealand • Massey University | Te Kunenga ki Pūrehuroa • Master Joiners • MATES in Construction • Maymorn Joiners • Meacham Associates • Metals New Zealand • Mid-Rise Wood Construction Partnership • Ministry for the Environment | Manatū Mō Te Taiao • Ministry of Business, Innovation and Employment | Hīkina Whakatutuki • Ministry of Education | Te Tāhuhu o te Mātauranga • Ministry of Housing and Urban Development | Te Tūāpapa Kura Kāinga • Mitre 10 • Momentum • Mott MacDonald • Motu Research • Mushroom Material • National Association of Steel Framed Housing • National Emergency Management Agency | Te Rākau Whakamarumaru. • National Institute of Water and Atmospheric Research | Taihoro Nukurangi • Natural Hazards Commission | Toka Tū Ake • Naylor Love • New Zealand Certified Builders • New Zealand Green Building Council | Te Kaunihera Hanganga Tautaiao • New Zealand Institute of Architects | Te Kāhui Whaihanga • New Zealand Institute of Building • New Zealand Product Stewardship Council • New Zealand Society for Earthquake Engineering • New Zealand Steel • New Zealand Timber Design Society • Offsite NZ • Oroqi Wellington • Pacifecon • Pāhāōa Marae • Passive House Institute New Zealand • Passive Fire Inspection and Test Services Consultancy • Porirua City Council • Property Council New Zealand • PTL Structural and Fire • QuakeCoRE | Te Hiranga Rū • Ramset • Realsure • Reilly Joinery • Resilient Organisations • Rondo Building Systems • SaferMe • Savory Construction • Scion • Simpli • Society of Fire Protection Engineers • Society of Fire Protection Engineers New Zealand • Southland District Council | Te Rohe Pōtae o Murihiku • Stats NZ | Tatauranga Aotearoa • Structural Engineering Society New Zealand • Superhomes Movement • Sustainability Trust • Sustainable Steel Council • Tasman Insulation • Tauranga City Council • Te Awa Kairangi • Te Matapihi • Te Toka Tumai Auckland • The Building Excellence Group • The Urban Advisory • Theca Architecture • Third Bearing • Timber Unlimited • Tonkin + Taylor • Tracklok • Unitec • United Fire Brigades Association • University College London Sustainability Lab • University of Auckland | Waipapa Taumata Rau • University of British Columbia • University of 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BRANZ is committed to a future where all New Zealanders can live in safe, healthy, sustainable and affordable homes.

The Building Research Association of New Zealand (BRANZ) is an independent and impartial building research and testing provider for Aotearoa New Zealand.

BRANZ is proudly independent. We use our systems knowledge, collaborative research and broad networks to find practical solutions to improve Aotearoa New Zealand's buildings.

We do this through:

- **our role as steward of the Building Research Levy**
  We invest the Levy in a wide range of research projects to improve building sector performance.

- **our research**
  As a national research institution for building and construction, we collaborate and share building insights and opportunities with industry, regulators and all New Zealanders.

- **our testing and assurance services**
  We provide independent, evidence-based testing and assurance services on a commercial basis. We do not approve products for use. Instead, our independent accreditation helps product suppliers and regulators have confidence that new building products and systems will perform to the required legislation and building codes.

At its heart, BRANZ is a team of scientists, engineers and professionals committed to ensuring that Aotearoa New Zealand's buildings are the best they can be.

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BRANZ ANNUAL REVIEW 2024

In conversation

Nigel Smith, Chair of the BRANZ Board of Directors, and **Claire Falck**, BRANZ CEO

Nigel and Claire discuss the importance of collaboration to help solve challenges in Aotearoa New Zealand's building sector. They also bust some myths about BRANZ and talk about how we can improve housing for the future.

Collaborating to create change

The building and construction industry is facing some difficult challenges. In your opinion, what are the most pressing issues?

Nigel: The challenges the industry is facing have been with us for some time, and they aren't easy to solve. I think balancing housing quality and affordability will continue to be one of the biggest issues for Aotearoa New Zealand.

Claire: The complexity of the building and construction sector makes this challenge even more difficult to solve. About 98% of building and construction firms employ fewer than 20 people,[1] which means most of industry is focused on the everyday challenges of running their businesses. In this environment, developing consistent ways of operating and of understanding legislation, codes and practices can be difficult.

> **Balancing housing quality and affordability will continue to be one of the biggest issues for Aotearoa New Zealand.**
>
> **Nigel Smith**

What's the best way for BRANZ and the industry to begin to solve these challenges?

Claire: It all comes back to collaboration. I truly believe that the more we collaborate, the more we can improve Aotearoa New Zealand's built environment. Working together is the only way the industry is going to solve some of the enduring challenges it faces.

And I think BRANZ has a unique role to play. We are the only national research institution focused exclusively on building and construction. This means we can connect different parts – like government, industry, research – and provide information to create a better construction industry and better homes for all New Zealanders.

Nigel: Absolutely. We're in a time of enormous change for the building and construction sector. The most important way to drive long-term change is through sharing data, insights and ideas. Collaboration is where innovation happens.

Claire: We're committed to improving housing affordability for all New Zealanders as one of the most significant issues facing the country today. We're conducting targeted research into innovative new building materials, construction techniques and regulatory frameworks to help reduce building costs and improve housing supply.

I'm looking forward to collaborating on these insights with a wide range of people to make a real difference for the industry and for communities around New Zealand.

[1] MBIE (2022) *Building and construction sector trends annual report 2022*. mbie.govt.nz

How has BRANZ supported sector collaboration this year?

Claire: One collaboration I'm particularly excited about is our partnership with ConCOVE Tūhura, being appointed to lead an international UNESCO panel on the future of construction trades education. For the past 4 years, we've been working with organisations to reimagine the skills we'll need for sustainable construction. It means we already have the research, ideas and local support to help lead these conversations on a global scale.

Nigel: Our sustainability work has been a collaboration highlight for me too. It's been exciting to watch the shift from BRANZ pushing the zero-carbon agenda to it becoming more about co-investment and collaboration. There are now so many collaborators coming to the party to help achieve zero-carbon building and construction, which shows the real value the industry places on our research. When there's more of us working together, the research is quicker and the impact is greater.

> **For me, a big highlight this year has been expanding our collaborations across industry, research, government, iwi and community groups.**
>
> **Claire Falck**

> **When there's more of us working together, the research is quicker and the impact is greater.**
>
> **Nigel Smith**

Clarifying BRANZ's testing and assurance services

BRANZ has been around for 50 years, yet many people may not know about the wide scope of work it does. What myths would you most like to bust about BRANZ?

Claire: The biggest misconception is that BRANZ is a regulator for building products. This is not the case. BRANZ is not a government agency or an industry-led body. We are an independent science research and testing organisation. BRANZ does not approve building products for use in New Zealand. That's the job of the building regulator and building consent authorities.

Nigel: Yes, it's important to understand that what BRANZ offers is independent testing and assurance services. We give the best scientific advice to product developers and consumers to help them to choose the right product for different New Zealand environments. So while BRANZ appraisals are recognised and trusted, they're not obligatory.

Claire: We're incredibly passionate about our independence. BRANZ has been here for 50 years, and we'll continue to provide confidence and continuity to the sector for many years to come. We're tackling issues the sector faces and providing evidence and science-led research to support their decision making.

BRANZ is not a government agency or an industry-led body. We are an independent science research and testing organisation.

Claire Falck

If it's not obligatory, why should manufacturers and industry get their products assessed by BRANZ?

Nigel: People come to BRANZ for independent verification, to add a layer of confidence that the product or system they're using is tested, safe and fit for purpose.

I think where BRANZ research and testing stands out is that we test systems rather than just parts – meaning we think about how different products will be put together and the impact these different applications will have. There's value in looking at products in isolation to forecast how they'll perform in the future – but for me, the exciting part is testing the full environment and collaborating with different product suppliers and researchers to understand how we can make buildings safer.

Claire: This is so important because products that perform well in other countries may not perform the same way here. For instance, we're in a part of the world where the impact of UV is a real risk, which simply isn't an issue in places like Europe or the UK. So we have 24 exposure sites around the country to consider a range of climates and exposure risks. We play an important role in giving confidence that products used here are safe, resilient and suitable for our unique environment.

We're really proud of this work. It's so exciting to see the passion and expertise of the people here at BRANZ and the work that they do every day to make a real difference in New Zealand.

We're incredibly passionate about our independence.

Claire Falck

Supporting healthier homes for all New Zealanders

You've talked about how BRANZ can help the industry, but is there a role you can play in helping all New Zealanders?

Nigel: One of BRANZ's most important roles is increasing New Zealanders' knowledge of how to maintain healthy homes. Homes are often people's biggest investment – but, unlike a car, there's no instruction manual to help you take care of it. People move between completely different types of homes – like from an older house to a new build – but often don't change their behaviour around heating, ventilation and dealing with moisture.

BRANZ has so much information that can help all New Zealanders to maintain their homes. There are small things people can do, if we help them realise it, to invest in their most important asset.

Claire: Your home has such an influence over your health and wellbeing. Our work has touched so many New Zealanders' lives, often without them realising. Before I joined BRANZ, I didn't realise the breadth of our science. Yes, we research how to construct buildings, but we also have a lot of information about running a home as well as renovating and making best use of the environment you live in.

For instance, our Home Energy End-use Project (HEEP) looks at how energy is used in a home and how we can be more efficient. We did the first study 20 years ago, which led to changes such as Warm Up New Zealand and investment in insulation in houses and rental properties. We're doing it again this year to see how factors like population change and innovation have impacted the energy use in our homes.

This year, we also provided free ventilation advice to thousands of homeowners at home show stands around the country. We've already had some fantastic feedback from people who are putting our advice into action.

Nigel: We're also preparing for new issues that New Zealanders haven't really faced before, such as the overheating in homes last summer. We are collaborating on projects to understand how to prevent overheating and keep our homes cool as the climate gets warmer.

There's a lot we need to do to make changes to our existing housing. It's about providing people with the right information, products and systems to update their own environments to suit them.

Claire: This year, another big focus for BRANZ will be growing our research to develop practical guidance to help people better prepare their homes against potential flooding. Following the flooding caused by Cyclone Gabrielle last year, we were able to quickly provide advice to industry, insurers, government, councils and affected New Zealanders about how to recover their homes from flooding and prevent ongoing health issues.

However, communities around Aotearoa are still recovering from this major weather event, with many people still living in temporary accommodation. We're focused on helping to ensure New Zealand homes are more prepared and resilient for whatever the future brings.

BRANZ has so much information that can help all New Zealanders to maintain their homes.

Nigel Smith

Preparing for the future, responding to today

How does BRANZ find a balance between addressing today's needs while forecasting and predicting what's ahead?

Claire: It really is a balancing act. When today's issues are so pressing, there's not always an understanding of the need for BRANZ to be looking to the future.

When we first started our zero-carbon research over a decade ago, many people thought then that climate change would never happen. Now our research is being used to support the changes needed and to respond to climate events happening now.

Nigel: I think our next horizon will be the impact of artificial intelligence (AI) for the wider construction industry. There is potential for it to speed up processes – for instance, we're investigating the role that AI could play in building consenting.

Most things that sound far-fetched today may not be in the future – and if it doesn't sound far-fetched, then it's probably already happening.

Collaboration is crucial if we want to ensure that all New Zealanders can live in healthy, safe, sustainable and affordable homes.

Claire Falck

How is BRANZ helping to prepare for the future?

Claire: For me, one of the most exciting things is seeing our future leaders grow and bring new ideas to the table. Our ArchEngBuild competition is an annual highlight, where architecture, engineering and construction students work in teams to tackle a real industry issue. It's amazing what they come up with and how they work together.

Nigel: Absolutely. When I see the enthusiasm of younger people coming into the industry and hear them talk about the importance of collaboration, I feel the future of the industry is in good hands.

Claire: For the longer term, we're looking hard at how BRANZ can best support the industry into the future. Building practices and ways of living in Aotearoa New Zealand are changing faster than ever, so we're taking an intentional focus on our core mahi. We need to use our independent research and insights to help the building sector adapt and evolve too.

Nigel: As I said earlier, housing affordability continues to be one of the biggest challenges facing New Zealand. At BRANZ, we're committed to supporting collaborative problem solving to create more affordable housing in Aotearoa. We've also committed to grow and share our insights in several other key areas like building quality, sustainability and strengthening our resilience against extreme weather, earthquakes and fires.

Claire: Of course, these are big, crunchy, system-wide issues – so we can't do it alone. We're fortunate to have many strong working relationships with like-minded organisations across Aotearoa. Collaboration is crucial if we want to ensure that all New Zealanders can live in healthy, sustainable, safe and affordable homes.

Simulating fire, earthquakes and extreme weather in our new laboratories

Over the past decade, Aotearoa New Zealand has been impacted by many emergency events – for instance, the Kaikōura earthquake, fires at Loafers Lodge and the Port Hills and widespread flooding caused by Cyclone Gabrielle.

In the wake of these major events, there is an urgent need to ensure Aotearoa's buildings can better protect people from whatever the future holds.

These laboratories are essential in helping to improve the safety and resilience of New Zealand's buildings.

A centre for building research and testing excellence

BRANZ has developed innovative new research and testing laboratories that can better simulate the impacts of fire, earthquakes, extreme winds and rain on multi-storey buildings.

In 2025, BRANZ will open a new purpose-built fire laboratory. Based in Porirua, it will be the only fire laboratory in Australasia able to test buildings up to three storeys high.

It joins a new structural engineering laboratory, which opened in 2023, and our existing materials laboratories. It creates a centre for research and testing on entire building systems, evaluating fire resilience, structural performance, weathertightness, durability and more.

These new laboratories lay the foundations for advanced research and commercial testing that will benefit New Zealanders for decades to come.

Together, these new laboratories will:

- help to improve understanding of safety and resilience in multi-storey buildings
- help ensure products used in New Zealand are safe, durable and fit for purpose
- test bigger products and more complex systems, faster
- help keep New Zealanders and their homes safe.

Fire laboratory

Fires have caused enormous devastation in recent years – most notably, the Grenfell Tower fire in London and, closer to home, the Loafers Lodge fire in Wellington. As we build with higher density in Aotearoa New Zealand, improving fire safety is more important than ever.

And with hotter, drier conditions predicted, the risk of wildfires increases. Research shows that more homes were destroyed during New Zealand's 2016/17 fire season than have been in any of the previous 100 years. This was again well surpassed in 2020/21.

Our new fire laboratory and equipment will help improve understanding of fire risk in modern building practices. It will enable BRANZ and our partners to better test how fire, smoke and carbon monoxide spreads within and between multi-storey and higher-density buildings.

This work is crucial in supporting decision makers to help prevent future fire tragedies.

The fire laboratory will:

- test impacts of fire on multi-storey buildings
- simulate and measure fire spread
- analyse smoke density, carbon monoxide and carbon dioxide
- ensure close-to-realistic testing conditions to replicate high-density housing.

2,310 m² building footprint – about the size of **eight tennis courts**

22.5 m high roof – higher than **five double-decker buses**

3 storeys – the **height of buildings** that can be tested

1,350°C heat can be **applied to buildings**

It's an amazing facility – and it is a game changer for BRANZ and ultimately for the people of New Zealand because we can commit to really putting buildings through their paces.

Claire Falck, BRANZ CEO

Structural engineering laboratory

Structural research and testing help to ensure the resilience and durability of buildings for the long term.

BRANZ's new structural engineering laboratory can simulate stronger earthquakes and more extreme winds to ensure that today's buildings can withstand whatever the future holds.

It means we can stress test buildings against earthquakes we've had previously, replicating the movement and force of the Canterbury and Kaikōura earthquakes, for instance.

This ability helps to ensure buildings perform as they should and can withstand 'the big one'.

The structural engineering laboratory can:

- monitor the response of building systems to simulated earthquakes and the impact of snow, wind, gravity and occupant use
- earthquake test non-structural building parts like suspended ceilings, mechanical plant and components, partitions and claddings
- conduct multiple tests at the same time.

3 storeys – the **height of buildings** that can be tested

200 km/h **wind speeds** simulated in pressure chamber

50 tonnes of **tension/compression applied**

8 m tall reinforced **concrete strong wall** for earthquake testing

Already the structures lab is outperforming our expectations, with 6 months of work already booked ahead – and that increases every week. This shows us the high value this lab has for the building sector.

Martin Gordon, BRANZ General Manager Consultancy Services

Testing and assurance services for Aotearoa New Zealand's building sector

Alongside our research, BRANZ provides independent, evidence-based testing and assurance services on a commercial basis.

BRANZ's expert assessments are recognised and held in high regard across the building sector – but they are **not** compulsory.

Manufacturers, suppliers and importers choose to test with BRANZ to make sure that their products will be safe and durable in Aotearoa New Zealand's unique climate and seismic environment.

BRANZ is proudly independent. Our primary focus is on the safety, quality and affordability of Aotearoa New Zealand's building practices.

The role of our testing and assurance services

BRANZ's expert assessments give confidence to product suppliers that their materials should perform to the applicable building codes and standards when properly installed and used. These services provide the building system with transparent, evidence-based insights to support informed decision making and reduce business risk.

BRANZ does not approve building products for use in the building and construction industry or as part of a building consent application. Product approvals are the role of the building regulator and building consent authorities.

Instead, we serve as an impartial advisor. We engage with regulators, policy makers and industry stakeholders, to ensure that our research and testing results support effective and practical standards.

Independent expertise for Aotearoa New Zealand conditions

Aotearoa New Zealand needs more quality, affordable building materials in the market. However, it is important that those products are safe, resilient and fit for purpose given our unique climatic, ultraviolet (UV) and seismic conditions.

With extensive testing and building expertise, our scientists, technicians and product auditors are trusted for their evidence-based evaluations. They assess international test evidence and certification against local regulatory requirements and New Zealand's specific environment to ensure products meet current building standards and perform as they are supposed to.

Our team works with product manufacturers, importers and building consent authorities to provide assurance that new innovations will be safe and durable in New Zealand buildings.

Full-service testing and assurance excellence

BRANZ's testing and assurance services are unique in Aotearoa New Zealand. Using our expertise, we assess products for durability, performance, structural integrity, fire testing and safety engineering.

Durability and performance

To meet the New Zealand Building Code, many building elements – such as structural floors, walls and fixings – must be proven to last at least 50 years. BRANZ has New Zealand's most extensive range of specialist equipment to accelerate the ageing process. We can replicate decades of use in just a few months.

We also test in real-life conditions around the country, with 24 BRANZ research and testing sites in highly exposed areas from Northland to Invercargill.

Our New Zealand-specific testing:

- **Exposure to solar and UV radiation:** New Zealand buildings are exposed to a higher level of UV radiation than almost anywhere else in the world. Our 10 UV chambers are essential in understanding the long-term performance of building materials given our place in the world.
- **Corrosion:** Corrosion is a high risk in our coastal areas and particularly affects how paints and metals perform. In the laboratories, we have salt spray chambers for accelerated testing, and we also conduct testing at our exposure sites.
- **Weathertightness:** We have completed extensive research on weathertightness. Using this knowledge, we apply wind and water pressure to materials, replicating expected weather conditions on external claddings.
- **Insulation:** R-values (the flow of heat in a product) are assessed differently in New Zealand than in other jurisdictions. We test insulation products to help ensure they will perform as intended and keep Kiwis warm.

Structural integrity

We assess how building products and systems will perform in earthquakes and strong winds as well as with movement from daily use.

Using a range of high-tech equipment – from shake tables to hydraulic rams – our team will shake, stretch, pull, bend and break products and building systems to assess for flexibility, movement and deflection resistance.

While seismic activity is not unique to Aotearoa, the way we build is different to overseas methods. This means we also test the way the products will be installed and used – including assessing bracing and connections – and provide advice on how to comply with regulations.

Fire testing and safety engineering

While fire safety is an international concern, New Zealand and Australian building standards are unique. BRANZ supports new products entering the New Zealand market to meet the codes through expert advice and testing.

Our internationally recognised experts test how products and systems might resist and react to fire. This includes fire performance of interior finishes and exterior cladding systems and reaction to wildfires.

With our laboratory testing accredited by International Accreditation New Zealand, BRANZ also provides local manufacturers with internationally recognised testing to demonstrate compliance beyond New Zealand. BRANZ has New Zealand's only International Organization for Standardization (ISO) 9705 full-scale testing room and ISO 5660 small-scale testing for the fire safety of interior linings (see page 14 for more about our fire testing capabilities).

Guide to BRANZ's evaluations

BRANZ provides a range of independent and impartial third-party assessment options. These technical opinions act as supporting evidence of compliance with the New Zealand or Australian Building Codes.

Our experts also provide advice on pathways to meet the Building Code as well as evidence of potential risks or product weaknesses to support business health. These trustworthy, independent assessments can assist new products entering the New Zealand market, and we can advise on whether they meet our unique codes and conditions.

BRANZ evaluations are not compulsory. Suppliers who choose to conduct a BRANZ assessment do so because they trust the rigour of our process and the fact that they are held in high regard across industry. Appraisals take time because they test more than just the product – they test the product in place within a system. This gives clients confidence that their products perform to the current Building Code and standards, which supports their standing in the market. And ultimately, that assurance helps protect New Zealand consumers.

- **BRANZ Appraisal:** An independent extensive testing and assessment of a product's scope, limitations and evidence of performance against New Zealand and Australian Building Codes as well as pathways to compliance. It is a technical opinion of a building product or system's fitness for purpose and has been independently verified by BRANZ experts to ensure that the product meets all Building Code requirements.
- **CodeMark:** A technical assessment of whether a product will perform as the manufacturer says it will based on the information supplied. CodeMark products must be accepted by building consent authorities.
- **Bespoke testing and advice:** BRANZ also offers tailored expert testing and advice for all stages of product development and the building process.

2023/24 at a glance

325 **fire, materials and structures testing** projects completed

167 **organisations** with products tested by BRANZ

51 **insulating glazing products tested** – our most requested product test

Safe and resilient built environment

Aotearoa New Zealand is vulnerable to many weather, climate and geological hazards, which can create complex and serious risks and impacts for the people who live here.

BRANZ invests the Building Research Levy in research to improve the resilience of our built environment, including research to find ways to better protect buildings and people against extreme heat, wind and rain, earthquakes and fire.

Working in collaboration with researchers, industry and community groups and local and central government, our science is focused on unpacking the issues and developing practical solutions for a safer and more resilient built environment.

Why this research is important

In 2023, Aotearoa New Zealand experienced the devastating impacts of multiple flooding, bushfire and extreme wind events. Over coming years, extreme weather is forecast to increase. This year, BRANZ signalled priority investment into research focused on strengthening Aotearoa New Zealand's built environment to better withstand our changing climate.

Floods are not the only focus. We are also leading, collaborating, investing in and contributing to research that covers the wider range of climatic changes and natural disasters as they affect the built environment.

Ongoing research in this area focuses on:

- adapting to climate change
  - flooding
  - rainfall, corrosion and rain run-off
  - overheating
- fire-safe design
- advancing seismic resilience.

Together, this research aims to provide policy makers, designers, building and construction practitioners, insurance companies, civil defence groups and people throughout Aotearoa New Zealand with the information they need to prevent damage and harm and also support building back better for more effective recovery from disasters.

750,000 New Zealanders and about **500,000 buildings** are near rivers and coastline already **exposed to extreme flooding**[2]

$145 billion is the value of these homes and buildings[2]

$16 billion per year is the estimated **cost of corrosion** in New Zealand[3]

[2] MfE & Stats NZ (2023) *Our atmosphere and climate 2023*. environment.govt.nz

[3] Australian Corrosion Association (2021) *Impact of corrosion in Australasia*. corrosion.com.au

In their words

Dr Jo Horrocks

Chief Resilience and Research Officer | Pouārahi Manawaroa me te Rangahau, Natural Hazards Commission (NHC) | Toka Tū Ake

What's the role of NHC Toka Tū Ake in protecting Aotearoa New Zealand's built environment from natural hazards?
At NHC, we focus on two things in respect of resilience of the built environment: where we build and how we build. We want new developments to avoid the highest-risk land so we are not putting more and more communities in harm's way. And we want to see our buildings built to a standard that meets our current and future natural hazard risks.

Practically speaking, that means we invest in research on building for resilience, and we support science-to-practice pathways like providing guidance on more resilient building practices or supporting professional development for key professions like builders or engineers. We also provide public education on the small practical things that everyday New Zealanders can do like securing or removing chimneys or bracing foundations.

How important is the role of research in reducing risk and building resilience?
Research is critical from my point of view. Convincing decision makers to devote limited time and resources to natural hazard risk reduction – among many pressing and competing priorities – is no easy feat. Robust evidence is absolutely essential for persuading them that action is needed, is cost-effective and is likely to make a meaningful difference. We're not going to get anywhere without that evidence so at NHC, we focus on building the evidence base.

How are NHC Toka Tū Ake and BRANZ collaborating? What are the opportunities for collaboration in the future?
NHC co-funds and collaborates with BRANZ across a broad area of resilient buildings, which can be retrofit of existing building, building back better after natural hazard events and new building and construction techniques or standards for future buildings.

A good example is the work we co-funded on design of buildings on slopes. There was a lot of damage and loss of buildings on slopes during the Canterbury earthquakes, so we knew it was a key area of vulnerability. BRANZ conducted a series of physical shaking tests of buildings on slopes. This is super important research to improve our seismic resilience, particularly for places like Wellington.

Both NHC and BRANZ have a shared objective in improving building resilience, so it makes sense to coordinate our efforts to find opportunities for synergy and alignment. I think there's a lot of opportunities for collaboration that we haven't explored enough yet.

What BRANZ research in this area are you most excited about?
I'm really excited about BRANZ's new research on how to build back better (see page 25). We saw a lot of issues for people during and after Cyclone Gabrielle. People had a lot of questions like: 'How do I reinstate or how do I improve my house for the next flood? I know I'm on a flood plain. I don't want to move from this location, but I do want to be smart for the future.

BRANZ research will help answer some of these questions. At NHC, we would love to persuade people to invest in resilience before an event, but sometimes it's more practical – or easier to persuade people – to invest immediately after an event as they're rebuilding. So, I'm excited about the project and I'm keen to explore how NHC can support it.

Adapting to climate change

The increase of climate-related impacts on our homes, offices, schools and public buildings is a driving force for many new areas of research. From considering the potential relocation of marae vulnerable to flooding and erosion to improving resilience in hillside housing, we are collaborating on fields of research that will make our communities safer.

Building resilience into our built environment

More than 440,000 homes, sheds and sleepouts throughout Aotearoa New Zealand are in known flood risk areas, according to a 2023 report by National Institute of Water and Atmospheric Research (NIWA) | Taihoro Nukurangi and University of Auckland | Waipapa Taumata Rau. It is estimated the replacement value of these buildings would be $218 billion.[4]

After Cyclone Gabrielle in 2023, people urgently sought advice on how to recover their homes from damage. With extreme weather events and flooding on the rise, BRANZ has initiated a 2-year project to help improve the resilience of our built environment. **Climate resilience – building back better (new)** is the first phase of an ongoing research stream that will create practical guidance to strengthen homes against disasters and severe weather.

This project aims to help ensure people and authorities have the right advice to safeguard homes before disaster hits as well as practical recovery information for when they need it most.

BRANZ researchers will work with Ministry of Business, Innovation and Employment (MBIE) | Hīkina Whakatutuki, NIWA, University of Canterbury | Te Whare Wānanga o Waitaha, University of Waikato | Te Whare Wānanga o Waikato, Fire and Emergency New Zealand (FENZ) | Whakaratonga Iwi, and environmental and engineering consultancy Tonkin + Taylor.

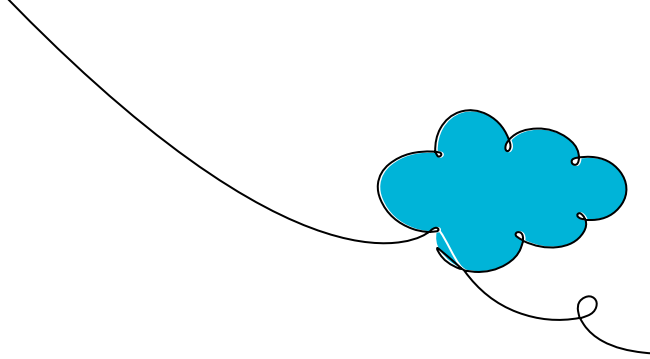
Other collaborators include local councils, National Emergency Management Agency | Te Rākau Whakamarumaru, Insurance Council of New Zealand | Te Kāui Inihua o Aotearoa and the New Zealand Claims Resolution Service.

Together, they will create a framework to help people make informed and evidence-based decisions to protect and strengthen new and existing homes. This will include practical guidance on repairs post-event for existing buildings, including material choices, cost-benefit analysis and design considerations. This mahi will support decision making for different audiences with a range of potential benefits – for instance, reducing costs and the associated stress of damaged buildings for homeowners.

It will also provide homeowners, occupiers and building consent authorities with guidance on rebuilding decision-making during disaster recovery. Insurance companies will have evidence-based data around the best options for incentivising higher standards of building repairs for improved resilience.

With the impacts of flooding as the initial focus, the project will also include landslides, increasing temperatures and wildfires. It will consider wind, volcanic and earthquake risk and the combined impact of multiple hazards occurring at once.

[4] Paulik et al. (2023) *Modelling national residential building exposure to flooding hazards.* sciencedirect.com



Co-creating solutions to protect marae from climate change impacts

Flooding, erosion and the loss of land is already affecting marae – to the extent that more than half of hapori Māori (Māori communities) believe relocation is a serious consideration. This is according to a survey of more than 100 marae undertaken as part of **Climate change impacts on marae (complete)**.

Marae relocation is a contentious and emotionally charged subject for whānau, hapū and iwi, stemming from the vital need to safeguard the mauri (cultural essence) of the whenua (land) and marae. Some fear losing invaluable taonga (treasures) and disturbing urupā (ancestral resting places) affected by the impacts of climate change.

This project has highlighted climate change issues that whānau and hapū living on their marae are facing and the decisions they need to make to provide protection. The research has been led by Kiri Maxwell of Build Back Better Aotearoa New Zealand, with support from co-directors Professor Suzanne Wilkinson and Professor Regan Potangaroa.

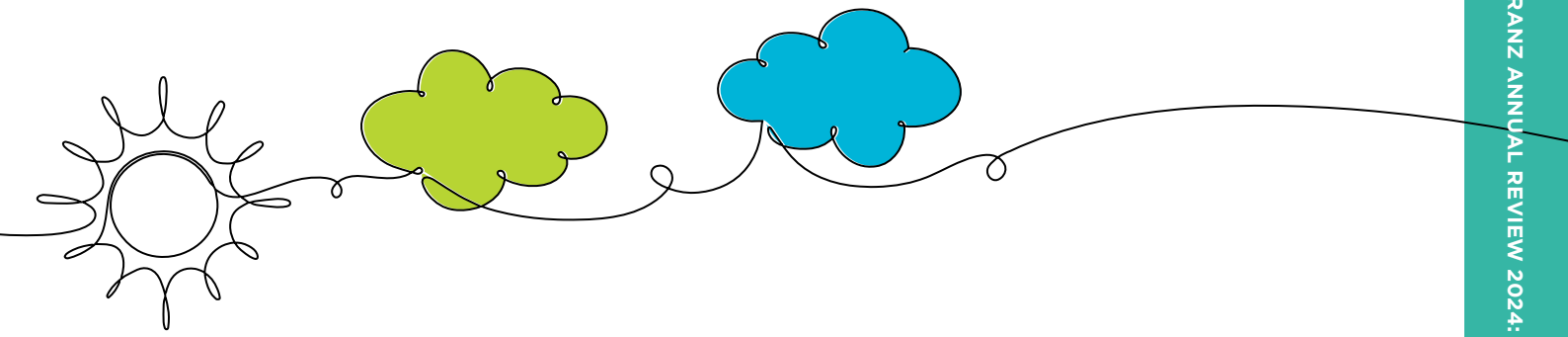
The team worked in partnership with iwi and marae. In particular, following the survey, they collaborated closely with six marae on detailed analysis of their vulnerability to climate change.

Together, they created kete mātauranga – a resource for hapori Māori (marae communities) to navigate the complexities of climate change impacts on their marae. These resources are freely available to help marae explore possible solutions such as managed retreat, preservation, and adaptation including design, retrofitting and strengthening.

The next phase of this kaupapa (topic) will examine the practicalities of these solutions. Working closely with 10 marae, **Navigating marae relocation: exploring building relocation strategies (new)** will help further guide decision making. The project will consider risks, costs, benefits and engineering options, heritage preservation and managing conflicting viewpoints of relocating marae buildings.

Climate change poses an existential threat to our culture, our whakapapa, our economy and our natural environment.

Kiri Maxwell, Build Back Better



The team, in partnership with marae, will co-create digital archives and practical tools. These will include 3D scans of building layouts, whenua maps using drones and model options using virtual and augmented reality. Guidelines, reports, online learning and interactive materials will be developed to advise on relocation, including the possible methods, trades and skills required.

Researchers will work alongside iwi, research and industry rōpū (groups) and government agencies to maximise benefit and share findings.

Together, this mahi (work) aims to create viable solutions for hapori Māori to make informed decisions on how to protect and preserve their marae for generations to come.

Protecting, saving and respecting buildings and the cultural heritage of our marae is the core value of our research.

Kiri Maxwell, Build Back Better

Out of 100 marae surveyed:

over half
have been **impacted by climate change**, mostly by flooding

61
reported that **access to mahinga kai** (food gathering place) has been **compromised** or is different

55
consider **relocation to be a possible issue** in the future

76
need assistance and information to reduce the impacts of climate change

Improving the resilience of timber houses from flooding

Since 1968, flood damage has consistently been the second-highest cost for insurance company repairs, according to the Insurance Council of New Zealand.[5] However, there is little existing scientific research about how timber-framed buildings, which make up 90% of New Zealand homes, will perform after exposure to flooding.

Flood resilience of light timber frame wall envelope systems (new) will help improve the resilience of timber houses against flooding events. The project will enhance our understanding of how timber buildings perform structurally when wet or dried out after they have been wet.

The research, led by University of Canterbury, will look at the structure and durability of light timber framing bracing walls and the best way to test them following a flood.

It will develop guidance on the best method to evaluate the structural and durability performance of flood-impacted timber buildings. This will help lay the foundation for the development of Code-compliant post-flood repair methods for bracing walls to ensure future structural performance.

In the second year of the project, in consultation with BRANZ researchers and MBIE, the team will then develop a design guide for a flood-resistant light timbe-framed wall envelope system.

With almost all New Zealand homes made from light timber framing, this work is essential in ensuring the long-term resilience of our built environment following flooding events.

[5] Insurance Council of New Zealand (2023) *Cost of natural disasters.* www.icnz.org.nz

Examining durability of new building materials under a changing climate

Climate change is driving the development of new construction materials that need to be more durable and environmentally friendly and have a lower carbon footprint.

BRANZ is leading **Materials under the changing climate (ongoing)** to develop a full picture of how new materials perform in these increasingly important areas.

Results from scientific experiments from 25 sites across the motu (country) are being matched with machine learning-enabled big analytics, with thanks to expertise from University of Auckland.

Machine learning will improve the accuracy of data analysis and automate the development of predictive models. The artificial intelligence (AI) limits the need for human intervention, as the systems can learn from data, identify patterns and make informed decisions, which means faster results.

With this multidisciplinary approach, the project will deliver a wealth of information about:

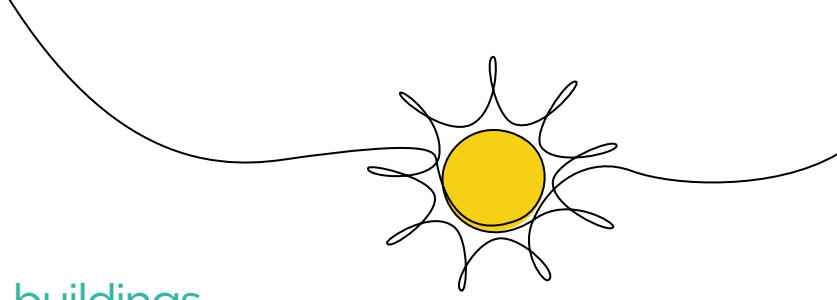
- climate change and its potential impacts on the corrosivity of Aotearoa New Zealand's built environment
- the durability of new, low-carbon building materials such as natural fibre-reinforced composite materials
- material performance under extraordinary conditions, including very severe marine environments and geothermal/volcanic emissions
- pollution caused by material degradation (such as heavy metals, microplastics and other emerging contaminants).

This project is connected to and strongly supported by several other collaborative projects.

Metal corrosion rate prediction in climate change scenarios (new) aims to reduce the estimated $16 billion per year cost of metal corrosion in Aotearoa New Zealand. Led by University of Auckland, it uses past BRANZ corrosion data to train AI models to predict corrosion rates. New testing site data will verify the accuracy of AI models.

The extent to which surfaces – metals, bitumen-based membranes, composite plastics and concrete – contaminate rain run-off is also being explored. Led by University of Canterbury, **Prediction tool for long-term contaminant release from building surfaces (ongoing)** is developing prediction models for different material surfaces over their lifetime. Real-world data from BRANZ's **Materials under the changing climate** will help improve the accuracy of the models.

Another related project, funded by Earthquake Commission Biennial Grant 2024, aims to improve building resilience under more extraordinary conditions. 'Quantifying corrosion to improve Aotearoa's built environment resilience to future volcanic eruptions' is being led by Massey University | Te Kunenga ki Pūrehuroa, with contributions from GNS Science | Te Pū Ao, University of Canterbury and United States Geological Survey.



Preventing overheating in buildings

In early 2024, overheating hit the headlines as temperatures in Tāmaki Makaurau Auckland homes soared. While New Zealanders now generally accept the need to better insulate their homes through both regulatory change and awareness, the challenge is now to prevent overheating.

Low impact (net zero carbon) buildings (complete) recently investigated overheating risks in apartments. It found that overheating is a room-by-room (zonal) issue. The size and orientation of windows and the amount of shading available are also critical factors. Measurements taken on occupied apartments were used to build computer models, allowing researchers to test strategies and interventions to reduce overheating risks in different rooms. Research findings highlight the importance of mitigating overheating risks, and advances in computer modelling are making it easier to understand the issue and, in the future, to resolve it.

Building on these findings, **Higher performing buildings (ongoing)** is exploring ways to reduce overheating risk through ventilation, including to understand the impact of warm roofs. Warm roofs – where the layer of insulation is shifted from being on top of the ceiling to directly under the roof cladding – can have significant benefits for heating homes. In addition, early indications from this research suggest that warm roofs may also reduce overheating risks.

The research is also investigating the best ways to manage overheating through glazing (such as glass coatings) and shading techniques. It is testing computer modelling tools and techniques, in collaboration with the Fraunhofer Institute and WUFIPlus® (a heat and moisture simulation tool).

Early research findings are expected to be released later in 2024, with a final report on the warm roof experiments and modelling due in 2025.

8 of the past 10 years
have been among Aotearoa New Zealand's **warmest on record**[6]

25 of 30 monitoring sites
experienced an increase in days that **exceeded 25°C** over the past 50 years[6]

25% increased mortality risk
in vulnerable populations when indoor temperatures **exceed 25°C**[7]

Overheating is a problem for many Kiwi homes, especially in summer. Fundamentally, it's a design challenge, and the risk needs to be identified early in the process when the cost to mitigate is lower.

Stephen McNeil, BRANZ Senior Building Physicist

[6] MfE & Stats NZ (2023) *Our atmosphere and climate 2023*. environment.govt.nz

[7] Ballester et al. (2023) *Heat-related mortality in Europe during the summer of 2022*. nature.com

Fire-safe building design

Fire-safe building design is more important than ever. In the wake of the Loafers Lodge fire in 2023 and the wildfires that destroyed homes at Lake Ōhau and Port Hills in 2024, people are demanding a better understanding of fire risks for their homes.

As new materials and technologies emerge and housing density increases, BRANZ has continued to drive fire research and testing in Aotearoa New Zealand. BRANZ's *Building fire-safe densified housing* programme aims to create cost-effective and high-performing fire safety expertise for New Zealand's residential buildings.

Fire research and testing opportunities in Aotearoa New Zealand will greatly expand with the opening of a new fire laboratory at BRANZ in 2025. The lab will allow for more advanced testing of how fire, smoke and gases spread through multi-storey and higher-density buildings.

Improving fire safety in densified housing

As our housing changes, we need to change how we evaluate fire risks. Over the past decade, Aotearoa New Zealand has seen an increase in housing densification and engineered mass timber construction along with changes in building services practices.

These factors all contribute to how fire might spread. However, their combined impact is not yet well understood. This lack of standardised understanding can cause increased costs and delays in the consenting process – fire safety was found to be the most common technical issue when consenting densified housing.

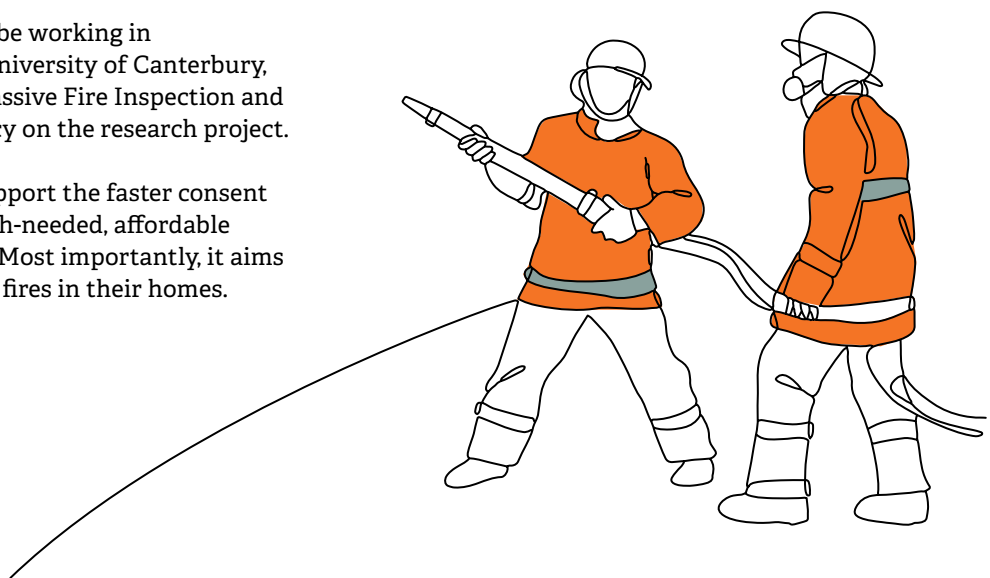
The future of evaluating building fire performance (new), led by BRANZ, seeks to reduce the incidence of fire safety technical issues while maintaining or improving fire safety in densified housing. An ambition of this research is that, when a fire happens, there will be clear evidence whether fire risk was considered appropriately for the changing Aotearoa New Zealand built environment.

BRANZ researchers will be working in collaboration with the University of Canterbury, Holmes Solutions and Passive Fire Inspection and Test Services Consultancy on the research project.

This research aims to support the faster consent and construction of much-needed, affordable densified housing areas. Most importantly, it aims to keep people safe from fires in their homes.

Ngā mihi nui to our *Building fire-safe densified housing* programme advisory group:

- Auckland Council | Te Kaunihera o Tāmaki Makaurau
- Australian Government
- FENZ
- Institution of Fire Engineers
- Jasmax
- Marsh New Zealand
- MBIE
- Meacham Associates
- Society of Fire Protection Engineers
- Society of Fire Protection Engineers New Zealand
- University of Canterbury
- Wood Processors and Manufacturers Association



Mapping quality assurance processes in building fire safety

Delays in consents for medium-density housing are often due to the potential for fire spread and the incorrect use and installation of fire-stopping products. This suggests that quality assurance processes around fire safety need to be better understood.

BRANZ is collaborating with MBIE and FENZ on **Fire safety quality processes in the NZ built environment (ongoing)**. It aims to improve fire safety in buildings and reduce consenting delays and the potential for expensive rework.

The project will map quality assurance processes across the building fire safety ecosystem, assessing their effectiveness and exploring gaps and barriers to improvements. This will help guide informed conversations with MBIE, FENZ, councils, the Society of Fire Protection engineers and the Fire Protection Association of New Zealand.

Ultimately, this aims to improve fire safety processes to reduce the impact of residential fires in Aotearoa New Zealand.

Related links:

- branz.co.nz/fire-research
- Nuth & Duncan (2019) SR428 *Medium-density housing technical issues*. branz.co.nz

Fire-risk modelling tool looks to the future

B-RISK is fire simulation software that predicts fire growth and smoke spread in buildings, originally developed as BRANZFIRE over two decades ago by BRANZ. In 2013, BRANZ released B-RISK in collaboration with University of Canterbury, adding probabilistic features to support innovative risk-informed building fire safety design. It is widely used for fire engineering in Aotearoa New Zealand and is the third most-used fire-modelling software internationally,[8] leading to the construction of more cost-effective, sustainable and safer buildings.

B-RISK support for future development roadmap (new) will ensure that the tool continues to be effective in supporting consenting processes and remains cost-effective and user-friendly for fire safety practitioners.

The roadmap and implementation plan will be informed by feedback from the building sector. Collaborators and stakeholders include Fire Research Group, Enlightened Fire Solutions, FENZ, MBIE, Auckland Council and University of Canterbury.

[8] Wade et al. (2021) *Fire engineering practitioner tools – Survey and analysis of needs*. SFPE Foundation

Fire risk of lithium-ion batteries in buildings

From e-bikes to electric cars to solar power storage, lithium batteries of all sizes are in more households than ever before. The search for lower-carbon energy sources has also meant a greater need to accommodate lithium-based renewable energy technologies such as electric vehicles (EVs), photovoltaic systems and energy storage systems in buildings.

However, this growing use represents an increasing potential fire risk in densified housing. Of additional concern is that lithium-ion batteries release highly toxic combustion byproducts such as hydrogen fluoride and carbon monoxide, which can pose health risks.

Led by BRANZ **Lithium-ion batteries: Fire risks associated with buildings (complete)** draws on overseas research to provide a technology watch on the risks around the use of lithium-ion batteries and other alternative energy technologies in residential buildings. This includes research insights from our collaboration with Fire and Rescue NSW on the Safety of Alternative and Renewable Energy Technologies (SARET) project.

As the use of lithium-ion batteries has surged around the globe, there has been a corresponding rise in fire incidents associated with them.

George Hare, BRANZ Fire Research Engineer

BRANZ researchers also investigated the risks around the storage and use of lithium batteries in and near residential buildings. This includes where an energy storage system is fixed to combustible cladding (such as timber weatherboards) and where an electric vehicle is charged in a residential garage.

The findings will support MBIE and other regulators with future updates to relevant documentation that includes consideration of the risks around these new technologies.

BRANZ supported the Battery Industry Group in the development of its large battery stewardship scheme. The scheme, which will be government regulated, will provide assurance to large battery users that there is an end-of-life pathway for batteries, including reuse, recovery and recycling.

Related link:

- BRANZ (2019) *Lithium batteries – what's the problem?* fireandemergency.nz

Advancing seismic resilience

In Aotearoa New Zealand, earthquakes are inevitable. To keep people safe and to limit damage, our buildings need to be constructed and strengthened to a high level of seismic resilience.

Understanding and reducing seismic impact on buildings has long been a focus for BRANZ. Through our earthquake research and testing, we address real-life engineering challenges and produce practical engineering and design guidance, tools, information and seminars.

This year, BRANZ has collaborated in seismic projects that have explored the vulnerabilities of hillside housing and investigated non-structural building elements as well as how best to communicate seismic risk.

Collaborating internationally to test Kiwi innovations

In March 2024, research collaborators from Aotearoa New Zealand and China celebrated the completion of the world-leading ROBUST (RObust BUilding SysTems) experimental testing.

Kiwi researchers and engineers worked closely with counterparts at the Tongji University in Shanghai to test New Zealand and Chinese seismic innovations on one of the largest shake tables on the planet. The shaking table test is one of the most widely used experiments to assess the seismic performance of whole structures made of various materials.

Kiwi researchers from three universities were supported by the Natural Hazards Commission (NHC) | Toka Tū Ake. Additional support was provided by the Building Innovation Partnership, BRANZ, HERA Foundation, MBIE Endeavour funding through Auckland University of Technology (AUT) | Te Wānanga Aronui o Tāmaki Makau Rau, QuakeCoRE | Te Hiranga Rū, University of Auckland and the University of Canterbury.

The team tested a range of engineering solutions designed to reduce building damage and increase seismic resilience. These solutions were then subjected to intense earthquake simulations, well beyond that experienced in the Canterbury earthquakes. They also put non-structural elements like partition walls, sprinklers and ceilings – a common cause of damage in earthquakes – to the seismic test.

This collaboration has validated seismic engineering solutions and delivered deeper knowledge on how to design, validate and improve safety in multi-storey buildings, which will ultimately help save lives and protect property.

It's important to understand how engineering solutions and other building components will behave in future earthquakes. ROBUST results will help design buildings to withstand large earthquakes and minimise damage.

Dr Natalie Balfour, NHC Toka Tū Ake Head of Research

Strengthening the seismic resilience of hillside houses

Hillside houses represent a significant proportion of Aotearoa New Zealand's built environment, particularly in places like Te Whanganui-a-Tara Wellington where sloping sites are common.

Damage surveys after the Canterbury earthquakes revealed that hillside houses are much more vulnerable than houses on non-liquefiable flat sites. In most cases, the damage in hillside houses was caused by the subfloor system being damaged or prematurely failing, which often rendered the houses irreparable.

The subfloor is such an important part of a building because it separates the ground from the main structure of the house. It often consists of pile systems and foundation walls and receives earthquake shaking before the rest of the house.

Led by BRANZ, **Seismic design and retrofit of hillside houses (ongoing)** is studying the seismic performance of subfloor bracing systems in new and existing hillside houses to help build seismic resilience. Using computer simulations and lab experiments, the project will develop effective retrofit solutions, which will also be assessed for cost benefit and environmental impact.

These insights will shape much-needed design guidance for the subfloor framing systems for both new and existing hillside houses.

Despite living in a country of hills and valleys, we don't understand enough about how houses on hillsides will withstand earthquakes. This project will help identify critical engineering issues and develop solutions to better keep people and properties safe.

Angela Liu, BRANZ Senior Structural Engineer

Related link:

- branz.co.nz/seismic-resilience

Improving earthquake safety for non-structural building components

Most seismic research has focused on structural building elements – foundations, subfloors, beams, walls and roofs. However, the Canterbury and Kaikōura earthquakes showed how much damage non-structural elements such as plumbing, drainage and electrical systems can also cause.

Code of practice for non-structural elements (ongoing) is an essential step towards improved compliance with the Building Code. Led by the Building Innovation Partnership at University of Canterbury in partnership with WSP New Zealand and Beca, the project will provide guidance on the characterisation, specification and quality of the selection, design and installation of non-structural elements.

The code of practice is coordinated with a suite of other guidance documents being developed by MBIE, Health New Zealand | Te Whatu Ora, Ministry of Education | Te Tāhuhu o te Mātauranga and the Association of Wall and Ceiling Industries. The code of practice will directly impact procurement, design and construction projects across the building sector. Additionally, it will consider what quality assurance is required to meet regulatory and insurance needs.

By developing consistent procedures for the performance-based design and selection of non-structural elements, it will help ensure better resilience and safety for people and help our communities and businesses to reduce the economic burden of damage from an earthquake.

Changing behaviours by communicating seismic risk

Building owners and occupants should be able to understand the earthquake risks of their buildings. However, risk information is not always clear or easily accessible. The building industry has an important role to play in communicating these risks to support informed decision making.

Led by Resilient Organisations, **Seismic risk communication: Moving from understanding to behaviour change (ongoing)** aims to make seismic risk information more accessible.

Building on the BRANZ's earthquake-prone building guidance and by interviewing the people who provide seismic information to commercial building tenants, this project has identified current language, tactics, concerns and information gaps. It has tested existing and proposed communication approaches with commercial building tenants, exploring how issues such as perceived liability and trust influence the way messages are delivered and received.

In collaboration with MBIE's Building Performance, the project has created a resource for commercial building tenants. A guide for engineers, property managers, property owners and policy makers is also under way.

By increasing collective understanding, this project aims to drive a measured approach to seismic risk in buildings, increasing safety and minimising disruption through unnecessary closures. It will empower commercial building tenants to seek out and demand buildings that meet their seismic performance needs.

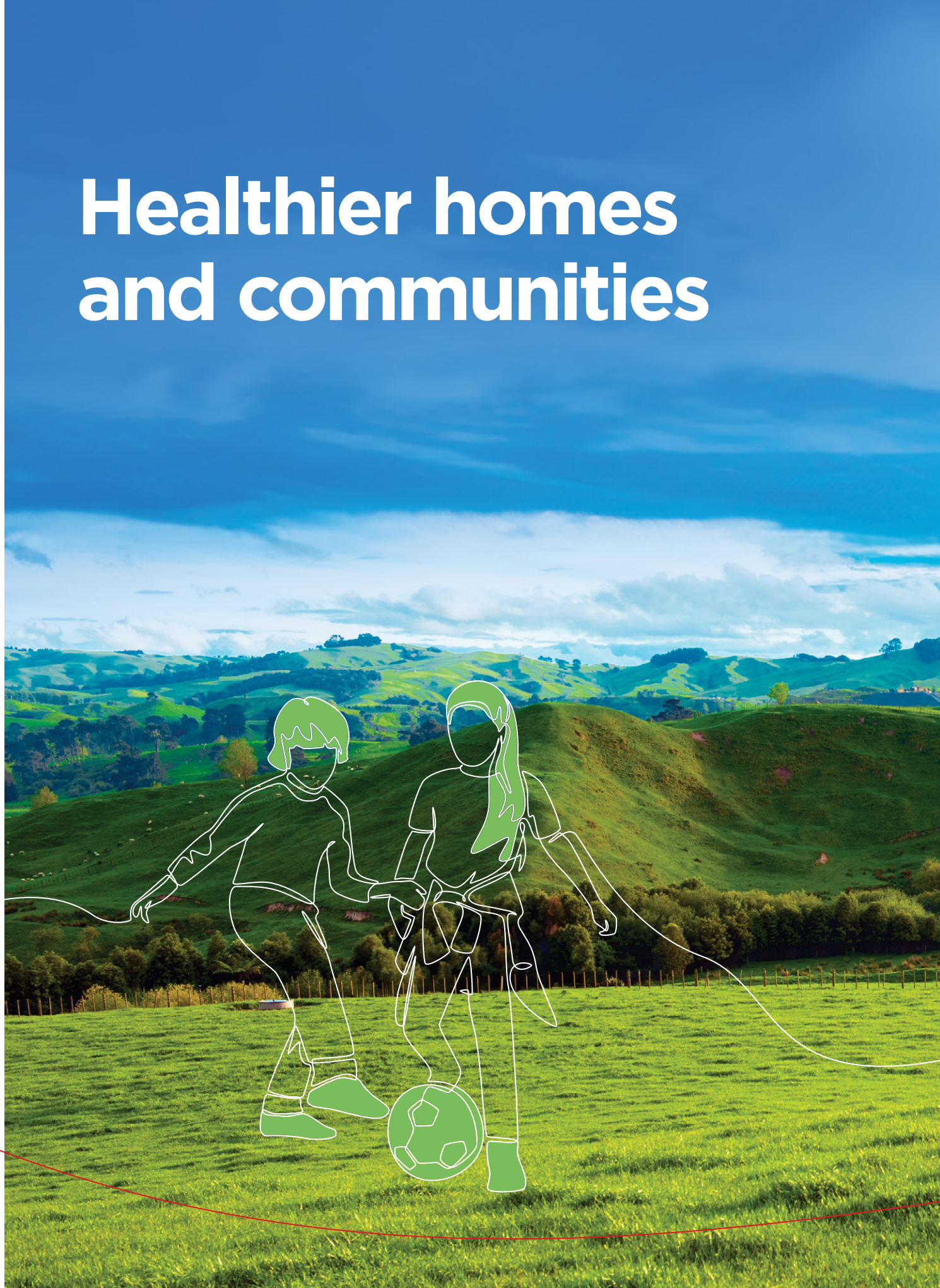
Related link:

- MBIE (2024) *Seismic risk resource for commercial building tenants.* building.govt.nz

20,000-plus earthquakes recorded by GNS Science sensors each year

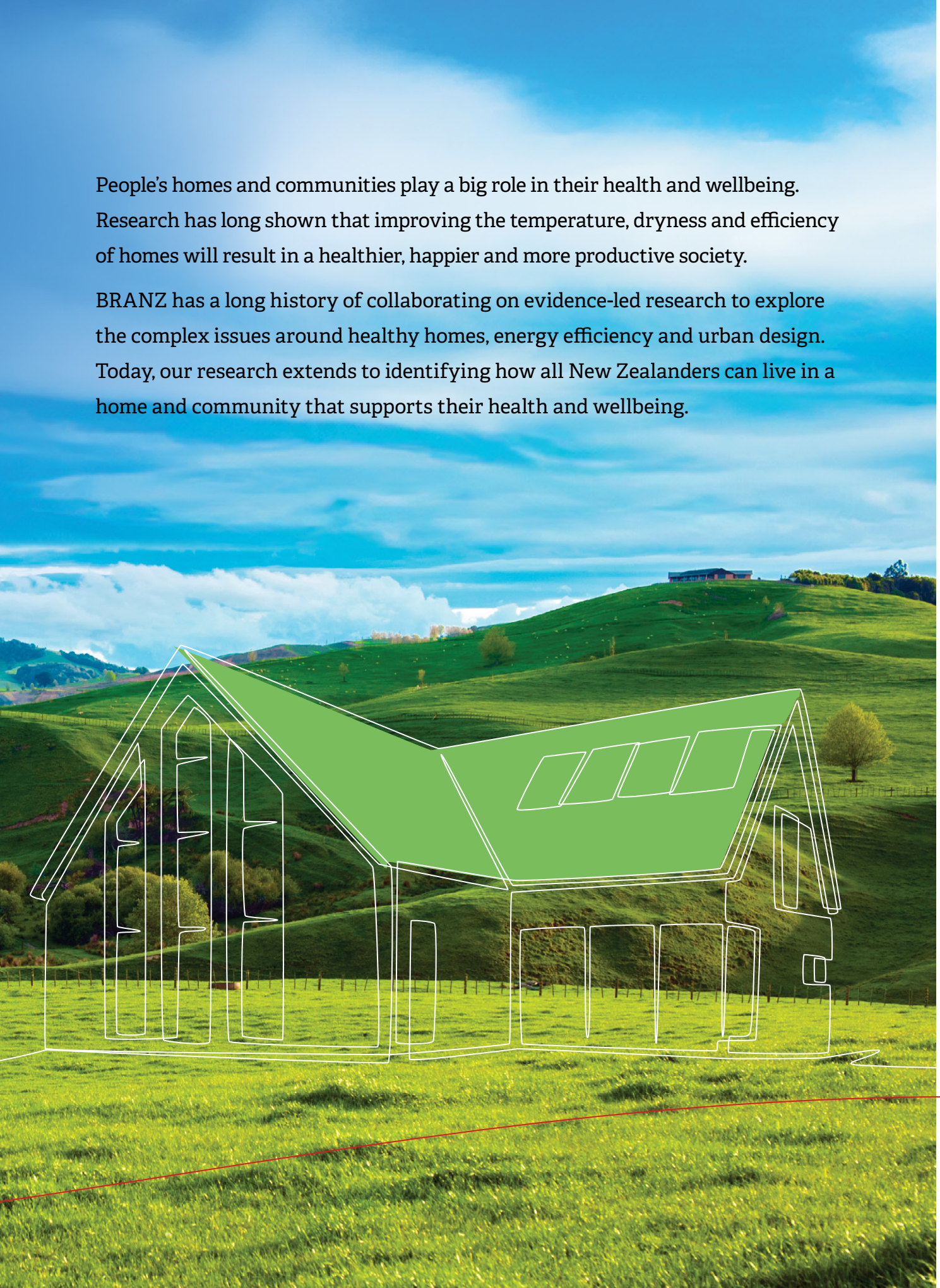
5,360 buildings are on the **Earthquake-prone Buildings Register** (March 2024)

Healthier homes and communities



People's homes and communities play a big role in their health and wellbeing. Research has long shown that improving the temperature, dryness and efficiency of homes will result in a healthier, happier and more productive society.

BRANZ has a long history of collaborating on evidence-led research to explore the complex issues around healthy homes, energy efficiency and urban design. Today, our research extends to identifying how all New Zealanders can live in a home and community that supports their health and wellbeing.



Why this research is important

Cold and damp housing is part of daily life in winter for many New Zealanders, including some of the most vulnerable people in our society. Children, the sick and elderly are more likely to spend a lot of time at home, making healthy housing even more important for these groups.

For over a decade, BRANZ has led research to improve our understanding of the issues and explore the solutions to achieving healthy homes. This includes BRANZ's significant, long-term programme *Healthier homes*.

Housing affordability is also a concern for many New Zealanders. The high cost of homeownership and rental housing, and maintaining and operating a home, are major factors in our current cost-of-living crisis. The cost of building new housing was also consistently raised in the 2024 BRANZ Industry Insights Survey.

$141 million per year approx.
on direct public sector costs is attributable to substandard housing conditions[9,10]

36,649 hospital nights approx.
attributable to home dampness and mould[10]

Current Levy-funded research focuses on bringing down the cost of a healthy home by looking at alternative ways of living, In addition, research explores effective low-cost interventions to reduce damp and mould and improve indoor air quality.

Last year, Building Research Levy investment was targeted at understanding the role of housing in a broader context of wellbeing – social, cultural and financial – and for our diverse population. Newly funded projects explore how to achieve multi-generational living, co-design models for Māori housing and barriers and solutions to designing for people with dementia.

In summary, this year's research activities span:

- home energy performance for people and planet
- indoor air quality and moisture
- housing affordability for all New Zealanders
- meeting the needs and wants of our diverse population.

Related link:

- branz.co.nz/healthy-homes-research

[9] Including crowding, cold, damp, mould and hazards linked to falls. These numbers include an average of 6,300 hospitalisations due to damp or mould, 1,500 hospitalisations attributable to injuries, 625 hospitalisations due to cold housing and 500 hospitalisations annually attributable to household crowding.

[10] Riggs et al. (2021) *Environmental burden of disease from unsafe and substandard housing, New Zealand, 2010–2017*. ncbi.nlm.nih.gov

In their words

Amanda Scothern

Executive Officer, Wellington Regional Healthy Housing Group

Can you tell us a little bit about the Wellington Regional Healthy Housing Group (WRHHG)?
WRHHG is a collective impact initiative that started in 2019. Our vision is healthy safe homes for the wellbeing of everyone in the Wellington region.

We connect central government agencies, councils, public health, industry bodies, research and community-based organisations. We enhance information sharing and collaboration, including to influence policy and resourcing decisions for healthier homes. Though we're a regional initiative, our system change priorities sometimes see us working at a national level.

How important is the role of research in making Kiwi homes healthier?
Research is essential to understand where intervention is most needed and what works, and how we communicate the research matters just as much if we're to deepen understanding and get effective action on home health.

How long has the WRHHG been collaborating with BRANZ? What value does BRANZ bring?
BRANZ has been a key part of the WRHHG initiative since the beginning. BRANZ research set the starting point for our strategy and continues to inform work across the collective.

BRANZ specialists provide guidance and practical help for WRHHG research, and Building Research Levy funding currently supports a flagship communications research project the collective is driving.

What research past or present are you most excited about?
Definitely our ongoing 3-year Healthy Homes Communication Action Research project. Its focus is on how to communicate the evidence on home performance and health in a way that actually shifts understanding and results in evidence-based action.

We've done research to better understand how people currently understand home health. We're working with specialists (at The Workshop) to develop and test narrative messaging.

An exciting outcome we hadn't fully anticipated is how it's bringing together different people in the sector to be part of a consistent way of talking about homes and health. We had planned that this project would support the work of the sector beyond our collective, but the level of interest is even higher than we expected

Related link:

- BRANZ (2023) *RE:INVEST* (p.27). branz.co.nz

Home energy performance for people and our planet

The condition of our homes impacts our health and wellbeing as well as the cost to keep them warm – and cool – and their greenhouse gas emissions. When it comes to home energy efficiency, it is a case of what is good for the people is good for the planet.

This year, we have made good progress on our home energy use study HEEP2, we are close to receiving answers on how banks can play an advisory role to improve new-build home performance and we've supported the industry's transition to updated H1 *Energy efficiency* regulations.

HEEP2 findings will contribute to an improved understanding of the performance of our homes. It will help address some key issues such as energy hardship and the environmental impact of housing in Aotearoa New Zealand.

Vicki White, BRANZ Senior Research Scientist

Understanding energy use to support healthier, energy-efficient homes

To improve the health and efficiency of New Zealand homes, we need reliable, robust and up-to-date information about how people use energy and the conditions they live in. BRANZ's HEEP1 study, carried out 1995–2005, provided a useful snapshot. It informed many initiatives that have improved living standards for Kiwis, including Warm Up NZ and Warmer Kiwi Homes.

With the rise of new technologies such as electric vehicles, energy use has changed, and now there is a focus on saving energy to reduce carbon and electricity peak demand. New data has potential to impact and influence future developments of the New Zealand Building Code, and MBIE *Building for climate change* initiatives as well as social, economic and environmental policies and outcomes.

Household Energy End-use Project 2 (HEEP2) (ongoing), which is part of BRANZ's *Healthier homes* research programme, is making great progress in capturing this information. It builds and updates on the success of HEEP1, a 15-year study completed in 2010.

Together, the projects are among the biggest studies ever undertaken by BRANZ. Ultimately, HEEP2 will provide researchers and policy makers with better information to help make sure all New Zealanders have energy-efficient and healthy homes that are affordable to run.

BRANZ partnered with Stats NZ | Tatauranga Aotearoa and its Household Economic Survey to recruit households – from Whangārei to Bluff – to participate in the HEEP2 study. The monitoring will measure electricity use and indoor conditions in around 320 homes. It will also collect information about the dwelling, appliances and household energy use behaviours. With co-funding from MBIE, an additional 130 households are taking part through surveys and by giving access to electricity metering data.

Household monitoring will continue for the next 12 months. The team is also working on processing the data already generated as part of the second phase of the project, **Energy use and conditions in New Zealand homes: Insights from HEEP2 data (ongoing)**.

A related study is being co-funded by MBIE and New Zealand Green Building Council | Te Kaunihera Hanganga Tautaiao. This co-funding is facilitating a Canterbury-based study of Code-compliant and higher-performance homes, which will help understand the impacts of building to higher performance standards than the Building Code minimum.

Information from HEEP2 will be used by policy makers and others on a range of issues such as emissions reduction, retrofit programmes, energy hardship, healthy housing research and the electricity market and as public information.

Related links:

- branz.co.nz/environment-zero-carbon-research/heep2
- youtube.com/watch?v=DtJvDlH2u9E
- White (2020) *Insights into energy use in homes.* buildmagazine.org.nz

We often hear, 'Oh I wish I had known that before' from people who have built a new home. This project explores how bank customers can be empowered in their decision making to achieve a higher-performing home.

Vicki Cowan, Beacon Pathway Co-manager

Advising bank customers on new-build home performance

A quality, high-performing new-build home supports occupant health and wellbeing and its lower carbon footprint minimises its impact on the environment. Unfortunately, too often newly built homes do not perform as well as they should.

To encourage people in their decision making, some banks offer customers financial incentives to build better-performing homes. However, navigating the building and borrowing journey is complex, and there is little support for people to make informed decisions about the comfort and efficiency of their homes.

Evaluation of an intervention to enable bank customers to achieve better building performance in new-build homes (ongoing) brings together a multidisciplinary team to investigate how best to support bank customers to build a comfortable and efficient home. Research organisation Beacon Pathway is partnering with Victoria University of Wellington | Te Herenga Waka, Dunedin City Council | Kaunihera a-rohe o Ōtepoti and ANZ Bank to deliver the research.

The project takes a customer-centred approach, recognising the complexity of decisions around borrowing money and building a new home. It aims to empower customers by improving understanding of the principles of how to make a comfortable and efficient home and identifying opportunities to optimise these within the borrowing journey.

The project is offering bank customers free consultations with independent advisors. Advice will include how to increase comfort and efficiency at minimal cost and when it is sensible to invest more upfront for long-term benefits.

There are widespread health, financial and environmental benefits to New Zealanders building homes that are comfortable to live in and more efficient to run and do not cost the Earth.

Supporting the industry's transition to the new H1 requirements

The year 2023 saw the introduction of the most significant changes to Building Code requirements in the past decade. The H1 changes were an important step towards improving energy efficiency of new homes, making them healthier and cheaper to run.

BRANZ worked alongside other industry players to provide information and guidance to support the transition to the new energy efficiency requirements, which came fully into effect on 1 May 2023. In the run-up, BRANZ created, updated and promoted a suite of tools to support the H1 implementation. This included the *House Insulation Guide* (6th edition), the H1 Calculation Method Tool, a one-stop online search tool H1 Hub, webinars, bulletins and *Build* articles, updated BRANZ Maps and an e-learning module.

This year, positive collaboration with industry on the *House Insulation Guide* has led to further iterations of the tool. PlaceMakers, Comfortech and Knauf all provided feedback that has helped improve its accuracy.

At the end of 2023, BRANZ ran a series of six interactive workshops attracting 232 participants from across the motu. The webinars and workshops together reached more than 10,000 people, mostly designers and building consent officers.

Participants enjoyed the interactive nature of the workshops and the opportunity to share thoughts and ask questions. Feedback showed that the knowledge they gained had been valuable in their day jobs and that the seminar handbook continues to be a useful reference. For BRANZ researchers, the opportunity to connect with participants has provided insights to inform further engagement on H1 implementation as well as on future initiatives.

BRANZ's H1 workshop has given me way more arsenal to do my job, I often flick back to the seminar handbook before going to do an inspection.

Building inspector, Western Bay of Plenty

90% of workshop participants said they had their **expectations met** or **expectations exceeded**

More than **10,000** **participants** across H1 webinars and workshops

Ngā mihi to our H1 education collaborators:

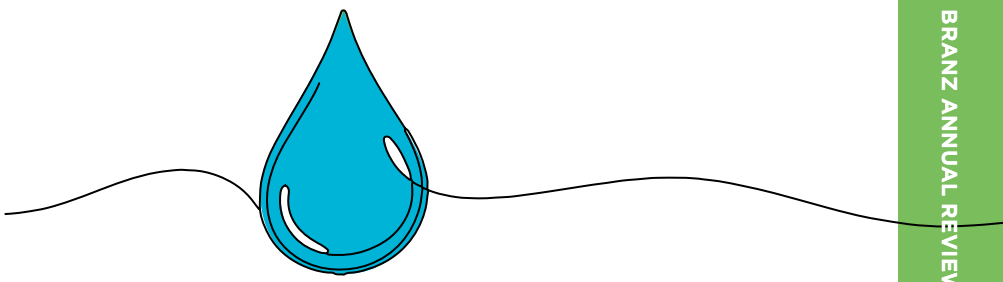
- Architectural Designers New Zealand
- Frame and Truss Manufacturers' Association New Zealand
- MBIE
- Insulation Association of New Zealand
- New Zealand Certified Builders
- New Zealand Institute of Architects | Te Kāhui Whaihanga
- New Zealand Green Building Council
- Window and Glass Association New Zealand

Improving indoor air quality and moisture

Indoor air quality can have a significant impact on the health of New Zealanders. It is estimated that, from 2010 to 2017, damp and mouldy housing accounted for a substantial proportion of the burden of disease in Aotearoa New Zealand. A total of 36,649 hospital nights were attributable to household dampness and mould.[1]

Understanding how dampness and pollutants enter and spread within our homes and what we can do to counteract this is essential in saving lives. To achieve this, BRANZ partners with many collaborators to improve indoor air quality in New Zealand homes.

[11] Riggs et al. (2021) *Environmental burden of disease from unsafe and substandard housing, New Zealand, 2010–2017*. ncbi.nlm.nih.gov



Reducing moisture in homes

Natural ventilation is an important part of keeping homes warm and dry. As our climate changes, ventilation will play a crucial part in lowering indoor temperatures, without increasing energy costs or carbon emissions. However, people's habits and behaviours in naturally ventilating their homes are largely unknown.

A three-stage research programme led by the University of Otago | Ōtākou Whakaihu Waka, **Natural ventilation in homes – an exploration of behaviours and intervention for change (ongoing)** has shed light on how people ventilate their homes. It explored some of the barriers people experience when trying to use natural ventilation and piloted low-cost interventions to reduce damp and mould.

The research will be used to form guidance on how to deal with moisture in homes. It will be used by MBIE, Health New Zealand, healthy housing groups and home occupiers. Longer term, the research will contribute to guidance on ventilation for all new and existing buildings. It aims to support people to ventilate their homes effectively and reduce mould and dampness to lessen respiratory illnesses in Aotearoa New Zealand.

A different study, **Low pitched metal roof colour to manage condensation and mould (new)**, by building surveyors Helfen, is looking into the issue of roof condensation. Research suggests that low-pitched roof designs can increase the potential for condensation build-up in the roof space and on roof materials. However, what is not so clear is the significance of the colour of the roof cladding relative to performance.

This research will investigate whether lighter-coloured roofs impact condensation and lead to further issues in the roof space. This project will explore whether the reduction in radiated heat in lighter-coloured roofs reduces drying ability, leading to negative implications from condensation. In particular, the research will explore whether there is a link between roof space moisture and mould growth and/or premature deterioration of roof materials.

The wider building industry will find the data useful to support any necessary changes or improvements to the way products are used. The research data may also provide guidance for improvements to the Building Code and relevant codes of practice.

I have two teenage boys that have been having more than their fair share of respiratory health issues. Now we have guidelines to help them make better decisions on their environment ... We really appreciate talking to BRANZ at the home show, and I wanted to share the difference the knowledge has made to our family

Nelson Better Home & Living Show attendee

Sharing ventilation advice with homeowners

BRANZ has decades of research exploring how to keep homes dry and healthy. While we know mechanical ventilation systems are valuable, our research also shows that simple actions can make a significant impact to the moisture in people's homes. For instance, drying washing outside, opening windows and cooking with pot lids on all help to minimise condensation.

This year, BRANZ sought to help improve people's knowledge of how to make their home healthy through everyday ventilation actions. We worked with Home Performance Advisor to turn our research into accessible, practical ventilation actions for homeowners looking to renovate.

In early 2024, BRANZ provided free advice at home shows in Nelson and Rotorua. Our experts engaged attendees on how to improve ventilation and distributed more than 800 hygrometers so people could monitor their own home temperature and relative humidity.

The team also surveyed home occupier perceptions and knowledge of how to keep their home healthy. Across both home shows, 87% of survey respondents said it was useful to talk to BRANZ researchers, with 63% on average finding it very useful.

With such strong feedback, BRANZ attended a third home show in Wellington in May 2024. We will also continue to take these messages to new audiences to help increase people's ventilation awareness and support positive actions to keep their homes healthy.

11,500 people
attended the home shows

800 hygrometers
given to people to monitor humidity and temperature of their own homes

90.4% of home show survey respondents found it **useful to talk to BRANZ**

How healthy are our homes? We surveyed nearly 200 home show attendees about their own homes:

66%
said their home was **too cold** in winter

63%
said their home was **too warm** in summer

72%
reported **condensation** on windows during winter

43%
said they struggle with **mould**

Helping us all to breathe easier

BRANZ and its partners at the Indoor Air Quality Research Centre New Zealand (IAQRC) continue to contribute to research that improves the air we breathe – at home, at school and at work.

The IAQRC brings together experts in building science, public health and air quality. The current membership comprises BRANZ, GNS Science, Massey University, NIWA, University of Canterbury, University of Otago and Victoria University of Wellington.

Indoor air quality research (ongoing) includes Pollutants in New Zealand homes being led by BRANZ in collaboration with University of Otago. The researchers took samples from bedrooms and living rooms in 150 New Zealand homes and analysed them to see which pollutants were present. Data from this first phase of research is being collated and analysed now.

Our research is revealing what pollutants are present in our homes and whether they're a health concern for us. Next, we'll seek to establish the sources of these pollutants.

Dr Manfred Plagmann, BRANZ Principal Scientist

The next phase of research, **Pollutants in New Zealand homes: sources and implications (new)** will look at where these pollutants come from and what may be done to reduce or manage them. Controlling pollutant emissions at the source remains one of the most effective approaches to manage indoor air quality in terms of cost and efficiency.

The results of this study will contribute to BRANZ's *Healthier homes* programme and MBIE's *Building for climate change* programme.

BRANZ is also part of an international project, under the umbrella of the International Energy Agency (IEA) conducting a literature review on smart ventilation and energy-efficient homes. The outcomes of the study of pollutants and their sources (IEA Annex 86) will also contribute to the knowledge of researchers who collaborate within the IEA.

The work aims to help reduce New Zealanders' exposure to air pollutants and infectious diseases that can damage our health and put a strain on our health system.

Housing affordability for all New Zealanders

The quarter-acre dream has long been part of Kiwi culture. However, for a growing proportion of the population, private homeownership has become unachievable (unaffordable to many).

Housing affordability is a challenge around the country, particularly for low to medium-income households. There is an urgent need to explore more affordable housing models and new ways for people to live in New Zealand homes.

BRANZ invests in research to explore low-cost pathways to comfortable, dry, healthy homes.

Looking at affordable alternative housing pathways

Barriers to homeownership in Aotearoa New Zealand are high. The decline of owner occupation and the growth of an intermediate housing market is leading to a growing population of lifelong renters. Alternative housing tenure models offer a promising pathway into homeownership for low to medium-income households

Led by Massey University, **Affordable alternative housing pathways (new)** will look at various models offered by community housing providers and iwi and Māori organisations. It explores whether they provide pathways to homeownership that are culturally appropriate, accessible and sustainable to a range of households.

This research investigates the experiences of households involved in alternative tenure models and the potential outcomes for these families. By examining the social, cultural and economic impacts of affordable alternative housing tenure models across various communities, the study aims to enhance the capacity of non-governmental housing providers. The goal is to foster innovation and develop best practices that ultimately support low to medium-income households to access greater housing security and homeownership.

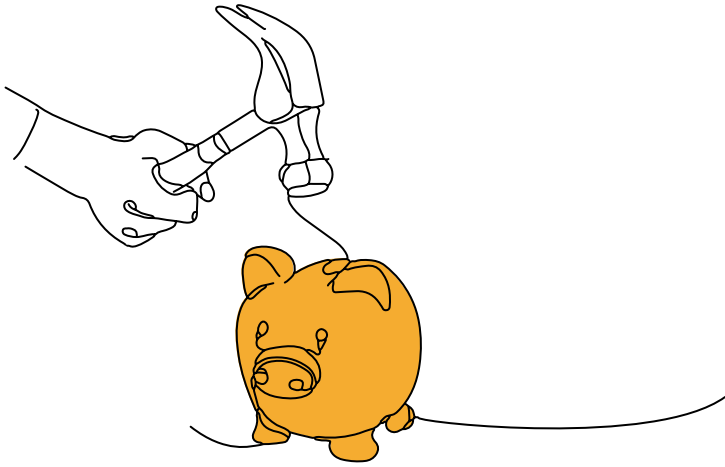
A project research advisory group has been established to include representatives from Community Housing Aotearoa | Ngā Wharerau o Aotearoa, Ministry of Housing and Urban Development | Te Tūāpapa Kura Kāinga and Te Matapihi.

Long term, the research will help contribute to making a wider variety of intermediate housing options available and tailored to the needs of low to medium-income groups. A new research study will look at opportunities provided by alternative housing models for families on low to moderate incomes with low equity.

Housing solutions for low to moderate income families with low equity (new) is led by Livingston and Associates. It will help clarify the characteristics and nature of alternative approaches to housing and how they can be used in Aotearoa New Zealand.

The project will assess the size of the low to moderate income housing market. It will also assess the demographics and the opportunities and challenges in providing housing solutions for these households. It will consider the market barriers and how they may be overcome.

The research aims to support affordable housing providers – such as iwi and hapū, central and local government, peak bodies and advocacy groups, developers and the construction sector, financiers and equity investors, and policy advisors – to offer an increased range of housing options for low to medium-income families.



Understanding the costs of running a home

Homeowners face ongoing energy and home maintenance costs to keep comfortable living standards. To explore the extent of these costs and how they impact housing conditions, BRANZ joined forces with Centre for Research, Evaluation and Social Assessment (CRESA), Victoria University of Wellington and Motu Research.

The project was part of **Affordable housing for generations (complete)** exploring multiple dimensions of housing affordability, insecurity and provision to develop new options for housing. It was part of a 4-year programme of work, under the Building Better Homes, Towns and Cities National Science Challenge programme, and was co-funded by the Building Research Levy.

Cross-referencing earlier research using national datasets and the latest data from a BRANZ housing condition survey, researchers found that underinvestment in repairs and maintenance, such as repairing or replacing external and interior features like bathroom fittings and windows was a common issue. They found shortfalls in terms of both the number of households investing in maintenance and the amount being spent per dwelling.

This research provides new insight to the often-overlooked issue of operational costs associated with maintaining a healthy home. These findings should help inform regulation and policy decisions aimed at tackling maintaining affordable, healthy homes.

90% of dwellings
needed some maintenance

35% of households
reported spending on maintenance in 2018/19

Related links:

- homesforgenerations.goodhomes.co.nz
- Riggs et al. (2023) *Examining the factors affecting household expenditure.* buildingbetter.nz
- White et al. (2024) *Undone maintenance: What will it cost?* buildingbetter.nz

Meeting the needs and wants of our diverse population

The way we live in Aotearoa New Zealand is changing. People's needs and expectations of their homes, workplaces and the wider built environment are continually shifting.

Aotearoa New Zealand needs more homes that are flexible for multigenerational living, allow for culturally appropriate living environments and are suitable and safe for people with disabilities and health challenges.

Exploring barriers and solutions to multigenerational housing

There is an increasing demand for multigenerational housing in Aotearoa New Zealand. Between 1996 and 2013, extended family households grew by 49%, and that demand continues to grow.

Understanding barriers to the delivery of multigenerational housing (new) seeks to understand the challenges and identify the opportunities for designing and building fit-for-purpose, multigenerational housing to suit our diverse population in Aotearoa New Zealand.

The project is led by The Urban Advisory and Axon Consulting and seeks to understand and identify opportunities for designing and delivering fit-for-purpose homes for multiple generations in Aotearoa New Zealand.

Understanding public housing tenures and outcomes

Public and community housing provides essential shelter to many New Zealanders unable to find an affordable place of their own. Past governments have taken different stances on housing policy from housing for life to housing for the durations of need.

To add to the ongoing debate on the role of public housing, in March, scholarship student Karin Henshaw from University of Otago completed her master's thesis **Public housing transitions (complete)**, which explores the outcomes of tenants with different tenure experience.

With the help of Stats NZ, Karin investigated Housing New Zealand data, linking information on tenant entering and exiting patterns with long-term health, justice, income and employment outcomes.

The value of secure housing should not be underestimated, as those with the least-stable tenure patterns had poorer outcomes than those who remained in housing or who left.

These findings will help inform public housing policies on the best approach to housing allocation and where additional assistance might be needed to help tenants live a good life.

Related links:

- Henshaw (2024) *The comparative long-term outcomes for different tenure groups in the Housing New Zealand population.* otago.ac.nz

Connecting whānau with whenua

What does a mātauranga Māori approach to developing the built environment look like?

Ka mua, ka muri: Connecting tangata to whenua through housing (complete) provides advice for housing industry professionals on how to work with Māori landowners building home and ways to support co-design efforts.

The project was led by Victoria University of Wellington in collaboration with Katoa Ltd and Pāhāōa Marae, near Te Kaha in the Eastern Bay of Plenty.

The work investigated what it means to be well housed on your whenua and to increase capacity for cultural responsiveness, particularly for people in the housing system working with whānau Māori. It is part of a longer-term effort to establish a pā (Māori village) at Te Kinakina in the Eastern Bay of Plenty within the tribal rohe of Te Ehutu/Te Whānau-ā-Apanui.

The project began with a wetlands restoration project funded by the Building Better Homes, Towns and Cities National Science Challenge and went on to explore how whānau can be housed within the ecosystem, strengthening the whakapapa connections between people, land and the environment.

The research team have heard about the pressing issues of housing and climate change from a wide range of whānau and have incorporated the learnings into their methodology guide for the research.

The team will now test the methodology guide with different blocks of whenua Māori across the rohe, expanding on the case studies already developed.

Related links:

- Bergan et al. (2024) ER85 *Ka mua, ka muri connecting tāngata to whenua through housing.* branz.co.nz
- poipoia.net/te-kinakina-wetlands

Starting conversations about the dual challenges of climate resilience and housing is tough, particularly where whānau are just trying to get by. At the same time, there's a somewhat cathartic aspect to exploring what a climate-resilient kāinga could look like.

For us, it reinforces how this rangahau is as much about the process – of starting conversations – as it is about the outcome.

Dr James Berghan, Victoria University of Wellington

With the help of people living with dementia, researchers will co-create solutions for better indoor home spaces with the aim of improving their quality of life.

Alessandro Premier, Senior Lecturer, School of Architecture and Planning, University of Auckland

Making housing better for people with dementia

For older people living with dementia, indoor light in their homes can significantly impact their quality of life because of their altered spatial and sensory abilities.

Developing dementia-friendly housing requires more than focusing solely on accessibility solutions – yet these are usually the main design considerations in Aotearoa New Zealand.

Dementia-friendly housing: Improving design and retrofit guidance of daylit environment for older people living with dementia aging in place (new) seeks to address these issues. The findings of this research will increase awareness and inform more comprehensive guidelines for dementia housing in future. This includes the design and retrofit of the daylit environment in the homes of older people with dementia. The research will identify preferable conditions and building solutions, for example, a glare-free view, glare control, calming colour schemes or familiar aesthetics.

The research is a collaboration between the School of Architecture and Planning and the Centre for Cocreated Ageing Research at University of Auckland and sits alongside other dementia-focused projects. Participants include NGOs, dementia agencies, building research and industry representatives and experts in dementia and elderly environment design.

The collaboration promotes organisational change in private and public sector organisations, leading to future collaborative research and more delivery of dementia-friendly housing.

70,000 people living with dementia in New Zealand[12]

2 to 8 times higher risk of falls in people with dementia or cognitive impairment[13]

[12] Alzheimers New Zealand (2024) *Facts and figures.* alzheimers.org.nz

[13] Allan et al. (2009) *Incidence and prediction of falls in dementia: A prospective study in older people.* journals.plos.org

Urban design for community wellbeing

In 2023, about 90% of Aotearoa New Zealand's population lived in urban areas[14]. As higher-density housing increases, our cities and towns will continue to grow – so it is vital that urban design is considered early in building developments.

A well-considered built environment can have significant impact on the thousands of people who live, work and play there. BRANZ is supporting and collaborating in research that investigates how to increase accessibility, minimise construction impacts and put people at the heart of design.

Our aim is to increase understanding and support design solutions that will create better urban environments for generations to come.

[14] Stats NZ (2023) *Subnational population estimates*. stats.govt.nz

Creating accessible communities

Research is under way to explore the challenges faced by people with disabilities when they use Aotearoa New Zealand's public buildings. **Making New Zealand's built environment inclusive and accessible for everyone (new)** aims to improve the lives of the 24% of New Zealanders who live with a disability.

This work is intended to lead to more accessible and inclusive public buildings and improve awareness and practice by the construction industry.

The project is led by Massey University with research support from AUT. In collaboration with an accessibility advisory panel, the researchers will measure the compliance with accessibility regulations in public buildings and assess the knowledge of building practitioners on accessibility requirements.

Using these findings, they will co-design solutions for improving accessibility and identifying drivers for change. The research results, guidance and recommendations will be shared with government agencies, the construction industry, tourism businesses and the disability and research communities.

Accessibility of basic sanitary amenities like public toilets is the focus of **Accessibility to commercial buildings' sanitary facilities (new)**. Led by WSP with support from MBIE, it will inform revisions to the Building Code to make toilets in public and commercial buildings more accessible and inclusive.

Building on earlier research, the work will look at people's expectations for adequate and convenient public sanitary facilities. The findings will contribute to the liveability and attractiveness of cities and public spaces, encouraging people to spend time there.

24% of New Zealanders **live with a disability**[15]

74% of local authorities rated **accessibility of their built spaces** as adequate or good[16]

[15] Stats NZ (2014) *Disability survey: 2013*. stats.govt.nz

[16] Office for Disability Issues (2020) *Findings of the national local authority survey on accessibility*. odi.govt.nz

Understanding how environmental conditions affect wellbeing

To meet the demand for housing, new urban communities are being built across the country. These communities are often a mix of existing homes living alongside areas undergoing intense development.

BRANZ research in **Communities under construction (complete)** has shared its findings on the impact construction has on residents in these rapidly growing communities.

Working in collaboration with the industry, the research reveals how developers factor in community needs when planning new developments. It provides insight into how developers manage factors such as shade, views, privacy, congestion, dust and noise caused by construction activity. The guidance will be of interest to regulators in both central and local government.

A related BRANZ project, **Building for wellbeing (ongoing)**, focuses on how construction work impacts in-home conditions of those living nearby. The research has the potential to inform changes for optimal urban planning and development.

This project is part of Te Hotonga Hapori – Connecting Communities, a research programme exploring the relationship between urban redevelopment and community wellbeing. Led by AUT, Te Hotonga Hapori is funded through MBIE's Endeavour Research Fund. The founding partners include AUT, Kāinga Ora – Homes and Communities and Isthmus Group. BRANZ is also a member of the research consortium.

Related links:

- Simpson & Lockyer (2024) SR486 *Communities under construction.* branz.co.nz
- tehotongahapori.ac.nz

Sustainable construction

With the built environment contributing up to 20% of Aotearoa New Zealand's carbon footprint, BRANZ is collaborating across the sector to change the way we build.

BRANZ aims to support industry, government and the public so that, by 2050, the building and construction industry is delivering sustainable, net-zero carbon buildings in an affordable way.

Why this research is important

Cutting greenhouse gas emissions to net-zero by 2050 is a significant challenge for Aotearoa New Zealand and the building and construction sector. In the face of growing concerns about housing availability and affordability, climate change has moved down the list of priorities for many, according to the BRANZ Industry Insights Survey 2024.

With a huge collective effort needed across the sector to achieve the net-zero target, BRANZ's commitment remains more important than ever. We are continuing to provide training, science-led tools and guidance to support the transition to a more sustainable built environment.

Since 2019, our *Transition to a zero-carbon built environment* research programme has nearly 60 research projects completed, ongoing or newly approved to deliver practical solutions across the full life cycle of buildings.

60 new, ongoing or completed projects in the *Transition to a zero-carbon built environment* research programme

This year's areas of research focus are:

- upskilling industry for sustainable construction
- working together to minimise waste
- designing lower-carbon homes and communities
- measuring the whole-of-life carbon impact of buildings.

Ultimately, the research has one goal in common: to help deliver a more environmentally sustainable built environment for all New Zealanders.

Ngā mihi nui to our *Transition to a zero-carbon built environment* advisory group:

- Massey University
- Victoria University of Wellington
- University of Otago
- Naylor Love
- New Zealand Green Building Council
- Kāinga Ora
- Warren and Mahoney
- Christchurch City Council
- Building Better, Homes, Towns and Cities National Science Challenge

Upskilling industry for sustainable construction

Sustainable thinking must happen at every step of construction – from the decision around whether to repair or rebuild to design and material selection, on-site waste practices, how the building will be used and final demolition.

Our research shows that the best way to drive this change is to equip people across the system with the resources, knowledge and abilities to make effective zero-carbon decisions.

Collaborating with ConCOVE Tūhura for UNESCO construction training expert group

BRANZ is proud to support ConCOVE Tūhura as it plays a central role in determining the future of international construction trades training.

In March 2023, ConCOVE Tūhura was appointed as Lead Expert for the UNESCO-UNEVOC Bridging Innovation and Learning in Technical and Vocational Education and Training Expert Group (BILT).

Leading the Asia Pacific region, ConCOVE Tūhura will be joined by representatives from Africa and Europe. Together, they will create practical recommendations and materials to help shape the future of building and construction education.

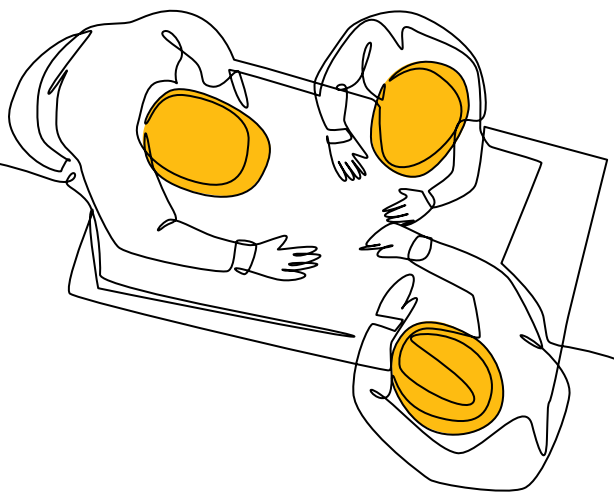
ConCOVE Tūhura will be working closely with BRANZ for the greening education focus area, drawing from our extensive research into building sustainability and zero-carbon construction.

The BILT project is implemented by UNESCO-UNEVOC with support from the German Federal Institute for Vocational Education and Training and sponsored by the German Federal Ministry of Education and Research.

With the first part of the project expected to be delivered in August 2024, it aims to gather global insights and innovations across construction and infrastructure vocational education.

We're so excited to be working in partnership with ConCOVE Tūhura and sharing our evidence-based education in zero-carbon construction internationally.

Dr Casimir MacGregor, Programme Leader, BRANZ *Transition to a zero carbon built environment* programme



In their words

Katherine Hall

Executive Director, ConCOVE Tūhura

Why is it a priority to train people in sustainable construction?
Sustainable construction is a huge national priority. While there's a desire for change, we've seen there's not enough zero-carbon knowledge, skills, experience and shared language across the building and construction industry.

At the moment, the training available in this space is limited. To upskill the industry, we need to embed knowledge into qualifications and teaching delivery – fast. We'll need new training methods to help develop digital skills too, particularly as we move to more off-site manufacturing.

And on top of all that, at a fundamental level, we've got work to do to really embed a respect for the natural world that we live in. There's a lot to be learned from te ao Māori here and how these learnings translate to the construction and infrastructure sector.

What's the role of vocational training in the sector's zero-carbon targets?
It's crucial! But there needs to be a planned, unified, national approach to how we deliver it.

Vocational training helps to equip workers with specialised skills to implement zero-carbon technologies and practices. Taking a practical, embedded approach helps to prepare the workforce for a rapidly evolving industry.

Why did you choose to partner with BRANZ for the UNESCO-UNEVOC BILT Lead Expert role?
BRANZ takes a unique leadership role in the building system. It's also the only national organisation that's working to support industry-led change to reduce emissions.

Our two organisations share the view that we need to take a system-focused approach to create and embed change. Together, we're working to support the industry to collaborate and develop better zero-carbon training options.

ConCOVE Tūhura and BRANZ have a strong relationship already. We've collaborated on BRANZ's *Future of work* programme, which aims to equip our sector for the transition to zero carbon. Through our role with UNESCO-UNEVOC, we're looking forward to both sharing this research and learning from global insights and initiatives.

What do you hope for the future of zero-carbon construction training?
For there to be a national, unified, collaborative approach to zero-carbon training. We want to ensure that everyone is playing a part in the solution – from secondary school education to vocational educational training, professional tertiary education to 'off the framework' solutions. Collaboration is key to achieving our zero-carbon goals.

Developing zero-carbon skills across the sector

The *Future of work* initiative seeks to understand gaps in industry knowledge and create a plan for developing sustainable construction expertise. Delivered as a partnership between BRANZ, ConCOVE Tūhura, Waihunga Ara Rau and the Construction Sector Accord, it aims to support the industry to upskill for zero-carbon construction.

The first phase, **Future of work: what do we need to know to transition to zero carbon (complete)**, was completed in September 2023. This was the first research to look at the existing state of zero-carbon construction knowledge in Aotearoa New Zealand.

It included a nationwide survey of people from the workforce, construction companies, professional associations, training organisations and government departments, backed up by more than 50 in-depth interviews. Using these insights, the team then identified core zero-carbon skills and determined how this upskilling could best be delivered and shared across the industry.

Phase two of the programme, **Future of work: Accelerate skills development for zero-carbon construction (ongoing)**, is now turning this knowledge into action. From September 2023, researchers have been co-creating and prototyping a series of zero-carbon mentoring and upskilling initiatives alongside practical guidance, resources and toolkits.

In partnership with industry and government stakeholders, these initiatives will be trialled, tested and evaluated over the next year. Ultimately, the programme will create practical and relevant learning pathways for people across the industry to better deliver zero-carbon construction.

Related link:

- branz.co.nz/future-of-work

We're working with industry to achieve their net-zero goals by making critical skills and knowledge available through qualifications and training.

Philip Aldridge, Waihanga Ara Rau Chief Executive

Ngā mihi to our *Future of work* collaborators:

Key partners

- BCITO
- ConCOVE Tūhura
- Construction Sector Accord
- Waihunga Ara Rau

Supporters

- Architectural Designers New Zealand
- Construction Workforce Research Consortium
- Climate Change Commission | He Pou a Ranga
- MBIE *Building for climate change* programme
- LT McGuinness
- New Zealand Certified Builders
- Registered Master Builders Association
- Engineering New Zealand | Te Ao Rangahau
- New Zealand Green Building Council
- Ministry of Education
- Tennent Brown Architects

Supporting industry-led learning

Creating guidance for structural engineers

This year, the Structural Engineering Society New Zealand (SESOC) Sustainable Design Task Force has led a project to develop zero-carbon guidance for structural engineers. **Actionable steps for structural engineers towards lower embodied carbon design (complete)** combined expertise from University of Auckland, Mott MacDonald, Holmes Group, Beca, Aurecon, Heavy Engineering Research Association (HERA) and many others.

Together, they created a free practical and accessible guide to help structural engineers design low-carbon buildings for New Zealanders. The guide will be available at sesoc.org.nz later in the year.

The guide and resource map have been designed with the purpose of helping engineers to engage with and deliver on the drive for more sustainable project outcomes.

Charlotte Toma, SESOC Sustainable Design Task Force Chair

Partnering with Massey University on a postgraduate master's

Since 2021, BRANZ has partnered with Massey University School of Built Environment on **Building capability to help the construction industry transition to carbon zero (ongoing)**. Designed to support people already working in the industry to become zero-carbon champions, the Master of Construction postgraduate qualification has been awarded to 100 graduates annually. Over a 3-year investment cycle, the course continues to increase enrolments and stakeholder engagement towards building capabilities to achieve a zero-carbon construction industry.

18 Master of Construction graduate projects funded by the Building Research Levy

Working together to minimise waste

The building and construction industry is one of Aotearoa New Zealand's largest waste producers, contributing up to 50% of all waste going to landfills and cleanfills.[17] Research has also shown that construction of a typical house generates about 4 tonnes of waste, with the average cost of materials sent to landfill valued at more than $31,000 per house.[18]

Through impartial, independent and system-wide action, BRANZ is driving industry change to reduce waste. By supporting the industry to make good decisions and providing the right resources and upskilling opportunities, we are building towards a more circular and sustainable sector.

[17] BRANZ (2022) BU671 *Reducing construction and demolition waste.* branz.co.nz

[18] Auckland Council (2024) *Why construction waste matters.* wastenothing.co.nz

We are partnering with BRANZ to address the complex challenge of construction and demolition waste. This partnership with the building sector will allow us to harness our collective expertise, ultimately leading to better outcomes for the sector.

Sam Buckle, Deputy Secretary, Climate Change Mitigation and Resource Efficiency, Ministry for the Environment

Supporting industry action on waste

Over the last couple of years, BRANZ facilitated and coordinated a Waste Action Group to drive collaborative change within the sector, bringing together central and local government, industry players and researchers. The Waste Action Group co-designed and implemented strategies, including a national waste hui, to help the industry adapt to new waste minimisation regulatory requirements.

Continuing our system-wide focus, in 2023, BRANZ entered an ongoing partnership with Ministry for the Environment | Manatū Mō Te Taiao. This partnership has supported the update of free, independent educational waste resources available on the BRANZ website and delivered free industry webinars.

Together, the initiatives aim to support people across the industry, from builders on site to major decision makers, to improve and embed better waste minimisation behaviours.

Ngā mihi to our waste minimisation collaborators:

- Construction Sector Accord
- Environmental Innovation Centre
- LT McGuinness
- MBIE *Building for climate change* programme
- Mitre 10
- Naylor Love
- Kāinga Ora
- Seamless
- Territorial authority waste officers
- Te Wānanga o Raukawa
- Tonkin + Taylor

Collaborating with BRANZ and other industry partners, we at Naylor Love are actively implementing our sustainability strategy. We are thrilled to be at the forefront of this exciting initiative, helping drive transformation in waste minimisation practices across the industry.

Annie Day, Naylor Love Group Environmental Manager

Recycling and reuse of materials

This year, BRANZ has continued to invest in research projects that explore the recycling and reuse of different materials across the building system.

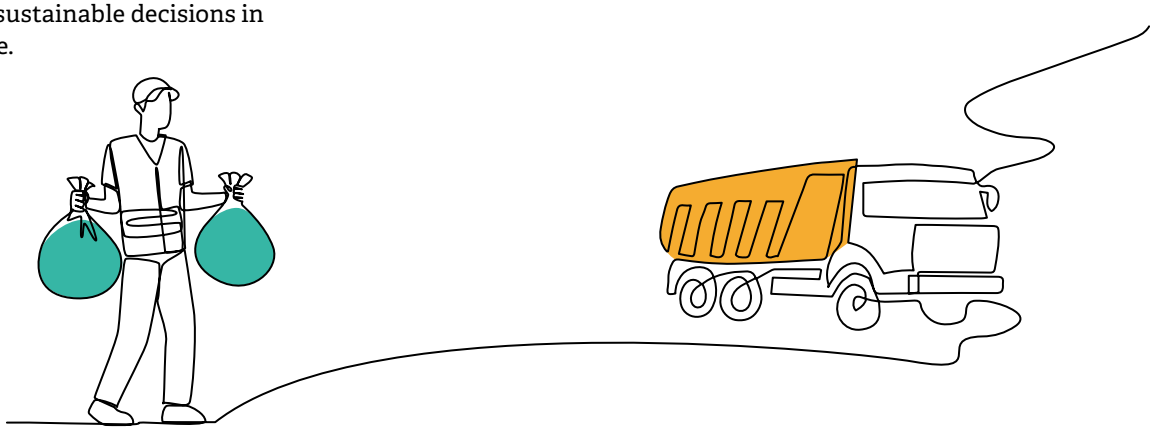
Plastics such as polymer and PVC materials, are widespread on construction sites. Consequently, the amount of plastic going to landfills from the industry continues to grow. A new partnership project between Unitec, Environmental Innovation Centre and BRANZ, **Understanding and redirecting plastic waste in residential construction (ongoing)**, is evaluating and exploring the sustainable management of plastic waste on construction sites.

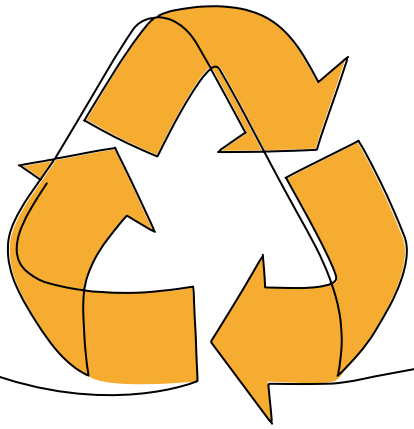
With support from the construction sector, the project will monitor six construction sites to understand barriers and assess the types and quantities of plastic waste going to landfill. Using this data, the researchers will explore alternative options to landfill disposal and develop practical solutions for construction companies.

The project will also provide updated data sheets to refresh BRANZ's free tools such as LCAQuick to support architects, designers and structural engineers to make sustainable decisions in designing out waste.

Another research project led by Tonkin + Taylor is **Examining timber waste in construction and demolition (ongoing)**. With the aim of reducing the amount of timber ending up landfill, the project will explore the full timber life cycle – from the processing of raw materials and building design to renovations and final demolition. It is due for completion in late 2024.

Circular design for a changing environment: design framework to reduce carbon and waste (ongoing) is also due for completion in late 2024. Led by HERA in collaboration with WSP and Aurecon and with input from a wide range of stakeholders, this project is developing a design framework suitable for a variety of building types constructed from various materials. Its aim is to provide guidance to building designers on how to reduce construction waste and carbon and enhance the circular economy of construction materials. The framework will be used to pilot the development of specific guidance for low-rise buildings made from steel, steel-concrete or steel-timber. It will also identify knowledge gaps where future research can provide guidance to reduce carbon.





Scholarship student Gerasimos Christoforatos at University of Waikato has started a research project **Life cycle assessment and material flows of buildings (new)** to reduce the environmental impacts and waste of buildings.

Gerasimos will develop robust estimates for the amount of materials used in different types of New Zealand buildings. He will use this data to help identify materials with poor environmental performance and, with the aim of achieving a circular economy, make recommendations for their replacement with novel materials.

Making the right changes in buildings' life cycles and reusing or recycling construction waste is our goal!

Gerasimos Christoforatos, BRANZ scholarship student, University of Waikato

Ngā mihi to industry supporters:

Understanding and redirecting plastic waste in residential construction 2022–2024

- Aliaxis
- Benton
- BuildLink
- Green Gorilla
- Junk Run
- Mitre 10
- Naylor Love
- Savory Construction

Examining timber waste in construction and demolition.

- Tonkin + Taylor

Circular design for a changing environment: design framework to reduce waste

- Aurecon
- HERA
- WSP

Designing lower-carbon homes and communities

From our homes to our cities and infrastructure, changing the way we design in Aotearoa New Zealand can significantly reduce carbon emissions.

We work alongside other research organisations, industry partners, local councils and government organisations to co-create, design and measure science-led design solutions.

Supporting more sustainable homes

Measuring progress in sustainable new-build homes

Every 4 years, BRANZ tracks the sustainability performance of new-build detached housing to measure the impact of past policy and regulation and inform future intervention.

This year, BRANZ published **Measuring our sustainability progress: second update (complete)**. It surveyed the sustainability of a random sample of 210 detached houses consented across Tāmaki Makaurau Auckland, Kirikiriroa Hamilton, and Ōtautahi Christchurch.

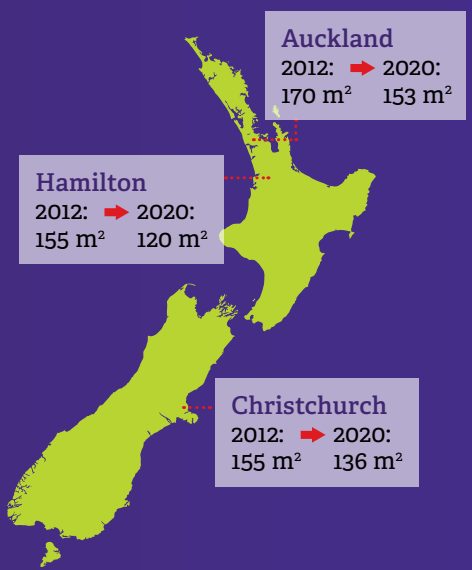
This research is thanks to a collaboration with Auckland Council, Christchurch City Council, Hamilton City Council | Te Kaunihera o Kirikiriroa, Beacon Pathway, Energy Efficiency and Conservation Authority | Te Tari Tiaki Pūngao, Kāinga Ora, NIWA and Victoria University of Wellington.

Related links:

- Sullivan (2022) *10 years of sustainable new housing.* buildmagazine.org.nz
- Jacques & Sullivan (2023) SR483 *Measuring our sustainability progress: New Zealand's new detached residential housing stock (second update).* branz.co.nz

Changes to detached new-build houses

Houses are shrinking – size* and number of bedrooms



The number of bedrooms per household is still on average higher than people living there:

3.7 Average number of bedrooms

2.7 Average number of people per household

Single-glazed windows have disappeared in Auckland

2012: **23%** → 2020: **0%**

Increase in sustainable certified homes

2012: **18** → 2020: **188**

Whole-house environmental certification (various institutes)

* House sizes have decreased by 10% over 10 years (Stats NZ data)

Creating a low-carbon home design

Low carbon design is often perceived as too complex to even attempt. As part of the **Low impact (net zero carbon) buildings (complete)** project, the Next Homes initiative is producing an easy-to-consent, low-carbon, accessible and standardised home design.

Based on an existing high-performance home by project partner Naylor Love, BRANZ has created a design template for a stand-alone four-bedroom home. It has been a rewarding collaboration also involving The Building Excellence Group (BXG), Lifemark and Theca Architecture.

The team has produced fully costed drawings and a specification that have been assessed by Lifemark and by BXG against the Homestar standard. When it is complete, the Next Homes design will be available to download from the BRANZ website.

With the aim of removing barriers, Next Homes ultimately aims to make building low-carbon homes a more accessible reality across Aotearoa New Zealand.

Exploring innovative hot water solutions

Water heating contributes about 30% of a typical household's annual grid energy (electricity or gas) use. The BRANZ project **Innovative water heating technologies (complete)** investigated the potential of new heating technologies to reduce household grid energy use and bills.

Three different solar direct photovoltaic (PV) water heating systems and a fourth best technology air-to-water heat pump were put through their paces. The solar direct PV systems use a small photovoltaic setup that feeds energy directly into a typical traditional water heating storage tank.

The results showed that incorporating solar direct water heating technologies or an air-to-water heat pump can greatly reduce grid-energy use for larger households.

With value for both homeowners and electricity providers, this research is a significant step towards building the evidence for the use of PV hot water systems in Aotearoa New Zealand. It sets the scene for further research into its advantages over increasingly popular gas heating water systems.

Related links:

- Rupp et al. (2024) SR488 Energy performance of innovative water heating technologies. branz.co.nz
- Du Plessis & Pollard (2024) SR489 Cost-benefit analysis of innovative water heating technologies branz.co.nz

Creating lower-carbon communities

The design of our towns, cities and regions has a significant impact on our environment.

Through conversations with Ministry of Housing and Urban Development and Ministry for the Environment, we identified a need for research about the wider built environment.

In 2021, we called for proposals exploring lower-carbon urban design and ways communities can achieve collective lower-carbon living.

The project report and map we've produced will help decision makers navigate a range of available evidence and make interventions relevant to their own situation.

Vivienne Ivory, Technical Principal, Social Science Resilience and Public Health, WSP

Related link:

- WSP (2023) ER80 Reducing greenhouse gas emissions in communities – evidence and opportunities for change in Aotearoa. branz.co.nz

Designing low-emissions urban environments

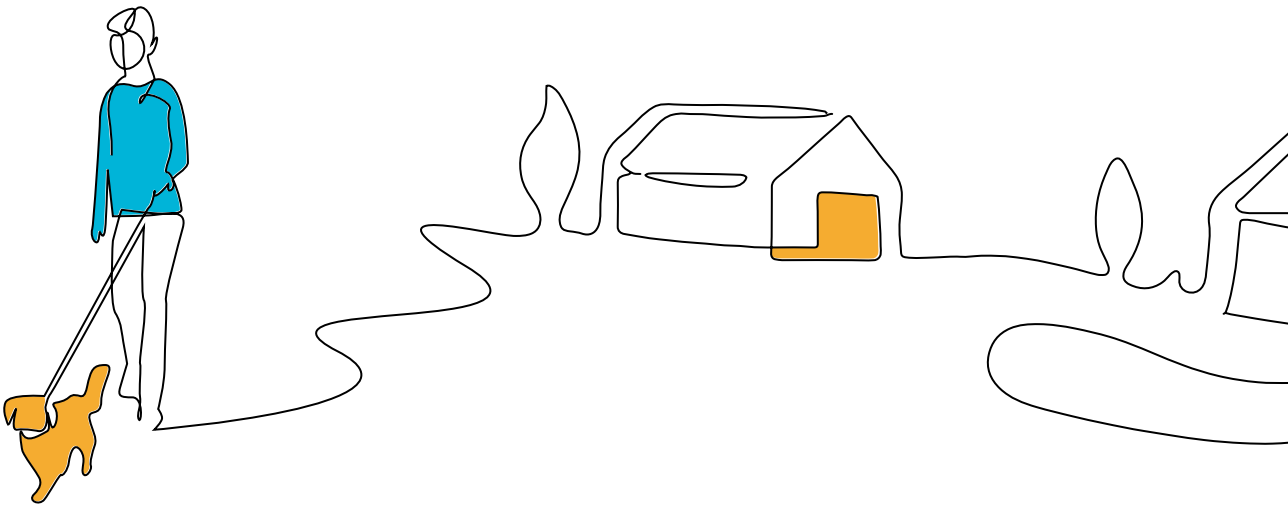
WSP's project **Reducing GHG emissions in communities – evidence and opportunities for change in Aotearoa (complete)** investigated how interventions to reduce GHGs can also deliver benefits for neighbourhoods, towns and cities.

From urban greening, urban design, mobility and transportation, energy and water to construction and smart technology, it found that a wide range of interventions that could be implemented successfully in Aotearoa New Zealand. It found that local expert knowledge on community values, needs and knowledge, including mātauranga Māori, is essential.

These findings are available to support local councils and central government to consider which interventions could best improve outcomes for local communities and at national level.

Best practice in urban form for emissions reduction (ongoing) aims to support decision makers and planners to better estimate potential impacts of urban development options.

Led by University of Canterbury, it will create a freely available web-based tool and scenario planner. It will allow people to explore real-world impacts of new policy and strategy changes to support community engagement and local decision making.



Improving energy efficiency at a community level

Urban energy use is also a significant contributor to carbon emissions. **Pathways to net-zero carbon buildings (ongoing)**, also led by University of Canterbury, is focusing on how energy use can be reduced and managed more effectively across our residential communities.

It will evaluate the collective impacts of decarbonising the electricity grid, electrification of building space and water heating, building efficiency improvements, digitalisation to improve energy management and electrification of vehicles.

Findings will inform the development of a tool to help councils and electricity suppliers understand and plan the energy demands of their communities and make projections for the next 10–20 years. With knowledge to be gained around energy efficiency and optimising grid infrastructure, project supporters include electricity companies Orion and Genesis, as well as MBIE Building Performance.

Reducing carbon emissions from water infrastructure

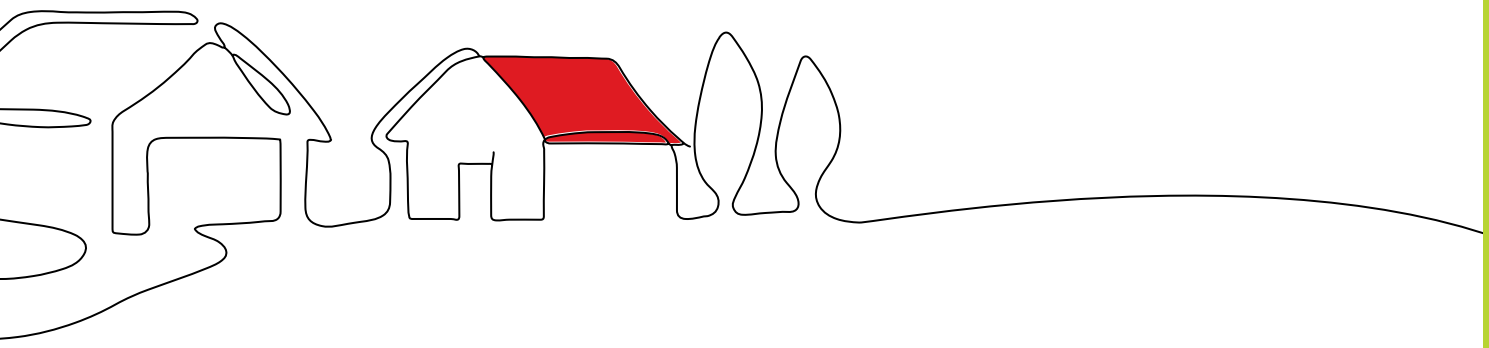
Often out of sight from the community but not out of mind for local authorities and water entities, stormwater, water and wastewater pipes are targets for carbon emissions reduction.

With the publication of his Massey University Master of Construction thesis, BRANZ scholar Kevin Manalo under **Capturing the carbon footprint of open-cut pipeline excavations (complete)**, organisations that install pipelines for open-cut excavations will have new methodology and guidance. This will help them to set up transparent carbon budgets and proactively work towards reducing emissions.

The project was made possible with support from Auckland Council as well as the BRANZ scholarship programme.

Related link:

- Manalo (2023) Carbon footprint of open-cut pipelines (NZ context). massey.ac.nz



Understanding the carbon impact of earthquake safety

Carbon considerations in the demolition of earthquake-prone buildings

For the past two decades, communities have debated about whether to strengthen or demolish earthquake-prone buildings, but little is understood about the environmental impact of these decisions.

Led by the University of Auckland, **Carbon curve of seismic strengthening (new)** will link the drivers for seismic resilience with the need to minimise embodied carbon. It provides the carbon lens to seismic strengthening strategies, helping to support the retention and reuse of existing buildings, and reduce demolition.

Collaborators on the project include MBIE, NHC Toka Tū Ake, Kestrel Group, Health New Zealand, Ministry of Education, Structural Engineering Society New Zealand, New Zealand Society for Earthquake Engineering, Education New Zealand and University College London Sustainability Lab.

Research outcomes will help inform decision making for existing earthquake risk buildings incorporating consideration for net-zero carbon targets.

Dr Charlotte Toma, Senior Lecturer, University of Auckland

Measuring the whole-of-life carbon impact of buildings

As the saying goes, what can't be measured can't be managed. To achieve a more sustainable built environment, we need to better measure and understand the long-term carbon footprint of buildings from the production of component materials through to building decommissioning.

BRANZ works alongside research organisations, industry partners, local councils and government organisations to co-create, design and measure sustainable building solutions.

We are incredibly fortunate to have free access to the LCA and carbon assessment resources from BRANZ. Compared to other regions, it provides a significant foundation to our local industry's capability to address the carbon challenge within the built environment.

Nick Carman, Technical Director, Built Environment & Sustainability, Mott MacDonald

Ensuring BRANZ tools stay relevant and reliable

Our expertise in life cycle assessment and carbon footprinting is integral to BRANZ's commitment to supporting the industry to become more carbon literate.

BRANZ carbon tools to support industry decision making are:

- life cycle assessment tools LCAQuick and LCAPlay to estimate climate change impact as well as other environmental indicators such as eutrophication (algal bloom) and fossil fuel depletion.
- carbon footprint tools CO_2NSTRUCT, CO_2MPARE and CO_2RE to inform decisions during the design process.

Being freely available, our tools have become trusted go-to resources used across the Aotearoa New Zealand construction industry. They also provide evidence and insights for BRANZ education resources such as webinars, seminars and publications and support new government regulations, such as the 2023 update to H1 *Energy efficiency* requirements.

Continuing keeping carbon current (new) enables BRANZ to keep updating and expanding the embodied carbon data and accompanying datasheets for building materials, which feed into BRANZ life cycle assessment and carbon footprint tools. This coming year, significant updates will be made to CO_2RE and LCAPlay to ensure they remain relevant and reliable.

The collaborative BRANZ-led project **Validation of carbon footprinting tools (new)** will provide guidance on the best methodology to verify the carbon measurement tools available from different providers. The findings will enable future regulations and support stakeholders who rely on accurate carbon assessments.

Project collaborators are Kāinga Ora, Naylor Love, Warren and Mahoney, Christchurch City Council, New Zealand Green Building Council, Scion, Massey University and Victoria University of Wellington.

Related links:

- branz.co.nz/calculators-tools
- branz.co.nz/low-carbon-resources

Vibrant industry

The building and construction sector is crucial to Aotearoa New Zealand's economy. It contributes more than 7% to our gross domestic product (GDP) and employs more than 290,000 people.[19] An efficient and productive industry will have significant benefits for our country's health, economic stability, security and everyday lives.

To support industry performance, BRANZ connects expertise in leadership, systems knowledge, insights and economics to encourage cross-sector collaboration and problem solving.

[19] MBIE (2024) *National Construction Pipeline Report*. mbie.govt.nz

Why this research is important

The building industry is facing many complex challenges – the cost of building, the fragmented nature of the sector, skills shortages, barriers to innovation, workforce health, safety and wellbeing and how to meet the information needs of a diverse cross-section of industry players.

To solve these issues, the industry needs to work together to share knowledge, insights and systems. BRANZ invests the Building Research Levy in research to develop and adopt methods, materials, processes and technology to improve the resilience and performance of the workforce and the sector.

Key areas of research this year are:
- identifying building sector needs
- streamlining the consenting process
- encouraging innovation and technology
- increasing industry resilience and efficiency.

Together, this research provides the building and construction sector with insights, data and the opportunity to collaborate to create solutions. A well-performing and efficient sector is crucial for delivering safe, healthy and affordable buildings for all New Zealanders.

290,000 people
(approx.) are **employed in the construction industry** in New Zealand[20]

$60.8 billion
is the estimated **value of the construction industry**[1]

43,160
new dwelling Code Compliance Certificates were issued in 2023[1]

[20] MBIE (2024) *National Construction Pipeline Report*. mbie.govt.nz

Understanding the industry

New Zealand's building system is diverse and complex with a wide range of people and processes. Every 2 years, BRANZ's Industry Insights Survey takes a pulse check of the building and construction sector to identify challenges and needs.

To capture perceptions of issues, we surveyed more than 500 industry participants, including designers, engineers, builders, tradespeople, government and research professionals, and carried out one-on-one interviews with key sector stakeholders.

The survey found that the industry is mostly unified in its prioritisation of issues and has been consistent in these views for many years. It demonstrates the need for long-term solutions and sector-wide collaboration.

Related link:

- branz.co.nz/investing-research/identifying-building-system-needs

Top five industry needs:

1. **Better access to materials** at a reasonable cost
2. More **consistent interpretation of the Building Code** and regulations
3. Increased levels **of building performance** to prevent long-term issues
4. Increased use of **innovative building products** and techniques
5. More focus on **minimising construction and demolition waste**

What will make a difference over the next 5 years:

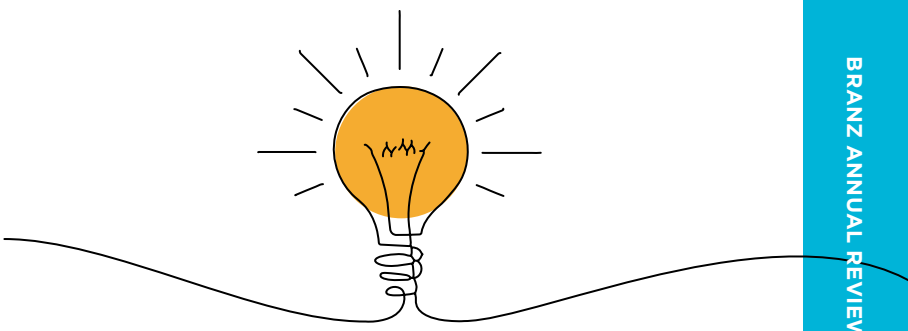
Training and education

More collaboration

Retaining and attracting people

Streamlining the consenting process

Bottlenecks in consenting processes are a well-recognised issue in the sector. To help increase efficiency and speed, BRANZ is supporting research to standardise consenting requirements, streamline the consenting process and explore the potential for new technologies.



Exploring whether AI can help the consenting process

A new project is looking at bottlenecks in the consenting process and whether the use of artificial intelligence could be beneficial for consenting officers. **Can AI be helpful in the consenting process? (new)** is a collaboration between BRANZ, Auckland Council and the Fraunhofer Institute for Building Physics in Germany.

This project aims to understand the consenting process and investigate whether there are avenues to help consenting officers understand outputs from computer simulations of a building's performance. It aims to break down barriers to simulation tool use by industry and building control authorities.

For instance, computer simulations are already used to assess energy and moisture risk in buildings. However, BRANZ fields a lot of queries from councils to help clarify the reports they receive during consenting processes. This project will investigate the possibility of using an AI tool to help interpret results – ultimately speeding up the consenting process and reducing risk.

This research will contribute to a framework to give assurance that the right conditions and information have been used to run the computer simulations. This helps councils and consenting bodies to be confident in the quality of the modelling. It aims to lower the risk of construction errors and boost confidence in using new materials.

The research team will involve key sector stakeholders including universities, councils, MBIE, Kāinga Ora and New Zealand Green Building Council.

Standardising consenting processes

In Aotearoa New Zealand, there are 1,260 building officers working across 66 building consent authorities. Each authority has its own management system to assess Building Code compliance for consents received from approximately 5,000 different entities. This complexity has led to uncertainty and misunderstandings on both sides of the consenting process, increasing reliance on additional requests for information.

ModelDocs: Transforming building consenting behaviour (ongoing) aims to enable faster, more robust consenting processes. It seeks to streamline consenting by identifying behaviours that can lead to a set of model documents.

This project will provide insights on what information the industry needs to submit for more consistent communication and decision making from consent authorities. They will include documentation guidance and a directory of good practice.

The project is led by University of Auckland in consultation and collaboration with stakeholders, including Auckland Council, Tauranga City Council, MBIE, Building Officials Institute of New Zealand, New Zealand Institute of Architects, Licensed Building Practitioners, Engineering New Zealand, Simpli, Objective Build, EBOSS, builders, manufacturers and suppliers.

Encouraging innovation and technology

New technology and innovations have the potential to revolutionise how we design and construct buildings in Aotearoa New Zealand.

This year, BRANZ is supporting research that explores how these innovations can be applied while still minimising risk. This work explores how industry and regulators can introduce new building materials, adapt to the pace of change and share new ideas more effectively.

Making it easier to use new building materials

Adopting new building materials could help improve productivity and achieve Aotearoa New Zealand's greenhouse gas emissions targets. However, using tried and tested materials is often seen as the quickest and easiest approach for gaining building consent.

Accelerating acceptance: Reducing regulatory barriers to adopting material and product innovations (ongoing) aims to increase the speed of consent for innovative materials. It will investigate ways to increase the acceptability of innovative materials, ultimately to improve their viability for the building and construction industry.

The project is led by Third Bearing, working with Simpli building consent authority (BCA) members and participants from nearly 30 BCAs. The project is also engaging with industry organisations who are developing innovative materials, products and systems.

These insights will be developed into guidance for BCAs, regulatory bodies and industry innovators to support consenting processes for new materials. It aims to increase the growth of lower-carbon materials and methods available to the industry.

Encouraging rapid innovation through new technologies

International research shows that full-scale digitisation may help the building and construction industry save up to $1.7 trillion worldwide each year.[21] However, a BRANZ survey of 428 companies, published in 2022, found a low uptake of new technology in Aotearoa New Zealand's construction sector. Often, the cause was a lack of expertise and skills for technology integration.

De-risking the uptake of new technologies (ongoing) aims to support the industry make the most of new technologies. It is led by University of Auckland in collaboration with Victoria University of Wellington and Callaghan Innovation.

Working with industry stakeholders, the project will trial a series of co-design solutions to influence effective change management in architecture, engineering and construction firms. It will also develop case studies to encourage decision-making processes that support technology uptake across the sector.

Uptake of technology in the industry is not great. It has room to be a lot better in my view.

Building sector leader, BRANZ Industry Insights Survey

[21] Gerbert et al. (2016) *The transformative power of building information modeling: Digital in engineering and construction.* bcg.com

Leveraging industry knowledge of off-site construction

Off-site construction (OSC) can help to address housing affordability and supply challenges.

Research shows that sharing knowledge about OSC projects can provide valuable information for new developments. This project seeks to help organisations share and reuse OSC project knowledge in Aotearoa New Zealand.

Improving performance and collaboration for offsite construction (ongoing) is led by University of Auckland with University of Canterbury and Codify Asset Solutions.

The researchers are developing a freely available OSC knowledge base, developing best-practice guidelines for storing OSC learnings and data and creating multiple case studies. They will also build a longitudinal survey to evaluate the effectiveness of the work.

The research aims to drive sector-wide behaviour change for capturing and reusing OSC knowledge. Ultimately, it will support collaboration to realise the productivity and financial benefits of OSC.

Using computational software to automate high-tech timber design

How can technology help automate the design and prefabrication of timber residential housing? **The algorithm and the abode: automation in architecture (new)** is a BRANZ scholarship project by Lucy Lee, a Master of Architecture student at Victoria University of Wellington, who aims to answer that question.

In collaboration with Hector Egger, a leading prefabricated timber panel manufacturer, Lucy's research will explore the automation of digital workflows for designing and manufacturing prefabricated panel homes. The project will use computational software to automate timber residential home design from first plans to prefabricated manufacture and consider timber-to-timber connections and building finishes.

Her research promises to deliver significant contributions to the understanding of prefabricated architecture, particularly in Aotearoa New Zealand, with practical applications to help improve residential construction processes.

My aim is to improve design processes and encourage the uptake of technology to streamline the construction of timber homes.

Lucy Lee, BRANZ scholarship graduate, Victoria University of Wellington

Increasing industry resilience and efficiency

A resilient and efficient industry is essential for improving housing supply and quality in Aotearoa New Zealand. With 98% of building and construction firms employing fewer than 20 staff,[22] the industry can be particularly vulnerable to economic challenges.

To help strengthen the sector for the future, BRANZ is investing in research to improve resilience through better processes around cost estimation, quality control and risk management. It aims to help share this knowledge across the industry.

[22] MBIE (2022) *Building and construction sector trends annual report 2022*. mbie.govt.nz

Improving construction system resilience

Most of Aotearoa New Zealand's residential construction firms are small scale. This is often seen as a key factor in sector vulnerability, but little is known about what matters most for system resilience.

The role of scale and business model approach to improve resilience project (ongoing), led by Third Bearing, is working closely with industry bodies and large group-home builders. It will investigate whether the systems such as quality management and assurance used by large companies can be extended to medium-sized firms to improve sector resilience.

Using literature reviews, targeted interviews, analysis of liquidation reports and analysis of available statistical data, the researchers are mapping the key issues for resilience for different sizes and business approaches of residential construction firms. The project will produce an analysis of the recent years of the building developer market with recommendations on how to improve resilience for small to medium-sized businesses.

Scale is part of resilience, but how a business is organised is equally or more important. We want to understand the factors and weak spots to improve the resilience of smaller-sized businesses.

Tyson Schmidt, Director, Third Bearing

Standardising cost-estimation processes

Cost estimation and cost management practices are often a common cause of insolvency among construction companies here and around the world.

Developing more robust cost-estimation processes could reduce cost blowouts and potentially decrease insolvency risk.

Improving cost estimation of construction projects (ongoing), led by Massey University, will identify different cost-estimation processes used at the tender stage and the reasons for cost variations. As part of this, researchers are examining the link between cost estimations leading to cost blowouts and insolvencies.

Through interviews with cost estimators, the researchers are developing good-practice guidelines for cost estimation processes. By standardising processes, the project aims to contribute to improving the sustainability of construction companies.

Improving quality control through behaviour change

Quality issues in buildings have a significant cost for homeowners and the building sector. BRANZ research has found that 85% of new homeowners call back their builders to fix defects after they move in.

Proactively eliminating quality issues in Construction 4.0 (ongoing) is a project that aims to eliminate quality issues by changing construction professionals' perceptions, attitudes and behaviours towards proactive quality management.

Led by Massey University in collaboration with industry stakeholders, the researchers are developing interventions for small and medium enterprises in the residential sector. This includes education and training, process improvements such as quality measurement and new technologies.

The project draws on research from the University of Southern Queensland and has been developed in consultation with architects, construction managers, software specialists, group-home builders and major product suppliers.

85% of new homeowners call back their builders to **fix defects**[23]

$2.5 billion estimated as the **economic cost of quality defects** in construction each year[24]

[23] Clarke & Lockyer (2022) SR471 *New House Owners' Satisfaction Survey 2021*. branz.co.nz

[24] Bealing & Leroy de Morel (2020) ER49 *The economic cost of quality defects*. branz.co.nz

Challenging industry leaders of tomorrow

Now in its 10th year, ArchEngBuild brings together 30 of the country's top architecture, engineering and construction management students. These future industry leaders collaborate in teams during an intensive 3-day competition.

Held in August 2023 in Te Whanganui-a-Tara Wellington, the ArchEngBuild 2023 challenge was to design a residential village for six families. It needed to adapt as the climate changes, minimise embodied carbon, remain affordable and support the families as they grow. It's no easy task – but we saw some truly innovative ideas from these collaborations.

ArchEngBuild judges Emily Newmarch, Yogesh Jumar, Hans-Christian Wilhelm and Stewart Peck commended the "out-of-the-box thinking" and robust solutions developed by the teams.

The winners were:

- Mila Makasini, Architecture student, Otago Polytechnic | Te Kura Matatini ki Otago
- Aleksandr Bakharovskii, Construction Management student, Ara Institute of Canterbury
- Andrea Tang, Engineering student, University of Auckland.

ArchEngBuild aims to nurture collaboration and innovation for the industry's emerging talent. Students gain insights into how their counterparts think and make decisions as well as their different perspectives and priorities. Participants quickly learn that effective communication is essential to the design process.

Past ArchEngBuild students have described the challenge as one of the best experiences of their studies and the only chance they had to collaborate with and get insight into the work of other disciplines.

The creativity and innovation the students bring always impress the ArchEngBuild judges, and the collaborative experience has made a real difference in past participants' work lives.

Ngā mihi nui to Dunning Thorton, Holmes Group, Living Pā and Tākina Convention Centre and to Victoria University of Wellington for hosting the 3-day competition.

ArchEngBuild 2023 was sponsored by Concrete New Zealand, Metals New Zealand, Sustainable Steel Council, Wood Industry Development and Education Trust, New Zealand Timber Design Society. It was supported by New Zealand Institute of Architects, Engineering New Zealand and New Zealand Institute of Building.

In their words

Mila Makasini

Master of Architecture student,
Otago Polytechnic | Te Kura Matatini ki Otago
Part of the winning team at ArchEngBuild 2023

What was the highlight of your experience at ArchEngBuild?
The biggest highlight for me was making connections – not just in my own field, but with people from different schools, professions and different ends of the country who I would never get the chance to bump into.

We still stay in touch, and it's cool to see everyone's progress as they transition from student to professional to experienced person in the industry.

What were the most important skills you gained as part of the competition?
Learning how to work in a team and maintain relationships is important. The only way you learn it is by going through a whole project and engaging with different people with different roles. At the end of the day, you all have the common goal of getting the best project outcome.

ArchEngBuild was like a mini-internship – or maybe baptism by fire! It reflects exactly what happens in the industry. You get a short timeframe and set parameters you have to meet. I remember that one of the judges, Yogesh Kumar, said it's about reading the brief, seeing what points you need to meet and hitting every one of them as hard as you can. If you can do that, you'll most likely come out on top.

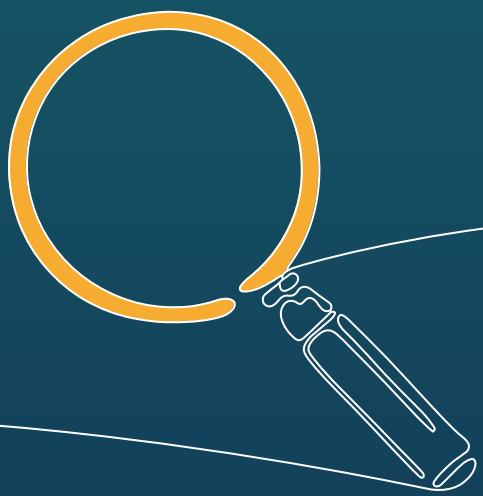
What did you learn from the project challenge?
The project echoed what's most important for the industry right now – particularly how much the industry has to do to respond to climate change. That's the challenge, and that's where our priority is. We need to build more sustainably, more responsibly and more ecologically.

How do you think ArchEngBuild will help you in your career?
I'd say it's about being more understanding of your colleagues. It gives you insight into what other people need to think about. The people I worked with, Alex and Andrea, were awesome and excellently skilled at both of their respective fields. I remember sitting next to my teammate and looking at the number of calculations she had to run for a design, which I could never do myself.

It gives you an understanding that everyone has different challenges and different expertise, but by working together, you get to produce something awesome.

What would you say to other students thinking about applying?
I would highly recommend it. It's not about winning an award, it's about the experience of designing for 3 days straight with all these other people from all over the country. We came out not only as better students but as better future professionals.

Full portfolio of research



Summary table of research projects

Includes all 2023/24 active projects plus those newly approved starting 2024/25 (**in bold**). Information is correct as of 31 March 2024 and is subject to change.

Safe and resilient built environment

Project title	Lead organisation	Project budget	Status	Page for more info
Amplifying impact – Zinc about it	BRANZ	238,000	Complete	
B-RISK support for future development roadmap	**BRANZ**	**320,000**	**New**	**33**
B-RISK Support 2021–24	BRANZ	286,000	Ongoing	33
Building fire-safe densified housing programme – comms & KT 2021–24	BRANZ	298,900	Ongoing	
Building fire-safe densified housing programme: Leadership 2020–24	BRANZ	361,000	Ongoing	
Changing evacuation behaviour to meet densified housing needs	University of Canterbury	313,551	Ongoing	
Climate change adaptation of buildings – research prioritisation	WSP New Zealand	86,670	Ongoing	
Climate change impacts on marae	Build Back Better Aotearoa New Zealand	176,100	Ongoing	26
Climate impacts of medium density housing (MDH): Expanding the MDH assessment tool	Beacon Pathway	144,475	Ongoing	
Climate resilience – building back better	**BRANZ**	**2,085,700**	**New**	**25**
Code of practice for non-structural elements	University of Canterbury	170,000	Ongoing	38
Dashboard for assessing the functionality of residential neighbourhoods before and after a disaster event	University of Waikato	199,000	Ongoing	
Durability verification database 2021–24	BRANZ	41,000	Ongoing	
Fire safety quality processes in the NZ built environment	BRANZ	507,000	Ongoing	33
Flood resilience of light timber frame wall envelope systems	**University of Canterbury**	**200,000**	**New**	**28**
Higher performing buildings	BRANZ	2,195,000	Ongoing	30

Safe and resilient built environment

Project title	Lead organisation	Project budget	Status	Page for more info
Lithium-ion batteries: Fire risks associated with buildings	BRANZ	125,750	Ongoing	34
Materials under the changing climate	BRANZ	3,108,000	Ongoing	29
Metal corrosion rate prediction in climate change scenarios	**University of Auckland**	**200,000**	**New**	**29**
Navigating marae relocation: exploring building relocation strategies	**Build Back Better Aotearoa New Zealand**	**238,000**	**New**	**26**
Prediction tool for long-term contaminant release from building surfaces	University of Canterbury	154,050	Ongoing	29
Robust building system testing	University of Canterbury	50,000	Complete	36
Scholarship: Gordon Chen – Steel beam-column connections in fire	University of Canterbury	75,000	Ongoing	
Scholarship: Jono MacIntyre – Predicting structural fire severity – update	University of Canterbury	75,000	Ongoing	
Scholarship: Kirill Panov – Metallic materials in geothermal environments	University of Auckland	75,000	Ongoing	
Scholarship: Luke de Schot – Human behaviour in fire	University of Canterbury	42,000	Ongoing	
Scholarship: Mikhail Gedyma – Seismic performance and hybrid bracing	University of Canterbury	75,000	Ongoing	
Scholarship: Mohamed Mostafa – Precast floors & torsion	University of Auckland	75,000	Ongoing	
Seismic design and retrofit of hillside houses	BRANZ	986,600	Ongoing	37
Seismic design of low-rise and mid-rise hybrid residential buildings	BRANZ	1,102,300	Ongoing	
Seismic risk communication: Moving from understanding to behaviour change	Resilient Organisations	169,400	Ongoing	39
Simulation-based multi-objective optimisation of school building energy retrofit	University of Canterbury	200,000	Ongoing	
Suspended ceilings code of practice update	Association of Wall and Ceiling Industries	18,480	Ongoing	
The future of evaluating building fire performance	**BRANZ**	**2,392,200**	**New**	**32**
Towards durable timber structures – phase 2	BRANZ	1,186,755	Ongoing	

Healthier homes and communities

Project title	Lead organisation	Project budget	Status	Page for more info
Accessibility to commercial buildings' sanitary facilities	**WSP New Zealand**	**196,500**	**New**	**60**
Affordable alternative housing pathways	**Massey University – Auckland**	**174,590**	**New**	**53**
Affordable housing for generations	BRANZ	158,000	Ongoing	54
Alternative tenure opportunities	Livingston and Associates	247,500	Complete	
Amplifying impact – Insulation innovators	BRANZ	238,000	Complete	
Amplifying impact – Vent it	BRANZ	238,000	Complete	50
Building for wellbeing	BRANZ	837,000	Ongoing	61
Cold formed steel framing – calibrating and modelling requirements	National Association of Steel Framed Housing	40,000	Complete	
Cold-formed steel framing: Calibrating and modelling for energy efficiency	National Association of Steel Framed Housing	121,300	Ongoing	
Communities under construction	BRANZ	254,000	Ongoing	**61**
Dementia-friendly housing – improving design and retrofit guidance	**University of Auckland**	**200,000**	**New**	**58**
Developing aspirational change – better kitchen joinery outcomes for all	Victoria University of Wellington	201,859	Ongoing	
Energy use and conditions in New Zealand homes: Insights from HEEP2 (home energy end-use project) data	BRANZ	3,065,000	Ongoing	45
Healthy homes: Communication action research	Sustainability Trust	226,883	Ongoing	43
Household Energy End-use Project 2 (HEEP2): Energy Insights from our Homes	BRANZ	6,530,100	Ongoing	45
Housing solutions for low to moderate income families with low equity	**Livingston and Associates**	265,700	**New**	**53**
Housing typology outcomes, demographic drivers and housing market constraints in Greater Christchurch	Livingston and Associates	243,800	Ongoing	
Inclusive and accessible built environment in New Zealand	**Massey University – Auckland**	187,930	**New**	**60**
Indoor Air / Environmental Quality (IAQ/IEQ) Research	BRANZ	1,204,300	Ongoing	51
Ka mua, ka muri: Connecting tangata to whenua through housing	Victoria University of Wellington	50,371	Complete	57
Low pitched metal roof colour to manage condensation and mould	**Helfen**	**354,550**	**New**	**49**
Mould: Finding the invisible – phase 1 Investigation	BRANZ	309,397	Ongoing	
Natural ventilation in homes – an exploration of behaviours and intervention for change	University of Otago	203,988	Ongoing	49

Healthier homes and communities

Project title	Lead organisation	Project budget	Status	Page for more info
Pollutants in New Zealand homes: sources and implications	BRANZ	998,200	**New**	**51**
Preservative treated timber outgassing	BRANZ	700,000	Ongoing	
Programme leadership – Warmer, drier healthier buildings	BRANZ	790,000	Ongoing	
Scholarship: Danielle Smith – Sustainable whenua (land) development for Māori housing and hauora (health)	University of Waikato	75,000	Ongoing	
Scholarship: Griffin Cherrill – Internal moisture from thermal bridges	Victoria University of Wellington	50,000	Ongoing	
Scholarship: Jane Waterhouse – Housing for dementia	University of Auckland	75,000	Ongoing	
Scholarship: Karin Henshaw – Public housing transitions	University of Otago	20,000	Complete	56
Scholarship: Phoebe Taptiklis – Maintenance and dampness	Massey University – Wellington	75,000	Ongoing	
Scholarship: Tim Boyle – Densification in our biggest cities	University of Otago	20,000	Ongoing	
Scholarship: Ting Yen Khor – Pre-contamination of wallboard with fungi	University of Auckland	20,000	Ongoing	
The future of national housing surveys: Towards a collaborative approach	BRANZ	64,000	Ongoing	
Understanding barriers to the delivery of multigenerational housing	**The Urban Advisory**	**195,637**	**New**	**56**
Warmer, drier, healthier homes: Comms & dissemination 2021–23	BRANZ	180,000	Ongoing	

Sustainable construction

Project title	Lead organisation	Project budget	Status	Page for more info
Amplifying impact – Grand designs	BRANZ	238,000	Complete	
Best-practice urban form for emissions reduction	University of Canterbury	139,649	Ongoing	77
Bio-based materials: NZ wood fibre insulation (proof of concept)	BRANZ	296,000	Ongoing	
Building capability to help the construction industry transition to zero carbon	Massey University – Auckland	327,000	Ongoing	69
Carbon curve of seismic strengthening	**University of Auckland**	**197,538**	**New**	**79**
Circular design for a changing environment: a design framework to reduce waste	Heavy Engineering Research Association	150,500	Ongoing	72
Continuing keeping carbon current	**BRANZ**	**786,000**	**New**	**81**
Evaluation of an intervention to enable bank customers to achieve better building performance in new-build homes	Beacon Pathway	262,000	Ongoing	46
Fostering the new good: biomaterials for a radically lower carbon built environment	Victoria University of Wellington	78,860	Ongoing	
Future of work: Accelerate skills development for zero-carbon construction	BRANZ	1,923,500	Ongoing	68
Future of work: What do we need to know to transition to zero carbon	BRANZ	884,600	Complete	68
Innovative water heating technologies	BRANZ	391,150	Ongoing	76
Low impact (net carbon zero) buildings	BRANZ	2,118,060	Ongoing	76
Low-carbon retrofit solutions for our changing climate	BRANZ	399,500	Ongoing	
Measuring our sustainability progress: second update	BRANZ	226,500	Ongoing	75
Modelling and calculating the carbon footprint of a building	Massey University – Palmerston North	178,276	Ongoing	
Non-traditional construction systems	BRANZ	575,890	Ongoing	
Pathways to net-zero carbon buildings in communities	University of Canterbury	181,640	Ongoing	78
Plastic waste on construction sites: A co-operative approach	Unitec	238,142	Ongoing	72
Roadmap to a net-zero carbon concrete industry	University of Canterbury	55,000	Complete	
Scholarship: Emily Newmarch – Designing low carbon architecture in New Zealand	Victoria University of Wellington	75,000	Ongoing	
Scholarship: Gerasimos Christoforatos – Life cycle assessment and material flows of buildings	**University of Waikato**	**75,000**	**New**	**73**
Scholarship: Kevin Manalo – Capturing the carbon footprint of open-cut pipeline excavations	Massey University – Auckland	20,000	Complete	78

Sustainable construction

Project title	Lead organisation	Project budget	Status	Page for more info
Scholarship: Rosa Gonzalez – Carbon case for resilient design	University of Auckland	75,000	Ongoing	
Supporting industry action on waste	BRANZ	388,500	Ongoing	71
Timber construction and demolition waste research	Tonkin + Taylor	239,500	Ongoing	72
Transition to Zero Carbon Programme: Leadership 2019–24	BRANZ	527,200	Ongoing	
Transition to zero-carbon programme communication and dissemination 2023–25	BRANZ	518,000	Ongoing	
Understanding waste generation in the New Zealand construction sector: scoping study	Auckland University of Technology	79,699	Complete	
Update of environmental impact data behind BRANZ CO_2NSTRUCT and LCAQuick	BRANZ	483,000	Ongoing	
Validation of carbon footprinting tools	**BRANZ**	**175,000**	**New**	**81**
Zero Carbon Built Environment Science Leadership 2021–24	BRANZ	454,300	Ongoing	

Vibrant industry

Project title	Lead organisation	Project budget	Status	Page for more info
Accelerating acceptance: Reducing regulatory barriers to adopting material and product innovations	Third Bearing	76,975	Ongoing	89
Advisory services 2021–24	BRANZ	1,028,000	Ongoing	
ArchEngBuild Challenge 2023	Concrete New Zealand	92,843	Complete	94
ArchEngBuild Challenge 2024	Concrete New Zealan.	125,000	Ongoing	
BRANZ Bulletins 2022–25	BRANZ	452,000	Ongoing	
BRANZ education programme 2021–24	BRANZ	1,845,000	Ongoing	
BRANZ Levy forecast 2021–24	BRANZ	729,000	Ongoing	
Build magazine 2021–2024	BRANZ	4,290,000	Ongoing	
Building controls 2021–24	BRANZ	990,000	Ongoing	
Can AI be helpful in the consenting process	**BRANZ**	**322,000**	**New**	**87**
De-risking the uptake of new technologies	University of Auckland	200,000	Ongoing	89
Digital knowledge transfer	BRANZ	1,248,000	Ongoing	
Guideline 2021–24	BRANZ	90,000	Ongoing	
How do clients choose a quality builder?	BRANZ	131,100	Ongoing	
Improving cost estimation of construction projects	Massey University – Auckland	190,000	Ongoing	92
Improving performance and collaboration for offsite construction	University of Auckland	200,000	Ongoing	90
Library information management 2021–24	BRANZ	922,000	Ongoing	
Materials and characteristics survey 2021–24	BRANZ	310,000	Ongoing	
ModelDocs: Transforming building consenting behaviour	University of Auckland	219,000	Ongoing	87
New house owners' satisfaction survey 2021–2025	BRANZ	226,800	Ongoing	
Proactively eliminating quality issues in Construction 4.0	Massey University – Auckland	149,345	Ongoing	93
Role of scale and business model approach to improve resilience	Third Bearing	95,380	Ongoing	92
Potential unintended consequences of high performance construction	BRANZ	1,049,000	Ongoing	
Psychologically safer workspaces	MATES in Construction (NZ)	191,638	Ongoing	
Scholarship: Lucy Lee – The algorithm and the abode: automation in architecture	**Victoria University of Wellington**	**20,000**	**New**	**90**

Understanding Levy investment decision making

BRANZ makes investment decisions to address the greatest and most pressing needs in Aotearoa New Zealand's building system. The Building Research Levy is awarded to research that will make a significant positive impact on the building system and ultimately improve the lives of New Zealanders.

Defining investment priorities and calling for proposals

Throughout the year, BRANZ carries out multiple strands of systems-scanning activities to inform investment priorities. These are consulted on externally with the sector, approved by the BRANZ Board and inform the Investment signals for the year for the research community.

With the aim of achieving greater collaboration and alignment across all research, starting in 2024, research signals will be published for all research organisations in a single guidance document – the Investment Priorities Statement. In previous years, the *Levy Investment Portfolio Statement* set out the investment signals for research conducted by BRANZ Ltd. The *Prospectus*, which contained specific investment signals informed by the *Levy Investment Portfolio Statement*, set out the investment direction for external researchers.

Projects proposed by all research organisations, including BRANZ Ltd, will be reviewed in parallel with a strong emphasis on closer integration between internal and external research. As before, BRANZ Ltd proposals are also reviewed by the Levy Allocation Advisory Group (LAAG) comprising independent experts.

Outside of this annual round, BRANZ Inc. considers out-of-cycle proposals from all research providers that respond to critical and urgent industry needs.

Our commitment to collaboration with external research providers

Collaborating with other providers is an important part of how BRANZ strives to deliver best value from the Levy. There is significant expertise within universities, Crown research institutes and independent research providers to complement BRANZ-based specialist teams. We are keen to receive research proposals from these organisations or hear from anyone wishing to collaborate with BRANZ.

Successful proposals align with investment signals and can demonstrate how they will deliver transformational impact on the built environment through excellent research, strong collaboration, and a clear pathway to impact. See the *Investment Priorities Statement* for more details about the process, full criteria and annual timeline.

If you are interested in making a research proposal or want to find out more about our research investment, please visit branz.co.nz/investing-research or get in touch at researchinvestment@branz.org.nz.

Ensuring rigorous and independent decision making

To ensure research is of a high quality, all investment proposals undergo a rigorous quality assessment by an expert panel comprised of industry and research representatives.

Research proposals put forward by BRANZ Ltd are reviewed by LAAG. This group of independent assessors is made up of experts drawn from the Building Research Advisory Council, the wider building and construction industry, science sector and government. The group provides independent expert advice that can give confidence to the BRANZ Inc. Board on the focus and quality of BRANZ Ltd research.

> As a member of LAAG, my perspective is one of many from across industry and government that delivers meaningful and independent advice to the BRANZ Inc. Board. Our role helps ensure fair and effective Levy stewardship, to benefit the sector and all New Zealanders.
>
> **Rick Osborne,** Business New Zealand representative, LAAG

Other investment mechanisms

Scholarships

BRANZ awards Levy funding to outstanding postgraduate scholars in tertiary institutions. The BRANZ scholarship programme is part of our portfolio of investments to support innovative research and the next generation of research talent.

During 2024, we are reviewing our scholarship programme to ensure that it is well positioned to deliver the best outcomes. While the review is under way, we will not be accepting new scholarship proposals. However, rest assured that we will continue to fully support all scholarships that are currently contracted and under way.

As part of our commitment to fostering collaboration and excellence in research, we strongly encourage research proposals to consider including students, particularly master's and PhD scholars, as part of the project team. When there is a strong alignment between the project's concept and the student's research interests, this collaboration can lead to mutually beneficial outcomes. If you have any questions or require further information, please do not hesitate to contact us via email at researchinvestment@branz.org.nz.

Strategic initiatives

BRANZ also invests the Levy in strategic initiatives beyond the core baseline investment in research. These are typically focused on national strategic opportunities and are approved by the BRANZ Inc. Board. BRANZ's strategic investments have ambitious goals and aim to have long-term, positive and far-reaching outcomes.

While Levy income fluctuates, BRANZ maintains a prudent approach to research investment. This maintains our financial stability and ensures we can continue to deliver on our commitment to supporting a high-performing industry.

Peter Searle, BRANZ Chief Financial Officer

Infrastructure

BRANZ invests Levy funding in developing and maintaining building research capability at its campus. This research infrastructure is a key national asset, and capital investment in property, plant and equipment is undertaken at BRANZ through a cyclical process targeting progressive improvement. By understanding the value and quality of existing assets and identifying future needs, we develop a programme of capital requirements and understand investment priorities. We are working on an exciting campus development that will deliver new research and testing capabilities for Aotearoa New Zealand.

Responsible stewardship – our Long-Term Levy Utilisation Policy

Under the Building Research Levy Act 1969, BRANZ Inc. is charged with effective stewardship of the Building Research Levy. Each year, the level of investment available for research and knowledge sharing is set by the BRANZ Inc. Board in keeping with its Long-Term Levy Utilisation Policy.

The amount of Levy received by BRANZ Inc. is directly linked to the levels and values of building consents. Our Long-Term Levy Utilisation Policy, which is based on a 20-year model, creates a stable and sustainable platform for BRANZ to invest the Levy effectively through the ups and downs of economic cycles.

Related links:

- branz.co.nz/investing-research
- branz.co.nz/investing-research/building-research-scholarships

Leading **BRANZ**

Our decarbonisation journey – 2023 update

As an organisation, we continue to take steps to decarbonise our operations and go above and beyond the expectations of our Toitū net carbonzero certification. We are committed to being a net-zero emissions business by 2035 – if not before.

Toitū net carbonzero certification achieved for a third year

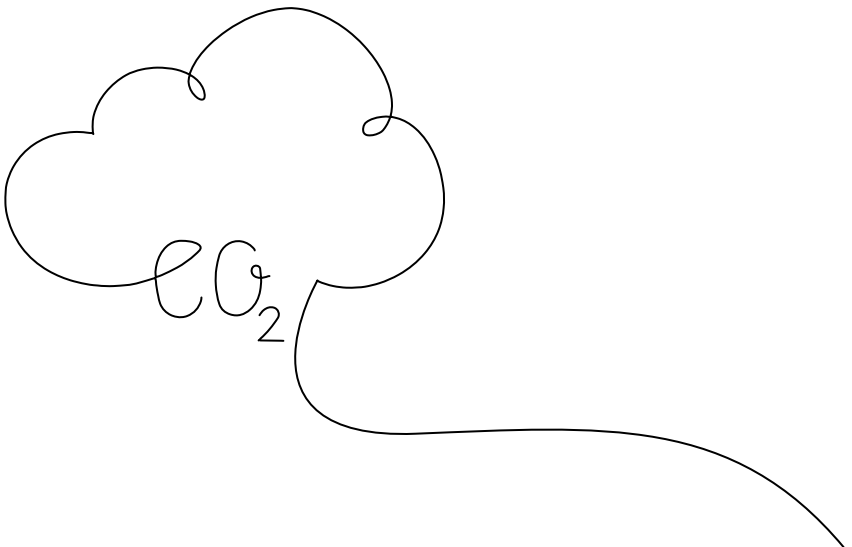
Once again, BRANZ has successfully achieved Toitū net carbonzero certification, which is recognised in 60 countries and verified annually. Achieving Toitū carbon certification means that BRANZ verified its greenhouse gas (GHG) inventory or footprint against international environmental standard ISO 14064-1 and an approved 6-year emissions reduction plan. Toitū carbon certification is accredited by the Joint Accreditation System of Australia and New Zealand.

TOITŪ NET CARBON ZERO ISO 14064-1 ORGANISATION

Raising the bar on our carbon reporting

This year, we report emissions data for 2023 going back to 2018 using the direct and indirect emissions format, farewelling Scopes 1, 2 and 3. Making these changes ahead of the Toitū carbon programme's reporting requirements taking effect in 2025 is consistent with our ambition to take an industry leadership position on environmental and sustainability measures.

Having this more detailed, comprehensive picture of our emissions will help to inform future steps in our decarbonisation journey. We will continue to tackle emissions reduction with a continuous improvement approach and the aim of exceeding stakeholder expectations.

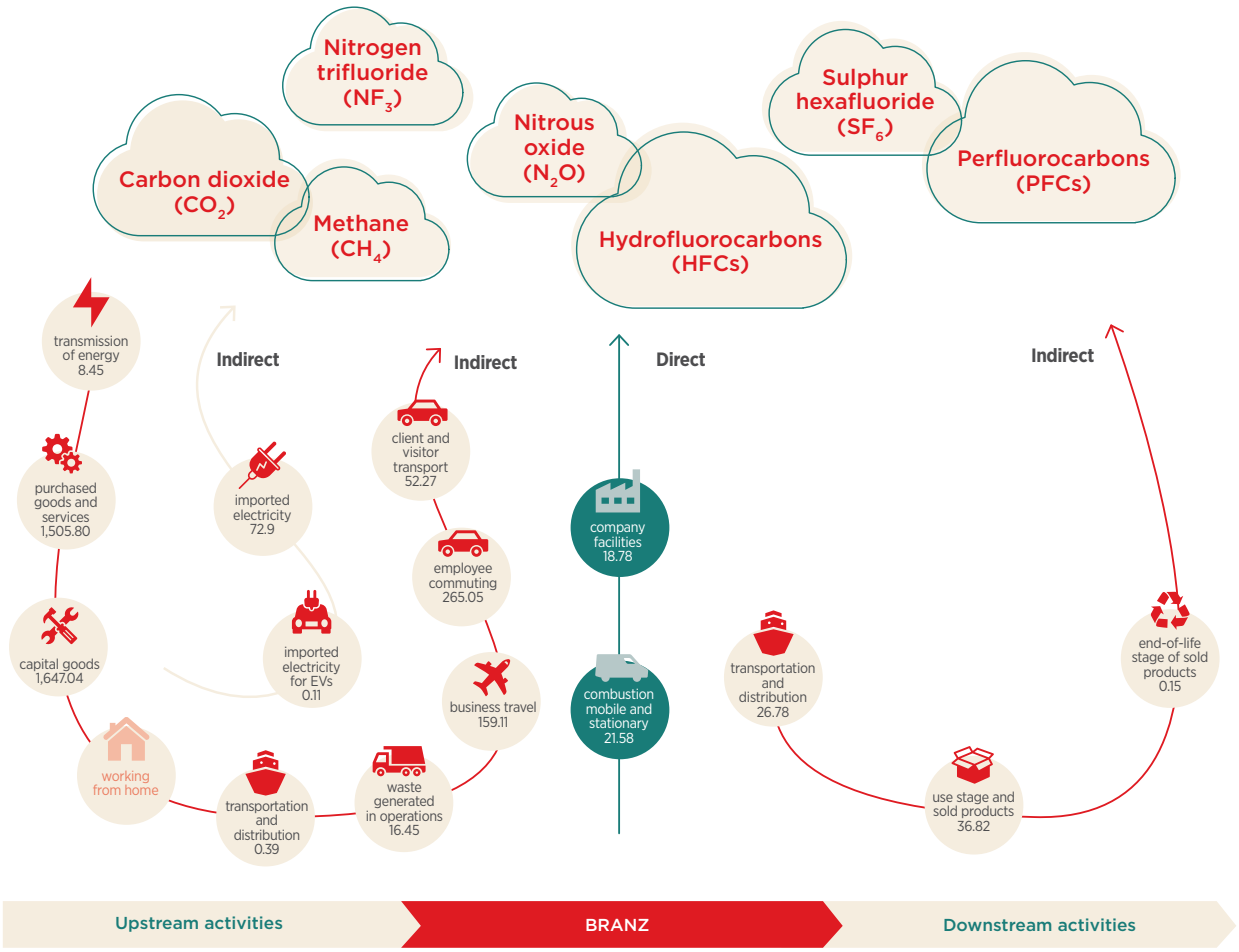


Understanding our emissions across our whole value chain helps us surface opportunities for future-focused emissions reductions.

Keith Clark, BRANZ Quality and Environment Manager

BRANZ GHG emissions 2023

Our gross emissions total for the 2023 calendar year was 3,831.69 tonnes of carbon dioxide equivalent (tCO_2e). For Categories 1 and 2 combined, our absolute emissions, the total was down 35% on the 2018 base year.



Notes:

- **Direct GHG emissions (Category 1):** from sources that are owned or controlled by the company.
- **Indirect GHG emissions (Category 2):** from the generation of purchased electricity, heat and steam consumed by the company.
- **Indirect GHG emissions (Categories 3–5):** includes transportation services, other products and services used by the organisation and use of products sold by the organisation.

Emissions over the past 6 years

Every year since 2017, our carbon footprint has been independently verified and we have purchased carbon credits to offset emissions from mandatory sources.

The table below shows 6 years of BRANZ emissions information.

Direct emissions

Emissions (tCO_2e)	2018	2019	2020	2021	2022	2023
Total direct emissions (Category 1)	108.87	105.43	23.21	46.22	30.70	40.36
Total indirect emissions (Categories 2–5)	2,684.31	2,847.30	1,991.71	1,677.54	1,815.98	3,791.33
Total gross emissions	2,793.18	2,952.73	2,014.92	1,723.76	1,846.68	3,831.69
Purchased carbon credits (mandatory offsets required for Toitū programme certification)	-779.70	-802.92	-477.47	-542.63	-510.88	-313.15
Total net emissions	2,013.48	2,149.81	1,537.45	1,181.13	1,335.80	3,518.54

As seen in previous years, direct emissions in 2023 were generated by combustion (mobile/stationary), company facilities and refrigerants. Following our continued efforts to minimise direct emissions, it is pleasing to see that, in 2023, they remained at a lower level compared with the 2018 base year, 40.36 tCO_2e versus 108.87 tCO_2e. This was above 2020 to 2022 levels. However, emissions during this period were unusually low due to the global pandemic.

Indirect emissions

The indirect emissions from products used by the organisation in Category 4 was 2,077.33 tCO_2e, around 54% of gross emissions. This included our largest single source of emissions from non-residential building construction (1,389.31 tCO_2e) due to the construction of our new lab facilities (see below). Our second-largest source was other business services (786 tCO_2e) and covers items such as bank charges, professional services and air conditioning maintenance.

The third-largest source of emissions was business travel in vehicles not owned by BRANZ (322 tCO_2e), which mostly relates to commuting to and from our campus (Category 3). Staff commuting is estimated at 265 tCO_2e. As a significant challenge area given our semi-rural location, not served by public transport, it is an ongoing focus in our Toitū Emissions Management and Reduction Plan (see key actions on the opposite page).

Photographic and scientific equipment is our fourth-largest source of emissions and then higher education, which includes the delivery of webinars and seminars, and then publishing, printing and reproductive services, which includes *Build* magazine. These activities are integral to BRANZ's commitment to turning research into actionable usable insights for the industry. We continue to engage with customers to assess their readiness for digital products. Our main printer Bluestar, who is also Toitū certified, is on track to calculate a Bluestar emissions factor to feed into our own GHG inventory.

Carbon impact of our research and testing facility upgrades

The new lab facilities will provide opportunity for enhanced research and testing and increased revenue generation for BRANZ. The construction project, which is now nearing its end, was our most significant source of carbon emissions in 2023 and will continue to be so for the next couple of years. In addition, the operation and maintenance of the facilities, including electricity use, will also contribute to ongoing indirect emissions in future.

To minimise the environmental footprint of construction, considerable consideration was given to the design, material and equipment selection. This included opting for lower-emissions concrete, more environmentally friendly air conditioning technologies and refrigerant choice (HFC-32). Other features chosen include modern meeting room communications, rain gardens, a wet scrubber for the furnace and a wooden onsite emergency water storage tower for half a million litres of water. In addition, the new fire lab will be capable of using gases other than LPG.

To offset emissions from the construction of our new lab facilities, in 2022, BRANZ purchased 3,271 credits from the Amayo Phase II Wind Power Project.

Once the facilities are fully up and running, a new baselining exercise will likely need to be undertaken for the 2025 or 2026 reporting periods.

Key actions taken in 2023 to reduce our carbon footprint

Our aim is to decarbonise BRANZ activities wherever possible while remaining operationally effective.

In our third year of implementing our Toitū Emissions Management and Reduction Plan, below are some achievement highlights.

- Installed EV charging facilities for 10 vehicles in December. Eight chargers are already available, free of charge, for customers, suppliers and staff to use. An additional two are available for overflow and in support of the replacement of two diesel vehicles in our vehicle fleet.
- Progressed business case discussion on purchasing two fleet vehicles with plug-in hybrid vehicles or EV only options. Completed a use-analysis assessment, and market research on vehicle options is currently under way.
- Added carbon emissions information to our international travel booking form so it can be factored into travel approval decisions.
- Completed an energy audit on half the campus to identify opportunities for electricity reduction.

In 2024, we plan to take steps to better understand renewable energy potential of solar at our campus.

Our wider sustainability initiatives

Broader steps we are taking to address sustainability are listed below.

- Maintaining our certifications with Telarc and Tōitu.
- 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.
- More recyclable packaging options in our operations.
- Ongoing monitoring of our electricity consumption.
- Transparency of our sustainability activity, plans and performance in our reporting and on our website at branz.co.nz.
- Maintaining membership of sustainability-focused organisations The Aotearoa Circle and the Sustainable Business Council.

Low-carbon research is a key area in our research investment portfolio and includes the *Transition to a zero-carbon built environment* programme. Through this programme, we will continue to provide sustainability leadership to the building and construction sector by providing resources, science, experience and networks.

BRANZ is committed to supporting industry players to make positive change and contribute to the building and construction industry's and Aotearoa New Zealand's carbon reduction goals.

Meet our directors

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. These elected board members can appoint up to three independent directors. As at 31 March 2024 there were six directors.

Nigel Smith — Chair

Nigel Smith has over 30 years' experience in the Aotearoa New Zealand construction industry, qualifying as an architectural draughtsman, and has extensive technical knowledge of the industry especially related to residential design and building methodology. Nigel holds positions on various boards, including as a director of several Canterbury-based building companies, and is the current National Chair of the Registered Master Builders Association. He was a founding trustee of Construction Health and Safety New Zealand and is a member of the New Zealand Institute of Directors. Nigel joined the BRANZ Board in 2019.

Mike Sang — Deputy Chair

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 7 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.

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 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. He is also a former Chair of the Ministry for Primary Industries Partnership Programme for Engineered Timber Buildings. Alan joined the BRANZ Board in 2015.

Dr Lisbeth Jacobs

Dr Lisbeth Jacobs has over 25 years' global business leadership and corporate strategy experience and a deep knowledge of engineering, innovation and research. Lisbeth holds a PhD in materials engineering. She is currently CEO of Gallagher Animal Management, and prior to that, she was General Manager, Innovation and Sustainability at Fletcher Building. Lisbeth is a non-executive director of Goodnature Ltd since November 2022 and Honorary Consul of Belgium to New Zealand since 2013. Lisbeth joined the BRANZ Board in 2020.

Alister Lawrence
Alister Lawrence is a Chartered Fellow of the Institute of Directors New Zealand and a director on several boards. With a background in building materials manufacturing, engineering and international project management, Alister holds an honours degree in civil engineering and a postgraduate diploma in business administration.

Alister is a director and shareholder of Enviroplaz International with insight into the technical development of building materials and their commercialisation and has great respect for the environment.

Erica Seville
Erica Seville has many years of experience in the research sector, including leading major research programmes in disaster management and reconstruction, economic and business recovery, and resilience of the built environment.

Erica has a Bachelor of Engineering (Civil/Environmental) and a PhD in Risk Management. Erica is a Commissioner with Natural Hazards Commission | Toka Tū Ake and Deputy Chair of Response and Recovery Aotearoa New Zealand. She co-founded Resilient Organisations, a social enterprise delivering public-good research and consulting to improve resilience. Erica joined the BRANZ Board in mid-2022.

Farewell and thank you to outgoing directors

We take this opportunity to farewell and thank two esteemed directors for their contribution to BRANZ since their appointment in 2014.

Deputy Chair Stephen Titter completed his last 3-year term in August 2023, and Director Lesley Haines completed her term in September 2023.

We wish Stephen and Lesley all the very best in their future endeavours.

Stephen Titter brought many years of practical financial and investment experience. Formerly a senior partner and board member of Ernst & Young, he is 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 New Zealand and a chartered accountant.

Lesley Haines contributed extensive public sector background, including senior roles at Treasury, MBIE and the Department of the Prime Minister and Cabinet. Lesley is a member of the Maritime New Zealand authority and a trustee of Motu.

Register of interests

Disclosure of significant shareholdings only, not shares held by family trusts, as at 31 March 2024.

Director name	Directorships
Nigel Smith	Ashborn Investments Ltd
	Ashborn Management Ltd
	Jennian Homes Canterbury South
	Milestone Homes Canterbury Ltd
	Milestone Homes National Ltd
	Mstone Holdings Ltd
	Registered Master Builders Association
	NSR Investments Ltd
Mike Sang	Comvita
	Government Superannuation Fund Authority
	Orion NZ
Alan Bickers	Jayal Enterprises Ltd
Lisbeth Jacobs	Goodnature New Zealand
	Other relevant interests
	Honorary Consul of Belgium
	CEO – Animal Management, Gallagher Group Ltd
Alister Lawrence	Aquatherm Ltd
	Finesse Holdings Ltd
	Plazrok International Holdings Ltd
	Plazrok International Ltd
	Procare Networks Ltd
Erica Seville	Resilient Organisations Ltd
	Response & Recovery Aotearoa New Zealand
	Other relevant interests
	Commissioner, Natural Hazards Commission | Toka Tū Ake
	Spouse to a senior manager/shareholder of Holmes Consulting Group
	Consultant Advisor on Critical Infrastructure Resilience (Morocco), The World Bank

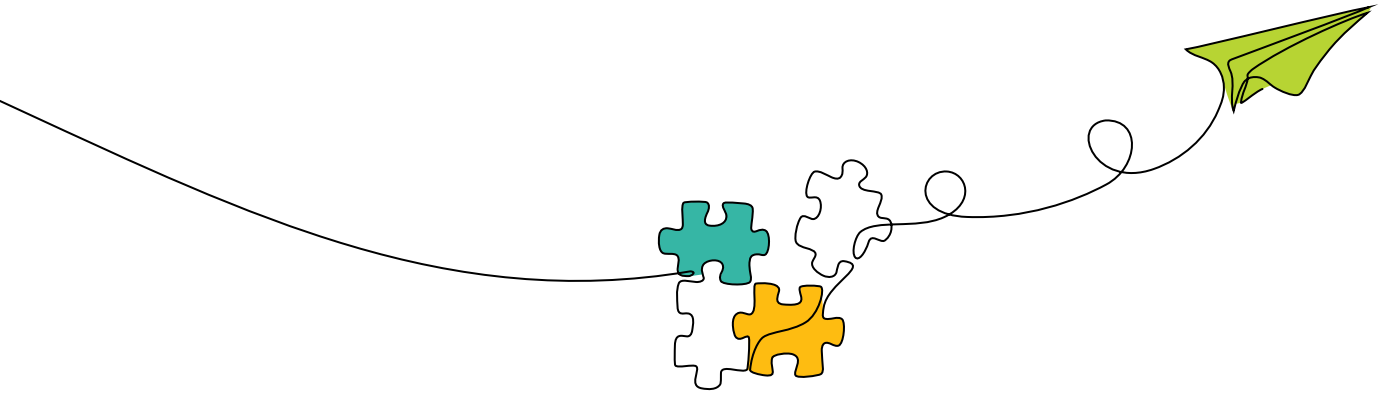
Standard disclosure statement affirmed at the beginning of every Board meeting:

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 the Chair from $56,700 to $58,320 and directors from $30,000 to $32,400 was outlined at the BRANZ Inc. Annual General Meeting on 3 August 2023. At its subsequent meeting on 28 August 2023, the Board confirmed this proposal.

Board role	Directors' fees per annum
Chair	$58,320
Deputy Chair	$32,400
Director	$32,400
Committee Chair	$6,550
Representative on external board	$6,550



Meet the Executive Leadership Team

BRANZ is led by Chief Executive Officer Claire Falck together with a leadership team of six members. Together, the BRANZ leadership team is passionately committed to co-creating enduring solutions for better building system performance.

Claire Falck, Chief Executive Officer

BRANZ Chief Executive Claire Falck is passionate about collaboration, which is at the heart of all BRANZ's work. Claire is committed to a future where all New Zealanders can live in safe, healthy and low-carbon homes.

Claire has enjoyed a wide-ranging career in both the public and private sectors, specialising in system design and complex transformation assignments. She has held senior roles with New Zealand Police | Ngā Pirihimana o Aotearoa, Ministry of Social Development | Te Manatū Whakahiato Ora and the former Housing New Zealand Corporation. Most recently, Claire was practice lead at MartinJenkins. She joined BRANZ as General Manager System Transformation in February 2021 and was appointed CEO in August 2023.

Claire has a Bachelor of Commerce and Administration from Victoria University of Wellington.

Team members

Karla Falloon	General Manager System Transformation and Office of the Chief Executive
Dr Chris Litten	General Manager Research
Martin Gordon	General Manager Consultancy Services
Janet Geritzlehner	General Manager People and Capability
Rhys Hurd	General Manager Communications, Engagement and Channels (since 15 April 24)
Peter Searle	General Manager Corporate Services/Chief Financial Officer (since 2 April 24)
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 Aotearoa New Zealand building and construction industry. It has 18 members representing 13 nominating bodies from the industry and trades, the business sector, consumers and government.

BRAC advises on industry issues for BRANZ's consideration and elects the BRANZ Board of Directors. BRAC meets twice a year.

In 2023/24, BRAC welcomed five new members:

- Garry Nott representing New Zealand Certified Builders
- David Hall representing Ministry of Business, Innovation and Employment
- Gavin Read representing Property Council New Zealand
- Andy Garvie representing Business New Zealand
- Cameron Lornie representing Civil Contractors New Zealand.

The following members completed their terms on BRAC in 2023/24:

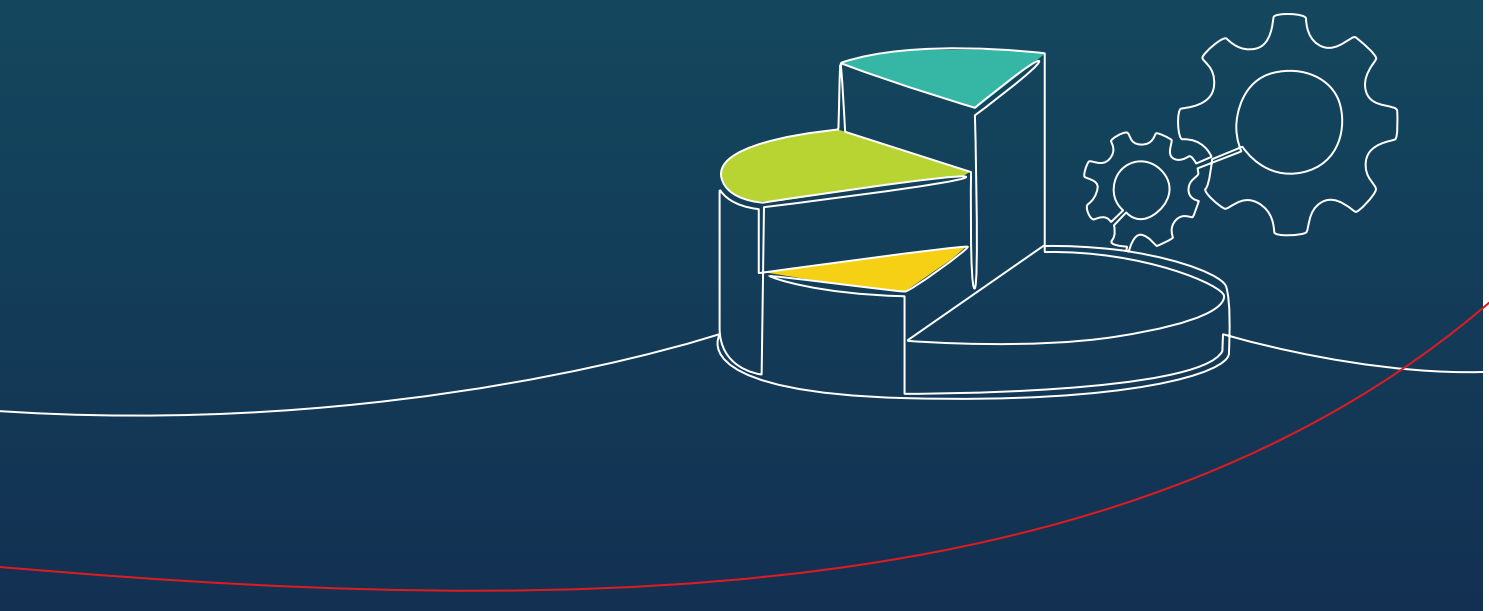
- Mike Craig representing New Zealand Certified Builders
- Don Tilbrook representing Civil Contractors New Zealand
- Jon Williams representing Property Council New Zealand
- John Malthus representing Business New Zealand.

BRAC role	Honorarium per meeting
Chair	$2,980
Members	$1,300

Members (as at 31 March 2024)

Name	Nominee of
Kieren Mallon – Chair	Registered Master Builders Association
Rick Osborne – Deputy Chair	Business New Zealand
Andy Garvie	Business New Zealand
John Gardiner	Building Industry Federation
James Le Page	Consumer New Zealand
Cameron Lornie	Civil Contractors New Zealand
Carol Caldwell	Engineering New Zealand
Paul Campbell	Engineering New Zealand
Andrea Duncan	Kāinga Ora
Jeff Fahrensohn	Local Government New Zealand
Richard Arkinstall	New Zealand Specialist Trade Contractors Federation
Wayne Carson	New Zealand Specialist Trade Contractors Federation
Ewan Brown	New Zealand Institute of Architects
Karl Wipatene	New Zealand Institute of Architects
Garry Nott	New Zealand Certified Builders
David Hall	Ministry of Business, Innovation and Employment
Gavin Read	Property Council New Zealand
Sanjesh Lal	Registered Master Builders Association

Our **financial statements** and service performance information



Our financial statements

BRANZ continues to position itself to be able to adjust its investment plans and traverse 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 9 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 despite the current 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 2023/24 financial performance

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

Total income for 2023/24 was $37.23 million, consisting of:

- $26.51 million from the Building Research Levy to fund industry research and knowledge transfer
- $9.39 million from commercial services
- $1.34 million of other income.

This compares with $40.50 million for the previous year. The decrease in income in 2023/24 was due to lower Building Research Levy receipts with reduced consenting activity after a significant increase in the prior year. This was partially offset by increased commercial income for testing services, which increased 20% on the prior year.

Expenditure directly managed for 2023/24 was $34.35 million. This was used to operate the business, directly deliver research outcomes and testing services, inform the industry and invest with other research providers.

Specific investment in research with BRANZ Ltd and other research providers amounted to $16.84 million, which is an increase on the previous year amount of $16.03 million. Expenditure in the previous year amounted to $30.37 million.

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. The Challenge finishes during 2024.

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 $14.08 million as at 31 March 2024 down from $34.1 million as at 31 March 2023. The balance includes $0.49 million of NSC 11 funding that has yet to be spent.

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 with an estimated investment of $50-55 million over 5 years. The most significant element of this plan is completing the campus redevelopment at Judgeford.

The investment case for the construction stage of the campus redevelopment project was approved by the Board in July 2021. The investment case included the provision of access to a funding facility of up to $25 million from Westpac New Zealand Limited, which is secured on the assets of the Group. At 31 March 2024, no drawdown has been made on the facility.

During the year, $22.77 million (2022/23: $20.93 million) was invested in the campus redevelopment project.

Building Research Association of New Zealand Inc.

Summary statements of comprehensive revenue and expenses

For the year ended 31 March 2024

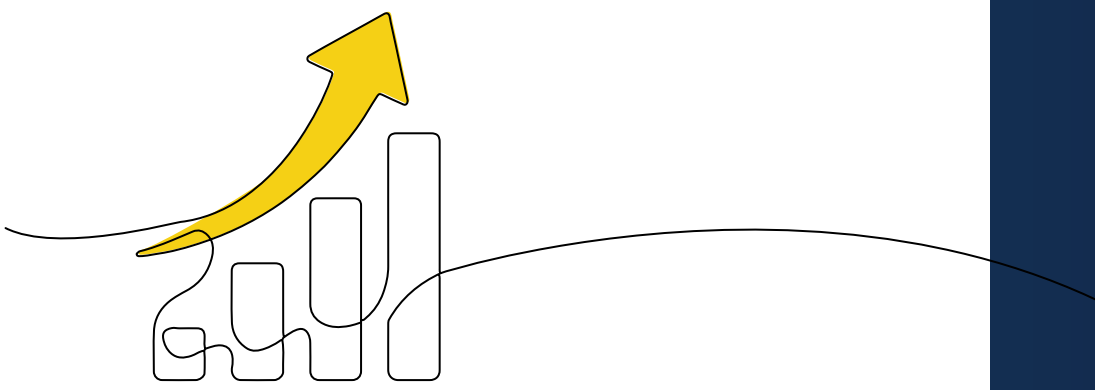
	Group	
	2024 $	2023 $
Operating income		
Revenue from non-exchange transactions		
Building Research Levy Act levies	26,506,541	31,532,855
Revenue from exchange transactions		
Commercial work fees	9,390,370	7,837,052
	35,896,911	39,369,907
Other income		
Interest received	1,327,906	1,118,810
Gain on disposal of assets	7,409	6,654
	1,335,315	1,125,464
Total income	**37,232,226**	**40,495,371**
Expenditure		
Personnel costs	15,687,790	14,753,590
Other operating costs	18,659,134	15,611,897
Total expenditure	**34,346,924**	**30,365,487**
Surplus before income tax	**2,885,302**	**10,129,884**
Income tax benefit	89,715	329,062
Surplus for the year	**2,975,017**	**10,458,946**
Total comprehensive revenue and expenses for the year	**2,975,017**	**10,458,946**

Building Research Association of New Zealand Inc.

Summary statements of changes in net assets/equity

For the year ended 31 March 2024

	Group		
	Foreign currency translation reserve $	Retained earnings $	Total equity $
Balance at 1 April 2022	28,485	65,377,027	65,405,512
Movement for year	(10,769)	10,458,946	10,448,177
Balance at 31 March 2023	**17,716**	**75,835,973**	**75,853,689**
Balance at 1 April 2023	17,716	75,835,973	75,853,689
Movement for year	2,083	2,975,017	2,977,100
Balance at 31 March 2024	**19,799**	**78,810,990**	**78,830,789**



Building Research Association of New Zealand Inc.

Summary statements of financial position

As at 31 March 2024

	Group	
	2024 $	2023 $
Assets		
Current assets		
Cash and cash equivalents	4,581,961	6,595,788
Term deposits	9,494,921	27,500,000
Other current assets	7,265,126	8,326,508
Total current assets	**21,342,008**	**42,422,296**
Non-current assets		
Property, plant and equipment	62,779,277	41,634,109
Intangible assets	626,382	310,316
Deferred tax assets	0	80,388
Total non-current assets	**63,405,659**	**42,024,813**
Total assets	**84,747,667**	**84,447,109**
Liabilities		
Current liabilities		
Trade and other payables	3,553,427	4,392,264
Other current liabilities	2,201,249	4,058,295
Total current liabilities	**5,754,676**	**8,450,559**
Non-current liabilities		
Other non-current liabilities	142,293	142,861
Total non-current liabilities	**162,202**	**142,861**
Total liabilities	**5,916,878**	**8,593,420**
Equity		
Total equity	**78,830,789**	**75,853,689**
Total equity and liabilities	**84,747,667**	**84,447,109**

Building Research Association of New Zealand Inc.

Summary statements of cash flows

For the year ended 31 March 2024

	Group	
	2024 $	2023 $
Net cash from/(used in) operating activities	2,098,141	11,178,950
Net cash from/(used in) investing activities	(4,112,637)	(13,379,299)
(Decrease)/increase in cash and cash equivalents	(2,014,496)	(2,200,349)
Unrealised gains/(losses) on foreign currency accounts	669	287,556
Cash and cash equivalents at 1 April	6,595,788	8,508,581
Cash and cash equivalents at 31 March	**4,581,961**	**6,595,788**

Building Research Association of New Zealand Inc.

Notes to the summary financial statements

For the year ended 31 March 2024

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 2024 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 25 June 2024.

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 Limited. BRANZ Pty Limited'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 2024 (2023: nil).

4. FUNDING FACILITY

In 2022, BRANZ entered into a funding agreement with Westpac New Zealand Limited. 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. At 31 March 2024, no drawdown had been made on the facility.

5. RELATED PARTIES

Group entities	Country of incorporation	Ownership interest	
		2024 %	2023 %
BRANZ Limited	New Zealand	100	100
BRANZ Pty Limited	Australia	100	100

Building Research Assocation of New Zealand Inc. charges rent to BRANZ Limited 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 2024, this amounted to $1,907,292 (2023: $1,984,116).

BRANZ Limited charges fees for research work and administration services carried out for Building Research Association of New Zealand Inc. BRANZ Limited also charges Building Research Association of NZ Inc. for its share of the Group Executive Leadership Team costs, provision of accounting, IT, support, health and safety and quality services and its share of insurance and marketing costs. In 2024, the fees for research work and share of management services amounted to $16,324,395 (2023: $14,987,357). 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 below.

During the year, BRANZ Inc. provided external research funding of $76,228 (2023: $55,015) to Resilient Organisations Ltd of which Erica Seville is an Executive Director.

6. NATIONAL SCIENCE CHALLENGE 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. The 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.

The National Science Challenges end during 2024, and the remaining funds will be spent by 31 March 2025.

Movement in funds received in advance is as follows:

	Group	
	2024 $	2023 $
As at 1 April	2,073,118	2,429,662
Funding received during the year	4,859,999	4,860,000
Funding applied during the year to:		
- Governance group meetings	(109,500)	(109,500)
- NSC 11 cost of undertaking research	(6,331,671)	(5,107,044)
As at 31 March	**491,946**	**2,073,118**

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 25 June 2024 by:

Nigel Smith
Board Chair

Mike Sang
Chair Audit and Risk Management Committee

Our service performance information

About this section

BRANZ prepares service performance information in conjunction with its annual financial statements, which are both audited. The service performance information is prepared in accordance with the accounting standard issued by the External Reporting Board *PBE FRS 48 Service Performance Reporting*.

Per the standard: "Service performance information is information about what the entity has done during the reporting period in working towards its broader aims and objectives, together with supporting contextual information."

BRANZ has taken the approach of framing the service performance information reported in the context of the Building Research Levy Act 1969. The measures selected are intended to demonstrate the breadth and depth of BRANZ's role within the system supporting the building and construction industry.

Other publications and information that provide more detailed understanding of BRANZ's work include *RE:INVEST, Levy Investment Portfolio Statement* and branz.co.nz.

Who we are and why we exist

BRANZ 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.

What we are working to achieve

Objective One: The Building Research Levy is invested in a high-quality, relevant portfolio of research that leads to accessible, actionable insights.

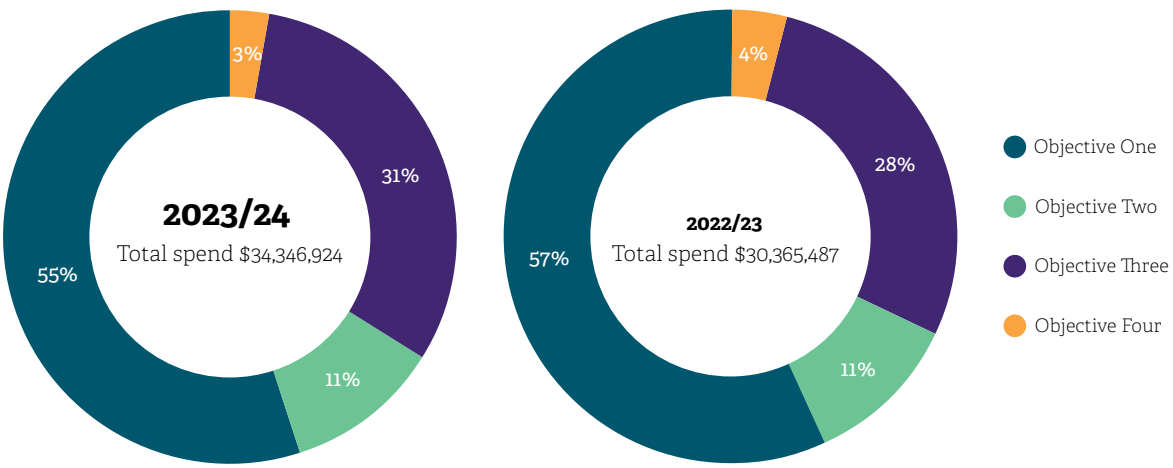
Objective Two: Our insights are used and valued by policy makers, industry and other system players.

Objective Three: We support industry to understand and demonstrate product performance.

Objective Four: Our environmental, social and governance practices demonstrate, through the way we operate, that we care for our people and the planet.

Expenditure across these four key objectives

Expenditure across the four objectives for 2023/24 $34,346,924 (2022/23: $30,365,487)



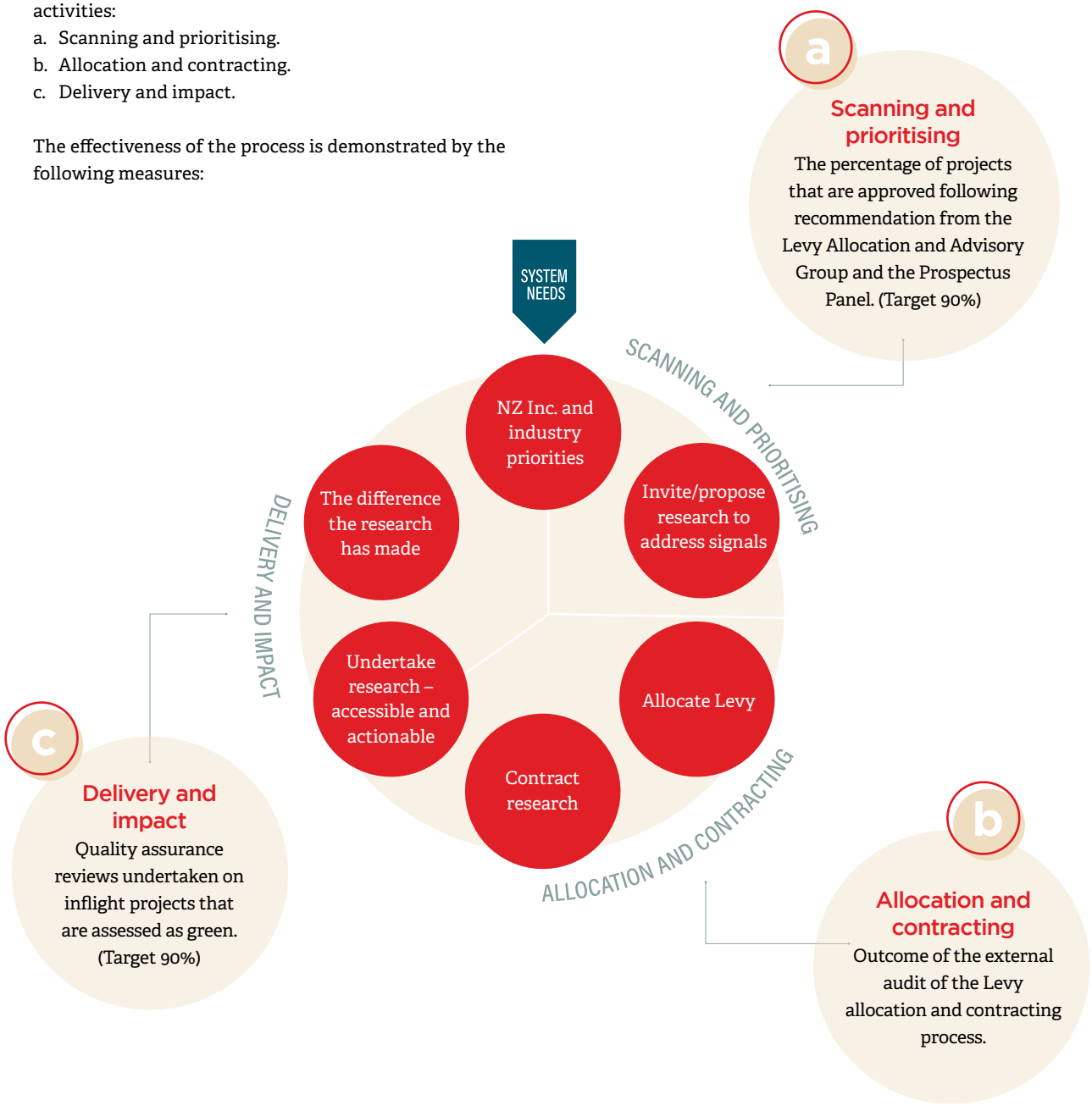
Objective One: The Building Research Levy is invested in a high-quality, relevant portfolio of research that leads to accessible, actionable insights.

Measure One: A robust process is followed when investing the Building Research Levy

The Building Research Levy is invested in an open, transparent and contestable way using robust mechanisms to help ensure quality investments are made. The process has three key activities:

a. Scanning and prioritising.
b. Allocation and contracting.
c. Delivery and impact.

The effectiveness of the process is demonstrated by the following measures:



The percentage of projects that are approved following recommendation from the Levy Allocation and Advisory Group and the Prospectus Panel. (Target 90%)

BRANZ Inc. has two panels to assess and provide targeted, advice to BRANZ on research funding proposals. Each panel has terms of reference approved by the Board that specify the role, composition and required skill sets:

- The Levy Allocation Advisory Group (LAAG) is an independent panel comprised of industry and government representatives with a broad range of experience. Its key function is to assess research proposals developed by BRANZ Ltd and provide a recommendation to the BRANZ Inc. Board on the merits of the work and the approaches proposed.
- The Prospectus Panel provides advice to the BRANZ CEO and Executive Leadership Team on research proposals submitted by external research providers in response to an issued prospectus.

Each panel provides a recommendation regarding the investment in research projects in line with the prioritised research investment signals, which are published annually in the Building Research Levy Investment Portfolio Statement. The percentage of projects that are approved following a panel's recommendation reflects alignment to our research investment priorities.

2024: 100%	**2023:** 100%

Outcome of the external audit of the Levy allocation and contracting process.

Independent auditors are engaged biennially by the Board to provide an opinion on the Building Research Levy investment as part of BRANZ's commitment to transparency and accountability associated with Levy stewardship. The auditors, in forming their opinion, consider:

- the extent to which the Levy investment has been used to deliver on the agreed work and outputs
- the success of projects in delivering the planned knowledge transfer or emerging knowledge transfer opportunities
- the approach taken with respect to engagement with key stakeholders and expected project participants.

A traffic light system is used to rate overall performance.

Green	All projects are following established processes, no significant issues to address.
Amber	Most projects follow established processes, evidence that issues are being managed.
Red	Several projects are not following established processes, significant issues have been identified and need management attention.

In the year that the audit does not occur, an interim audit is carried out to review progress made implementing any actions arising from the recommendations identified in the biennial audit.

	2024	2023
Biennial audit	**Green**	n/a
Interim audit	n/a	Auditor concluded that all actions have been adequately addressed by management.

C

Quality assurance reviews undertaken on inflight projects that are assessed as green. (Target 90%)

The BRANZ Research Investment team undertakes reviews throughout the year of the health of the research portfolio against a set of criteria, which ensures all projects are reviewed at least once. A report is provided to the Board annually. Where a project is assessed as amber or red it signals the need for greater oversight to ensure the outcomes required for the Levy investment are met. This may result in an increase in monitoring point meetings to resolve issues and/or a variation to the project.

A traffic light system is used to rate each project.

Gold Exceeding: The project is exceeding expectations.

Green On track: The project is on time and scope, no issues to address.

Amber On track – issues being managed: The project is progressing but has encountered issues (due to internal or external factors), and these are being managed.

Red Off track: The project is significantly delayed or there are concerns that it may not deliver expected outputs/outcomes – the project is in need of management attention.

The table below shows the status of the current and previous years' research portfolio against traffic light criteria. Excluded are scholarships, knowledge transfer (such as *Build*), enabling activities (such as the monitoring network) and strategic projects.

Portfolio performance 2024 (2023 numbers in brackets)

	BRANZ Ltd projects	External projects	Total
Exceeding initial scope: gold	0 (0)	0 (0)	0 (0)
On track: green	38 (73)	42 (18)	80 (91)
On track – issues being managed: amber	4 (3)	0 (1)	4 (4)
Off track: red	1 (1)	0 (0)	1 (1)
Total	**43 (77)**	**42 (19)**	**85 (96)**

2024: Achieved
94% of projects are rated gold or green

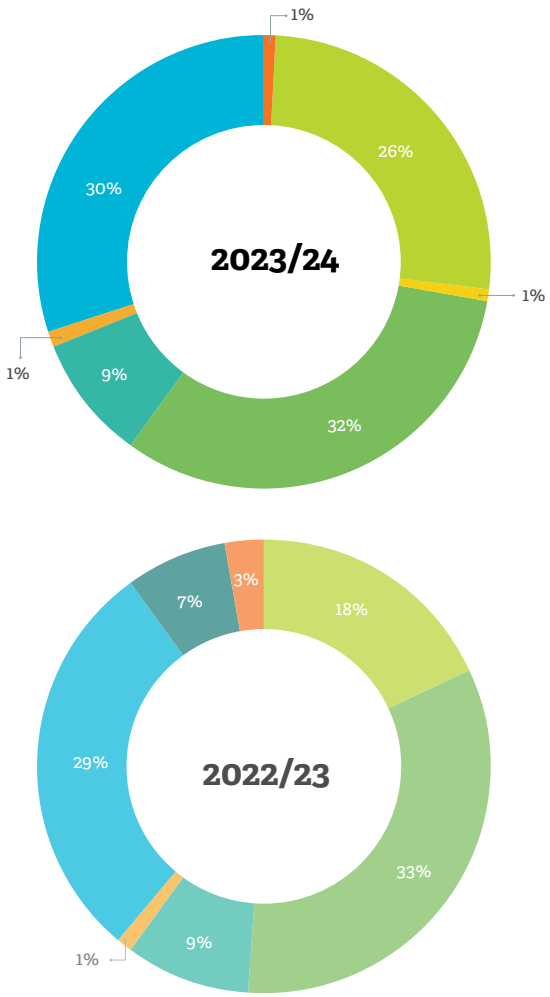
2023: Achieved
95% of projects are rated gold or green

Measure Two: Building Research Levy investments

A key driver of the Levy investment is ensuring that all research is designed with the needs of the industry and ultimately all New Zealanders in mind. BRANZ maintains strong relationships with a wide range of system players active within New Zealand's built environment. By developing and nurturing connections with industry and government, BRANZ makes sure Levy-funded research is relevant and effective.

Our Long-Term Levy Utilisation Policy includes robust mechanisms to ensure that quality investments are made and to avoid unnecessary duplication of capability and facilities across New Zealand.

Portfolio investment by research focus area



Measure Three: Science Recognition

BRANZ is committed to an enduring collaborative effort across a range of system players. Our research exploring new ideas and finding practical frontline solutions is increasingly co-created alongside key users who have the ability to implement the research findings into their work.

The number of times researchers are formally recognised by external peers as collaborating and contributing to their success in advancing science demonstrates the value of our work. Advancing science includes co-authoring academic papers or articles, being a reviewer or committee member, or mentoring or supervision of a PhD/master's student.

	2023/24	2022/23
Number of formal recognitions by external peers	36	38

Objective Two: Our insights are used and valued by policy makers, industry and other system players.

Measure Four: *Build* Magazine reach, value and quality

Build is BRANZ's flagship magazine and New Zealand's premier building industry magazine and information resource. It is published bimonthly in hardcopy with an online version updated regularly to reach a wide audience and provide information and insights in a way people value.

	2023/24	2022/23
Average distribution of *Build* per issue (hardcopy)	32,400	34,024
Number of visits to *Build online*	438,036	451,498
Net promoter score for *Build**	N/A every 2–3 years	N/A every 2 years

Measure Five: Seminar/webinar reach, value and quality

BRANZ provides seminars/webinars where gaps in the technical information available have been identified. Seminars/webinars are targeted at various sectors of the industry. This is to ensure that the information covered is specifically relevant and of sufficient depth to produce the best learning experience possible for attendees.

	2023/24	2022/23
Seminars/webinars held	8	8
Number of registered attendees	4,218	4,018
Net promoter score for webinars*	+42	+41

* A net promoter score measures how likely someone is to recommend a service or product. As a rule of thumb, a net promotor score of 20 or above is favourable, above 50 is excellent and above 80 is world class. There was no readership survey in 2023/24 with the next survey expected in 2024/25.

Objective Three: We support industry to understand and demonstrate product performance.

Measure Six: Active certificates

BRANZ provides evidence-based advice at all phases of the product life cycle from preliminary R&D through to verifying end-use product proficiency. A BRANZ assessment provides assurance that the products should do what they say they will do. BRANZ CodeMark, Appraisal and product certificates are searchable and available via the BRANZ website branz.co.nz.

	At 31 March 2024	At 31 March 2023
CodeMark	19	18
Appraisal	514	500
Reports	421	390
Total	**954**	**908**

CodeMark is a voluntary product certification scheme. It provides an easily understood and robust way to show a building product, design or method meets the requirements of the New Zealand Building Code or the Building Code of Australia.

A BRANZ Appraisal is a robust, indepth and independent evaluation of a building product or system to assess whether it is fit for purpose and meets Building Code performance requirements.

Reports include type tests and technical opinions, which are products that don't require the full rigour of a BRANZ Appraisal or CodeMark. They can be used to demonstrate compliance with a specific standard or requirement of the New Zealand Building Code.

Measure Seven: Customer satisfaction

Customer satisfaction surveys are conducted each year and reported to the Board. The customer satisfaction surveys are a useful touchpoint that enables BRANZ to better understand our organisational performance, obtain trends and insights and ensure that we continue to improve our service levels. The surveys are comprised of projects for which we receive commercial income for consultancy work and *Build* and *Build online* magazine.

	Target: "Were your expectations met or exceeded?"	2023/24	2022/23
Consultancy work	80%	91%	91%
Build magazine (hardcopy)	90%	n/a	n/a
Build online	90%	n/a	n/a

Note: The *Build* readers' survey is only undertaken every 2–3 years so no result for 2022/2023 and 2023/2024.

Objective Four: Our environmental, social and governance practices demonstrate, through the way we operate, that we care for our people, our country and the planet.

Measure Eight: Investing in our people

At its heart, BRANZ is a team of scientists, engineers and professionals passionately committed to ensuring the built environment is the best it can be. Supporting professional development and building skills to communicate, collaborate and co-create is a key investment in our people.

All staff participate in our communication and collaboration development programme.

Total investment in developing the skills of our people was $1,938 per FTE (2022/23: $1,472 per FTE).

Measure Nine: Health, safety and wellbeing

A health, safety and wellbeing (HS&W) survey is carried out annually and open to all staff and key contractors. The survey is one of several touchpoints with staff to help understand the health of our HS&W culture and practices and whether changes to the HS&W programme may be needed.

Willingness to participate with our HS&W culture is important for measuring engagement and developing the HS&W maturity of BRANZ.

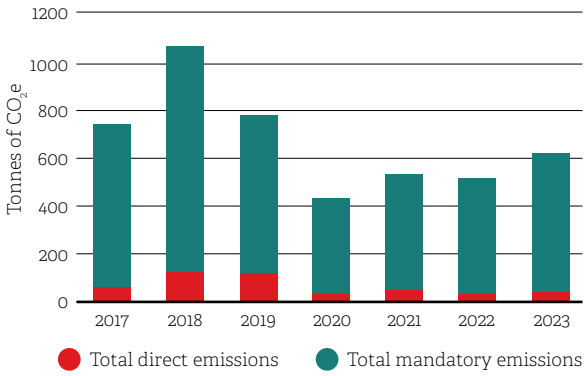
	2023/24	2022/23
Participation rate in survey	93%	95%

Comments collected in the survey indicate strong and open discussions are occurring about HS&W in teams and individual responsibility for HS&W is high.

Measure Ten: Environmental

BRANZ's aim is to become a net-zero emissions business by 2035 – if not before. We continue to take actions to reduce our carbon footprint. In April 2022, we achieved the Toitū net carbonzero certification, a certification that meets and exceeds international environment management best practice (ISO 14064-1). We measure our carbon footprint – total greenhouse gas emissions by category – and offset our emissions through the purchase of verified carbon credits to achieve a net-zero balance.

More detail on our emissions and reduction plan can be found in *Our decarbonisation journey – 2023 update* on page 108.



Note: Emissions are calculated for the period 1 January – 31 December.

Judgements

In determining the costs associated with the objectives, judgement has been used using a cost allocation methodology. Direct costs are charged directly to the activities that fall within the objective. Indirect costs are allocated to activities that fall within the objective based on cost drivers and related activity or usage information. Depreciation and amortisation are allocated on the basis of asset utilisation.

Independent auditor's report to the Members of Building Research Association of New Zealand Incorporated

Opinion

The summary financial statements which comprise the summary statements of financial position as at 31 March 2024, the summary statements of comprehensive revenue and expenses, summary statements of changes in net assets/equity, summary statements of cash flows, and summary service performance information 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 2024.

In our opinion, the accompanying summary financial statements are consistent, in all material respects, with the audited financial statements, in accordance with PBE 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 25 June 2024.

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 PBE 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.

Ernst + Young

Chartered Accountants
Wellington
25 June 2024

A member firm of Ernst & Young Global Limited

Ngā mihi to our IN THEIR WORDS contributors

Dr Jo Horrocks
Chief Resilience and Research Officer | Pouārahi Manawaroa me te Rangahau,
Natural Hazards Commission | Toka Tū Ake

Amanda Scothern
Executive Officer, Wellington Regional Healthy Housing Group

Katherine Hall
Executive Director, ConCOVE Tūhura

Mila Makasini
Master of Architecture student,
Otago Polytechnic | Te Kura Matatini ki Otago (member of the winning team at ArchEngBuild 2023)

Many organisations have contributed to the great mahi featured in these pages.

I'd like to thank everyone involved – from our directors providing governance and counsel, to BRAC members for their important insights and of course the 193 organisations we've worked with throughout the year.

Finally, I'd like to acknowledge the energy, passion and dedication of the BRANZ team. Every day, they work to help ensure all New Zealanders can live, work and play in healthy, safe, sustainable and affordable buildings.

I'm incredibly proud to work alongside you all. Thank you.

Ehara koe i a ia!

Claire Falck
CEO

BRANZ team, December 2023

Minimising the environmental footprint of this Annual Review

- BRANZ is net carbonzero and Enviromark Diamond certified by Toitū and Telarc for Quality and Environmental Management Systems.
- Our Annual Review this year incorporates new investment information, previously the subject of the separate publication *RE:INVEST* (formerly *Levy in Action*).
- We have taken a digital first approach to publication and distribution, with a small print run to minimise paper, ink and postage.
- Printed publications are produced on environmentally responsible paper, manufactured using FSC® certified mixed-source pulp from responsible sources.
- Our printer Bluestar has the following certifications (see bluestar.co.nz/sustainability):
  - Toitū Carbon Reduce and Enviromark Diamond Certification, actively managing their impact on the environment.
  - Chain of Custody Certification, including both Forest Stewardship Council® (FSC®) and Program for the Endorsement of Forest Certification (PEFC).

BRANZ Inc.

1222 Moonshine Road, Judgeford, Porirua City 5381, New Zealand

» **branz.co.nz**