



RE:INVEST 2022

RESEARCH INVESTMENT FOR A
BETTER BUILDING SYSTEM



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

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

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

BRANZ invests the Building Research Levy to improve building system performance by co-creating enduring solutions that make a real difference in the lives of people in Aotearoa New Zealand.

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About this document

The purpose of BRANZ RE:INVEST is to explain how BRANZ informs its research investment decision-making process. In this edition, you will find information about current research investments funded by the Building Research Levy (the Levy), including new research for the financial year 1 April 2022 – 31 March 2023.

For further information, you are welcome to read these documents can be found on the BRANZ website www.branz.co.nz:

- Industry Insights 2022 captures the results of a biennial survey of the views and information needs of the building and construction sector.
- Levy Investment Portfolio Statement 2022/23 (LIPS) which sets out investment signals to guide both BRANZ Ltd and external researchers seeking funding from the Building Research Levy.
- Prospectus 2022 contains questions based on the LIPS and calls for proposals from external providers. Successful applicants are featured in this edition of BRANZ RE:INVEST.

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A FRESH FOCUS

It gives me great pleasure to introduce the inaugural issue of BRANZ RE:INVEST.

This publication replaces Levy in Action and provides a deliberately singular focus on the research aspects of BRANZ's investment of the Building Research Levy.

It may be a play on words, but BRANZ RE:INVEST also better depicts the circularity of our decision-making approach. BRANZ is constantly scanning, prioritising industry needs, investing in research, evaluating outcomes and feeding those back into the next year's allocation process. In many cases, we expand or extend successful work programmes and areas of enquiry – reinvesting in those areas where research is most urgently required and can make the biggest difference to the building system.

Through investment of the Levy, each year, BRANZ undertakes and commissions research and knowledge dissemination activities that drive transformation across the building and construction system. We are guided by the clear parameters of the BRANZ portfolio of research areas, but how do we decide where to invest and why?

The BRANZ investment decision-making process is exceedingly comprehensive and multi-factorial. We have broad networks that ensure BRANZ keeps its finger on the industry pulse – many of our insights are gathered from regular discussions and engagement with our stakeholders. We also scan, analyse and consider:

- the likely impact of national and international events
- findings from the biennial Industry Insights Survey
- new statistics data and independent forecasting – for example, population growth and house price trends
- industry scanning activities
- government policy, reports and programmes
- system collaboration outcomes – for example, the Construction Sector Accord
- new entities emerging in Aotearoa New Zealand and abroad – for example the Climate Change Commission
- the impact of legislative and regulatory changes.

Frequent engagement with international research colleagues in directly aligned and complementary fields also ensures BRANZ is well informed about global trends.

The widest possible range of information is considered to ensure the Levy continues to be wisely invested in research that

responds to the most pressing needs of the Aotearoa New Zealand building system. For example, in this issue of BRANZ RE:INVEST, you will note a strong emphasis on investment supporting our flagship *Transition to a zero-carbon built environment* research programme. This focus on decarbonisation is essential if Aotearoa New Zealand is to meet its obligations under the Paris Agreement by 2050.

We also shine a light on one of our key scanning activities – the Industry Insights Survey – and how our research has already responded, and is continuing to respond to perceived industry challenges. These insights help ensure BRANZ's research reflects current building and construction needs as cited by the industry itself.

In the 2022 BRANZ Annual Review, I noted that, for more than 20 years, the same five themes – or variations on those themes – have emerged in each Industry Insights Survey. System leaders and practitioners said they have concerns about:

- The system's relationship to the Building Code and regulations
- improving build quality – moving beyond compliance
- innovation and risk – getting the balance right
- building sustainability – ensuring the right drivers are in place
- addressing shortages – building system resilience.

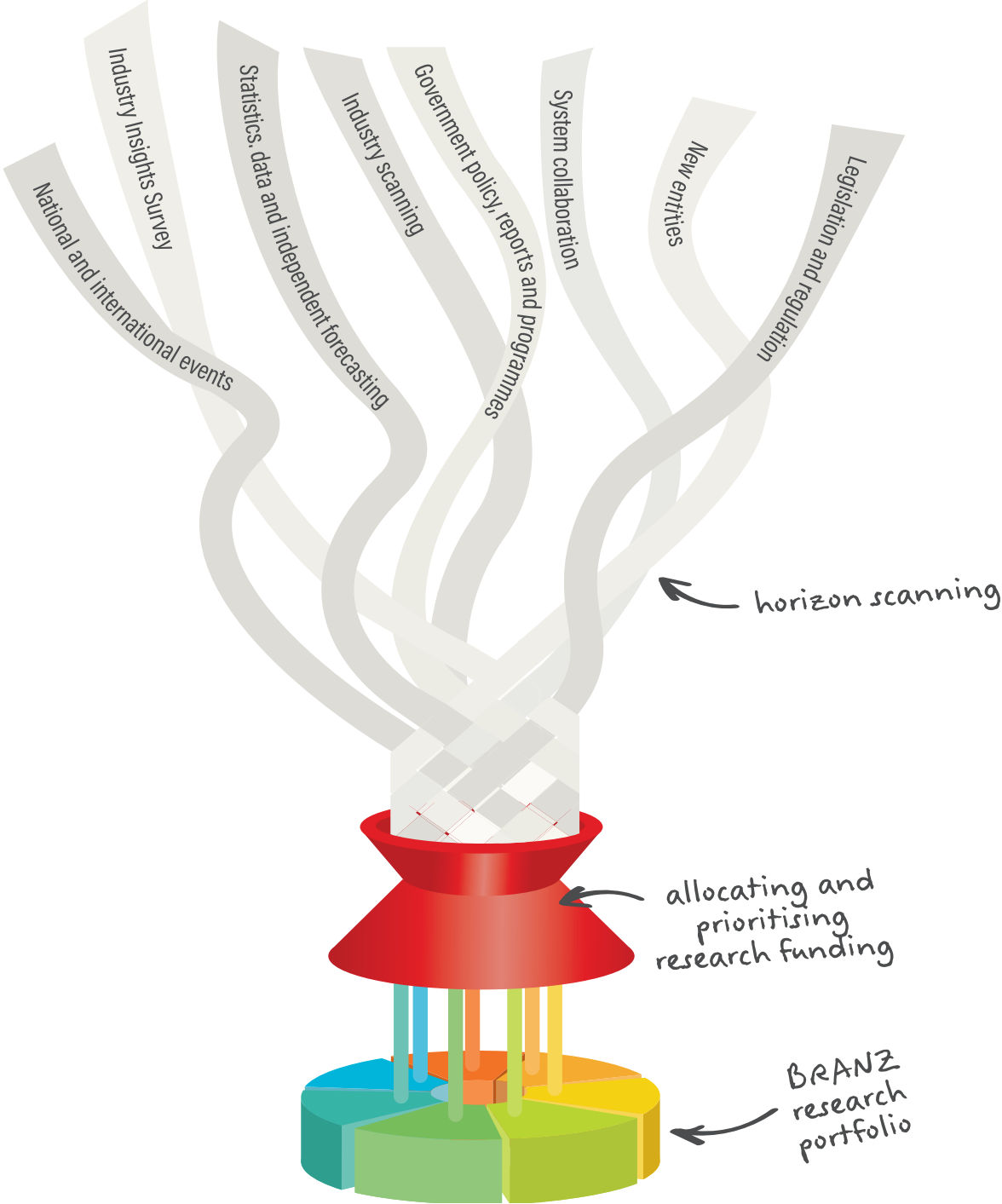
On the face of it, you could be forgiven for thinking that the industry is not making headway, but the reality is far more optimistic. Considerable progress has been made across the BRANZ research investment portfolio areas, which neatly align with the challenges identified in the survey. However, by its very nature, progress is incremental and therefore not always immediately apparent. In research, there are very few silver bullets!

We hope you enjoy reading BRANZ RE:INVEST and learning more about how we make Levy investment decisions, progress made in priority areas and the new projects that have been funded this year. BRANZ continues to be passionately focused on outcomes rather than outputs – understanding that, while great science is important, transformation of Aotearoa New Zealand's building system also requires practical solutions.



Chelydra Percy, BRANZ CEO

HOW WE RE:INVEST



INFORMING BRANZ INVESTMENT DECISIONS

BRANZ is charged with prudent stewardship of the Building Research Levy. The decisions we make about which research topics and projects to invest in have significant implications for building system performance in Aotearoa New Zealand now and into the future.

BRANZ needs the most accurate and up-to-date information on which to base its investment decisions. Therefore, a major part of our process is ensuring robust and broad scanning activities take place.

BRANZ gathers information from a wide range of sources to ensure investment is made in research that responds to the greatest and most pressing needs that Aotearoa New Zealand's building system faces. BRANZ considers:

- both national and international events
- findings from the biennial Industry Insights Survey
- statistics data and independent forecasting
- independent industry scanning and forecasting activities
- changes in or introduction of new government policy, reports and programmes
- system collaboration outcomes
- new entities
- the likely impact of legislation and regulatory changes.

This comprehensive dataset informs and ensures that BRANZ undertakes and commissions research that is practical and drives positive change across our research portfolio where it matters most.

SPOTLIGHT ON THE INDUSTRY INSIGHTS SURVEY

In this edition of BRANZ RE:INVEST, we are focusing on one of these inputs – the findings of the most recent national biennial Industry Insights Survey undertaken on our behalf by Kantar Public. This work consisted of:

- a review of the last 20 years of BRANZ Industry Insights Survey research
- in-depth interviews with nine building system leaders
- a survey of a broad range of 392 industry practitioners.

BRANZ has conducted this survey for more than 20 years, the findings providing a unique, long-term perspective and understanding of the issues facing the industry in their own words.

This year, the survey identified five big challenges that had already been well signalled by the building and construction sector as a result of the pandemic. While we interviewed the same groups as in previous years, we broadened the range of people and organisations we engaged with to get a holistic view across the building system.

While some issues appear perennial – systemic change can be slow – it was useful to cross-reference these findings with our current research activities. It was gratifying to see that significant improvement and progress is constantly being driven by research activities across the BRANZ research portfolio as you will note in the following pages.

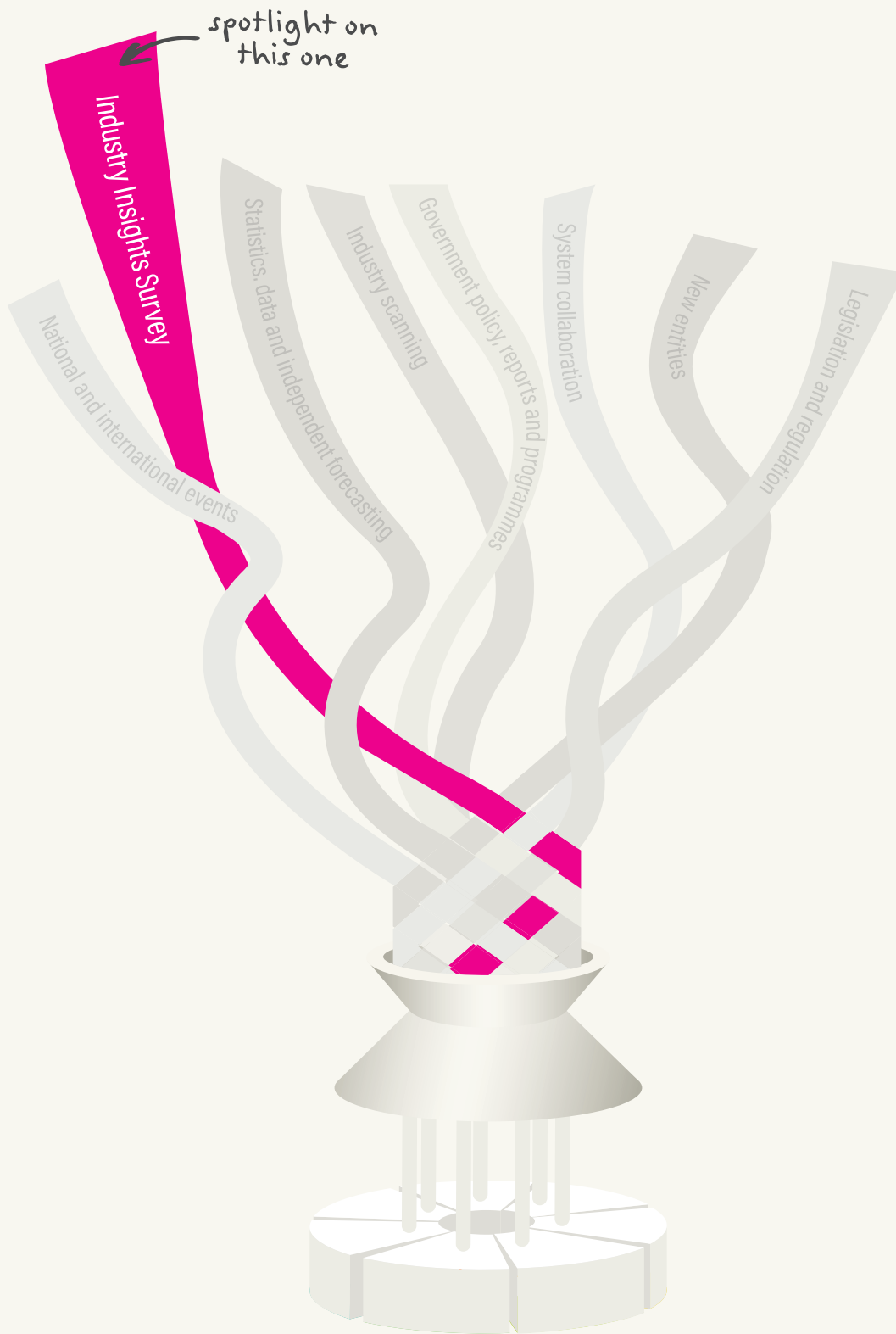
CAPTURED THE VIEWS OF **392** INDUSTRY PRACTITIONERS

IN A SURVEY OF BUILDERS, ARCHITECTS,
SUBCONTRACTORS, DEVELOPERS, INSURERS,
BUILDING OFFICIALS, RESEARCHERS AND EDUCATORS

TOOK THE INDUSTRY PULSE FROM **9** BUILDING SYSTEM LEADERS

IN IN-DEPTH INTERVIEWS WITH CONSTRUCTION
CEOS, MANAGING DIRECTORS AND BOARD CHAIRS,
INCLUDING IN CENTRAL AND LOCAL GOVERNMENT,
DEVELOPERS, FINANCIERS AND INSURERS

KEY INSIGHTS THAT INFORM LEVY INVESTMENT



THE SURVEY RESULTS REVEALED FIVE AREAS WHERE THE BUILDING AND CONSTRUCTION SYSTEM FACED CHALLENGES.



FIVE CHALLENGES THE INDUSTRY IS FACING

1 The system's relationship to the Building Code and regulations

2 Improving build quality – moving beyond compliance

3 Innovation and risk – getting the balance right

4 Building sustainability – ensuring the right drivers are in place

5 Addressing shortages – building system resilience

area of increased need



We could do more to move beyond prescription and compliance, to the underlying benefit of having rules and regulations to have enduring quality. – System leader

1

THE SYSTEM'S RELATIONSHIP TO THE BUILDING CODE AND REGULATIONS

Getting clear, up-to-date information about regulations, codes and standards was first identified in the 2008 survey. It remains a priority today.

41%

OF INDUSTRY PRACTITIONERS THINK **WE DON'T HAVE CLEAR AND EASY-TO-UNDERSTAND CODES AND REGULATIONS.**

Many in the system see the value in codes and regulations, and some want them strengthened.



THE WHY



SYSTEM LEADERS BELIEVE ATTITUDES TOWARDS CODES AND REGULATIONS COULD BE IMPROVED WITH **GREATER EMPHASIS ON WHY THEY ARE SO IMPORTANT.**

2

IMPROVING BUILD QUALITY MOVING BEYOND COMPLIANCE

Both system leaders and industry practitioners are concerned about build quality, believing it's not at a standard that prevents long-term problems.

28%

THINK 'A GREATER EMPHASIS ON QUALITY' IS A TOP PRIORITY FOR THE SYSTEM'S SUCCESS OVER THE NEXT 5 YEARS.

SYSTEM LEADERS' PERCEPTIONS OF BARRIERS TO QUALITY

- The public aren't willing to pay for quality.
- The materials and labour shortages.
- Regulations and codes set as the absolute minimum levels of acceptable are treated as targets.
- There is a lack of genuine collaboration, knowledge and information sharing.



THREE IDEAS FOR IMPROVEMENT FROM SYSTEM LEADERS

- Have codes and regulations that guarantee high-quality builds.
- Greater standardisation, including prefabrication.
- Getting the system working together rather than against each other.



3

INNOVATION AND RISK

GETTING THE BALANCE RIGHT

System leaders and industry practitioners believe the system is not good at innovating. They see the introduction of new ideas and innovations as a priority for the future success of the system.

18%

OF INDUSTRY PRACTITIONERS THINK THE SYSTEM IS PERFORMING WELL, VERY WELL OR EXTREMELY WELL AT USING INNOVATIVE TECHNIQUES.



SYSTEM LEADERS' PERCEPTIONS OF BARRIERS TO INNOVATION

- Difficulties getting approval for those innovations that require it due to the building system being very risk averse.
- The size of the Aotearoa New Zealand market means getting approval for those innovations that require it is often not financially viable.
- The regulatory framework does not keep up with innovations – for example, door frame sizes for tiny homes.

TWO IDEAS FROM SYSTEM LEADERS

- Have the system work together to bring innovations in – not just a business or businesses but business working with the public sector.
- Innovate within what we know already works and is established in Aotearoa New Zealand.



Innovation by nature requires an element of risk and uncertainty. We think that the desire for information in this area is driven by a need to reduce the risk and uncertainty to allow people within the construction system to make informed decisions and take calculated risks. – System leader

4

BUILDING SUSTAINABILITY ENSURING THE RIGHT DRIVERS ARE IN PLACE

Everything we do now should be focused on how it affects our response to global warming.
- System leader

Sustainability as a priority to industry participants has fluctuated over time.

Architects, designers and engineers, in particular, think **the system needs more focus on climate and sustainability**. 36% of architects compared with 20% of all other industry participants believe this should happen.



48%

THINK AN INCREASED FOCUS IS NEEDED ON BUILDING FOR CLIMATE CHANGE AND USING SUSTAINABLE BUILDING MATERIALS, PROCESSES AND METHODS.

22%

THINK IT SHOULD BE ONE OF THE TOP THREE KEYS TO SUCCESS FOR THE SYSTEM OVER THE NEXT 5 YEARS.

SYSTEM LEADERS' PERCEPTIONS OF BARRIERS TO BUILDING SUSTAINABILITY

- High cost is a disincentive to build sustainably.
- Lack of demand from customers.*
- Little regulatory push to make the system change.*

* System leaders believe that change is starting to occur in these areas.

IDEAS FROM SYSTEM LEADERS TO IMPROVE SUSTAINABILITY



- Make maintenance for 20 years part of a build contract – then builders will build for the long term.
- Establish a green builder accreditation programme.
- Ban products that cannot be recycled.
- Consent applications should gain sustainability points for the inclusion of information on sustainable practices and products. If they don't reach a threshold, the consent should not be granted.
- Products should have their entire life cycle included in their cost.

5

ADDRESSING SHORTAGES BUILDING SYSTEM RESILIENCE

Access to materials and labour availability are the two poorest performing areas of the system at the moment, according to all industry participants.



RESOLVING THE BOOM-BUST INDUSTRY CYCLE WILL HAVE A MAJOR IMPACT ON LABOUR SHORTAGES. THEY BELIEVE IT'S CRITICAL THAT PEOPLE ENTERING THE SYSTEM IN ALL ROLES CAN BE CONFIDENT IN THEIR CAREER AND FUTURE OUTLOOK AND IN THE SYSTEM.

Anything we import is just costing so much to land here, and there's just a big mismatch in global supply and demand causing supply chain bottlenecks.
– System leader

There are always ups and downs ... Biggest challenge is how to smooth the cycle.
– System leader

77%

SAID GETTING ACCESS TO MATERIALS WAS A PROBLEM FOR THE INDUSTRY.

They believe this is a short-term issue driven by pandemic-related disruptions.

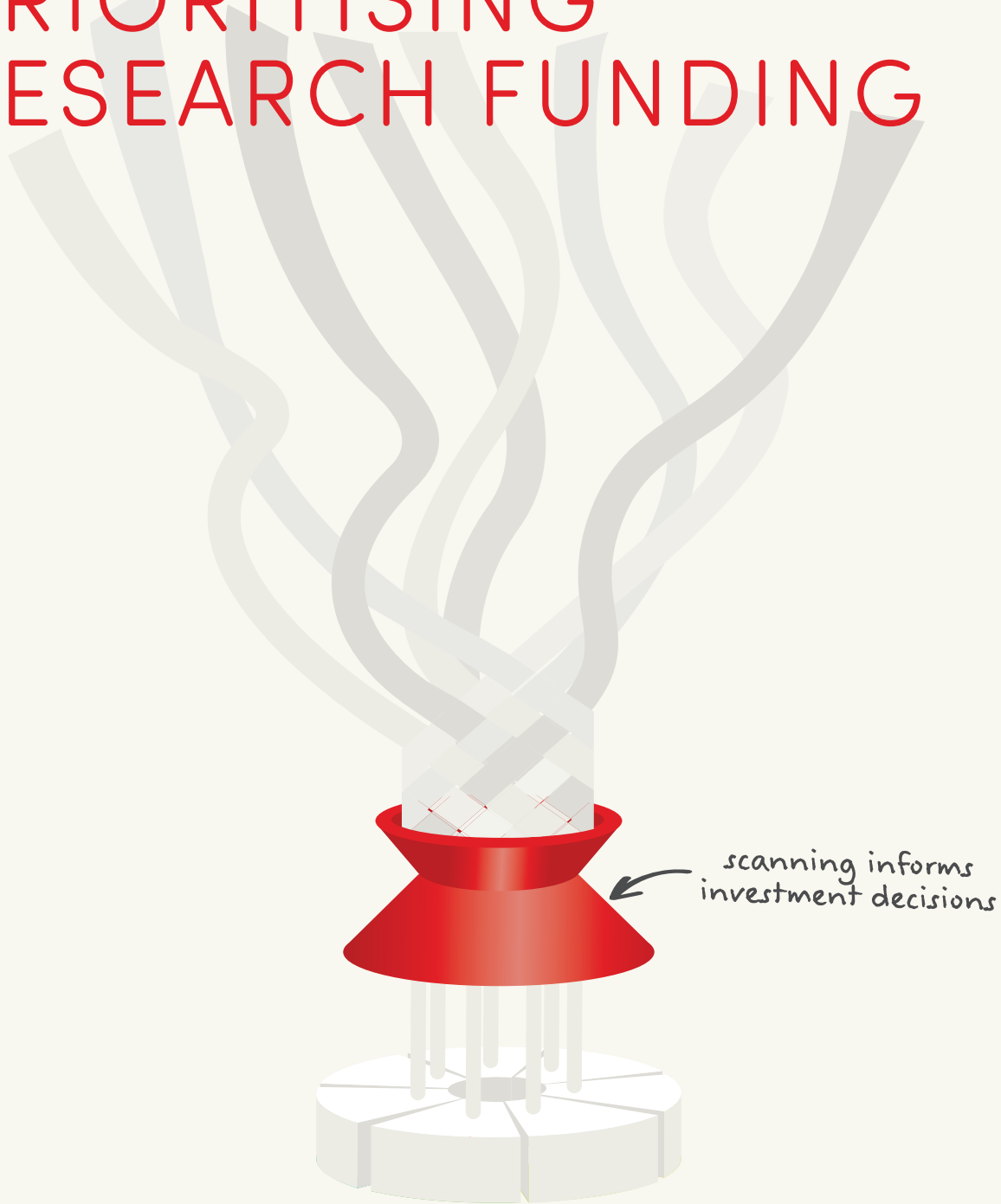
52%*

SAID ATTRACTING PEOPLE TO WORK IN THE INDUSTRY WAS DIFFICULT.

Labour shortages are seen as a longer-term issue resulting from high demand, coupled with low domestic unemployment and heavily restricted immigration.

* Likely to have increased as the labour market continues to tighten.

ALLOCATING AND PRIORITISING RESEARCH FUNDING





HOW BRANZ IS TACKLING THE FIVE BIG CHALLENGES

Taking a systems view

With the information gleaned from its scanning work, including the Industry Insights Survey, BRANZ can effectively determine and prioritise industry needs and consider the research most urgently required to bring about change.

However, our experience over the past 20 years has also led to BRANZ adopting a systems lens when evaluating issues and considering solutions or possible mitigations. For example, building sector resilience is reliant on its ability to adapt and respond to a raft of factors, including demographic changes, natural hazards, climate change and international geopolitical events.

In short, the building and construction industry is just one part of a complex, dynamic and interconnected system and can't be viewed in isolation. Part of BRANZ's role is to ensure industry understands how these dots are joined and fund research that takes tomorrow's potential challenges into account.

As an example, in the 2021/22 funding year, a deliberate focus has been on investing in projects that support BRANZ's *Transition to a zero-carbon built environment* research programme. In other years, the priority focus will shift to other aspects of the system where investment is required.

Our research programme illustrates our commitment to listen, learn, see patterns and ensure we can continue to meet emerging, long-term and future needs.

Here is a snapshot of how BRANZ is helping tackle the challenges identified in the recent Industry Insights Survey.

Building Code and regulations

Stakeholders' consistent concerns with building regulations, the Building Code and standards have prompted significant ongoing research efforts. Recent projects have included an investigation of perceived barriers to obtaining resource consent and building consent for medium-density housing (MDH) and resource consent for prefabricated housing. Other projects include investigating industry perceptions of MDH consenting issues, challenges and, importantly, solutions. Resource consent issues in five different city councils have been examined, as has finding ways of better integrating third-party technology into the building consent process.

Improving build quality

System stakeholders have consistently expressed concern about the quality and durability of buildings. Concerns about the weathertightness of Aotearoa New Zealand buildings have fed into BRANZ's flagship *Warmer, drier, healthier homes* research programme. Research in this programme includes projects such as:

- evaluating the risks associated with retrofitting insulation into timber-framed walls
- measuring the extent of thermal bridging in external timber-framed walls to prevent high levels compromising the thermal performance of walls
- transitioning to routine measurement of airtightness by specifying an optional airtightness target, with whole-dwelling mechanical ventilation installed to address underventilation.

Another BRANZ research project surveyed potential new-home owners about their decision making regarding the choice to exceed minimum building standards as outlined in the Building Code.

This research found that consumers faced challenges accessing information about building beyond the Code. It also found a lack of confidence and trust in building professionals and some bias towards the normality of living in a cold, damp home.





Balancing innovation and risk

For 20 years, the majority of survey respondents have indicated the importance of obtaining reliable information on new materials entering the market, alternative construction methods and innovative technologies.

BRANZ research into innovation has looked into various kinds of software development, product performance and new practices. For example, current projects focus on:

- software that allows users to analyse fire safety and smoke spread in buildings
- measuring the functional performance of non-structural building elements in an earthquake
- investigating the seismic performance of timber residential buildings with hybrid bracing solutions.

Achieving building sustainability

Sustainability and the environment initially emerged as one of the building system's top priorities in the mid-2000s. Despite a decline in importance in the 2010s, it has re-emerged as a priority in the most recent survey. Almost half (48%) of industry practitioners believed the system was not adequately focusing on both building for climate change and using sustainable building materials, processes and methods.

The aim of BRANZ's *Transition to a Zero-carbon built environment* research programme is to have the building and construction industry delivering net-zero carbon buildings in an affordable way by 2050. The programme vision is to provide research support for an industry-led transition to a zero-carbon built environment. The goal is decarbonisation across the whole building life cycle and encouraging industry leadership and decision making to manage climate change mitigation.



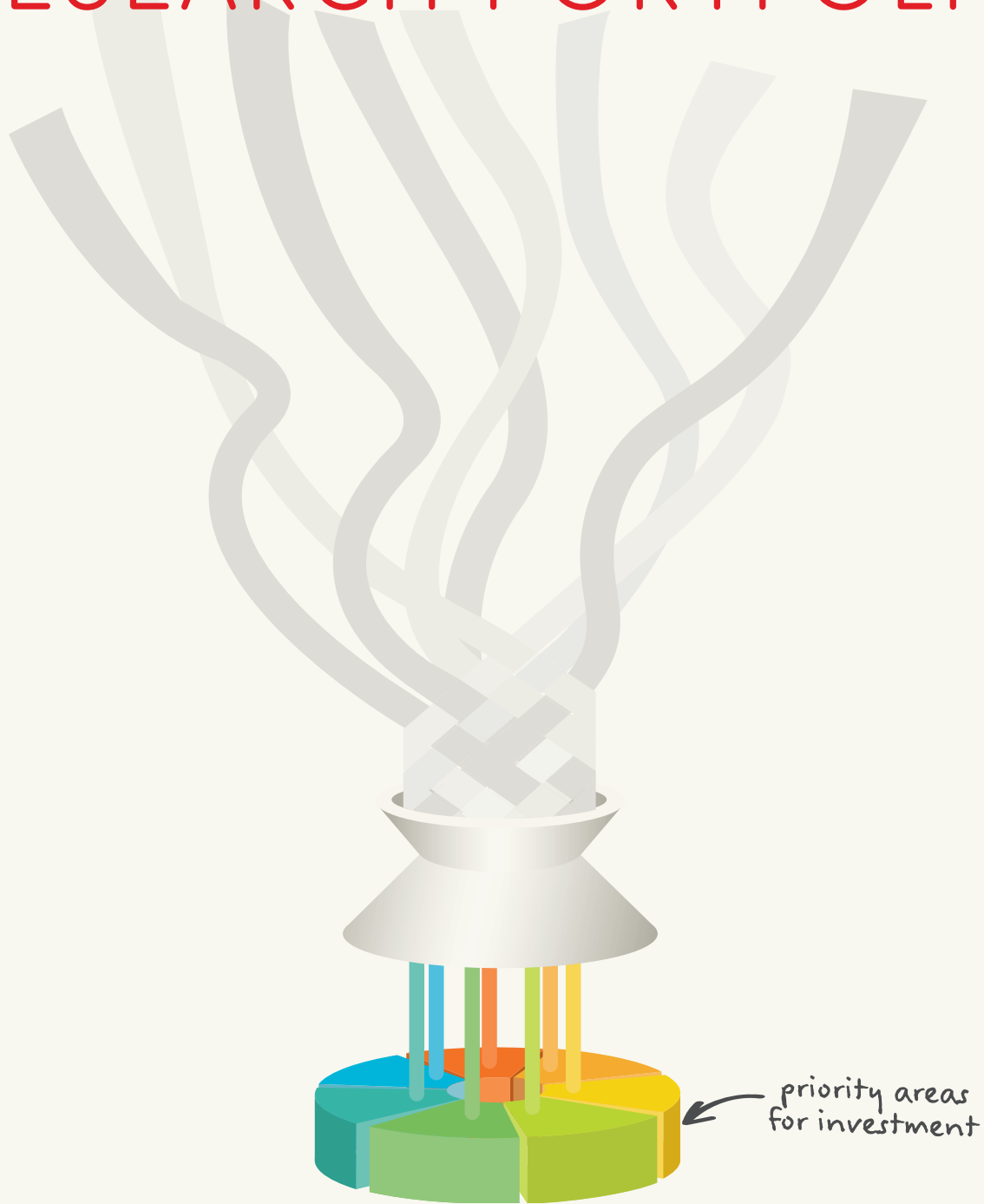
Addressing shortages

The Aotearoa New Zealand construction and infrastructure industry is labour intensive. It is dependent on the availability of skilled labour to both meet demand and maintain quality. Access to labour has been a consistent area of industry concern for some years. However, in the wake of the pandemic, this survey has also highlighted material shortages for the first time.

BRANZ activities support the development of skills through its building design resources, publications, educational seminars, and e-learning modules. We have supported research to develop career pathways for those entering the industry and the future skills required by the workforce to help it meet Aotearoa New Zealand's carbon goals. This year, we have supported surveys to obtain accurate data on the current and likely future state of the building product supply chain to help specifiers and builders to better plan ahead.



THE BRANZ RESEARCH PORTFOLIO



BRANZ has adopted a research portfolio comprised of seven key categories that correspond with critical aspects of Aotearoa New Zealand's building system and, consequently, areas of investment for the Building Research Levy:

- Low-carbon research
- Quality and performance of homes and buildings
- Resilience of the built environment
- Vibrant industry
- Housing affordability
- Thriving cities, regions and communities
- Meeting Aotearoa New Zealand's population needs

Research into improving outcomes in these areas through prudent investment of the Building Research Levy will make the biggest difference in the lives of people in Aotearoa New Zealand.

These themes also help support our systems thinking approach and provide a strong strategic framework to both organise and evaluate the work we do. For instance, analysing existing issues through the lens of these themes has at times helped identify new ways of thinking or researching solutions.

Our Levy investments for 2022/23 across our research portfolio are detailed in the following pages. In 2022/23, much of our investment has been focused on supporting our zero-carbon programme to meet the needs of the building and construction system.



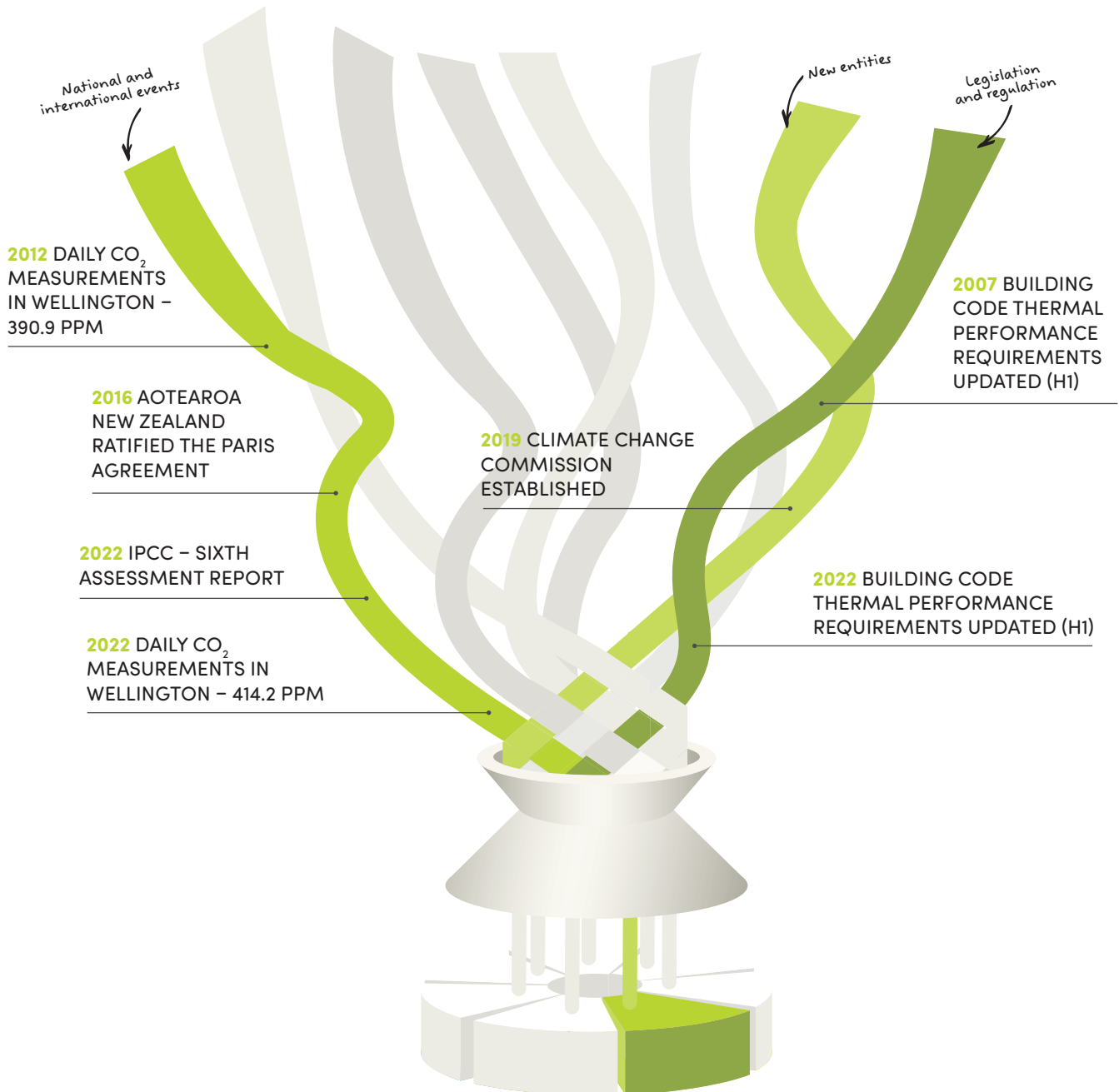
- Low-carbon research
- Quality and performance of homes and buildings
- Resilience of the built environment
- Vibrant industry
- Housing affordability
- Thriving cities, regions and communities
- Meeting Aotearoa New Zealand's population needs

LOW-CARBON RESEARCH

Climate change is this century's most urgent challenge. Aotearoa New Zealand has signed up to ambitious targets to reduce its emissions under the Paris Agreement. The built environment has a key contribution to make in adapting to and mitigating climate change. To address this issue, BRANZ harnesses expertise in whole-of-building life cycle assessment, understanding building quality and performance, construction waste, water use, sustainability, energy efficiency and social science.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



Non-traditional construction systems

Levy investment	\$495,000
Timeframe	April 2022 – March 2024
Lead organisation	BRANZ Ltd

The context of this project is to ensure that the Aotearoa New Zealand building system can innovate while maintaining robust performance and environmental impact standards.

Understanding the environmental impacts and performance criteria of construction systems and methods being used in Aotearoa New Zealand is vital to ensure build quality. As new construction methods are developed here or adopted from overseas for use in Aotearoa New Zealand, ensuring that accurate, location-specific data is available is vital.

This project has two main workstreams. The first is to gain a better understanding of the environmental impacts of new and emerging construction methods and prefabrication processes in Aotearoa New Zealand.

The second workstream builds on research into structurally insulated panels (SIPs) currently being undertaken by BRANZ. The focus is on determining the durability and seismic performance of SIPs made with magnesium oxide/sulphate panel skins and metal skins.

Understanding the long-term performance of SIPs and their behaviour during earthquakes will help to inform compliance pathways and provide specification insight for designers and builders of Aotearoa New Zealand buildings.

Low-carbon retrofit solutions for our changing climate

Levy investment	\$399,500
Timeframe	June 2022 – April 2024
Lead organisation	BRANZ Ltd

To ensure Aotearoa New Zealand is adequately prepared for the challenges of climate change, our existing housing stock needs to be warm, dry and healthy. This project is examining what is likely to be required to retrofit existing housing stock to adapt to and mitigate climate change.

Working with a coalition of industry stakeholders, this research is seeking to identify solutions to ensure homes are resilient enough to adapt to and cope with more extreme weather events, coastal inundation and flooding. The research is also sourcing and assessing ways to mitigate the impact of existing buildings on climate change through retrofit solutions that reduce operational carbon emissions and also have low embodied carbon.

The research will lead to practical retrofit guidance and options so industry can successfully adapt existing buildings to better cope with the challenges of climate change.

Carbon footprint of fit-out

Levy investment	\$120,000
Timeframe	April 2022 – March 2023
Lead organisation	BRANZ Ltd

As buildings become more energy efficient, the relative importance of embodied carbon is expected to increase. The Ministry of Business, Innovation and Employment's Building for Climate Change programme has already recognised the need to address both operational and embodied impacts to reduce the carbon footprint of buildings.

Given this increasing focus on embodied carbon, the potentially significant contribution of fit-out elements and the lack of quantitative data in this area, there is a clear need for additional research.

This project is focused on determining the impact of fit-out elements to a building's carbon footprint by:

- defining fit-out scope
- identifying frequency and scope of fit-out replacement in commercial buildings
- analysing several reference office and retail buildings
- determining the importance of fit-out elements to the overall carbon footprint of office buildings
- assessing the total contribution of fit-out elements to a building's overall carbon footprint.

This research will allow development of carbon footprint rates specifically for fit-out elements to better understand the scale of the issue relative to other building elements. It will also determine where the environmental hotspots are and contrast results for office and retail settings.

Overheating in apartment buildings

Levy investment	\$399,500
Timeframe	June 2022 – April 2024
Lead organisation	BRANZ Ltd

The upgrading of energy efficiency standards in residential buildings in recent years has taken a 'one size fits all' approach, irrespective of the thermal dynamics of the building type. Apartment buildings behave quite differently to detached and medium-density housing, and as a result, they are often cited as overheating.

This suggests there's a significant performance gap between current regulation, industry awareness and occupant comfort. With rising global temperatures due to the impact of climate change, moves towards higher insulation levels and greater urban density, overheating will almost certainly get worse.

This research is outlining the extent and severity of overheating in apartments and seeking to ensure that our desktop dynamic thermal simulation models are producing realistic results.

This is being achieved by measuring and monitoring apartment unit temperatures, energy use, occupancy and ventilation to accurately calibrate dynamic energy models and provide a trustworthy modelling protocol for overheating. The resulting energy models can inform the development of apartment-specific guidelines and standards, especially with regard to clause H1 compliance.

This research will create industry guidance to enable designers, specifiers and regulators to make better decisions around apartment design for a more comfortable, lower-carbon future. In turn, these insights will enable better physiological, mental health and wellbeing outcomes for people living in apartments.

Overseas retrofit policies

Levy investment	\$124,000
Timeframe	May 2022 – December 2022
Lead organisation	Business and Economic Research Ltd (BERL)

Aotearoa New Zealand is not alone in trying to implement changes to the built environment to tackle the impacts of climate change. This research is to identify existing international initiatives, including products, processes or materials, that have successfully reduced greenhouse gas emissions from existing buildings and to consider them in the Aotearoa New Zealand context.

The focus of this research is not on deep retrofit but on evaluating international policies and specific measures such as insulation and heating efficiency in the Aotearoa New Zealand context. The project methodology starts with a literature scan to identify international examples of initiatives that promote renovations and retrofitting that lead to a reduction in greenhouse gas emissions. From there, a selection of initiatives are being shortlisted, and an impact analysis of each is being undertaken.

Viewed through the lens of Aotearoa New Zealand's construction approach, regulatory and strategic environment and future climate change impacts, this research will identify cost-effective, readily implementable solutions.

Pathways to net-zero buildings in communities

Levy investment	\$150,440
Timeframe	March 2022 – June 2025
Lead organisation	University of Canterbury

This project evaluates the impacts of the five major strategies currently driving the global development of net-zero carbon buildings and communities, which are:

- decarbonisation of the electricity grid
- electrification of building space and water heating
- building efficiency improvements to reduce energy demand
- digitalisation of buildings
- development of electricity grids to improve energy management and electrification of vehicles.

Rather than evaluate each of these strategies in isolation, a systems modelling approach is being used.

The primary aim of this research is to identify and characterise the best pathways and technologies for reducing carbon emissions from buildings, construction and communities. A secondary aim is to develop systems analysis methodologies suitable for assessing emissions reductions associated with individual buildings and communities. The five strategies will be considered in both aims.

Information from this research will improve designers' capability to reduce the carbon footprint of buildings and will underpin the future development of building regulations covering carbon emissions.

Digital enablement for green building product purchases

Levy investment	\$114,845
Timeframe	February 2022 – August 2022
Lead organisation	GS1 New Zealand

Harnessing digital technology to enhance uptake of green building products is at the heart of this project. This research is assessing how information on environmental product declarations (EPDs) and from life cycle assessments (LCAs) can be incorporated digitally into commercial purchase decisions. It builds on GS1 New Zealand's 2020 BRANZ research that focused on structured product data.

Research will investigate sustainability and civil engineering works, including data templates for the use of EPDs for construction products in building information modelling (BIM). Digital data templates (DDTs) can be used to easily inform procurement choices – for example, the consideration of packaging waste – and can be expanded to include any other technical standards.

Interviews with large construction sector merchants and retailers are being conducted to understand how DDTs inform their purchasing decisions and therefore how this influences what suppliers offer in Aotearoa New Zealand. Consideration will also be given to how DDTs inform government construction procurement agencies given the role they play in shaping industry material and product choices.

Increasing use of DDTs in e-procurement has the potential to drive automation of downstream processes, including BIM adoption, whole-of-life asset management and sharing of digital information in supply chains.

Addressing the climate impacts of MDH – an expanded assessment tool

Levy investment	\$144,475
Timeframe	January 2022 – August 2023
Lead organisation	Beacon Pathway Inc.

This research develops an existing resource, the medium-density housing (MDH) assessment tool, to include assessment components and recommendations to reduce greenhouse gas (GHG) emissions. This will assist developers and property managers to understand the impacts of their buildings' operations on the climate, environment, local neighbourhood and residents. It will also inform future design and the potential retrofitting of existing MDH. The research will also provide targeted behavioural advice to residents.

The project methodology comprises a literature review to determine current best international and national practice that revises the tool to include GHG emissions components. The tool will be tested – including an assessment of energy usage – with end users in three case studies.

A summary case study is being developed to raise awareness of the benefits of better practice to reduce GHG emissions and promote further use of the tool. A follow-up survey with case study organisations will be done to determine actual changes and reductions in GHG emissions.

Reducing greenhouse gas emissions in communities

Levy investment	\$220,350
Timeframe	December 2021 – December 2022
Lead organisation	WSP New Zealand Ltd

This research responds to the urgent need to identify the types of interventions that should be pursued to reduce greenhouse gas (GHG) emissions in Aotearoa New Zealand. Rather than considering emissions reduction interventions in isolation, this project focuses on how they can also deliver benefits for well-functioning neighbourhoods, towns and cities. By looking at real-world examples and international and national best practice, the project aims to identify what works and how those solutions can be successfully implemented locally.

The project has three components:

- The existing and emerging evidence for GHG emissions reduction and benefits for urban environments.
- Key characteristics of interventions.
- Lessons for successful implementation.

The results of this research will enable stakeholders and decision makers to consider a wider range of proven interventions and assess the suitability of each for their situation. Given the critical changes currently under way at a policy/regulatory level, this project is timely. There is an opportunity to provide evidence that can be applied locally and also used to support national-level change.

Climate change impacts on marae

Levy investment	\$176,100
Timeframe	June 2022 – November 2023
Lead organisation	Build Back Better

Most marae are built adjacent to inland and coastal waterways for transport and kai. Unfortunately, with climate change, that means some marae and their whareniui are at risk from inland and coastal flooding, landslides, wildfire and rising sea levels. All of these are projected to become more frequent and severe.

This mahi is the first full survey of all marae in Aotearoa to gauge the extent of the problems that whānau, hapū and iwi are experiencing due to climate change. In partnership with BRANZ, Build Back Better and iwi, this mahi has co-developed a framework of the climate change challenges identified. It also includes the capability and capacity needed to address those challenges, which are often being faced alone by hapū and iwi.

The significance and importance of protecting marae for future generations is well understood. The research, underpinned by kaupapa Māori values and principles, will leverage existing mātauranga (knowledge) through existing partnerships with marae within the research team and with key partners and stakeholders.

The outcomes will be available for hapū and iwi, agencies and organisations such as Local Government New Zealand, Heritage New Zealand and government-funded science and research platforms to access and use.

Climate change response

Levy investment	\$327,000
Timeframe	July 2022 – May 2025
Lead organisation	Massey University

Responsible for about a fifth of carbon emissions in Aotearoa New Zealand, the building industry needs people with greater knowledge and understanding of climate change to enhance processes, products and technology. One of the main ways to enable the industry's transformation is by educating those designing, developing and constructing Aotearoa New Zealand's buildings and infrastructure.

In 2021, Massey University piloted a project to upskill professional students in its Master of Construction programme with sustainable building knowledge to use within their organisations and the wider industry. Leveraging this increased knowledge base, the aim of the programme was to increase the use of zero-carbon initiatives in the built environment.

This pilot was very successful, providing early-career and mid-career professionals with the knowledge and skills necessary to become sustainability leaders and champions. With a clear opportunity to grow that leadership and shift the dial on climate change response, Massey is now expanding the programme over 3 years to support more students. Amongst other initiatives, it aims to involve the industry in project selection.



LOW-CARBON RESEARCH INVESTMENT OVERVIEW

● Under way ● New funding 22/20/23

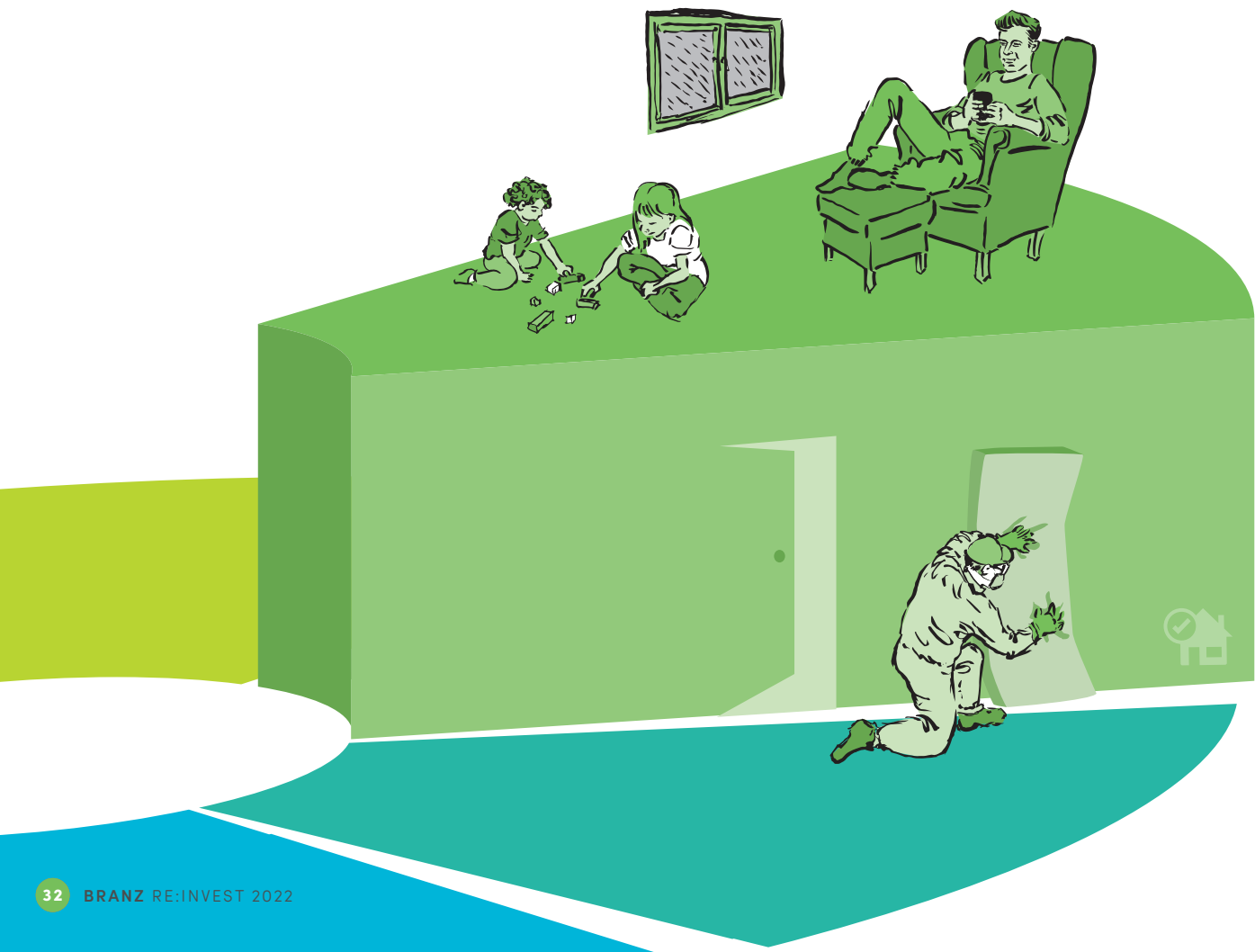
	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Transition to a zero-carbon built environment										
Low-impact buildings		■				■				2,118,060
Building Energy End-use Study (BEES) 2.0 – addressing energy demand			■			■				500,000
Transition to zero-carbon programme – leadership 2019–24			■	■	■	■	■			527,200
Innovative low-carbon residential water heating solutions				■		■				391,150
Transition to zero carbon programme – communication and dissemination				■		■				298,000
Scholarship: Emily Newmarch – Designing low-carbon architecture in New Zealand				■		■				75,000
Keeping carbon current				■		■				483,000
Energy and carbon certificates for dwellings				■		■				100,000
Get ready! Preparing building and construction businesses for the transition to zero carbon				■		■				401,700
Can materials durability contribute to a zero-carbon future?					■	■				87,100
Towards a New Zealand building stock model – scoping					■	■				170,000
Bio-based materials – New Zealand wood fibre insulation					■	■				296,000
Housing stock strategies for meeting New Zealand's 2050 carbon target					■	■				188,000
Zero-carbon built environment science leadership 2021–24					■	■				454,300
Measuring our sustainability progress – second update					■	■				226,500
Marginal abatement cost curves (MACCs) – phase 2					■	■				341,800

● Under way ● New funding 2220/23

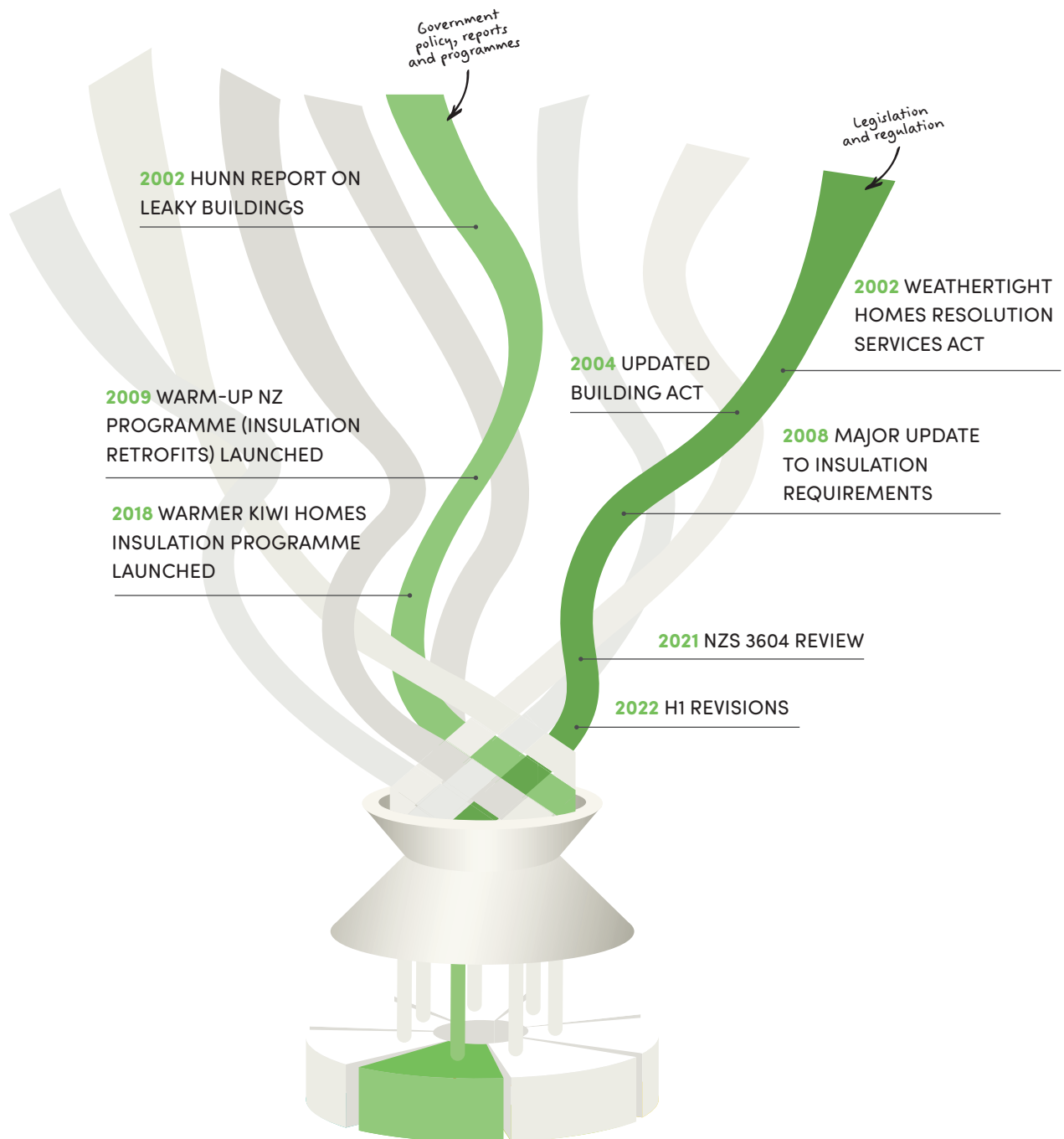
	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Future of work – what do we need to know to transition to zero carbon?					Under way	Under way	Under way			884,600
Seismic design and retrofit of hillside houses					Under way	Under way	Under way			717,700
Scholarship: Rosa Gonzalez – Carbon case for resilient design					Under way	Under way	Under way			75,000
Roadmap for evaluating building performance for low-carbon houses					Under way					109,600
Next-generation carbon footprinting tools – scoping					Under way	Under way				153,800
Is the Code fit for a changing climate?					Under way	Under way				174,800
Reducing greenhouse gas emissions in communities						New funding 2220/23				220,350
Addressing the climate impacts of MDH – an expanded assessment tool						New funding 2220/23				144,475
Digital enablement for green building product purchases						New funding 2220/23				114,845
Pathways to net-zero buildings in communities						New funding 2220/23				150,440
Non-traditional construction systems						New funding 2220/23				495,000
Carbon footprint of fit-out						New funding 2220/23				120,000
Overseas retrofit policies						New funding 2220/23				124,000
Low-carbon retrofit solutions for our changing climate						New funding 2220/23				399,500
Climate change response						New funding 2220/23				327,000
Overheating in apartment buildings						New funding 2220/23				399,500
Climate change impacts on marae						New funding 2220/23				176,100

QUALITY AND PERFORMANCE OF HOMES AND BUILDINGS

Buildings are fundamental to our way of life. Not only are they where we live, work and play, they house the foundations of our economy and represent the majority of fixed assets in Aotearoa New Zealand. Improving the quality, function and performance of our buildings is vital for supporting Aotearoa New Zealand's economic growth. BRANZ harnesses expertise in building performance modelling, testing, materials research and knowledge of building systems, codes and standards to address this issue.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



Indoor Air Quality (IAQ/IEQ) Research Centre

Levy investment	\$ 1,204,300
Timeframe	April 2022 – March 2023
Lead organisation	BRANZ Ltd

Indoor Air Quality Research Centre (IAQRC) aims to improve the understanding of indoor air quality for all New Zealanders. IAQRC consists of a multi-disciplinary team with specialist indoor air quality expertise, including researchers from BRANZ, GNS Science, Massey University, NIWA, University of Otago, Victoria University of Wellington and University of Canterbury.

IAQRC strives to accomplish the following:

- Increase awareness of indoor pollutants and health outcomes for occupants.
- Create a collaborative environment for indoor air quality research to thrive.
- Create opportunities for joint research proposals and funding optimisation.
- Build evidence-based knowledge of indoor air quality in Aotearoa New Zealand.
- Advocate for healthy indoor air quality.
- Grow indoor air expertise for research and industry.
- Transform current and future practice.

This project's ambitions are to raise awareness and provide resources to advance the understanding of indoor air quality in Aotearoa New Zealand. Given the need to mitigate the transmission of COVID-19 indoors, this work is more important than ever and includes providing practical advice to the public to improve indoor air quality.

Mould: finding the invisible – phase 1 investigation

Levy investment	\$277,000
Timeframe	February 2022 – March 2024
Lead organisation	BRANZ Ltd

How many times have you walked into a building and smelled something musty, earthy or mouldy but then found – after much searching – that there is no visible indication of anything untoward?

Recently, there have been moves to improve the quality of our buildings, and this is leading to more airtight construction with minimal passive ventilation. This presents new challenges, especially around the management of moisture inside the building envelope.

Instead of cold damp buildings, we are now potentially moving towards warmer damp buildings with increasingly ideal conditions for mould to grow rapidly. The compounds released by moulds can agitate or cause allergies, increase asthmatic effects, cause infections and, in rare cases, cause severe toxic reactions.

This research project aims to identify technologies that make invisible moulds visible. First, a literature survey will be conducted, and the initial testing of promising technologies will then be examined.

If successful technologies can be identified, this research will help deepen our understanding of the condition of Aotearoa New Zealand houses through BRANZ's House Condition Survey or similar. Ultimately, it could also lead to approaches to target remediation in affected buildings.

The future of national housing surveys: towards a collaborative approach

Levy investment	\$64,000
Timeframe	August 2021 – March 2023
Lead organisation	BRANZ Ltd

BRANZ has been undertaking national housing surveys since 1994 through its House Condition Survey and other research such as the Household Energy End-use Project. These are highly valued data sources used by a wide range of agencies, including government, NGOs and researchers. Increasingly, more building-related data is being collected.

To be useful, this data needs to be enduring – for example, to be used at government level for monitoring impacts of regulations/ interventions over time and for use in official statistics.

BRANZ is working with key government stakeholders such as the Ministry of Business, Innovation and Employment, Ministry of Housing and Urban Development, Energy Efficiency and Conservation Authority and Stats NZ. Through this project, we are developing a shared understanding of and commitment to how, when and what information will be collected and the roles and responsibilities in delivering the data collections. In doing so, we will adopt a systems thinking view of our housing surveys to consider where and how these align with or could better support end-user data needs. This will help ensure our work is shaped by the needs of others and the data we deliver has optimum value and impact for Aotearoa New Zealand.

Potential unintended consequences of high-performance construction

Levy investment	\$964,000
Timeframe	February 2022 – December 2025
Lead organisation	BRANZ Ltd

Many changes to how we build and the New Zealand Building Code result in unintended consequences. The changes proposed to clause H1 *Energy efficiency* are aimed at energy efficiency and making homes warmer, drier and healthier – all important improvements. But these changes have potential consequences for other areas of the Building Code such as fire safety and structural performance. For example, the increasing use of lithium batteries for non-building use has potential fire risks for buildings in which they are stored.

BRANZ is taking a systems thinking approach to this research to determine if these problems exist and, if so, how we might mitigate them while still achieving the high-performance buildings New Zealanders desire. By undertaking this research early, we hope to reduce the potential for problem construction remaining in the Aotearoa New Zealand building stock in the future. Ultimately, this research will inform development of the Building Code and modelling by enabling a more holistic approach to Building Code updates.

BRANZ high-performance construction details

Levy investment	\$2,195,000
Timeframe	April 2022 – April 2025
Lead organisation	BRANZ Ltd

To meet the challenges of climate change, all buildings need to be improved and solutions need to be developed and comprehensively assessed. The objectives of the *Warmer, drier, healthier homes* programme provide for this holistic approach, and this project is developing the technical solutions for both new buildings and deeper retrofits to existing buildings.

The project focuses on three areas:

- Ventilation – BRANZ researchers have recently recommended a shift to mechanical ventilation as the default option for all housing typologies. This project looks at the role ventilation can play in the context of climate change and changing heating habits.
- Building envelopes – facilitating the adoption of more thermally efficient building envelopes. Emphasis will be placed on simple, cost-efficient strategies while carefully considering the increased risk of moisture-related problems in high R-value assemblies.
- Occupant comfort – investigating how occupant comfort is affected by changes to the indoor environment and building envelope.

The research aims to address the knowledge gaps identified to enable all Aotearoa New Zealand homes to be warmer, drier and healthier by 2030.

Uptake of engineered wood products

Levy investment	\$68,000
Timeframe	November 2021 – June 2025
Lead organisation	Peak Projects NZ/Red Stag Investments

The awareness of mass timber as a construction option is increasing. However, there is currently no effective monitoring of the lead and lag indicators of its adoption in Aotearoa New Zealand.

The Mid-Rise Wood Construction programme is a joint venture investment between the Ministry for Primary Industries and Red Stag Investments through the Sustainable Food and Fibre Futures initiative. The programme's objective is to increase the building industry's understanding of mass timber's performance by using demonstration buildings to show how mass timber can be used to best advantage.

In 2019, BRANZ conducted a survey that resulted in BRANZ Study Report SR453 *Usage and uptake of engineered wood products in New Zealand*. In conjunction with BRANZ, the programme is now repeating this study in 2021, 2023 and 2025 to measure the uptake of mass timber in construction and identify any limitations to its uptake.

This new longitudinal study will measure qualitative indicators of adoption and quantitative measures of actual volumes of mass timber used in construction of mid-rise buildings in Aotearoa New Zealand. The results will be made available to the building sector.

QUALITY AND PERFORMANCE OF HOMES AND BUILDINGS INVESTMENT OVERVIEW

● Under way ● New funding 2022/23

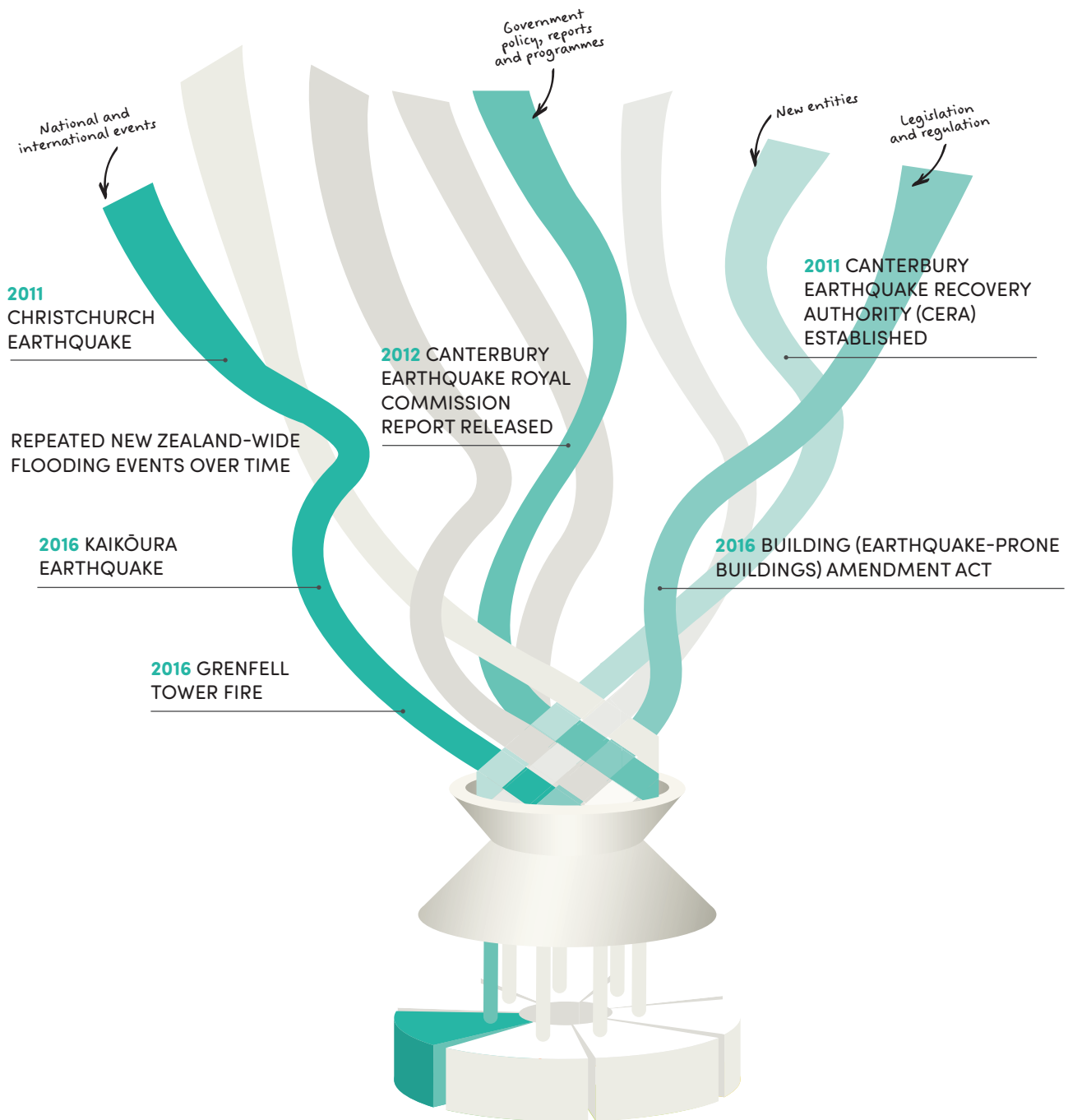
	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Warmer, drier, healthier homes										
Scholarship: Phoebe Taptiklis – Maintenance and dampness						Under way				75,000
HEEP2 – Energy insights from our homes				Under way						5,660,000
Streamlined compliance through generic product specs (Scoping)					Under way					289,500
Preservative treated timber outgassing					Under way					700,000
Indoor Air Quality (IAQ/IEQ) Research Centre							New funding 2022/23			1,204,300
Mould: finding the invisible – phase 1 investigation							New funding 2022/23			277,000
The future of national housing surveys: towards a collaborative approach							New funding 2022/23			64,000
Warmer, drier, healthier homes: comms and dissemination 2021–23					Under way					180,000
Potential unintended consequences of high-performance construction							New funding 2022/23			964,000
BRANZ high-performance construction details							New funding 2022/23			2,195,000
Stand-alone projects										
Durability verification database 2021-24					Under way					41,000
Towards durable timber structures – phase 2				Under way						1,140,000
Building for wellbeing					Under way					837,000
Update of engineered wood products						Under way				68,000
National Association Steel Framed Housing (NASH) CFS							New funding 2022/23			40,000
BRANZ monitoring network					Under way					745,000
Scholarship: Griffin Cherrill – Internal moisture from thermal bridges					Under way					50,000

RESILIENCE OF THE BUILT ENVIRONMENT

Aotearoa New Zealand is vulnerable to many weather hazards (wind, rainfall), climate hazards (sea-level rise) and geological hazards (earthquakes, volcanoes, tsunamis). Buildings and infrastructure need to be designed to minimise the risks from and withstand these events. BRANZ harnesses expertise in structural and non-structural engineering research, fire research, materials research and knowledge of building systems, codes and standards to address this issue.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



Fire safety quality processes in the New Zealand built environment

Levy investment	\$507,000
Timeframe	August 2021 – December 2023
Lead organisation	BRANZ Ltd

Fire safety systems are not needed until there is a fire. Other than specified quality assurance processes such as inspections, that means there is no ongoing verification of their proper operation, which is fundamentally different from structural, weathertightness and other building services.

Unless there is a robust system in place for reviewing, commissioning and inspecting these systems throughout the various phases of a building's life cycle, deficiencies may not be uncovered until it is too late, with potentially disastrous consequences.

This project is undertaking a mapping exercise and ecosystem scan of quality assurance processes and measures that are implemented to achieve building fire safety performance. A gap analysis of the current quality assurance system is being performed by considering building case studies where system deficiencies have been found. The third step is looking at barriers to building fire safety quality. A separate aspect of this project is delivering the first iteration of the building element fire assessment course as continuing professional development.

Improving confidence in fire safety system quality in Aotearoa New Zealand buildings is the aim of this project.

Non-structural elements

Levy investment	\$50,000
Timeframe	September 2021 – May 2022
Lead organisation	Building Innovation Partnership, University of Canterbury

Understanding how buildings are going to react in earthquakes is essential in Aotearoa New Zealand.

Recent research suggests a high likelihood of a magnitude 8+ earthquake causing major shaking in the South Island and lower North Island within the expected life of current building stock and new builds.

Non-structural elements are fundamental components within a building that are not considered to be part of the structural system. For instance, non-structural elements include weathertightness, fire, acoustic and thermal performance.

While Aotearoa New Zealand has a good understanding of the likely performance of building structures, very little is known about how non-structural elements will perform. Given these constitute about 80% of a building's value and provide much of the essential functions of a building, this information is vital.

Interviews with a wide range of industry professionals have concluded this information is not readily available. The sector needs a guidance document for the characterisation, specification and quality assurance of non-structural elements.

The purpose of this project is to investigate the value to the Aotearoa New Zealand building industry in developing a system for assessing and improving the seismic and functional performance of non-structural elements.

Continuous improvement of fire design: B-RISK 2021–24

Levy investment	\$212,000
Timeframe	March 2021 – March 2024
Lead organisation	BRANZ Ltd

B-RISK is a software application developed at BRANZ that allows users to analyse fire safety and smoke spread in buildings. B-RISK takes a systems approach that enables people to make the right choices.

The aim of this project is to ensure B-RISK continues to provide practising engineers with the best tools to support innovative fire design of buildings.

In 2017, BRANZ conducted an impact assessment of B-RISK, which identified the need for additional training and support based on feedback from users. And, there is a need to explore the potential business models that could be used to help maintain this tool.

This project will maintain and support the B-RISK fire software by:

- improving the user experience and responding to feedback
- ensuring the programme code is maintained and potential bugs investigated and fixed
- providing training to University of Canterbury Master of Engineering in Fire students through a 1-day hands-on seminar/workshop
- ensuring documentation is kept up to date.

Keeping B-RISK updated and ensuring the satisfaction of users will further support its uptake and help drive the construction of more cost-effective, sustainable and safer buildings.

Seismic performance of timber residential buildings with hybrid bracing solutions

Scholar	Mikhail Gedyma
Timeframe	March 2022 – August 2025
Tertiary institute	University of Canterbury

This research aims to provide technical solutions for timber buildings with hybrid bracing systems as the residential construction sector moves towards medium-density housing (MDH) solutions in Aotearoa New Zealand cities.

A large proportion of residential buildings in Aotearoa New Zealand are 1-2-storey light timber-framed (LTF) structures constructed in accordance with NZS 3604. However, MDH solutions are now being sought given the increased urban population and limited land supply.

Timber-based hybrid structures with steel, concrete or concrete masonry can provide a structurally sound and cost-efficient solution to meet the MDH demand. However, there are no approved design guidelines available for such hybrid structures, which may cause discrepancies in design and uncertainties in seismic performance.

This project is focused on recognising the differences between low-rise and mid-rise LTF hybrid residential buildings in terms of floor layouts, alignment of bracing walls between levels, types of structural systems and other considerations.

The research outcome will be used as a basis for expansion of the application of NZS 3604 to 3-storey (low-rise) LTF buildings with specifically designed bracing elements that use mixed materials. It will also provide updated design and construction methodologies for resilient mid-rise buildings.

NEW LEVY INVESTMENTS IN 2022/23

Human behaviour in fire – individual movement within crowds

Scholar	Luke de Schot
Timeframe	April 2022 – May 2026
Tertiary institute	University of Canterbury

This research explores the use of immersive virtual reality (VR) to study individual movement within crowds with the aim of improving emergency egress design for the built environment.

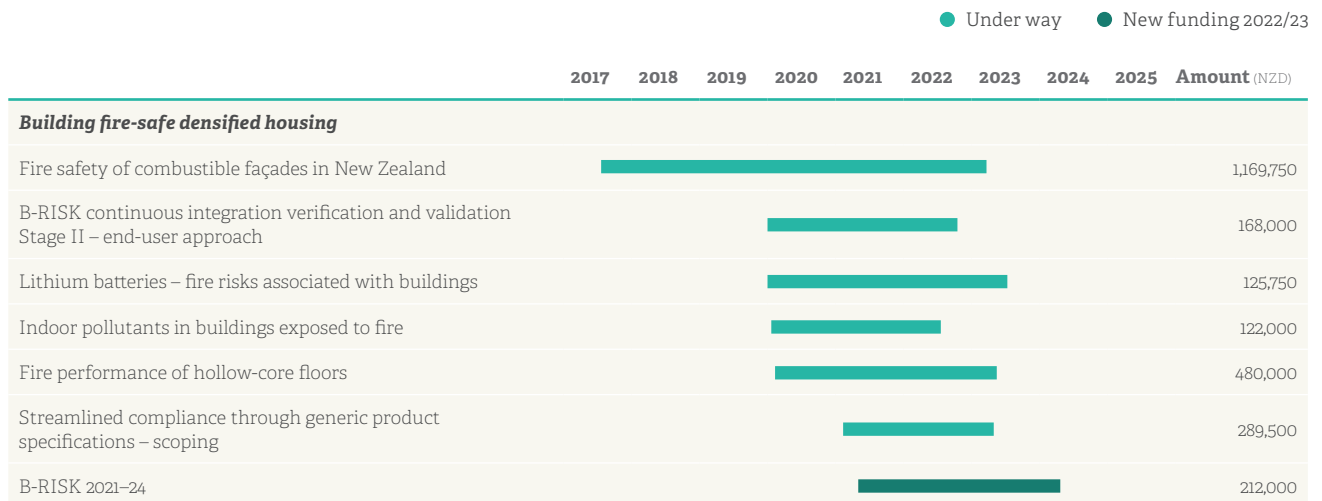
This work is essential due to the uncertainty associated with historical data currently used in evacuation models and changes in the built environment such as greater densification of housing and other buildings.

This requires observation and data collection of an individual’s movement within a crowd, which is difficult when their movements are often blocked from view by the people

surrounding them. Immersive VR can overcome this challenge and, by simulating a crowd, can also enable researchers to observe and collect individual pedestrian movement data without the disadvantages of real-life crowd experiments.

A series of experiments are testing the research question: Can VR be used as a valid means of collecting individual movement data for pedestrians in crowds?

RESILIENCE OF THE BUILT ENVIRONMENT INVESTMENT OVERVIEW

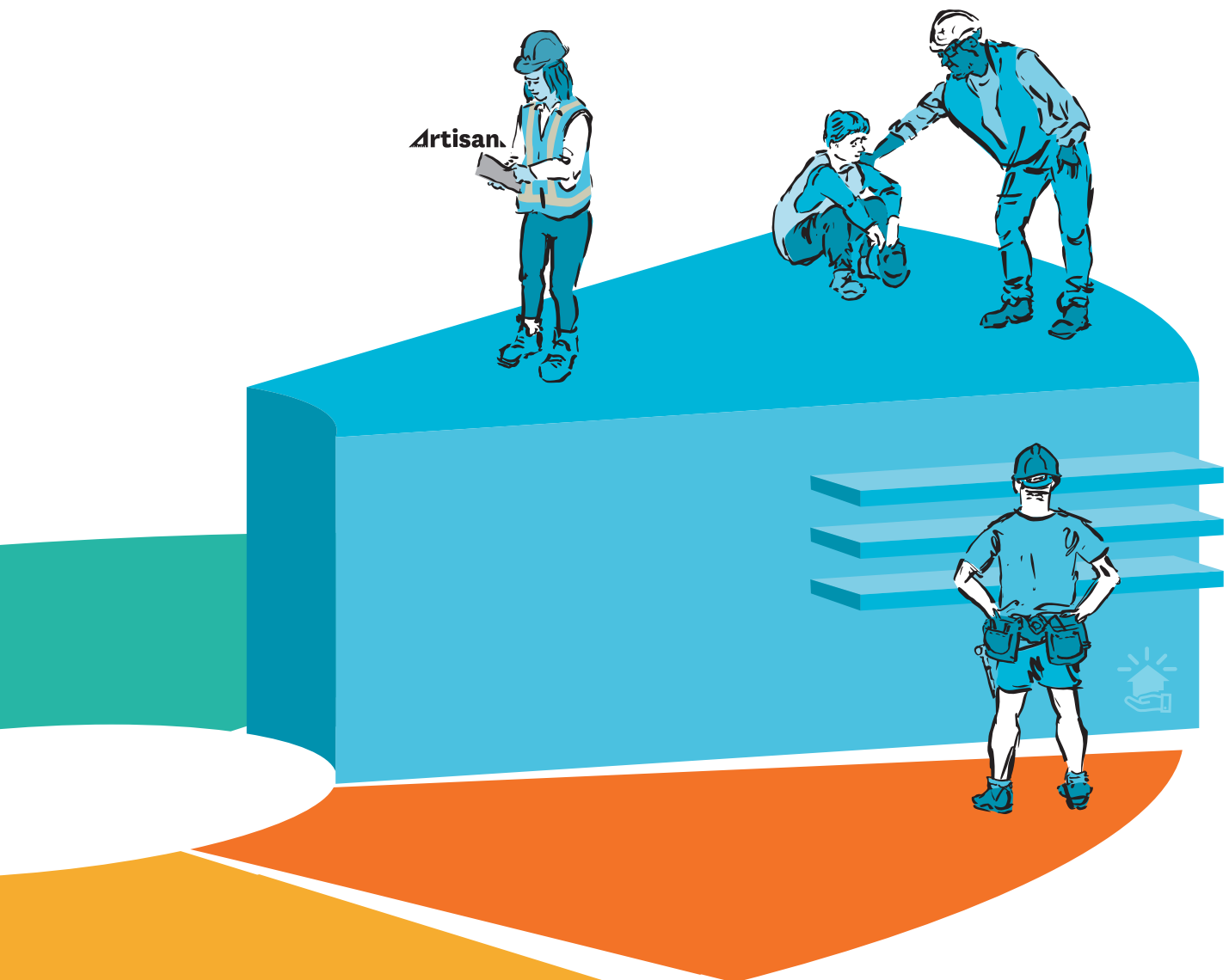


● Under way ● New funding 2022/23

	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Fire safety quality processes in the New Zealand built environment						██████████	██████████			507,000
Non-structural elements						██████				50,000
Scholarship: Luke de Schot – Human behaviour in fire – individual movement within crowds							██████████	██████████		42,000
Stand-alone projects										
Seismic design of low-rise and mid-rise hybrid residential buildings						██████████	██████████	██████████		1,021,000
Robust building system testing			██████████	██████████	██████████	██████████				50,000
ReCast floors				██████████	██████████	██████████				1,053,161
Scholarship: Jono MacIntyre – Predicting structural fire severity						██████████	██████████			75,000
Scholarship: Nicole Allen – Multi-volcanic hazard impacts						██████████	██████████			75,000
Scholarship: Mohamed Mostafa – Precast floors and torsion						██████████	██████████			75,000
Scholarship: Gordon Chen – Steel beam-column connections in fire						██████████	██████████			75,000
Scholarship: Kirill Panov – Metallic materials in geothermal environments						██████████	██████████			75,000
Scholarship: Mikhail Gedyrna – Seismic performance of timber residential buildings with hybrid bracing solutions							██████████	██████████		75,000

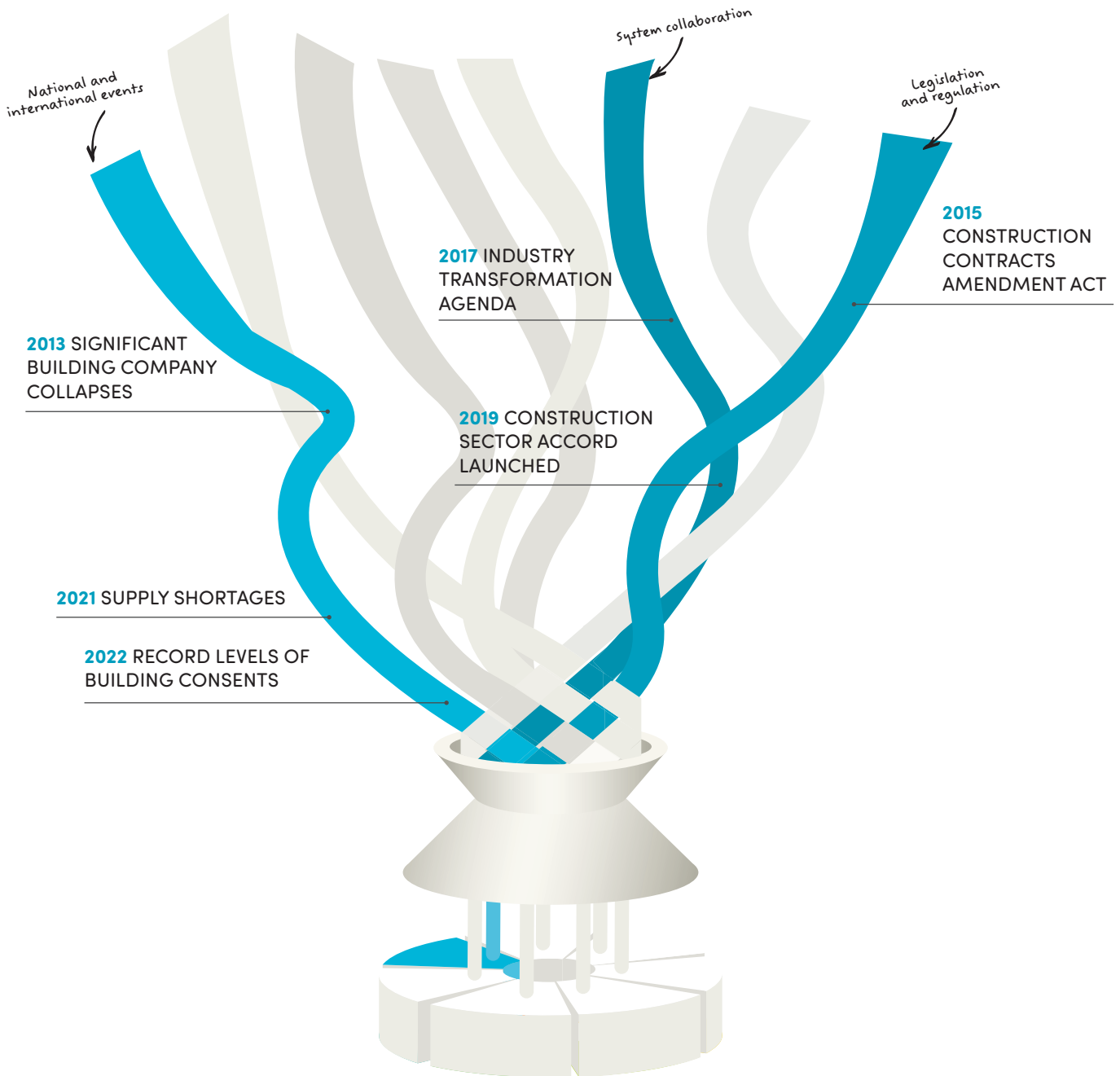
VIBRANT INDUSTRY

The building sector is crucial to Aotearoa New Zealand's economy. It contributes more than 6% to our gross domestic product (GDP) and employs more than 250,000 people. A well-functioning sector will have a positive effect on our country's health, economic stability, security and social cohesion. BRANZ harnesses expertise in leadership, systems knowledge, collaboration and economics to contribute to a well-functioning industry.



Artisan.

HOW PAST EVENTS HAVE SHAPED THE RESEARCH



Understanding and redirecting waste in residential construction

Levy investment	\$79,699
Timeframe	June 2022 – February 2023
Lead organisation	Auckland University of Technology (AUT)

Reducing waste in construction is particularly challenging as it typically comprises many distributed small businesses producing accumulative waste at different points in the supply chain. This scoping study takes a systems approach to understand the waste streams in supply chain and on-site construction. It is looking at the behaviours leading to such high levels of waste from the sector and the groups and initiatives active in reducing and removing waste streams.

The aim is to produce a systematic study of waste streams and regional variations in the Aotearoa New Zealand construction sector. This will be delivered through:

- a systems mapping diagram, which will provide an 'at a glance' overview of key material streams from material extraction through processing to on-site use as well as key leverage points where high levels of waste are being produced.
- an in-depth report, which will provide granular quantitative and qualitative data on the various key points of the mapping diagram.

This work will provide data around waste production to help inform reduction activities. The data gathered in this programme regarding the types, quantities and locations of waste created will also make it possible to measure the impact of policy or legislation changes.

Plastic waste on construction sites: a cooperative approach

Levy investment	\$171,885
Timeframe	January 2022 – May 2024
Lead organisation	Unitec New Zealand Ltd

This project is focused on how to reduce plastic waste on construction sites. This study is auditing the plastic waste generated from three commercial and three residential active new-build construction sites of different sizes (three small, two small to medium and one medium). The study will encompass the whole construction period to identify the main causes of plastic waste generation including packaging materials, componentry and building protectors.

The project team is working with the plastics industry, building product suppliers and manufacturers, and the waste management sector to identify opportunities for change. This includes identifying unnecessary and problematic plastics in order to eliminate them where possible, and identifying opportunities for creating circularity through reuse and recycling. The overall aim is to divert plastic waste from landfill.

The team is also working with the construction sector to develop, communicate and implement practical on-site solutions to reduce plastic waste.

The resulting data will be made available to inform tools such as LCAQuick that are relied on by architects, designers and structural engineers to make sustainable design decisions.

Timber construction and demolition waste research

Levy investment	\$195,000
Timeframe	July 2022 – May 2024
Lead organisation	Tonkin & Taylor Ltd

Through data collection and stakeholder engagement, this research project aims to improve current understanding of the profile of timber entering the waste stream from construction and demolition (C&D) projects.

The sources and triggers that generate timber construction and demolition waste exist throughout the material and project life cycle. A series of activities could be addressed with respective owners to improve timber waste management and reduce the timber C&D waste ending up in landfill. These range from processing raw materials and designing the building through to renovations or demolition.

This project is estimating the quantity and profile of timber waste generated during one commercial construction project and two residential construction projects by using on-site data collection. This will provide the basis for an evidence-based estimate of timber waste generated on similar projects and also a timber waste measuring methodology. This methodology can then be used by others as a basis for better future data collection on other subsets of C&D waste.

The data will provide high-level commentary on the status quo approach to dealing with timber C&D waste. It will also be used to refine existing assumptions regarding construction-related timber waste in Aotearoa New Zealand and associated climate impacts in life cycle assessment studies.



Understanding building product substitution

Levy investment	\$39,130
Timeframe	May 2022 – October 2022
Lead organisation	EBOSS

Product substitution has always occurred within the construction industry. However, recent pandemic-induced supply chain issues have increased substitution activity.

This project aims to understand the prevalence and impacts of product substitution within the construction industry, how substitution is initiated, the experience of substitution now and how substitution differs by product category.

This project is surveying builders, architects, designers and building consent authorities (BCAs) to obtain data on the prevalence, impact and detail around product substitution in the Aotearoa New Zealand construction industry. This will help inform the Ministry of Business, Innovation and Employment, BCAs and the wider industry about issues surrounding product substitution.



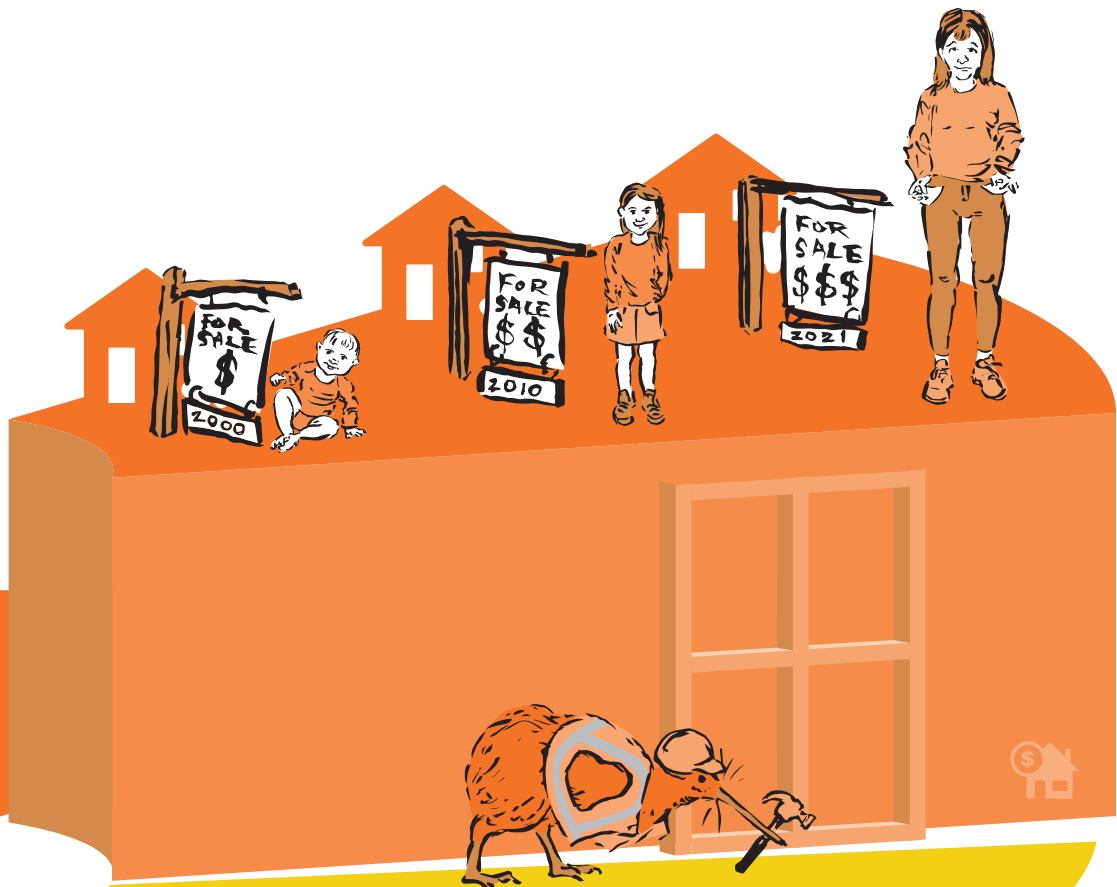
VIBRANT INDUSTRY INVESTMENT OVERVIEW

● Under way ● New funding 2022/23

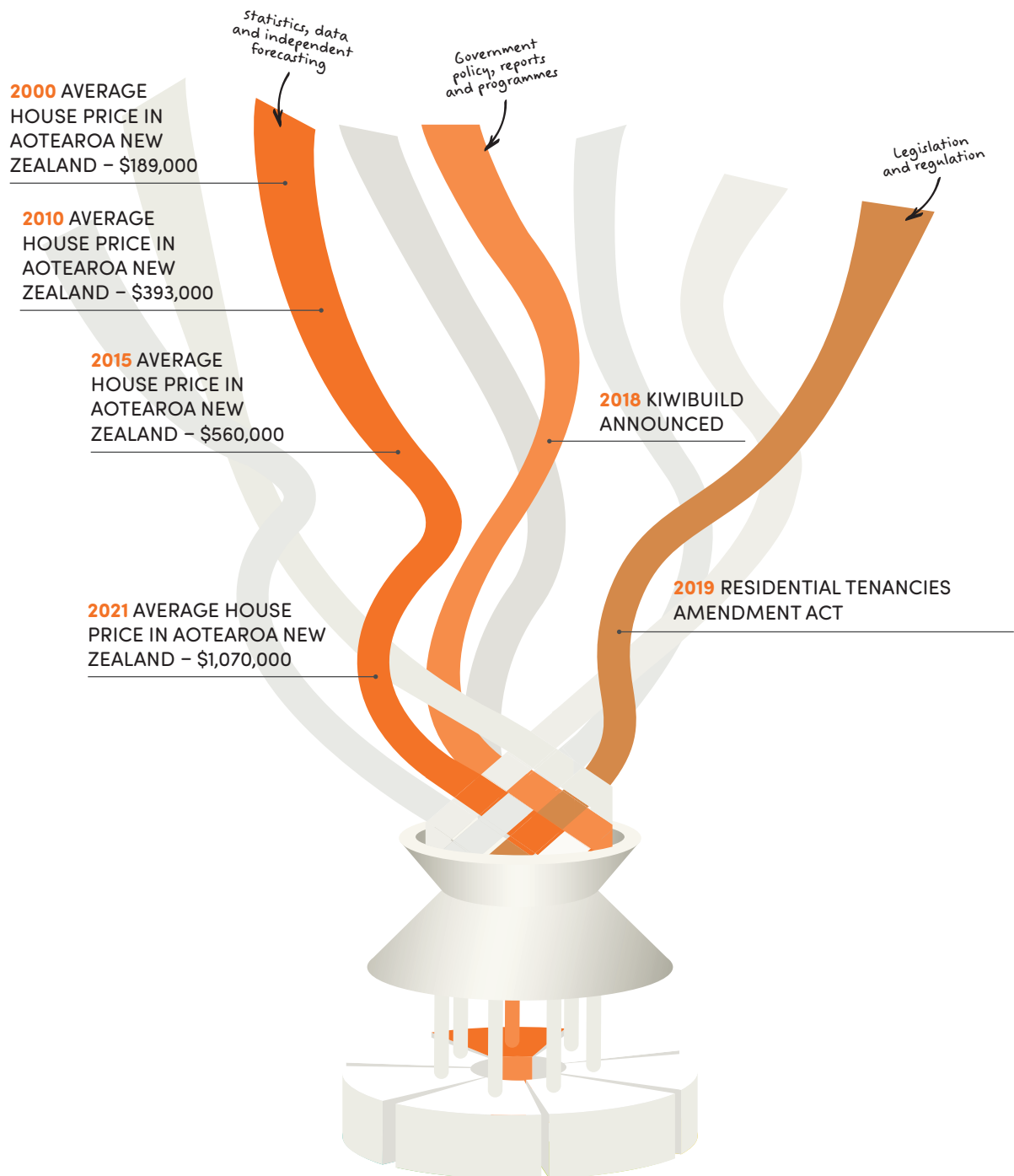
	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Stand-alone projects										
Monitored at work? Real-time employee monitoring technology				■	■	■				139,274
ArchEngBuild 2022						■				79,334
New House Owners' Satisfaction Survey 2021-2025					■	■	■	■	■	226,800
MyBRANZ Knowledge and digital knowledge transfer				■	■	■				1,408,000
Build magazine 2021-24					■	■	■	■		2,820,000
Advisory services 2021-24					■	■	■	■		1,028,000
Education 2021-24					■	■	■	■		1,710,000
Guideline 2021-24					■	■	■	■		90,000
Bulletins 2022-25					■	■	■	■	■	452,000
Materials and characteristics survey 2021-24						■	■	■		310,000
BRANZ Levy Forecast 2021-24						■	■	■		412,400
Library – information management 2021-24						■	■	■		922,000
Building controls 2021-24						■	■	■		990,000
Understanding and redirecting waste in residential construction						■				79,699
Plastic waste on construction sites: a cooperative approach						■	■	■		171,885
Timber construction and demolition waste research						■	■	■		195,000
Understanding building product substitution						■	■	■		39,130
Scholarship: Gerard Finch – Prefab architecture			■	■	■	■				82,000

HOUSING AFFORDABILITY

Housing affordability is a major concern for many New Zealanders. An increasing number of New Zealanders have found themselves priced out of home ownership, and the cost of rental housing has also become an issue for many. Access to decent, affordable housing has become a priority issue for both government and industry. BRANZ harnesses expertise in economics, forecasting, social science, building system and building performance to address this issue.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



Alternative tenure opportunities

Levy investment	\$247,500
Timeframe	May 2022 – June 2023
Lead organisation	Livingston and Associates Ltd

Housing costs are continuing to increase faster than household incomes, reducing housing affordability to both private renters and potential first-home buyers and giving rise to the need to explore alternative types of tenure.

Previous research investigated whether intermediate/shared-equity tenure models used overseas are applicable in Aotearoa New Zealand and if they could improve access to affordable good-quality housing with long-term security of tenure.

This project builds on that research by investigating how various alternative tenure models could potentially be implemented in an Aotearoa New Zealand context. This research examines how the interrelationships between elements of housing and related systems impact on the opportunity for alternative tenure models to support the provision of affordable housing.

This systems-based analysis will provide insight into the viability and opportunities associated with alternative tenure models.

The campaign for rent controls

Scholar	Nicolas Guerrero
Timeframe	February 2022 – November 2022
Tertiary institute	Victoria University of Wellington

As households continue to be pushed out of the residential property market, an increasing proportion of New Zealanders are relying on the private rental market for long-term accommodation. The possibility of rent controls has resurfaced in both public and policy debates due to this growing unaffordability.

Rent controls are supported by tenancy unions and advocacy groups. However, they have received strong criticism from property investment and industry groups. Currently, there is a major gap in the literature about the impact major policy change such as rent controls may have and what this means for the building and construction industry.

This research answers whether major policy change within the rental sector is on the horizon. It also critically analyses the dominant and competing narratives within housing and how these have changed over time.

Application of inclusionary housing practices

Scholar	Sam O'Brien
Timeframe	February 2022 – February 2023
Tertiary institute	University of Otago

Inclusionary housing is a development tool that is currently underutilised in Aotearoa New Zealand. Inclusionary housing can refer to a programme, regulation or law that makes available incentives to private developers to incorporate affordable or social housing as a part of market-driven developments.

It is a means of using the planning system to produce affordable housing for people with low to medium incomes. This project considers whether inclusionary housing practices provide a viable model to respond to issues of housing affordability and community isolation throughout Aotearoa New Zealand.

The housing system is prone to facilitating the economic and racial isolation of communities, and traditional methods

of housing provision have failed to adapt. Using policy interventions at a local level, inclusionary housing is one proposed solution to address housing affordability and isolation and to increase affordable housing supply.

Queenstown Lakes District Council is one of the few local authorities that has implemented a formal inclusionary housing programme. This research project evaluates the Queenstown model and analyses whether its inclusionary housing practices have been successful in improving access to affordable housing and fostering diverse communities.

The research is seeking to understand the potential barriers and challenges to the widespread implementation of inclusionary housing nationwide.

HOUSING AFFORDABILITY INVESTMENT OVERVIEW

● New funding 2022/23

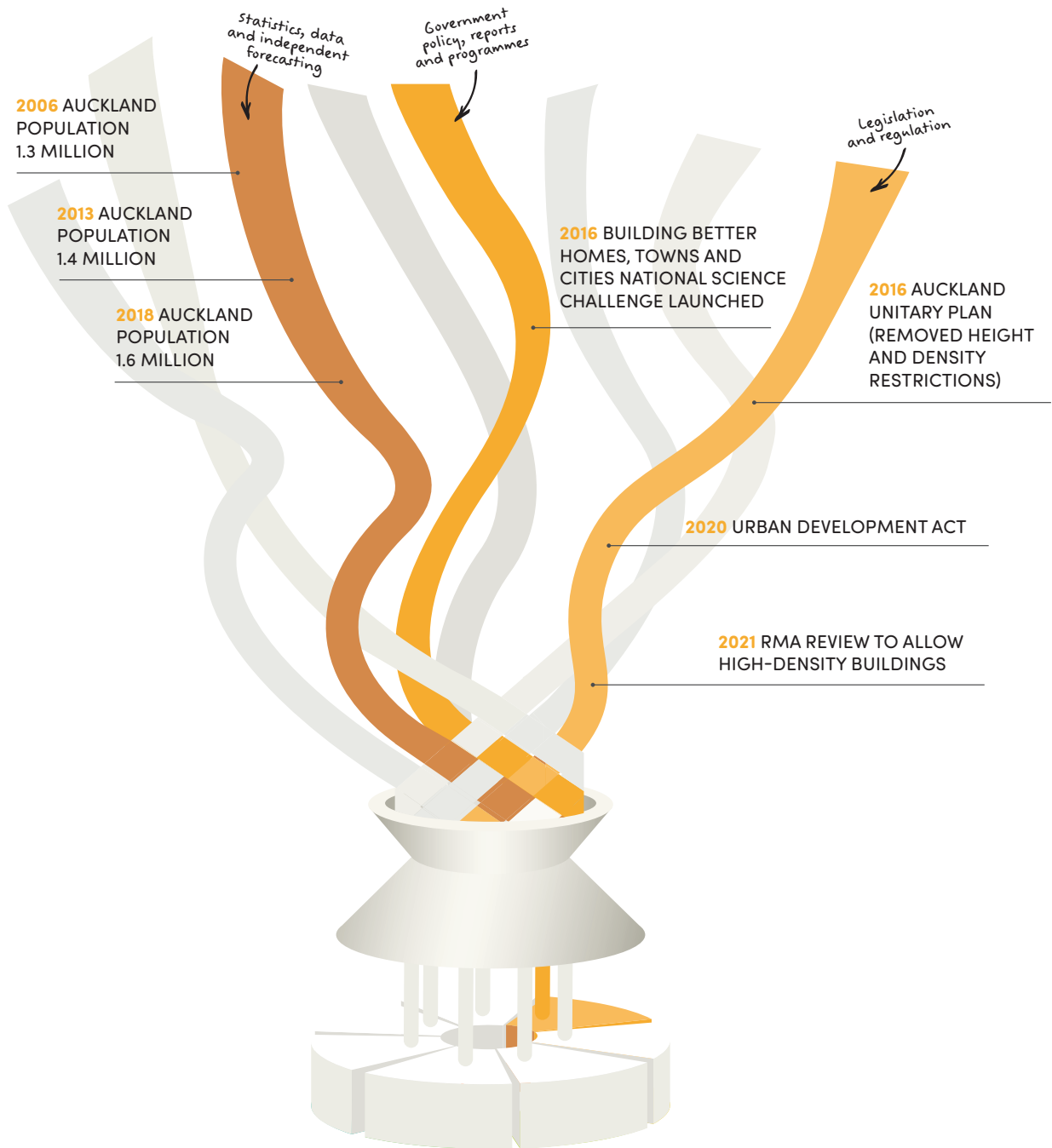
	2022	2023	2024	2025	Amount (NZD)
Stand-alone projects					
Alternative tenure opportunities		██████████			247,500
Scholarship: Nicolas Guerrero – The campaign for rent controls		████			20,000
Scholarship: Sam O'Brien – Application of inclusionary housing practices		██████████			20,000

THRIVING CITIES, REGIONS AND COMMUNITIES

Successful well-functioning cities and regions are the engine room of a well-running country. Aotearoa New Zealand cities and regions are key to delivering a stronger, more diverse, inclusive and productive economy. Projections to 2042 show that Auckland's population will increase more than the rest of Aotearoa New Zealand's growth combined. However, not all urban areas and regions are growing rapidly – some are at risk of economic decline. Aotearoa New Zealand's future economic, social and environmental performance relies heavily on the performance of all our cities, regions and urban areas. BRANZ harnesses expertise in economics, sustainability and building system and building performance to address this issue.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



THRIVING CITIES, REGIONS AND COMMUNITIES INVESTMENT OVERVIEW

● Under way

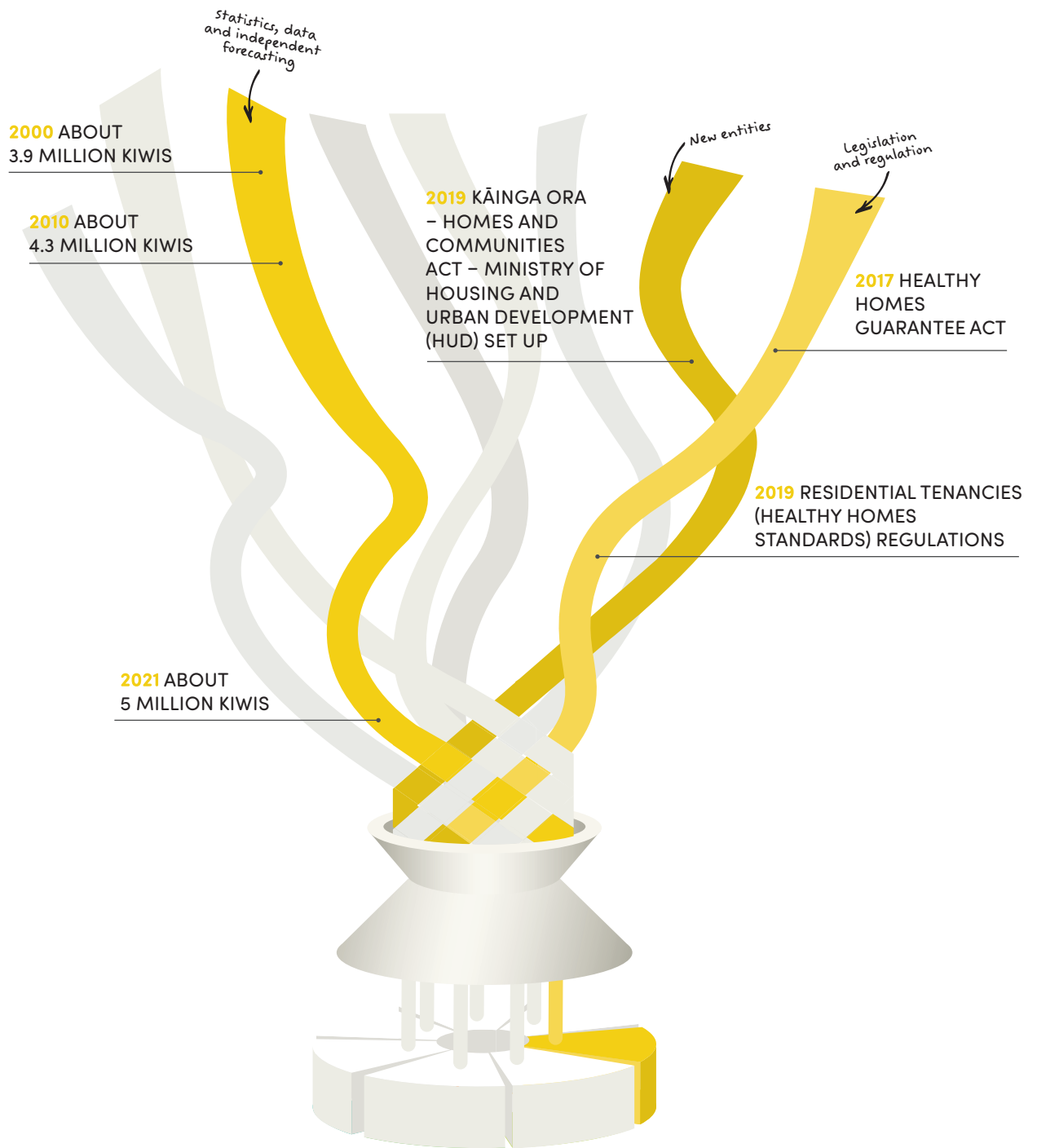
	2017	2018	2019	2020	2021	2022	2023	2024	2025	Amount (NZD)
Stand-alone projects										
Communities under construction										254,000

MEETING AOTEAROA NEW ZEALAND'S POPULATION NEEDS

As our population grows and changes, the demands on our homes, public buildings (schools, hospitals, libraries) and commercial buildings also change. We need to ensure that our buildings continue to meet Aotearoa New Zealand's diverse population needs now and into the future. BRANZ harnesses expertise in economics, forecasting, survey design, sustainability, understanding building quality and performance to address this issue.



HOW PAST EVENTS HAVE SHAPED THE RESEARCH



NEW LEVY INVESTMENTS IN 2022/23

Visual comfort in housing for dementia

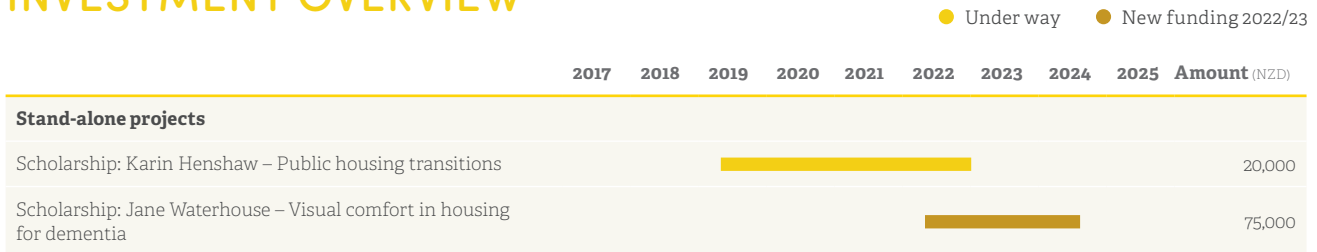
Scholar	Jane Waterhouse
Timeframe	April 2022 – August 2024
Tertiary institute	University of Auckland

As Aotearoa New Zealand’s population ages, better understanding of their housing needs is required. This research responds by specifically looking at what constitutes supportive housing for people living with dementia who are ageing in place.

Evidence suggests that suitable visual environments, among other building factors, have the potential to ameliorate a person’s dementia symptoms and contribute to their wellbeing. However, existing literature does not adequately demonstrate how Aotearoa New Zealand housing could be designed or adapted to construct supportive daylit spaces for people living with dementia.

This PhD research investigates whether Aotearoa New Zealand housing’s prevalent use of non-dementia-specific criteria for daylit spaces provides visually comfortable conditions for people living with dementia. The findings will lead to the development of appropriate housing adaptations to support ageing in place for this population and contribute to the current understanding of dementia requirements for visual environments.

INVESTMENT OVERVIEW



LOOKING TO THE FUTURE



ACCESSIBLE AND
ACTIONABLE RESEARCH

RESILIENCE
OF THE BUILT
ENVIRONMENT



VIBRANT
INDUSTRY



QUALITY AND PERFORMANCE
OF HOMES AND BUILDINGS



HOUSING
AFFORDABILITY



LOW-CARBON
RESEARCH



THRIVING CITIES,
REGIONS AND
COMMUNITIES



MEETING AOTEAROA
NEW ZEALAND'S
POPULATION NEEDS



THE DIFFERENCE
THE RESEARCH
HAS MADE



TRANSFORMATION THROUGH WORKING TOGETHER

Collaboration is at the heart of what we do at BRANZ to ensure the successful, sustainable transformation of the built environment and building and construction system. We invest the Building Research Levy to improve the building system by co-creating enduring solutions that make a real difference in the lives of people in Aotearoa New Zealand.

We hope you have enjoyed learning about the research invested in by BRANZ in 2022/23 and how information gleaned from our wide-ranging scanning activities contributes to our investment decision-making processes.

As we look to the future, BRANZ remains committed to an enduring collaborative effort with a range of system players. We will continue to listen, learn and share information, expertise and research to explore new ideas across the BRANZ portfolio to find practical solutions for the system.

If you are interested in finding out more about BRANZ's research projects, our investment approach or how to apply for funding, please visit our website www.branz.co.nz/investing-research.

For any queries relating to the Building Research Levy funding for potential research collaboration, you are welcome to email researchinvestigations@branz.co.nz.



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