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BUILDING KNOWLEDGE

ISSUE 205 | AUTUMN 2025

Quality • affordability

Is it either-or?

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The quality quotient

When Dael and I sat down to brainstorm topics under the quality umbrella that we might cover in this issue of *Build*, we quickly realised what a multifaceted and complex theme it is.

There's quality of workmanship – probably the most obvious angle. This, I suspect, remains front of mind for most Kiwi homebuyers in light of the leaky homes saga and the despair and hardship it has caused. David Hindley gets to grips with this angle on page 44, unpacking the problems and potential solutions driven by Levy-funded research and other interventions.

Closely related are the systems that support high-quality workmanship – in particular the vexed consenting and inspection systems. David also examines these on page 44 and again, in much more depth, on page 38. Digital technology will undoubtedly offer solutions, and on page 74, Nick Helm explores the various ways in which emerging technology might contribute to higher quality and more sustainable outcomes.

Then there's quality of life. On page 82 there's a fascinating piece on nature-positive infrastructure – an idea gaining momentum overseas where new infrastructure projects are designed to achieve a net biodiversity gain. And on page 64, I introduce new Levy-funded research that will inform design and retrofit guidelines for the daylight environment of a vulnerable – and growing – community: older people living with dementia.

Of course quality, as one of the pressing concerns facing the sector, doesn't exist in a vacuum. It intersects and interacts with other critical priorities: housing affordability, resilience and sustainability. Quality and affordability seems like a particularly difficult balance to strike but as BRANZ CEO Claire Falck argues on page 6, with a strong evidence base and long-term thinking, there's good reason for optimism.

Enjoy the read!

Ngā mihi nui

Colin Barkus
***Build* Editor**

BRANZ

BRANZ's vision
Challenging Aotearoa New Zealand to create a building system that delivers better outcomes for all.

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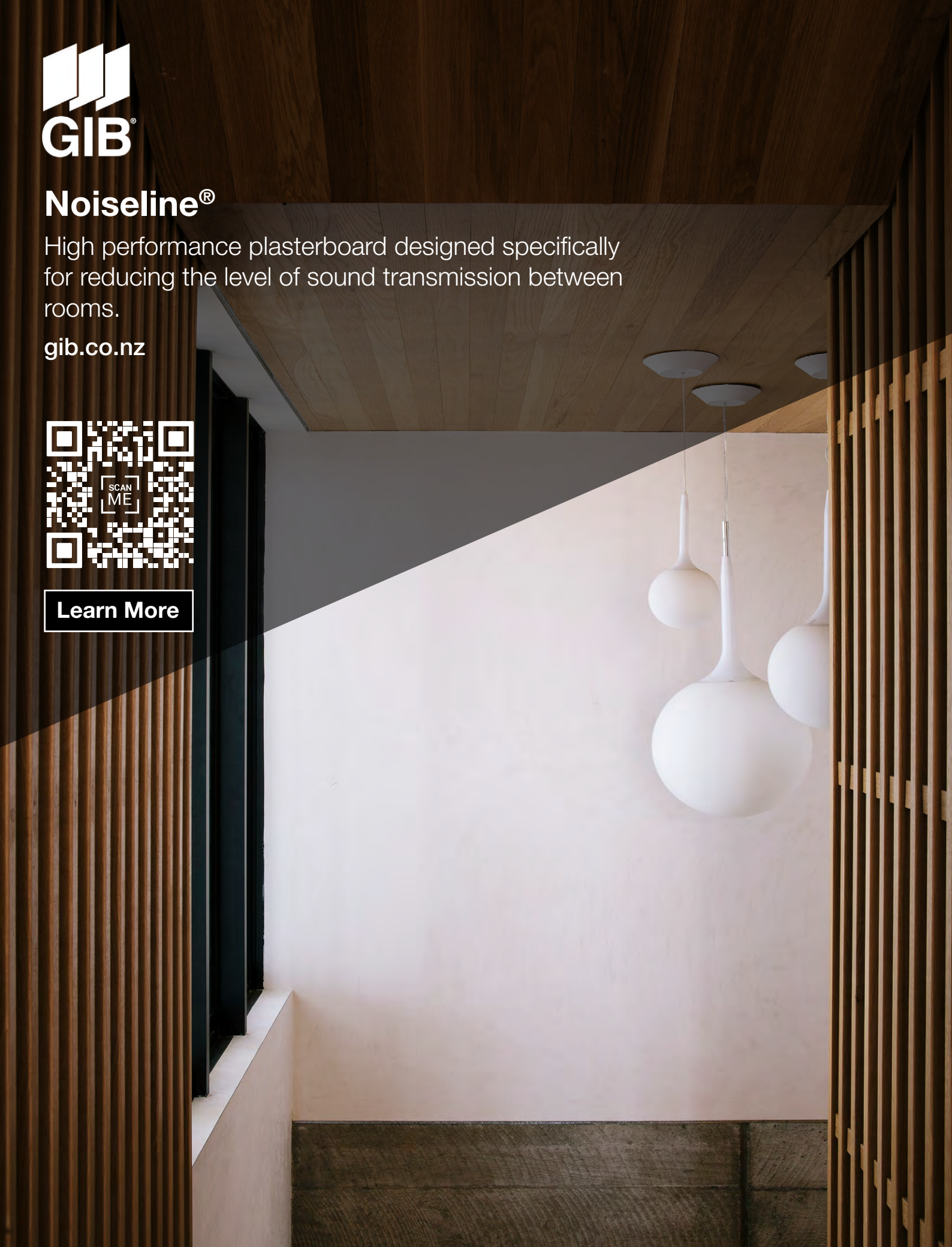
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OPINION

Balancing the quality/ affordability equation

BRANZ CEO *Claire Falck* identifies the need to balance affordability and quality as among the most pressing challenges facing the sector in 2025.

Often when we start talking about improving quality standards in the building industry, the default response is 'but what about affordability?'– the concern being that the two concepts are mutually exclusive or 'quality equals expensive'.

It's not an unreasonable concern, but it is an inaccurate assumption, and I don't think New Zealand has to – or should – choose between the two.

Every year, we're confronted with news of a range of building flaws and failures. Already in 2025, we've seen stories emerge about overheating townhouses, new weathertightness issues in apartment complexes, blatant non-compliant practices and multi-million-dollar repair costs.

There's no question that, collectively, the sector needs to do better because the costs to building and homeowners of putting things right will always far outweigh the cost of getting them right first time.

Creating a quality habit

I don't usually quote Aristotle(!), but he once said, 'Quality is not an act. It is a habit.' This is the standard that the sector needs to aspire to – we need quality baked in to every aspect of the building system, but we need to find affordable ways to achieve this.

And quality does not mean luxury. For example, off-site manufacturing and prefabrication are proving their worth by increasing productivity and reducing cost. These methods produce quality, durable products that are affordable and emphasise sustainability.

Further improvements in quality will increasingly be driven by new technologies, including the integration of AI. These resources have the potential to revolutionise the building sector by enabling high-quality, cost-effective solutions that enhance efficiency, sustainability and safety. Many technologies are still in their infancy but are already punching above their weight in terms of impact.

Two examples immediately spring to mind – building information modelling (BIM), which improves design accuracy and facilitates better project management and cost control, and Artisan, which supports quality assurance across the build process and is successfully used as a virtual inspection tool, cutting down wait times and reducing cost.

New technologies that expand the uses and limits of prefabrication techniques will likely be at the heart of sustainability and affordability efforts. These are just the tip of the iceberg, and as we know, AI is already proving a game changer for almost every global industry. Building will be no exception.

Engaging on regulatory reform

Last year saw the beginnings of significant building consent reforms. This focus on creating more efficiencies and streamlining building and construction through new and amended legislation is welcome. The current consenting regime is notoriously inefficient, and expensive as a result. Research funded by BRANZ and led by the University of Auckland estimated that half a million days of productivity are lost each year because of those consenting inefficiencies. That impact on housing affordability is significant.

Similarly, BRANZ has supported an amendment Bill to remove barriers to importing overseas building products – albeit with the caveat that all product assessments are evidence-based.

Our view is that all products must be safe, resilient and fit for purpose given New Zealand has unique climatic, UV and seismic conditions. BRANZ wants to ensure there are safeguards in place to minimise any unintended consequences by identifying both low-risk and higher-risk product categories.

If we are to create a sector-wide quality habit, we must be wary of any unintended consequences, including false economy.

The secret sauce

While we agree affordability is a major concern – and much of BRANZ's work is dedicated to housing affordability – we must avoid short-term thinking and consider the long-term return on investment. We need to ensure that, in saving money, we don't cut corners.

Technology and regulatory reform alone won't create the habit mentality. Ultimately, it is about every person in the sector being committed to quality as a non-negotiable. We must be ambitious and aspirational. It's a delicate dance, but the right balance can be achieved through cross-sector collaboration and ensuring we rely on good science and evidence-based solutions.

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Building confidence and resilience in 2025

As we usher in 2025, optimism is cautiously making its way back into New Zealand's building and construction sector, says *Ankit Sharma*, CEO of Registered Master Builders Association.

The past few years have been marked by significant challenges, testing the resilience of builders, developers and suppliers alike. As the dust begins to settle, we see signs of recovery and fresh opportunities on the horizon and it's time to focus on building confidence – in the industry and for clients.

Recent data from Stats NZ provides an encouraging snapshot of the sector's trajectory. In November 2024, 3,100 new homes were consented – a 4.8% increase compared to the same period in 2023. Multi-unit homes saw a significant 14% percent rise, while stand-alone houses dipped slightly by 4.1%. These figures paint a picture of cautious optimism, with developers and clients starting to revisit their building plans. This shift, while modest, is a step in the right direction.

Why confidence has returned to the market

A critical driver behind this is the reduction in the official cash rate (OCR) over recent months. Lower interest rates have begun to ripple through the economy, improving access to finance for both developers and prospective homeowners. Although enquiries have increased across the sector, the conversion of those enquiries into signed contracts remains slower than we might want. This highlights a lingering hesitancy among clients, but further OCR cuts may provide the certainty they need to move forward.

Indeed, the latest NZIER Quarterly Survey of Business Opinion also showed the building sector was the most optimistic, with a net 29% of building sector firms positive about the economic outlook for the coming months. This was a sharp turnaround from the 9% of firms feeling pessimistic in the September quarter and over 50% in the first half of 2024.

Building stronger foundations

Beyond the numbers, 2025 presents an opportunity for the sector to strengthen its foundations. One initiative I am excited about is Master Builders' new voluntary financial rating programme, launching in partnership with CreditWorks. It will allow builders to demonstrate their financial health and robust business practices to clients, suppliers and lenders – going beyond traditional credit checks to offer an analysis of financial metrics highlighting the professionalism and stability of businesses.

This initiative is not just about meeting today's challenges – it's about preparing for the future. As the market recovers, businesses combining craftsmanship with sound financial governance will best succeed. Master Builders is committed to supporting our members in this and enhancing the reputation of the sector.

Opportunities for growth

The opportunities for growth in 2025 go beyond residential builds. The deficit in affordable housing and infrastructure is a challenge that has spanned decades and successive governments. As economic conditions improve, we must be ready.

The initiatives aimed at reducing red tape and driving productivity are a welcome step. However, their success will depend on the details of their implementation. Master Builders looks forward to working closely with government to ensure these policies translate into tangible benefits for the sector.

One area of focus is efficiency in the consenting process. Streamlined processes for low-risk residential builds, backed by guarantees, could free up valuable resources for more-complex projects. Technology has a role to play in enabling initiatives like this. BRANZ's Artisan is the perfect example. Many of our members use it as a quality assurance tool and as a consenting tool because having a record of work completed streamlines the consenting process. We believe this will play a role in any self-certification solution. Initiatives like these will enhance productivity and standards.

Looking ahead

As we set the stage for 2025, my message is that confidence is the cornerstone of recovery. Together, we have the tools and resilience to build not just homes but stronger businesses and communities. Let's embrace the opportunities, sharpen our skills and demonstrate the professionalism that defines our industry.

Our sector has weathered its share of storms, but brighter days lie ahead. With them comes the promise of growth, innovation and success. Let's make the most of it.

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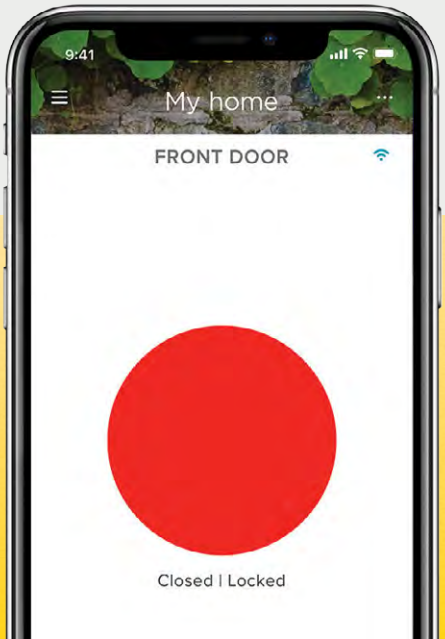

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Sector round-up

Recent events and highlights from the building and construction industry here and around the globe.

Financing global green building

Alliance recommends steps to raise global building sustainability standards.

A global alliance of leading environmental groups – the UK's Building Research Establishment, the Green Building Council of Australia, the Singapore Green Building Council, the US Green Building Council, and Alliance HQE-GBC France – is pushing to use innovative financing to bring buildings up to modern sustainability standards.

A report by the alliance – *Building Transition: How to Scale and Finance an Inclusive Transition for the Built Environment* – lays out how to attract capital to the 75% of underperforming buildings. The alliance sees this as a crucial step towards decarbonising at scale.

The report identifies a critical gap. While high-performing buildings have access to green finance and resources, most buildings remain locked out due to a lack of capital. These are some recommendations to address this:

- Policy and taxonomy reform – stronger policies and taxonomies that direct capital towards underperforming buildings and context-specific, performance-oriented criteria tailored to diverse building types, ensuring investment reaches all buildings.
- Global decarbonisation standards – defining a credible decarbonisation transition and providing common standards, metrics and decarbonisation tools that can be used globally while allowing for harmonisation across diverse assets and geographies.
- Resilience in financing – incorporating adaptation and resilience in real estate finance to account for the impacts of both acute and chronic climate events. Currently, this is not a common practice in real estate finance, and lack of resilience makes lower-performing buildings – the other 75% – more vulnerable to becoming stranded assets and suffering from climate impacts.

A row of houses in the UK.

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AI and the science of design

Are there ways that AI can improve building design?

Artificial intelligence (AI) is seen by some in the industry as a driver of change in building design – with science-led design, powered by AI, enabling data-driven decisions, improving building performance, urban planning and human wellbeing.

While AI in design has to date mostly focused on streamlining processes through digital tools, it has the potential to create more fundamental changes in how buildings are used and operated and how they connect with people and wider urban systems.

Science-led design is an approach that brings research and data into creative processes to enhance decision making with greater information about how a building or place might perform or to assess its impact on people or the planet.

It uses evidence and defined targets – from building sensors, human experience data and even climate or infrastructure data – to enhance design for specific outcomes.

Despite the advantages of science-led design, its development has been limited by the ability to bring complex datasets from the built environment together or integrate research and data from other sectors. AI is changing this paradigm.

Now, machine learning, natural language processing and AI algorithms are providing new opportunities for integrating science-led design into building development and design.

It is lifting previous limitations around integrating new research into evolving work patterns, predictive maintenance scheduling, advanced manufacturing processes or even neuroscience.

As an example, a study by IBM and Earlham Institute, a life science institute in Norfolk, UK, used AI to gain deeper insights into human circadian rhythms, with possible applications in lighting design in buildings.

In the future, design teams may include computer programmers or AI technologists who can facilitate deeper collaboration between disciplines such as biomedical or psychology and building engineering and design.

Swiss scientists pull water from the air

A team of Swiss researchers has unlocked a potentially game-changing innovation that could revolutionise air quality in indoor spaces by creating walls and ceilings that can suck water from the air and store moisture until a room can be properly ventilated later.

While sales of dehumidifiers and air purifiers skyrocketed during COVID-19, these devices can't stop a scientific fact – when groups of people gather in tight spaces, the air will inevitably become thick with humidity.

And while most office buildings and schools are equipped with effective mechanical ventilation, it can be extremely expensive to run and energy-hungry.

To find a solution, scientists from ETH Zurich used the waste from marble quarrying, bound it with alkaline solution and built a 3D-printed wall and ceiling. They simulated a room filled with people and showed that the building material they used can significantly reduce humidity in indoor spaces.

This breakthrough is potentially huge as the materials and 3D-printing method are more cost-effective than traditional components and better for the environment.

The benefits of a common language

Standardising language can help to prevent defects.

The NSW Building Commission has established a building defects library that standardises the language around 40 of the most common defects found by building inspectors.

Five categories relating to apartment buildings are covered – fire safety, waterproofing, structure, building envelope and building services. Previously, inspectors have been free to describe defects in their own terms, leading to differing interpretations and confusion. The information is presented in a downloadable booklet with text and images.

Acting NSW Building Commissioner Matt Press says a common taxonomy of building defects was needed because there are so many ways to describe a defect that communicating with industry about the most common ones was difficult.

'We could say the number one defect is waterproofing, which is fascinating, but to be meaningful to the supply chain, you need to go down to a granular level about what we're talking about. Are we talking about interior or exterior, bathrooms, particular walling systems, roofs, moisture management? We need to be specific.

'This means we can say to a building surveyor, how about you use this type of language to describe defects in your inspections? For their part, builders can use the library to prepare for inspections. It's useful for them to know the 40 or so defects we as the regulator see 80% or 90% of the time so they can avoid those pitfalls.'

London's calling for retrofits

Policy backs retrofitting city buildings.

The City of London has introduced new policies that support the city's RetroFit progamme, encouraging the reuse of existing buildings and other circular economy measures. Developers will be provided with the Planning for Sustainability Supplementary Planning Document (SPD) for guidance on how they should approach the sustainability policies in their planning applications, including the design and construction of buildings.

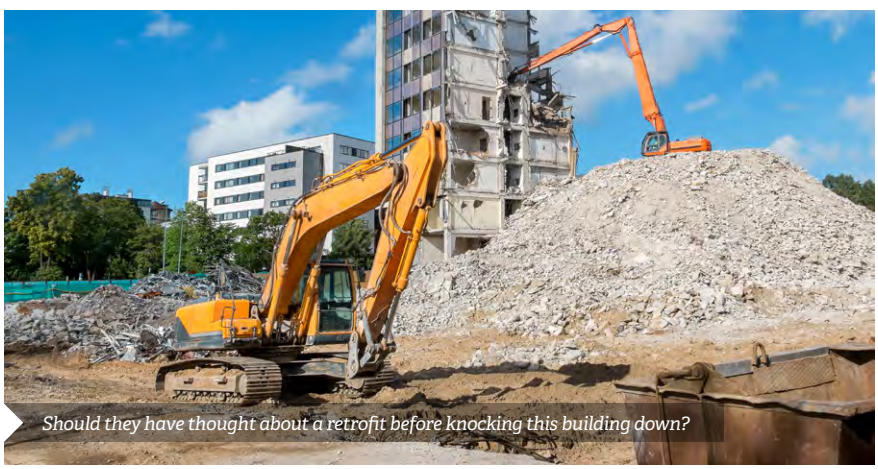
RetroFit was launched in September 2019 and has been adopted by several local councils apart from the City, including Westminster, Camden and Bath and North East Somerset. More planning authorities are expected to follow.

The new SPD would offer a degree of flexibility if planning applications fall short of the upfront carbon benchmarks. In such cases, developments will be expected to go above and beyond in their delivery of wider environmental sustainability benefits in central London's Square Mile.

This could include creating or extending local energy networks, supporting sustainable transport modes through significant public realm upgrades, implementing City climate resilience infrastructure such as cool routes – the use of a digital wayfinding tool to find the coolest routes for walking or cycling through a city on a hot summer's day – or providing skills and training opportunities in sustainable construction.

The rising value of recycled materials

Valuing long-term use.



Should they have thought about a retrofit before knocking this building down?

It's increasingly common to maintain existing buildings rather than knock them down. It makes financial sense too – according to recent analysis by McKinsey and the World Economic Forum. Their analysis highlighted the role of circular retrofitting in conserving natural resources, meeting decarbonisation targets and cutting costs to 77% when compared to constructing a new building.

McKinsey says that, to meet global net-zero carbon targets, the retrofit market must grow from $500 billion today to $3.3 trillion by 2050. Reaching this target could result in a reduction of 500 million tonnes of carbon emissions annually and divert materials worth $600 billion from landfills by that date.

'There is also a growing awareness around the value of construction materials and how to protect that value for longer periods of time, as opposed to simply tearing down existing buildings and starting again from scratch. By upgrading existing building stock, energy consumption can be reduced, and people can adapt to future higher temperatures without relying heavily on carbon-intensive materials required for new construction.

'Businesses and governments are beginning to recognise the potential of this approach but making it the global standard is imperative.'

By Daniel du Plessis and Matt Curtis, BRANZ Economists

Affordability improves for mortgage holders

While there has been significant reduction in interest rates from a high of 5.5% in July 2024, the outlook for mortgage rates in 2025 points to more gradual and steady reductions. Current forecasts suggest the OCR will stabilise between 3% and 4% over the next 2 years, with the Reserve Bank aiming for a neutral OCR of around 3%. That means mortgage rates are likely to settle somewhere between 4.5% and 5% over the next 2 years..

Declining consents for new homes set to improve

Stats NZ reported in February that 33,600 new homes were consented in the year ending December 2024 – 9.8% less than a year earlier. As a result, there has been reduced pressure on the industry's productive capacity, which has naturally dampened the growth in cost for both materials and labour. This downturn in construction activity followed a prolonged period of above-average growth in the demand for new homes. However, the recent decrease in demand for new homes is still above the lows experienced during the global financial crisis and there are early signs in the new dwellings data from Stats NZ that a trough in construction activity may have been reached.

During 2025, construction activity is expected to improve as mortgage rates stabilise further, net migration flows turn positive and increases in construction costs remain subdued.

FOR MORE Any comments? Contact daniel.duplessis@branz.co.nz or matthew.curtis@branz.co.nz

New guidance targets reduced slope slip damage

New guidance from the New Zealand Geotechnical Society (NZGS) will make it easier for geotechnicians to identify and evaluate landslide risk.

Landslides are New Zealand's deadliest and costliest natural hazard on average, but until now, there hasn't been a consistent approach for evaluating landslide hazards.

'The lack of a good practice document can sometimes lead to the same slope being evaluated by different people with completely different results,' says Richard Justice, lead author of the guidance and an expert in geotechnical risk assessment.

'For years, New Zealand's geotechnical community has been calling for clear and consistent advice on how to conduct site investigations and hazard assessments for landslides, and we've made a big step in that direction through this new guidance.'

FOR MORE Visit www.nzgs.org/libraries/slope-stability-unit-1 to view the first guidance unit.

More landslide claims than ever

The Natural Hazards Commission Toka Tū Ake reported late last year that it had received almost 10,000 claims for damage from landslides in the last 3 years, nearly 10 times more than the previous 3 years.

The country's natural hazards insurer is urging homeowners to make sure they understand the natural hazards that could impact their properties and the limits of their insurance.

'The significant storms in recent years caused devastation to communities across the country,' says NHC Toka Tū Ake Chief Resilience and Research Officer Jo Horrocks.

'Landslide damage can be complex and costly to fix, and the insurance available for damaged land is limited. It's really important to understand the risks, think about ways to protect your property and factor that into your financial planning – before an event happens.'

NHC Toka Tū Ake says there are things homeowners can do to identify signs of potential slipping and prepare their property.

FOR MORE www.naturalhazards.govt.nz/be-prepared/homeowners/slopes-and-retaining-walls

Revised earth building standards released

Newly updated New Zealand earth building standards are freely available, paving the way for designers, builders and engineers to further advance this sustainable practice for tomorrow's built environment.

The set of three standards – NZS 4298:2024 *Materials and construction for earth buildings*, NZS 4297:2024 *Engineering design of earth buildings* and NZS 4299:2024 *Earth buildings not requiring specific engineering design* – better align with the Building Code.

The standards help promote the use of earth in a variety of traditional wall techniques and cover mud brick or adobe, cob, pressed earth bricks, rammed earth, internal adobe veneers, earth floors, and earth or lime plasters. Informative guidelines for using allied natural building techniques – straw bale and light earth that uses a fibrous clay mix within a timber framework – are also included.

IN BRIEF

Resilient Organisations rebrands

Resilient Organisations has rebranded as ResOrg. ResOrg says the name connects it to its whakapapa and acknowledges the broader mahi done today and into the future. A new logo has an organic shape that can change its form to suit its environment. This reflects ResOrg's core philosophy – to enhance the capacity of organisations, systems and sectors to respond, adapt and thrive through change.

Funding boost to save lives

The lives of more construction workers will be saved after the government boosted funding for mental health and suicide prevention charity MATES in Construction New Zealand. Funding provided through the Innovation Fund will support MATES to expand further into the regions. It will also support new training programmes in 2025 requested by the industry.

BCITO backs apprenticeship awards

BCITO has come on board as a sponsor of the New Zealand Certified Builders Apprentice Challenge, which celebrates up-and-coming leaders in the construction sector by putting their carpentry skills to the test.

Apprentices compete at regional heats on 12 April with winners going through to the national final to be held at the NZCB conference on 6–7 June. Entries close on 20 March.

FOR MORE For more information and to register, visit www.apprenticechallenge.nz.

Iwi works with scientists on natural hazards

New partnership improves emergency preparedness.

Porirua's Takapūwāhia community has partnered with GNS scientists to map its exposure to natural hazards. It is using the information to protect its people and property from future events.

The results have helped the community make important decisions about where to place emergency supplies and how to protect homes and key resources – like marae, kura and medical centres – from natural hazards.

Takapūwāhia is home to 1,500 people, the majority of whom are tangata whenua from Ngāti Toa Rangatira iwi. The land is vulnerable to earthquakes, tsunamis, landslides and other natural hazards, so Ngāti Toa knows it is only a matter of time before an event strikes. It wants the community to be prepared.

'As climate disasters increase in frequency and intensity, Māori face growing threats to their lands, homes, taonga, people and culture,' Board Chair of Takapūwāhia Marae Callum Kātene says. 'Emergency management frameworks often fail to incorporate Māori perspectives, limiting the effectiveness of disaster response efforts in our community. Future planning informed by research empowers Ngāti Toa to lead themselves in times of crisis to ensure they can better respond and recover from disasters.'

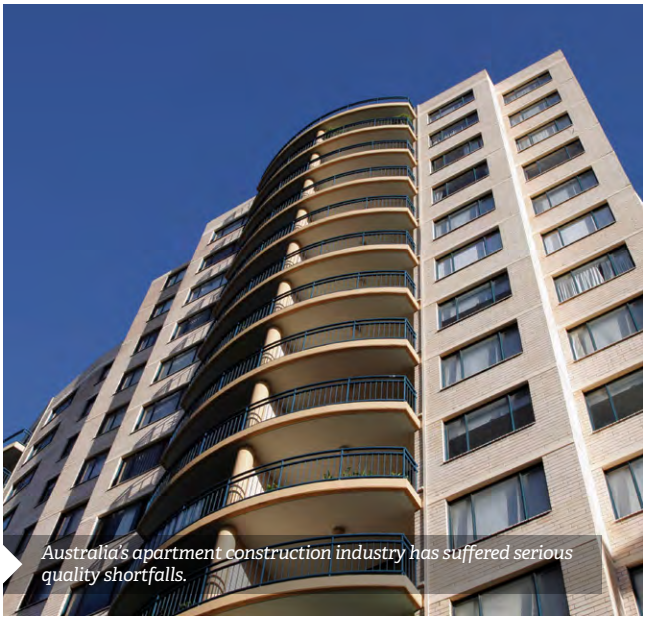
Technical expertise was provided by GNS Science and funded through It's Our Fault, a collaborative research programme studying Wellington's earthquake risk.

Hazard maps at Takapūwāhia, Porirua.

'This project demonstrates how science can support communities to become better prepared and resilient to these forces,' says Dr Andrea Wolter, a GNS landslide hazard scientist on the project team.

'We started by meeting with tangata whenua to determine how we could help. This included protecting their people, buildings and infrastructure from the natural hazards they are exposed to and was followed by data collection, hazard mapping, impact assessment, a street survey and a rapid assessment of potential sites to host emergency supplies.'

The scientists worked with the community to understand its needs such as finding buried river channels, planning sites for community gardens and locating the most vulnerable individuals. The result was a report and maps that show where natural hazards are likely to affect the community and recommend potential sites to host emergency response containers.



Australia's apartment construction industry has suffered serious quality shortfalls.

Fixing the quality problem in Australia

Report identifies options for better-quality apartments.

A report has been released following concerns about the quality of some new high-rise apartments in Australian cities, including situations where the apartments had to be abandoned by the people living there.

Constructing Building Integrity: Raising Standards Through Professionalism addresses the need to enhance public trust in the residential apartment sector, focusing on improving quality and reducing defects in multi-storey apartment buildings. It highlights the role of various professionals in the construction industry and how their standards and interactions can be improved to achieve better outcomes.

Reasons for the quality issues were identified as aggressive competition, work overload, competence issues and a lack of robust integrity systems, including institutional frameworks, to ensure accountability and governance.

The report makes five recommendations:

- Establish an apartment industry development agency.
- Create national centres of excellence in residential apartment housing.
- Raise standards in education, training and education.
- Promote, protect and improve professional standards through regulation.
- Enhance and support professional associations' ethical standards frameworks.

FROM THE BRANZ HELPLINE

Lining external walls behind built-in fittings and fixtures

In this issue, we address recent queries we've received regarding continuity of internal linings to residential external perimeter walls.

First, we look at residential renovations. It's always interesting uncovering the work of a previous builder or DIY renovator during the initial strip-out or partial demolition phase of a renovation project. With older homes, you often reveal obsolete building materials or practices. The renovation offers an opportunity to make good these shortcomings and ensure the home meets current performance expectations.

A common query involves wall linings (or lack of) behind built-in fittings and fixtures such as kitchen benches and cupboards, built-in bathtubs or laundry cabinetry. In most older homes (and more alarmingly, many recent homes), these spaces have no internal wall linings at all. With our current awareness of insulation installation and performance, we know that these surfaces must be fully insulated to perform optimally if they are on exterior walls – so they must also be fully lined. Sheet junctions should also be taped or stopped (at least a first coat) to prevent air movement – more efficiently than flexible building wraps can. These surfaces are inaccessible after the bathtub or joinery unit is installed (out of sight and out of mind!) so do it while the rest of the wall is being lined.

A companion query is whether these surfaces must be lined and insulated in a new-build situation. For the same reasons, the answer is yes. There is no excuse for these walls being left unlined, but sadly it still occurs. Diligent practitioners will go even further – using boots around pipe penetrations and sealant along the floor/bottom plate junction.

The bottom line is do it once, do it right.

What they said…

'Some of the issues we heard are around windows not having wide openings. And the way windows are oriented – if they're large windows, they can attract a lot of heat.' *– Lisa Dunshea, Auckland Council Urban Design Manager, commenting on overheating problems with some medium-density housing.*

'The wider residential construction sector has been in a downturn for about two years now, with dwelling consents falling and actual workloads subsequently declining too. The industry has come off extreme highs recorded during COVID, and building activity remains solid when compared to previous cycles. Even so, it does look like there is capacity opening up, which has reduced the pressure on costs.' *– Kelvin Davidson, CoreLogic Chief Property Economist.*

'Grumpy space tends to be a private outdoor area so that you can get away from either people in your own house or people within adjoining houses, privately. Even if it is quite a small area.' *Tim Gittos, architect, Space Craft.*

These days, he deserves his own laundry.

New home trends revealed

Show discovers what's attracting new homeowners in Australia.

Real estate agents at a display home show in Australia have identified four trends attracting new homebuyers – the most-effective way to build on a sloping site, adding a granny flat, building two properties on an empty block and adding a pet laundry.

Sloping blocks are often more affordable than flat ones and often come with stunning views. Modern construction techniques make them achievable and more cost-effective than ever due to innovations such as advanced footing systems and prefabricated construction.

Granny flats are a popular trend among homebuyers for many reasons – the space can be a source of income or a crash pad for family and friends or double as a separate study or workspace. They also accommodate multi-generational families, providing a private spot for ageing parents or adult children. The loosening of regulations around their construction is a further reason for their rising popularity.

Building two properties – a duplex – on an empty block or demolishing an existing house and creating two homes in its place helps address rising property prices and housing shortages without adding to the urban sprawl. They help contribute to the trend towards sustainable, community-focused urban planning by optimising land use, reducing infrastructure expansion, and promoting walkable neighbourhoods.

A surprising trend is the growing popularity of pet laundries – a space that offers a convenient way to wash the family pet. Equipped with features like walk-in doggy showers and storage for pet supplies, they make pet care easier and more organised and offer a cosy spot for pets to relax.

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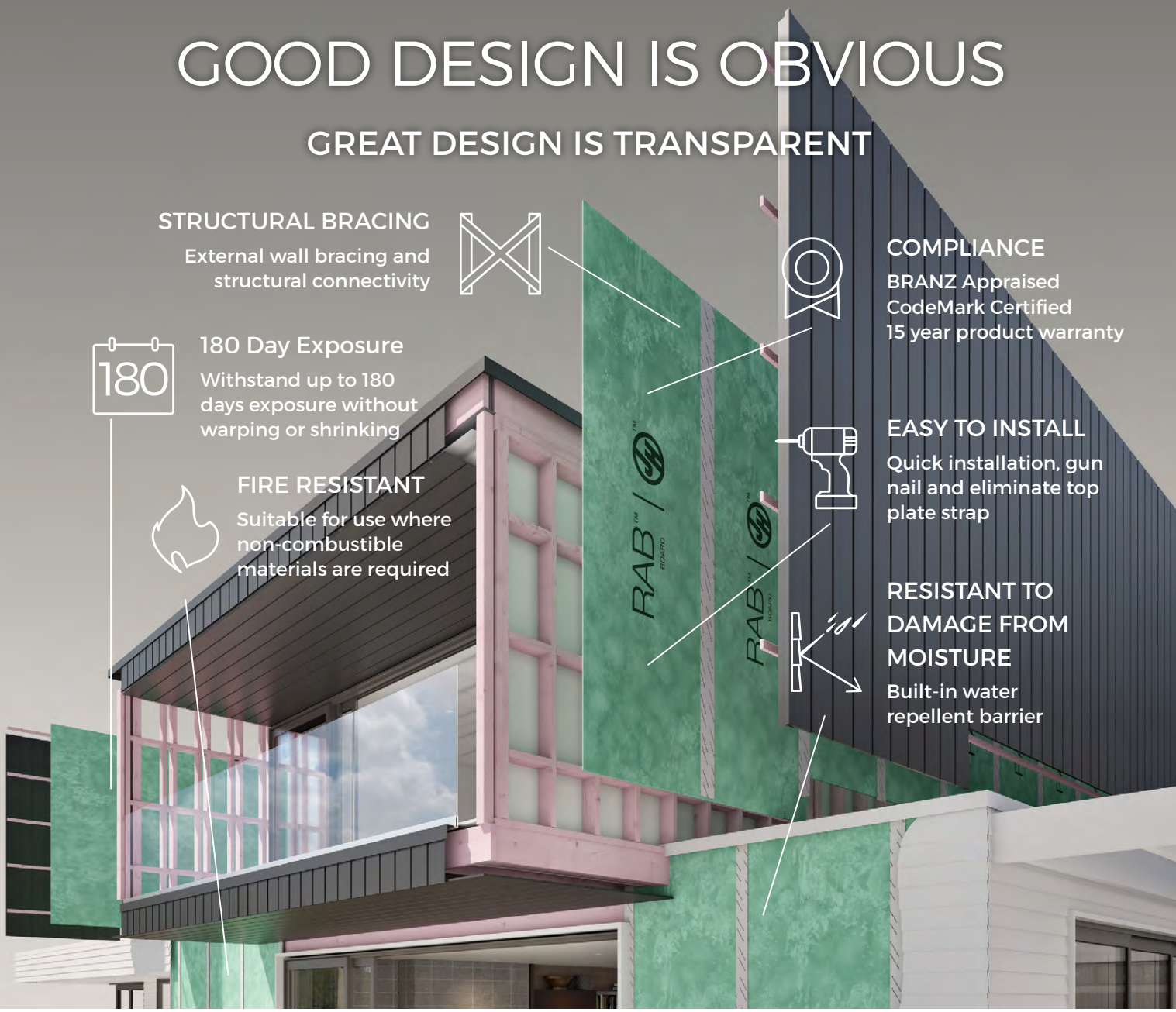

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Fired up about work

Peter Whiting's career took some unexpected turns before he became BRANZ's award-winning Senior Fire Engineer and Fire Testing Team Leader. A dalliance with night cleaning at McDonald's didn't work out – and New Zealand's building designers, owners and occupiers are thankful for it!

Q. What attracted you to fire engineering as a career – did you have a youthful fascination with fire or was there some teacher or connection that fed your interest?
The short answer is no. My career as a fire engineer began at BRANZ 30 years ago and it was unplanned. Read on!

Q. What was your study and work history leading up to BRANZ?
I graduated with a building science and architecture degree from Victoria University just after the share market crashed – yes, that ages me! The downturn that followed meant I couldn't find any architectural work, so I took off to England for 2 years hoping for better things. It wasn't much different there. I got a couple of interviews, but to be honest, I was a bit disillusioned with architecture by that point. I ended up working a few other jobs, including night cleaning at McDonald's!

When I returned to Wellington, I ended up back in my old student job in the parts department at Continental Cars. I'd always been fascinated with cars – and it proved a useful move. One of our clients was prominent architect Roger Walker, who invited me to work with him for one day per week. That led to a full-time compliance job with Tse Group Architects looking after building warrants of fitness, and although I was made redundant 18 months later, I had some very useful experience in my résumé.

Times were still tough and I must have applied for 60 or more jobs before – out of the blue – I got an interview with BRANZ in 1995.

Q. How did your career at BRANZ develop?
I was employed in the fire research team. One of my first jobs was to set fire to buildings in the paddock outside and record data to drive a new BRANZ fire model. I loved it.

Once I was into the role, I was asked if I'd be interested in retraining as a fire engineer. It was a hard yes! However, as my existing qualification was in architecture, I needed to complete some prerequisites, including physics and chemistry, before studying fire engineering at Canterbury. I'd always been a B or C student, just

getting by, but studying to support my career at BRANZ gave me immense focus. I started getting top results and questioning why I'd lost marks rather than how to gain them!

A new fire manager arrived at BRANZ – John Clampett – who managed to fast-track me onto an Australian fire engineering

course without prerequisites. I block-studied in Melbourne and it was very rewarding. It also exposed me to Australian building codes and standards, which would prove very helpful as my career progressed. We routinely test and prepare fire assessments for Australian clients.

Q. You've now had a long career in fire engineering. What are some of the significant changes you have seen in that time?

Probably the biggest changes relate to densification – in two respects. We're seeing a lot more structures being built a metre from the boundary and a lot more multi-level and multi-unit dwellings built using lightweight construction materials. We're seeing a number of our long-time clients innovating and testing new solutions as these trends have emerged.

Q. Has your expertise contributed to changes in fire standards and, if so, in what ways?

Well, if you open the New Zealand Building Code docs, there's reference to one of my research papers. It discusses the development of a test method for fire spread on external claddings. It's very gratifying – and humbling.

Q. BRANZ has built an impressive new fire lab. What are its capabilities and what stands out about it?

The new lab is a world-class facility for standardised testing and non-standard research and exploratory work.

On the commercial testing side, we now have vastly better facilities to serve multiple clients at the same time and maintain absolute confidentiality. We – or our clients – can build multiple test specimens on site at the same time. Some specimens might need to be set aside for curing, and we have the space for that. We can test to exact standards or go beyond. By testing larger specimens, we can, by assessment, determine the fire performance of specimens that are larger still. We can also carry out more exacting loadbearing tests, including beam tests, than we could before.

Our three new cube furnaces mean specimens don't have to sit flat or be only 800 mm deep. We can go up to 3 m deep because we have the volume in the furnace for that. We also have hydrocarbon capabilities that extend the scope of the testing we can do. Our regular furnace tests follow a temperature curve based on cellulosic materials like wood and paper. Hydrocarbon fire tests are much more severe than regular tests and can damage furnaces unless they're specifically designed for it. That's what we've now got.

Another major advantage is that our façade rigs are inside, so we can safely test no matter what the weather is doing. We were also able to increase their height at the last minute to match a change to the testing standard, so they are future proofed.

Q. You were recently honoured with an industry award. What was this and what was it given for?

I was blown away to receive an award last year from the Fire Protection Association of New Zealand for outstanding engineering achievement. It recognised my contributions to research and testing that have helped improve understanding of fire hazards and their mitigations. It also acknowledged my part in steering the BRANZ fire lab project.

Q. Is that your proudest career moment?

It was very humbling to be recognised by the industry in this way. I guess you do your job and enjoy it without really thinking about what it might mean to others.

I'm also very proud of my involvement with standards over the years. I sit on several committees working to refine and improve fire standards that, ultimately, help to keep people and property safe.

Q. Outside of work, what are your passions?

I enjoy getting active – particularly mountain biking and skiing. A lifestyle block keeps me busy too. I also enjoy photography – especially capturing events, nature and historic buildings. And occasionally I get to satisfy my passion for cars by testing and reviewing models – from the small and humble to the outrageously expensive – for an online motoring publication.

Products to watch

People tell us about new things all the time, and while we don't review or recommend consumer products, we figure you might want to know what's out there.

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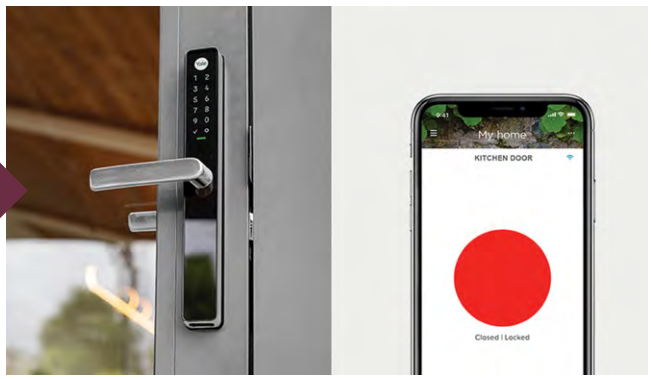

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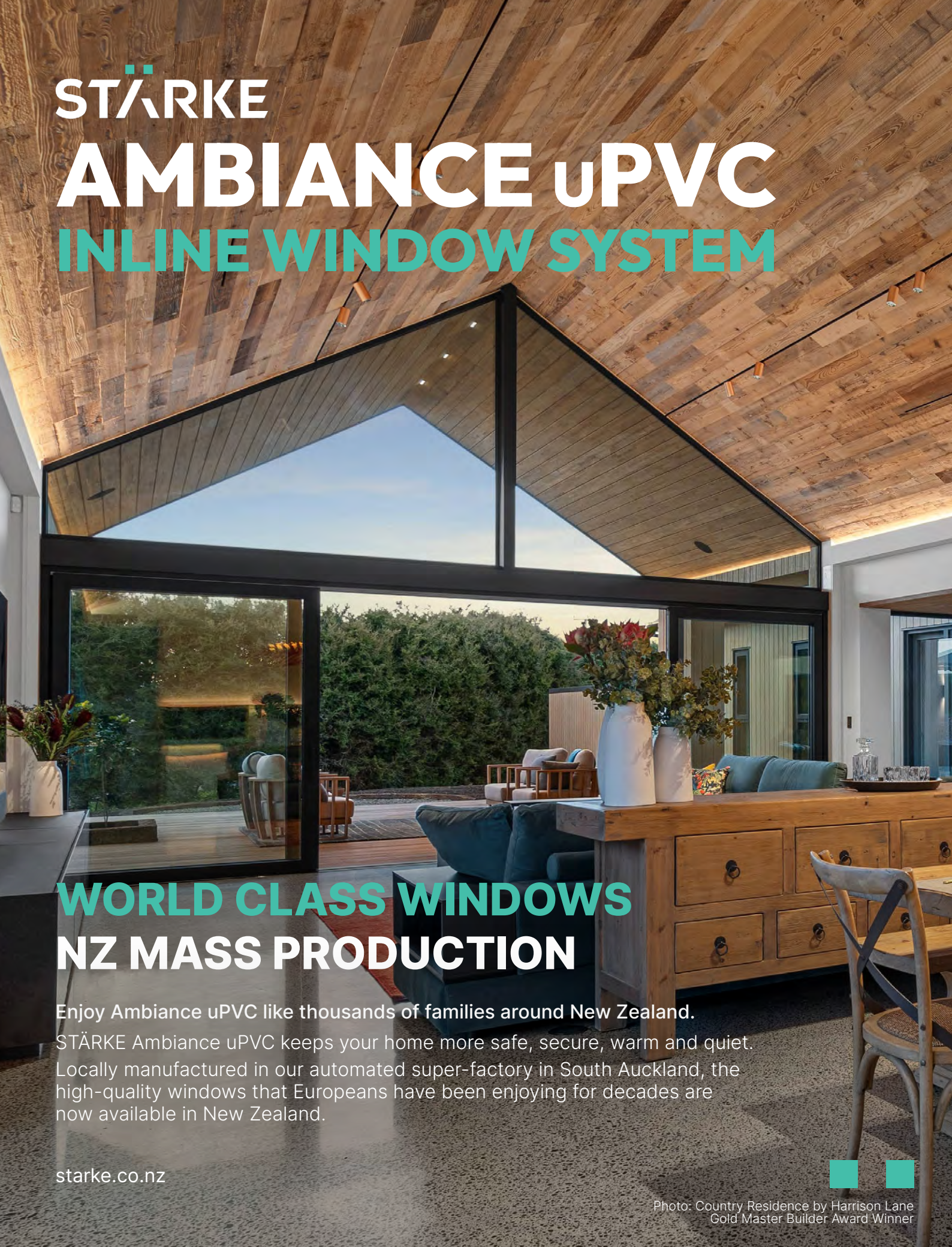

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Photo: Country Residence by Harrison Lane
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PREMIUM PERFORMANCE

By Bruce Barclay, Site Manager, Claymark

First published in Build *173, August 2019*

Coatings for timber weatherboards

The home is built and now the timber cladding needs painting or coating. It is important that this is carried out correctly to ensure long-term durability and a great appearance.

Timber weatherboards have been used to clad New Zealand homes for generations. They are a proven cladding made from a durable natural resource that is flexible and lightweight and can be easily worked and finished to a high standard.

Similarly, we have painted our houses for generations. Whether this has been done by home handypeople or professional painters, painting and paint systems are a critical component in protecting what is probably our most valuable asset.

Think about the paint system

Unfortunately, painting is frequently considered to be the final beautification process after all the sweat, hard work and maybe tears of the construction project have taken place.

Often it can take longer agonising over colours without paying additional attention to the details of the paint system and ensuring the paint actually does what it was designed to do – to protect an investment for many years.

Follow manufacturers' instructions

Regardless of type, all cladding products made by reputable manufacturers have care, handling and finishing instruction

Photo courtesy of Claymark

Photo courtesy of Claymark

details that are either supplied with the product or are available online. Making sure these instructions are adhered to is paramount to ensuring products perform as they were designed to.

The most prevalent timber weatherboard in use today is a finger-jointed treated and preprimed product manufactured from radiata pine. Some manufacturers use differing factory priming and sealing systems before getting their product to market.

Some producers provide an extra factory-applied top coating service that ensures high-quality consistent film builds and surface uniformity. Factory top-coating services save time and labour on site, provide additional board protection and cover the full face of the weatherboard.

Getting the best results

For best results, premium acrylic top coats of an appropriate colour – usually lighter – and suitable gloss level are recommended for use with timber weatherboards. The quality and thickness of the paint system – especially of top coats – have a significant impact on the long-term aesthetic performance of weatherboards.

Coating thickness or dry film thickness is relative to top coat application spread rates. These are clearly indicated on paint containers and paint company data sheets.

All premium paint brands offer relatively consistent application rate specifications, but note they typically state minimum levels. Not achieving at least the required minimum levels of top coat dry film thickness may result in premature weathering and breakdown of the overall paint system, causing early repaints and needless additional maintenance to properties.

Highly exposed homes adjacent to beaches with sand and salt spray, for example, may need additional coats and maintenance to keep an aesthetic appearance for longer-term periods.

Keep up the maintenance

Basic maintenance of home exteriors is often overlooked. All claddings, including timber weatherboards, benefit from a gentle wash, especially under eaves and overhangs. Washing will remove marine salts and other contaminants. Washing should be done at least annually.

Trade professionals

Using an experienced painter to prepare and apply exterior paint to timber weatherboards is an advantage. Often, they will have extended relationships with professionals in paint companies and cladding providers to give additional advice, ensuring best results.

Treat well for good performance

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By Greg Burn, Freelance Technical Writer, Structure Limited

Structurally fixing cavity battens for horizontal timber weatherboards

Using longer and thicker nails to fix horizontal timber weatherboards to structural framing through cavity battens can damage the weatherboards. However, there's a way round this.

At a glance

- Under E2/AS1, cavity battens behind horizontal timber weatherboards are non-structural and batten fixings are required simply to hold the battens in place.
- Longer weatherboard fixings penetrate both the board and batten and into the structural framing to the required depth.
- Longer fixings with a wider shank can often damage the weatherboard.
- Structurally fixing the cavity battens to the wall framing is an engineered solution.
- BRANZ testing has determined the timber batten and fixing requirements.
- This approach is not covered in the Acceptable Solution and should be submitted as an alternative method when applying for a consent.

The drained and ventilated cavity behind horizontal timber weatherboards is formed by nominal 20 mm thick x 45 mm timber cavity battens fixed vertically to the outer face of the exterior wall framing. The battens are fixed to the framing – primarily studs – to act as packers that form a cavity that keeps the back of the weatherboards clear of the wall underlay or rigid air barrier (RAB), which is fixed to the face of the framing.

The relevant Acceptable Solution

Under E2/AS1, the Acceptable Solution for Building Code clause E2 *External moisture*, the battens are non-structural and batten fixings are required simply to hold the battens in place until the timber weatherboard cladding is installed. The required fixings for the weatherboards are increased in length by 20 mm (minimum) to ensure that the fixings penetrate through the batten and into the structural wall framing to the required depth. These fixings ultimately secure the battens in place.

E2/AS1 also incorporates Table 24 *Fixing selection for wall claddings*, which covers fixing length, diameter and type as well as the minimum structural framing penetration and fixing patterns for a range of cladding systems, including timber weatherboards. Fixings for both direct-fixed and cavity-fixed claddings are included in the table.

The downside of increasing the weatherboard fixing length to allow for the cavity batten thickness is that the shank diameter of the fixing also increases. This increase in length and diameter can then have a detrimental effect on the weatherboard, often resulting in cracking or damage to the face of the board. It is also more difficult to accurately install longer weatherboard fixings.

Solving the problem

One way of resolving this potential problem and maintaining the standard length/diameter for weatherboard fixings is to structurally fix the timber cavity battens to the wall framing. In effect, this laminates the batten to the framing, forming a nominal 20 mm deeper framing member. For example, a 20 mm timber batten structurally fixed to a 90 x 45 mm timber stud forms a 110 x 45 mm stud. This is not covered in the Acceptable Solution and will need to be submitted for consent as an alternative method.

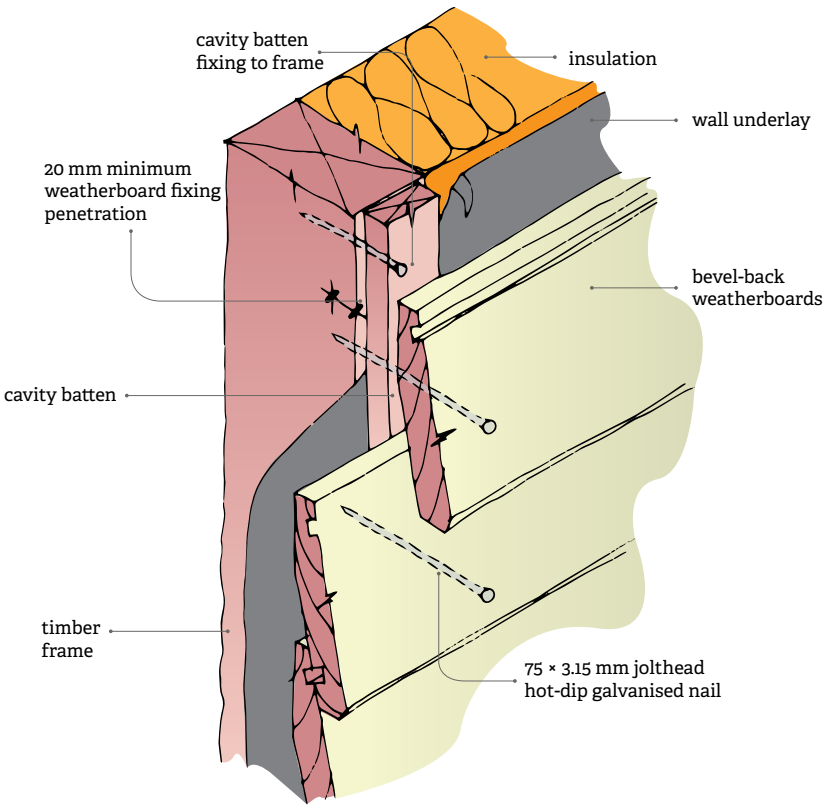

Figure 1: Fixing for bevel-back weatherboards fixed to structurally fixed cavity batten.

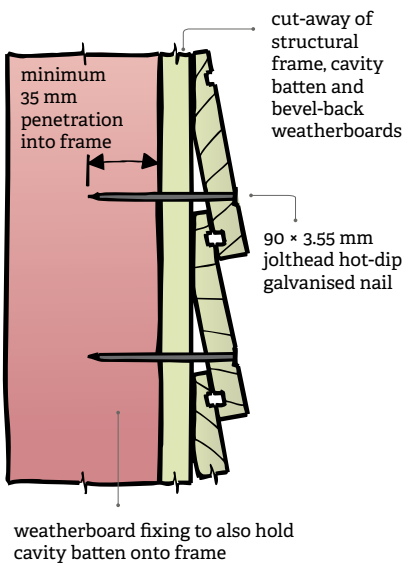

Figure 2: Traditional fixings and penetrations for a bevel-back weatherboard to E2/AS1.

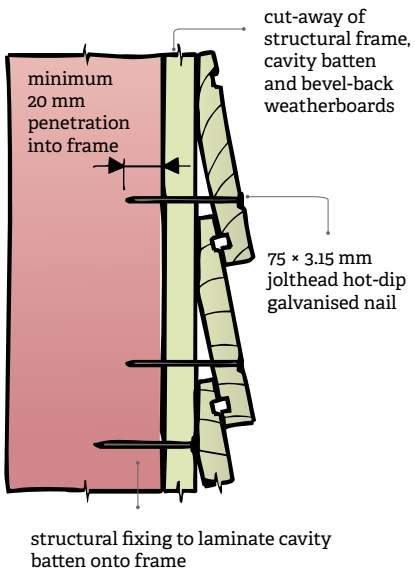

Figure 3: Fixings and penetrations for a bevel-back weatherboard using structurally fixed cavity battens.

To support the use of structural cavity battens, BRANZ testing has identified the type of timber batten required along with the fixing requirements. Using the correct fixing type and size ensures that there is sufficient structural resistance to prevent the batten fixings pulling out of the frame. Fixings for different timber weatherboard profiles have also been identified.

Timber structural cavity battens must be:

- 18–20 mm in thickness
- installed vertically to exterior wall framing (studs) where required to support the weatherboard cladding
- kiln dried, SG6 minimum, H3.1 minimum treated
- 40 mm minimum width – fixed on the centreline of the stud.

The battens must be structurally fixed to the framing with either:

- hand-driven 60 x 2.8 mm jolthead hot-dip galvanised nails
- power-driven 60 x 2.87 mm D-head hot-dip galvanised nails
- power-driven 64 x 2.8 mm D-head stainless steel annular-ringed nails.

Structural batten fixings must be at 300 mm centres maximum up to the very high wind zone and 250 mm centres maximum for the extra high wind zone. Fixings should be staggered 12 mm either side of the batten centreline.

Timber weatherboard fixings used with structurally fixed battens based on a flexible wall underlay must be:

- 75 x 3.15 mm jolthead hot-dip galvanised (or stainless steel equivalent) for bevel-back and rebated bevel-back weatherboards
- 60 x 2.8 mm jolthead hot-dip galvanised (or stainless steel equivalent) for rusticated weatherboards.

Where an RAB is used, the weatherboard fixings must be increased in length by the thickness of the RAB. Where proprietary horizontal timber weatherboards are specified, follow the manufacturer's instructions for the fixings and installation.

In all solutions other than those that have a current BRANZ Appraisal certificate or where the manufacturer has undertaken to have the cladding system specifically designed to meet the New Zealand Building Code, it is recommended that solutions for fixing cladding systems outside E2/AS1 should be covered by specific engineering design to suit each project.

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By Greg Burn, Freelance Technical Writer, Structure Limited

Insulated unheated slab-on-ground concrete floors

The new H1 regulations provide performance tables for the various types of slab-on-ground concrete floor, which vary according to climate zone. Here's what you need to know.

At a glance

- H1/AS1 Table 2.1.2.2B sets minimum construction R-values for unheated slab-on-ground floors across the six climate zones.
- H1/AS1 Appendix F provides methods, including performance tables, for determining construction R-values of different types of slab-on-ground floor.
- H1/VM1 Appendix F provides a calculation method.
- When using these methods, there are important things you need to know about the floor typology, floor insulation and external walls of the building.
- You will also need to know the slab's area-to-perimeter ratio.

When using H1/AS1 as a means of compliance with Building Code clause H1 *Energy efficiency*, Table 2.1.2.2B of the Acceptable Solution sets minimum construction R-values for unheated slab-on-ground floors across Aotearoa New Zealand's six climate zones. The minimum construction R-value is R1.5 for climate zones 1–4, R1.6 for zone 5 and R1.7 for zone 6.

H1/AS1 Appendix F *Thermal resistance of slab-on-ground floors* gives methods for determining the construction R-values of different formats of slab-on-ground floor. You can use either the performance tables in section F.1.2 or a calculation method in H1/VM1 Appendix F.

The performance tables provide construction R-values for a range of generic concrete slab-on-ground floors covering floor typology, floor insulation and the external walls of the building. They also cover both slab floor and raft foundation concrete slab-on-ground floors with the following insulation options:

- No insulation.
- R1.0 vertical slab edge.
- R1.2 or R2.4 full cover under slab.
- 1.2 m wide strip of R1.2 or R2.4 under slab along the slab perimeter.
- Combination of vertical slab edge and under slab.

The tables also incorporate building exterior wall type options – either masonry veneer or other exterior wall types.

To use the construction R-value tables, you also need to know the effective thickness of the external walls of the building and the floor slab area-to-perimeter (A/P) ratio – both are included in the tables.

Let's look at this in more detail.

Exterior wall types

Masonry veneer is installed on a rebate around the slab perimeter. This has an impact on the thermal performance of the slab edge – hence the differentiation to other claddings where a slab rebate is not required.

Effective wall thickness

A significant amount of heat loss occurs through the vertical edge of a concrete slab. The thickness of the exterior wall assembly dictates the distance that the heat must travel to get from the interior conditioned space of the building to the exterior.

The effective thickness of the exterior wall is measured as the distance from the interior wall surface (the interior lining) to the exterior face of the vertical slab edge at floor level. The greater this distance, the

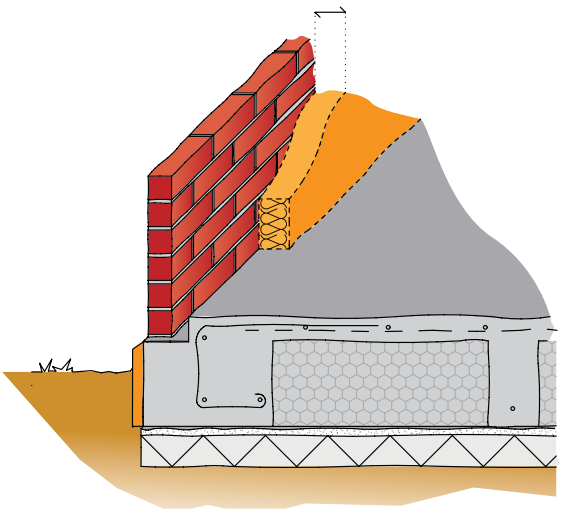


Figure 1: Slab edge insulation.

more thermally efficient the concrete floor slab is as the heat loss path through the slab edge to the exterior is greater.

Floor slab A/P ratio

Again, as a significant amount of heat loss can occur through the vertical edge of a concrete slab, the more exposed vertical slab edge relative to floor area there is, the greater the potential heat loss.

As an example, a 165 m² rectangular slab with a perimeter (vertical slab edge) of 57.25 m has an A/P ratio of 2.88. The same area of slab with a complex floor layout could have a perimeter of 103 m, equating to an A/P ratio of 1.60.

Consequently, the lower the A/P ratio, the less thermally efficient the concrete floor slab is, as there is a greater potential for heat loss to occur (see examples in Figure 2).

The slab A/P ratio of a proposed building is calculated by using either of two equations in Appendix F – the overall internal slab area and perimeter in accordance with Equation F.1 or the external slab area and perimeter in accordance with Equation F.2.

Slab insulation material

Concrete slab insulation is typically rigid foam insulation such as expanded polystyrene (EPS) or extruded polystyrene (XPS).

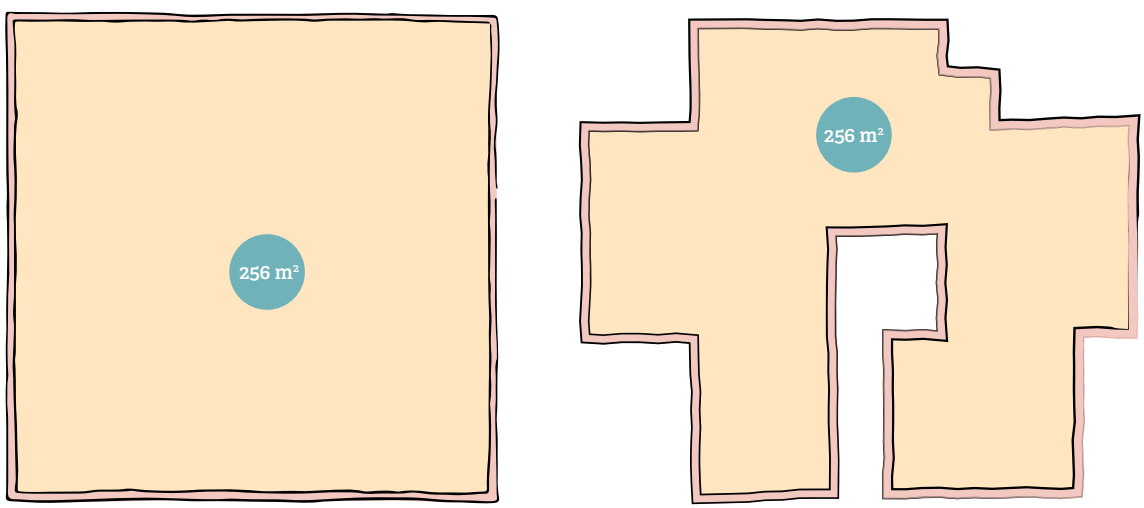
Slab edge insulation

Because a significant amount of heat loss can occur through the exposed vertical edge of the slab, slab edge insulation is a very effective way of improving slab thermal performance. The R-value tables in H1/AS1 incorporate R1.0 vertical slab edge insulation. R1.0 is optimal for this type of insulation as using higher R-value insulation provides minimal performance gains.

To be effective, the insulation must be installed on all exposed faces of the slab edge from the top of the slab to the bottom of the footing.

Slab-on-ground insulation options

The majority of slab heat loss is reduced



Floor area = 256 m²
Perimeter = 64 m
Area-to-perimeter ratio = 256/64 = 4

- Concrete raft foundation slab and 90 mm framed wall:
  without perimeter insulation = R1.8
  with perimeter insulation = R2.2

Floor area = 256 m²
Perimeter = 100 m
Area-to-perimeter ratio = 256/100 = 2.56

- Concrete raft foundation slab and 90 mm framed wall:
  without perimeter insulation = R1.3
  with perimeter insulation = R1.7

Figure 2: Slab area-to-perimeter ratio examples.

by incorporating both vertical edge and under-slab insulation.

When adding under-footing insulation, the inner vertical edge of the footing must also be insulated to get the full benefit of the insulation. Under-footing insulation requires specific engineering design (SED).

Slab-on-ground insulation options with masonry veneer cladding

Vertical edge insulation is less effective for masonry veneer as there is less slab edge to insulate and most heat loss occurs through the veneer/slab rebate. Combining vertical edge insulation with under-slab insulation is correspondingly much more effective.

Proprietary slab-on-ground floors

There is a wide range of proprietary insulated slab floor and raft foundation systems available. These offer a range of insulation options and levels of thermal performance. Many are outside the scope of the Acceptable Solution and will need to be consented as alternative methods .

Slab-on-ground floor insulation considerations

Consideration should be given to the following:

- The type of insulation and its suitability for the location in the slab assembly.
- Durability of exposed vertical slab edge insulation and any protective applied coatings associated with the protection/durability of the insulation.
- Timber bottom plate structural connections relative to the thickness and construction details of vertical slab edge insulation – these require a specific minimum slab edge distances and the manufacturer's specifications should be referred to in order to dimension to meet structural performance specifications.
- The conditioned spaces and unconditioned spaces within the building and junctions between these spaces. A conditioned space may include an attached garage so the floors, walls and roof of the encapsulated areas need to meet the requirements of H1 and garage doors would need to be considered in the H1 compliance equations. Junctions between unconditioned spaces (such as garages) need to be considered at floors /walls and roof. If perimeter edge insulation is to be installed this may require SED.

Plumbing and Drainage Guide
New edition now available

BRANZ

Supporting the improvement of the safety and reliability of Aotearoa New Zealand's plumbing and drainage systems.

Updated in April 2024, this edition incorporates the latest amendments to the AS/NZS 3500 *Plumbing and drainage* standards, along with New Zealand Building Code clauses G12 and G13.

BRANZ.CO.NZ/**PLUMBING-AND-DRAINAGE**

By David Hindley, Freelance Technical Writer

The vexed issue of requests for information

Building consent applications are often slowed down by requests for information (RFIs) from building consent authorities (BCAs). This frustrates both applicants and BCAs. What's behind the problem, and what can be done to speed things up?

Phil on the BRANZ helpdesk told *Build*, 'I often get complaints from designers about council RFIs being over the top, and on the other hand, councils saying the opposite, that designers' plans are poor quality and lacking in certain pieces of information.'

RFIs aren't just inconvenient niggles. One piece of recent research suggests that, across the country, there could be over 600,000 line items in RFIs each year, leading to over half a million days lost.

BCAs must grant a building consent if they are satisfied 'on reasonable grounds' that Building Code provisions will be met if the building work is completed in accordance with the plans and specifications attached to the consent application (Building Act section 49). Where they think they cannot make this decision because information is incorrect or missing, they ask for further information.

With 67 city and district councils acting as BCAs around the country, it is not surprising that vague phrases such as 'on reasonable grounds' have led to different interpretations of what is required and different approaches. In 2024, MBIE developed guidance for BCAs to apply the 'reasonable grounds' test (see QR code on page 41).

BCAs can request further reasonable information about the application.

There is more to BCA caution than just questions of wording, however. In the leaky homes disaster, many businesses involved in designing and constructing leaky homes were placed in receivership, leaving BCAs the only remaining bodies that could be sued in court. Leaky buildings claims have cost BCAs billions of dollars to settle, and they are keen not to repeat the exercise. (Recent Government announcements may rebalance some of the risks – see the panel story *Government changes may transform consenting* on page 41.)

Building consent timeframe blowouts

Section 48 of the Building Act requires BCAs to process a building consent in 20 working days in most cases, but RFIs can blow this out significantly. Within those 20 days, BCAs can request 'further reasonable information in respect of the application', suspending the required 20-day timeframe until it receives the information.

Recent research indicates that, in practice, the consent process takes much longer. For example, over one period studied, Auckland Council took 55 working days to grant a consent. Of this time, 19 days was actual processing time, and the council waited 36 days for a response from the applicant to its RFIs. MBIE is now monitoring BCAs' consent system performance and publishing the details on its website (see QR code on page 41).

RFIs aren't just inconvenient niggles. One piece of recent research suggests that, across the country, there could be over 600,000 line items in RFIs each year, leading to over half a million days lost.

Analysing RFIs in Auckland and Tauranga

The BRANZ external research report *ModelDocs: Transforming building consenting behaviour for better housing*, authored by Professor Anthony Hōete and funded from the Building Research Levy, examined the behaviour of those preparing building consent applications and the BCA staff processing them. It involved a national survey and looked in detail at building consents processed in May 2023 in Auckland Council and Tauranga City Council. On average, each building consent application generated 2.3 RFI letters with 27 subline items requiring a response (Tauranga) and 2.5 letters with 30 subline items (Auckland). Use the QR code on page 41 to access the full report.

What the research found:

- 86% of RFI items are related to applicant behaviour and 14% to BCA staff (RFIs that need not have been sent).
- Of the 86%, missing documentation accounts for 66%, incorrect documents 10% and coordination issues (such as between architect and engineer) 5%, with obscured documents, a responsibility for both the applicant and BCA, shared at 5%.
- General and documentation issues accounted for 20–25% of RFIs, Building Code clauses 75–80%.
- Of the Building Code clauses, 31–32% were related to B1 *Structure* and 19–25% to E2 *External moisture* (see Figure 1). The report points out that targeting these two Code clauses alone could potentially resolve over half of the line items.

Denise Whelan, Manager Building Consents Capability at Auckland Council, told *Build* that the high profile of B1 and E2 is because they – together with fire – are high-risk components of a building. 'It is crucial that the means of compliance in

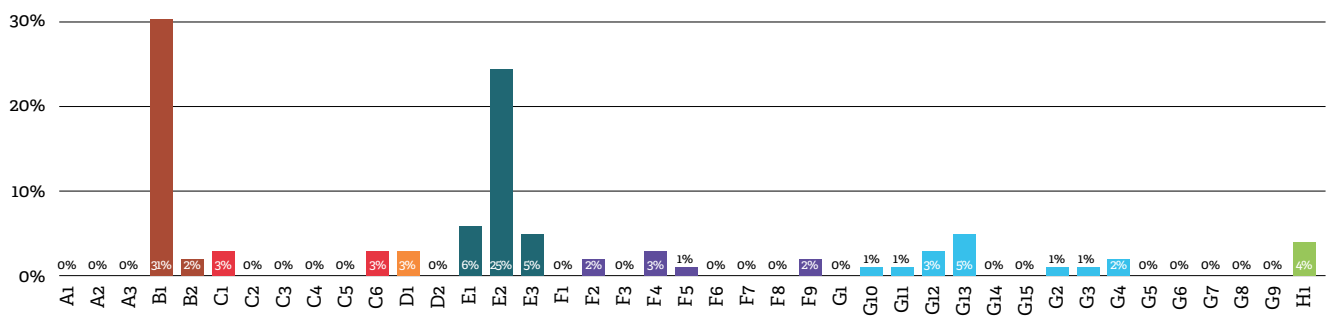


Figure 1: The number of RFIs that applied to specific Building Code clauses in consent applications to Tauranga City Council in May 2023. B1 and E2 account for over half.

the application is completely described and appropriate and that evidence is provided.'

While the research involved just two councils, Auckland and Tauranga, there is evidence that its findings are likely to apply in other areas. For example, at Christchurch City Council, several of the most used residential processing questions for RFIs also apply to B1 and E2.

Missing documents, inappropriate details

The variable quality of consent applications is nothing new. In 2016, a BRANZ survey of 52 sets of building consent documents for new houses (Study Report SR355 *Consent documentation quality for new housing*) also found absent or incorrect documents:

- 43% of the applications lacked details.
- Over 30% were missing uplift details.
- 10–15% were lacking bracing and junction details.
- 20% contained drawing details not applicable to the house.
- 50% had inconsistent scales in the plans.

BCA responsibility

BCAs sometimes get it wrong too. The ModelDocs research found that 14% of RFIs need not have been sent because the information was either originally correct (9%) or present but obscured (5%).

Apart from this, BCAs also have a big responsibility in making their requests clear. The ModelDocs research found that 'the quality of RFI line item response related to the clarity of the RFI query' and 'a badly worded RFI can generate more line items'. The report says an efficient RFI will always include four actions:

- Identify clearly what the applicant has done or not done.
- Explain exactly what is not compliant and why.
- Explicitly describe what is required to resolve the issue.
- Direct the applicant to the relevant compliance requirement.

Ways for applicants to reduce the risk of RFI requests

There are many approaches to reducing the risk of RFI queries:

- Make sure you are working from current versions of Acceptable Solutions, Verification Methods, standards and codes of practice.
- Pay particular attention to the requirements and compliance pathways for Code clauses B1 *Structure* and E2 *External moisture*, which account for a high proportion of RFIs.
- Make the whole application project-specific. Don't cut and paste large pieces of content from old applications.
- Get a project information memorandum (PIM) from the council early in the process. This can help identify specific land features and design requirements or approvals required. The PIM may give information around, for example, flood risk, subsidence, slippage, stormwater/wastewater systems and heritage status. The costs vary by council and the work/time involved. There is typically a deposit or base fee required.
- Arrange a pre-application meeting with BCA staff to discuss consenting issues relevant to the site and project. Denise Whelan at Auckland Council says this will be especially useful for someone who is starting out and does not have a lot of experience with building consent applications. The cost will depend on the complexity of the project.
- Make good use of the BCA's lodgement checklist. BCAs commonly require a completed checklist as part of an application. This identifies the information the BCA requires and can be an incredibly useful tool.
- Take advantage of other guidance such as MBIE's *Standard order of documents checklist for building consent applications*.
- Check early in the process whether the BCA has specific requirements for any documents – for example, does it require engineers' producer statements to be peer reviewed?
- Ensure that engineering drawings and architectural drawings match up and that the façade fire design/fire report matches the architectural plans.

The ModelDocs report came up with three longer-term recommendations to improve consenting in general:

- Missing documents from applicants are behind most RFIs. To address this, each applicant group – such as LBPs, architects, engineers – needs to be specifically addressed. LBPs make up most applicants (87% in Tauranga and 70% in Auckland), and there are various ways to reach them.
- Architects' behaviour can be transformed through CPD education.
- As 14% of RFIs need not have been sent (the information in the application was present and correct), BCA staff behaviour can be transformed through CPD education.

BRANZ is exploring what more it can do to help resolve the problem of RFIs. This work is at a very early stage – progress will be reported in due course.

Government changes may transform consenting

If all the government proposals announced in 2024 are put into action, the whole consenting experience is likely to be radically reformed in several years' time:

- A proposed new Building Act schedule would exempt a building up to 60 m² that meets strict requirements from needing a building or resource consent.
- Reforming the consent system to have fewer but larger BCAs (see Figure 2) and addressing the issue of liability may mean fewer inconsistencies between BCAs and a less conservative, risk-averse approach – reducing delays.
- A Building Act amendment would enable international standards to be used to show compliance with the Building Code. BCAs may be required to accept building products certified overseas and recognised by MBIE.
- One proposed replacement law for the Resource Management Act will provide for a greater use of national standards, setting minimum requirements for developments and other processes currently regulated through consents. Standards will reduce the number and scope of consents. Activities complying with a national standard will not require resource consent.
- A Building Act amendment will clarify the definition of a minor variation, reducing the need to submit a new consent application for minor product or design changes.

Figure 2: There are 67 city and district councils that act as building consent authorities in Aotearoa. The map does not include regional authorities or Consentium.

RFIs and resource consents

The issues around RFIs also apply to resource consents, but in this case, they are section 92 requests under the Resource Management Act. James Hassall, Head of Resource Consents at Auckland Council, told *Build* that there would be a request for further information with around 80% of resource consent applications.

Some councils place a timeframe on RFI responses such as 15 working days. If you don't respond in time and don't request a time extension, your non-notified application may be processed as a publicly notified resource consent instead.

James Hassall says that most resource consent applications are lodged by private planning consultants. His advice for reducing the risk of problems is to only use a reputable and well-experienced consultant, check whether resource consent is required well before lodging a building consent application and sit down with a council planner early in the process to fully understand what will be required for consent. While this will have a cost, it will be a small part of the overall resource consent cost, which is typically tens of thousands of dollars. 'It is a false economy not to do this.'

FOR MORE

View the BRANZ ModelDocs report

View MBIE guidance for BCAs applying the 'reasonable grounds' test

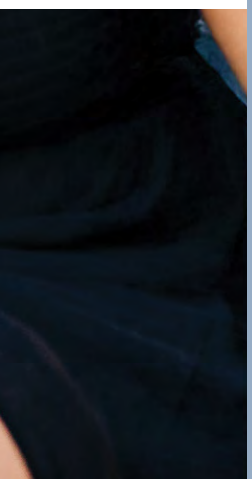
View MBIE monitoring of BCA consent application processing performance

FEATURE SECTION

Quality

Quality means different things to different people. For some it's high-end design that exceeds Building Code requirements. For others it's simply a safe and comfortable home for whānau. Why is it a struggle to achieve either?

IN THIS SECTION



Getting into the quality habit

Improving building quality is a key focus for the sector. What are the problems with quality, and could new government initiatives such as self-certification be part of the solution?

BY DAVID HINDLEY, FREELANCE TECHNICAL WRITER

'Time, cost and quality – pick any two,' goes the old saying. With house construction in New Zealand, there has long been a perception – backed by some evidence – that quality suffers because of the enormous cost and time pressures on new builds.

John Tookey, Professor of Construction Management at Auckland University of Technology, told *Build*, 'There is a difficult construction environment of rising costs and pressure on margins. The market is driven by borrowed money, and the cost of this has gone up. This has crushed the building industry in the last 18 months to 2 years.'

At the same time, he says the public's judgements around quality may be getting tougher. 'There is an escalation of expectation today. We are living in an era of unrealistic performance – just look at what you see on Instagram, for example. A lot of it is about aspirational lifestyle and not reality.'

Quality is a significant factor in the selection of a builder, according to a BRANZ survey.

New house owners' satisfaction

One measure of the level of quality in construction can be found in the BRANZ

The 191-year-old Treaty House at Waitangi is an example of our long history of off-site construction. Roman numerals marked on building elements can still be seen today.

New House Owners' Satisfaction Survey. The findings of the 13th survey (based on 547 new home builds) were recently published on the BRANZ website as Study Report SR492.

Quality is a significant factor in the selection of a builder – over a third of new house owners (39%) reported choosing their builder based on the quality of their previous work such as show homes. This is by far the number one criterion for builder selection – ranking well above the cheapest quote. That approach seemed to generally work out well: 81% of homeowners thought the overall quality of their home was good or very good. By comparison, this figure was over 90% in the 2013 survey.

There was a considerable drop in the standard of finishes with the positive ratings dropping to just 55% and an unacceptably high 31% rating the standard of finish poor or very poor. In the 2018 survey, the positive (very good and fairly good) ratings together were around 87%, almost the same as the 89% score in the 2013 survey.

'Rework is a pain in the tonsils for contractors to deal with,' Professor Tookey says, but nevertheless, in 86% of new homes in the latest survey, tradespeople were called back to repair defects after first occupancy. The most common type of defect was related to a contractor's work rather than a faulty product, and 42% of homeowners said there were more defects than they expected.

BRANZ research into quality

BRANZ has conducted or commissioned extensive research on issues that affect building quality. Findings have been published in reports such as SR445 *Procuring for quality,* ER49 *The economic costs of quality defects,* SR412 *Medium-density housing construction quality survey,* SR398 *Prioritising quality,* SR375 *Building-quality issues: A literature review,* ER29 *Evidencing quality issues: What can industry data tell us?* and SR387 *Prioritising quality: Literature review of common residential housing defects.* All are available on the BRANZ website listed under Publications > Research reports (access using the QR code on page 47).

The off-site construction pathway to quality

A major difficulty around consistently achieving quality is that almost everything is bespoke, Professor Tookey told *Build*. 'A big company may offer 30 or 40 or more standard design options, and each of those is almost infinitely amendable based on what a customer wants.' In the latest home-owners' survey, only 2% of respondents selected their design from standard plans with no changes.

'To have low defects, you need to have consistency and bolt together components on site rather than build everything on site. We have only scratched the edges of the capability of the off-site construction sector. The irony is that we have a long history of off-site construction in this country.'

The government hopes self-certification will help improve quality and reduce costs.

One of the challenges is that there are low barriers to entry and low establishment costs for the 'man, dog and Transit van' traditional approach to house building. Off-site construction by comparison requires substantial investment, and sustained downturns can drive out those who have made big investments.

Quality and the law

All building contracts should set out the standard (quality) of work expected. Quality is addressed in several laws:

- The Building Act 2004 contains implied warranties that cover residential building work (section 362I). They require that, among other things, work must be carried out in a proper and competent manner and with reasonable care and skill. Homeowners who find a problem with building work can make use of the automatic 12-month period when the contractor must fix defects (section 362Q). Homeowners can take action for up to 10 years after building work is completed if implied warranties have not been met.
- The Consumer Guarantees Act 1993 also applies to residential building contracts. It does not apply to a whole house but to parts of the house, even if they are attached or incorporated into the house. This law also requires that contractors must perform their services with reasonable care and skill. For more, see BRANZ Bulletin BU691 *Residential building contracts*.

Government can help

Professor Tookey sees central government, as a large funder of new housing, having a role to play. He points to systems that can help, such as the Performance Information Procurement System (PIPS) developed at Arizona State University. 'It is deceptively simple. You start by identifying organisations with a great track record of minimising risks and problems. Then look for organisations with the ability to produce a risk management plan, who can identify risks and have a plan of what to do. After these are taken care of, assess comparative costs.'

There are other approaches a government can take to lift quality in construction. The UK Government set

up the New Homes Quality Board in 2021. This voluntary scheme aims to ensure that house builders and developers meet high standards of quality. Over 80% of the top 50 developers have signed up, accounting for around two-thirds of all new homes. The Board established a New Homes Quality Code and also a New Homes Ombudsman Service that is free for homeowners to use.

Our own government's long list of proposed changes to the building controls system are also likely to have an impact on quality. In some instances, a lift in quality is seen as one of the reasons for change (see the panel story Will reducing inspections affect new build quality?).

John Tookey quotes Aristotle, who said, 'We are what we do repeatedly. Therefore quality is not an act, it is a habit.' It is about consistency. Tookey believes there are solutions for us to lift build quality and the ability to do it. 'The construction industry here is populated by can-do individuals with an optimism bias. Stuff gets done. Stuff gets built. We have visionaries and problem solvers. We need policies and practices to bring everything together.'

The proposal for self-certification met with mixed responses in the industry:

- Registered Master Builders (RMB) welcomed the announcement, noting 'this scheme rewards trusted, accredited and reliable builders, and fosters higher standards across the sector by incentivising quality work'. RMB said that, while many builders deliver high-quality homes, some use consenting as a substitute for quality control.
- Certified Builders also generally welcomed the scheme, focusing on the likely level of skills and qualifications required for self-certification. Chief Executive Malcolm Fleming told The Press he would like to see changes to builder licensing at the same time. 'The bar is too low. Anyone can stand up and call themselves a builder.'
- The New Zealand Institute of Building Surveyors (NZIBS) said that more continuous professional development and greatly improved education in the construction sector are required before a self-certification scheme is implemented. It says the sector already wrestles with a high rate of failed inspections, so removing a BCA's process of consenting could risk further failures.

Where self-certification sees practitioners carrying more responsibility for the quality of their own work, it should in theory lift quality. In practice, the scheme will only work smoothly for everyone, including homeowners, if practitioners are backed by good professional indemnity insurance. Certified Builders has noted that it can be difficult for small builders to obtain this. The NZIBS has also said that its sources indicate that professional indemnity insurance is not currently widely accessible other than for large-scale design and build contracts.

Will reducing on-site inspections affect new-build quality?

Throughout 2024, the government proposed changes in building controls aimed at reducing new home construction costs – in several cases, through requiring fewer on-site inspections (see *Supercharging the supply of land and housing* in *Build* 204). Late in the year came a significant new proposal for self-certification.

Electricians and gasfitters can already certify their own work. The new proposal is to allow self-certification, without the need for a BCA inspection, for builders, plumbers and drainlayers 'with a proven track record' carrying out low-risk residential building work.

Reducing costs is a primary driver, but Building and Construction Minister Chris Penk has also identified quality improvement as an aim. He says the new opt-in scheme will come with strengthened qualification requirements, a pathway that customers can access to remedy poor work and strict disciplinary actions for careless or incompetent self-certifiers. He says the new approach will see building practitioners shoulder more of the risk around their own work, which he says will 'incentivise better quality work'.

FOR MORE

See BRANZ research reports

Read BRANZ Bulletin BU691 *Residential building contracts*

The beauty and benefits of living with nature

There is an emerging understanding of the need to consider nature when designing our cities. Nature-based design is known to improve quality of life and helps mitigate the effects of climate change.

BY ZOË AVERY, DIRECTOR, THE URBANIST, AND ASSOCIATE DIRECTOR OF DESIGN – URBAN PLANNING, UNIVERSITY OF AUCKLAND

As cities worldwide face intensifying climate challenges, from devastating floods to scorching heatwaves, the imperative to reimagine urban design has never been more urgent. Nature-based design isn't just about adding green spaces to cities – it's about fundamentally reimagining urban environments to work in harmony with natural processes, recognising that nature is essential infrastructure underpinning human wellbeing.

The science behind nature's benefits

Nature is a vital component of a healthy city and should be considered as critical. With the effects of climate change, flooding, drought and biodiversity loss, we need a vision to achieve healthy, resilient, biodiverse and more equitable cities for people and nature.

Recent research reveals that interacting with nature through our senses triggers measurable physiological and psychological changes in our bodies. Even brief exposure to natural environments can reduce stress hormones, lower blood pressure, improve cognitive function and boost immune system responses. These benefits occur through multiple pathways: seeing green spaces and natural shapes reduces mental fatigue, hearing birdsong induces calming and smelling natural scents like pine can enhance immune function.

Studies show that as little as 20 minutes of exposure to nature can significantly reduce stress hormone levels. More extensive research indicates that spending at least 120 minutes per week in nature provides optimal health benefits. Importantly, these effects are cumulative – they can be gained through multiple shorter visits rather than requiring long periods of immersion.

Implementing nature-based design

Nature-based design can be implemented through various approaches, from large-scale urban parks to smaller interventions like pocket gardens and green walls. Nature-based design encompasses living infrastructure such as green roofs for stormwater management and temperature regulation, strategically placed urban forests creating cooling corridors, water-sensitive design features like rain gardens and permeable surfaces, biodiversity corridors connecting green spaces for wildlife movement and community spaces that promote social interaction and wellbeing.

Global success stories

Cities worldwide are demonstrating effective nature-based solutions. Copenhagen's Cloudburst Management Plan transforms parks into water storage during heavy rainfall. Singapore's ambitious greening programme aims to have 80% of buildings incorporating vertical gardens by 2030. China's sponge cities initiative uses permeable pavements, rain gardens and constructed wetlands to manage urban water flows naturally.

In London, research has shown that residents living in boroughs with higher street tree density have lower rates of antidepressant prescriptions. Toronto's extensive urban forest study demonstrated significant correlations between

A living wall on an office building in the Netherlands.

tree density and improved cardiovascular health among residents.

Aotearoa New Zealand's journey

While nature-based design is gaining traction in Aotearoa New Zealand, implementation has been slower than in some other countries. A significant milestone was reached with the Hundertwasser Art Centre in Whangārei, featuring Aotearoa's largest living roof with 4,000 plants. I led the design of the living roof project, winner of the 2023 Built Environment Green Roof Award at the World Green Infrastructure Congress in Berlin. It demonstrates how nature-based design can combine cultural values with environmental benefits.

A recent Auckland Council report analysed temperature variations across the city using climate modelling tools. It found that the city centre experiences temperatures up to 3˚C warmer than rural areas at night, while being cooler during the day due to local wind patterns.

Studies show that as little as 20 minutes of nature exposure can significantly reduce stress hormone levels.

However, challenges remain. Aotearoa is behind other countries worldwide in terms of utilising nature-based solutions in the built environment. Our stormwater infrastructure and receiving water bodies are not benefiting from this. Green roofs, living façades, sustainable urban drainage and urban trees are all nature-based flood defences.

Beyond aesthetics

The benefits of nature-based design extend far beyond visual appeal. Living walls can significantly improve indoor air quality and enhance beneficial microbiomes. Even small interventions like front garden plantings can measurably improve residents' wellbeing. Moreover, biodiverse urban spaces provide critical ecosystem services. They absorb and filter rainwater, reduce urban heat island effects, sequester carbon and create habitats for wildlife. As 100% of the economy is dependent on nature – from the food we eat to the air we breathe – embracing this interconnectedness helps solve environmental challenges holistically and sustainably.

Economic benefits

While the initial investment in nature-based infrastructure may seem substantial, the long-term economic benefits are ▸▸

Vertical gardens on high-rise buildings in Milan.

compelling. Studies indicate that nature-based solutions can reduce healthcare costs, increase property values and provide more cost-effective stormwater management than traditional infrastructure. As an example, Philadelphia's green infrastructure programme is expected to generate US$2.9 billion in economic benefits over 25 years compared to US$1.2 billion in costs.

The path forward

For nature-based design to gain wider adoption in Aotearoa, several shifts are needed. Regulatory frameworks must be updated to better accommodate innovative solutions, and successful pilot projects must be scaled up to demonstrate effectiveness at the city level.

Current regulatory frameworks and development practices often prioritise short-term gains over long-term sustainability. Auckland has an urban ngahere (forest) strategy that aims for canopy cover of at least 15%, but some of the mahi we've been doing at The Urbanist shows that we can't achieve those targets under current regulations. Our unitary plan rules don't require or leave enough space for nature.

The investment required for nature-based design might seem substantial, but the cost of inaction – in terms of flood damage, heat-related health issues and lost biodiversity – would be far greater. As climate change intensifies, working with nature rather than against it isn't just an option – it's becoming an imperative for resilient urban futures. Cities that embrace nature-based design now will be better positioned to face future climate challenges while creating more liveable, sustainable environments for their residents.

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Let digital innovation do the heavy lifting

Many New Zealand homes are shabby and underperforming, and effective and affordable solutions seem elusive. However, digital tools, increasing in aptitude by the day, can deliver smart solutions that raise the quality of all buildings.

BY DR XICHEN CHEN, PROFESSOR ALI GHAFFARIANHOSEINI, DR DAT TIEN DOAN AND PROFESSOR AMIRHOSEIN GHAFFARIANHOSEIN, SCHOOL OF FUTURE ENVIRONMENTS, AUCKLAND UNIVERSITY OF TECHNOLOGY

Challenges lie beneath the surface of Aotearoa New Zealand's building stock – from dampness, poor ventilation and inefficient systems to outdated materials that compromise resilience and sustainability. These are not just structural issues – they impact the comfort, wellbeing and productivity of those who live and work in these buildings.

As global environmental goals push the construction industry towards resilience and sustainability and with Māori cultural principles such as kaitiakitanga (guardianship) emphasising environmental care, elevating the quality of our building stock is no longer optional. It is a necessity. Digital innovation is tackling these issues with practical solutions, creating a healthier and more sustainable built environment for Aotearoa.

Quality crisis in our building stock

Aotearoa's housing stock is at a pivotal point. We are confronted by legacy problems such as quality and durability at a time of significant change within the industry. While most homes still provide a roof over our heads, many are fundamentally inadequate, leaving occupants feeling uncomfortable and unhealthy.

Increasing dampness is a key challenge. A recent BRANZ survey showed that about half of our homes contain visible mould caused by inadequate ventilation and heating systems that make homes cold in winter. Other building defects include poor weathertightness and deteriorating building materials. Climate change is further exacerbating the problems. Existing housing conditions are at risk of further deterioration owing to increasing moisture and mould along with old thermal and ventilation standards.

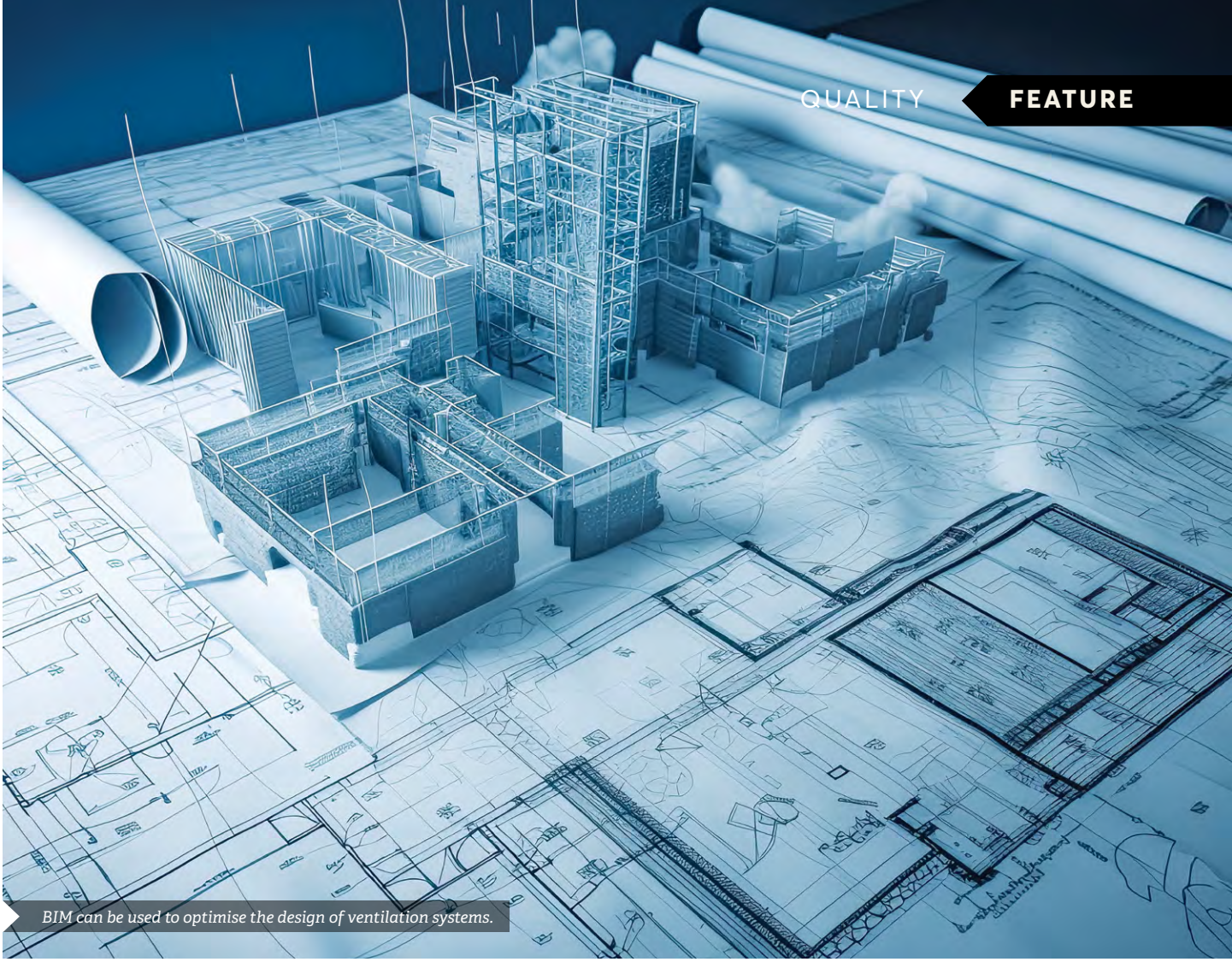
A pressing threat is the one posed by climate change. The consequences of Cyclone Gabrielle are still being felt at a time when the construction industry is suffering from a shortage of skilled workers and rising costs, and fewer new dwelling consents are being issued. While some of these issues are costly to address, they are minor in comparison to the long-term cost of inaction. As lives, health and sustainability are at risk, the question is how Aotearoa can be certain that our homes are not only habitable but also socially and environmentally resilient for generations to come.

The answer is innovation and systemic change. By focusing on building quality now, Aotearoa has an opportunity to strengthen resilience, close equity gaps and align with global sustainability goals.

Putting digital tools to use

What are the digital innovations that can provide a transformative path to better building quality? Let's look at some approaches to dampness issues, which are often caused by inadequate moisture management and the lack of effective real-time monitoring systems:

- Digital twins can simulate moisture flow within buildings, pinpoint areas prone to dampness and leakage and model indoor air quality and energy consumption to optimise heating, ventilation and air conditioning (HVAC) system designs. They can also create virtual replicas of existing buildings for retrofitting and predictive maintenance.



BIM can be used to optimise the design of ventilation systems.

- Internet of Things (IoT) – a system of connected devices equipped with smart sensors can detect and monitor humidity and moisture levels in real time, enabling timely interventions. Smart thermostats and air quality sensors help maintain optimal indoor conditions, while health tracking and monitoring systems facilitate just-in-time maintenance and minimise the risk of structural damage from moisture-related deterioration.
- Artificial intelligence (AI) and machine learning (ML), when combined with data analytics, can forecast potential failures in ventilation systems and weathertight components. These tools can also identify cost-effective energy efficiency upgrades and suggest tailored dampness mitigation strategies for various building types.
- Building information modelling (BIM) can be harnessed to evaluate and optimise the design of ventilation and heating systems. When integrated with computational fluid dynamics tools, BIM allows for detailed analysis of airflow patterns and thermal distribution, supporting the development of efficient system designs and enabling comprehensive performance assessments.
- AI-driven HVAC systems, when enhanced by IoT sensors, offer a dynamic and adaptive approach to managing indoor climates. These systems use real-time data on occupant preferences and environmental conditions to automatically adjust heating, cooling and air circulation.
- Blockchain, when integrated with BIM, brings an additional layer of innovation to construction material supply chain management, enhancing design transparency and material traceability to ensure compliance with quality standards and greater accountability throughout the construction project management life cycle.

As climate change accelerates the deterioration of building materials – especially when combined with ineffective sealing solutions that compromise weathertightness – precision-engineered components created through 3D printing and digital fabrication can improve weathertightness, enhance material fit and boost construction quality and structural durability.

The way to a smarter, digitally enabled future

The path to improving Aotearoa's building stock is clear. Embrace innovation today to be prepared for the challenges of tomorrow. In combating the lack of sustainable, resilient, healthier buildings, new ways and ecosystems need to be found that redefine how quality and efficiency are approached in construction and maintenance.

To what extent are we ready to turn vision into action and ensure that our buildings not only stand the test of time but also become a testament to innovation and progress?

Accelerating acceptance of innovations

Streamlined access to new product and material innovations would help to improve quality in the New Zealand building sector. A Levy-funded research project looked at how to achieve this in the face of hurdles such as limited access to development funding and uncertainty among building consent authorities (BCAs) about the compliance of new products.

BY TYSON SCHMIDT, DIRECTOR, THIRD BEARING LIMITED

Increasing the adoption of new materials and products in New Zealand's building and construction sector is important for achieving emissions targets and improving productivity. But developing products and making a success of them is not easy – with regulatory barriers often mentioned as a key difficulty.

Third Bearing Limited partnered with Simpli Centre of Excellence to look at how to accelerate the acceptance of new building products. We talked to new product developers, BCAs, product specifiers and technical advisors to get their views on where the issues lie and what solutions are needed.

Our Levy-funded research started with a focus on the regulatory aspects of new product innovation. However, many of the issues have their genesis in earlier stages of the product development life cycle. There is still room for regulatory improvement, but this is only one part of the picture.

Struggling throughout the product life cycle

Product developers experienced difficulties in the first two stages of the product life cycle – development and growth. The development phase is when the product is designed, tested and prepared for introduction to the market. It can be expensive with little revenue to offset development costs. The growth phase is where the race is on to claim enough market share to make the product profitable, with marketing and distribution costs ramping up.

Two common themes emerged in the development stage:

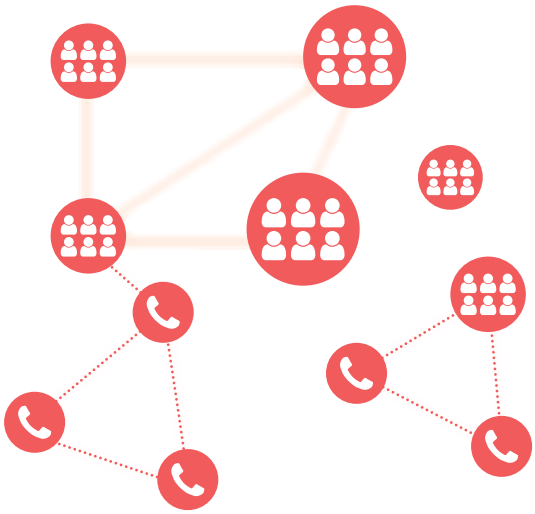
- Limited funding and start-up support for building product and material innovators. Most innovators funded developments themselves, with government and early-stage investment funds favouring high-technology and/or high-growth developments. When funding was available, it often came with limited advice specific to the construction sector, which led to issues later.
- Difficulties in choosing the right compliance pathway. Technical advice could be sourced – although there is limited availability – but often it was not fused with the business model and market growth strategy. This led to slower growth and a need to change either the compliance method or the market strategy.

We heard of some smart approaches to the growth stage. For example, innovators would piggy-back off the market's existing acceptance of well-known products. This helped mitigate three key issues raised in our research:

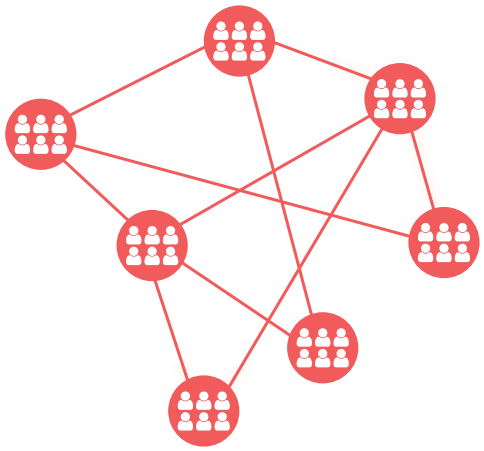
- Our market favours face-to-face – Kiwis are very relationship-based, and our trust goes up if we can meet in person.
- There are a lot of players making decisions about the product – there may be only a handful of product retailers, but there are a lot of councils, builders and designers that need to be aware of the product.
- Those players want to see the evidence – they prefer seeing examples of a product in use, taking precious time that new innovations often don't have.

These issues tip the scales in favour of large, well-established product manufacturers and suppliers who have existing wide networks and resources to invest in face-to-face relationships and deep enough pockets to take the time needed to get a product

Spreading the knowledge of new products



Current – slow diffusion
Knowledge of new products tends to spread slowly around BCAs, with shared learning tending to occur informally. There is some cross-BCA sharing through clusters and technical groups and at industry conferences.



Accelerated diffusion – decentralised
Accelerating knowledge dissemination across BCAs requires more formal connections. A shared product register could be developed, and BCA clusters could be supported to invest more time on information sharing.

known. Smaller, independent product and material innovators struggle to match this, resulting in higher costs and longer time to profitability.

Innovators who navigate the growth stage face the question of whether New Zealand's market is just too small to ever achieve maturity and an exit for their innovation. Niche products and materials, rather than mass usage products, found better prospects in overseas markets where the significantly greater scale made it easier to achieve the sales needed. It is almost as if New Zealand is a testing ground, but real growth and a successful exit for an innovator can only be achieved in larger markets.

Speeding up knowledge diffusion in consenting

We did not find significant regulatory barriers for new products and materials. Most consenting issues occurred when new products were used outside the scope of their chosen compliance pathway. Our analysis of requests for information showed that even tried-and-tested products with CodeMark certification still resulted in occasional questions from BCAs because they were used outside or right on the edge of their certification.

Increasing the speed with which knowledge about new products and materials spreads across BCAs would help with growth. Knowledge diffusion is currently slow. BCAs learn about new products or materials only when they appear in a consent application within their jurisdiction.

There is some informal sharing of knowledge across BCAs – for example, phone a friend – but nothing systematic or formal. This can mean the same questions are raised across different BCAs until the product or material becomes commonly known.

Speeding up knowledge diffusion requires improved connections between BCAs. Rather than each BCA having its own product register, a single technology platform used by all would help significantly. However, there is currently little incentive for BCAs to develop this.

There is little cost to BCAs of slow diffusion. Most, if not all, of the cost falls on the product developer and the wider system. Support to speed up knowledge of new products and materials needs to be seen as for the public good and funded centrally.

Where to invest to accelerate acceptance? Our research made it clear that the construction sector does not support new product innovation by small, independent developers. Higher productivity through increased innovation is potentially more easily achieved by speeding up how the system accepts the incremental developments that occur.

If investment is to support new product and material developments by independent innovators, it should go into:

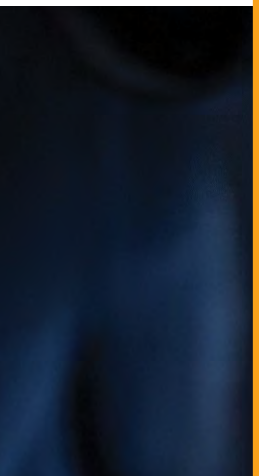
- more coordinated support of innovators to make sure compliance information, technical specifications, business models and market strategies are comprehensive and aligned
- a pool of construction industry specialists available to start-up or product development incubators and funders when they need support for a construction product innovation
- speeding up the diffusion of knowledge about new products across BCAs, which supports market acceptance of new products and materials.

FEATURE SECTION

Energy efficiency

The changing climate is influencing demands on energy. What is the research telling us and where might energy efficiencies be found?

IN THIS SECTION



The heat is on

Temperature monitoring in New Zealand homes over summer 2023/24 – part of BRANZ's Household Energy End-use Project 2 (HEEP2) – confirms that overheating is a problem for many. However, there are design and low-cost ventilation principles that can help.

BY VICKI WHITE, BRANZ SENIOR RESEARCH SCIENTIST, AND STEVE MCNEIL, BRANZ SENIOR BUILDING PHYSICIST

Our homes have a critical role to play in providing healthy, comfortable environments all year round. As the climate changes, it's essential we design to manage the hot periods as well as the cool. Last summer was one of the warmest on record for Aotearoa New Zealand, and 2024 broke the 1.5˚C global temperature rise threshold for the first time. These trends are important considerations when designing new homes and running existing ones as they imply an increased need for energy-hungry cooling – and higher electricity bills.

But it doesn't have to be that way. The good news is there are several design considerations that can be taken to enable householders to live comfortably and minimise the need for active cooling.

Homes uncomfortably warm in summer

HEEP2 is a national study of energy use and conditions in New Zealand homes. It involves surveying and monitoring hundreds of households throughout the country. As part of the study, householders were asked if they ever found their home

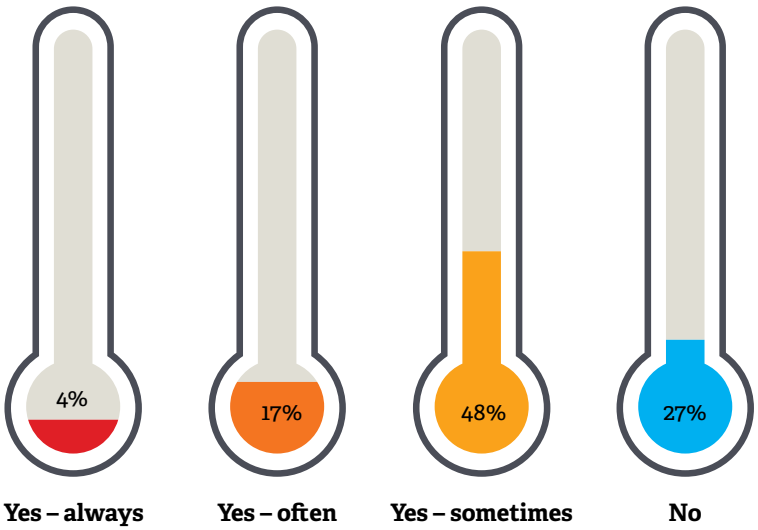


Figure 1: Was your home ever warmer than you'd like last summer?

warmer than they would like in summer. Over 1 in 5 (22%) said their home was often or always warmer than they would like and an additional 48% said their home was sometimes warmer (see Figure 1).

This means 70% of households experienced temperatures warmer than they would like at least some time in summer. Interestingly, this is higher than the proportion that said their home was colder than they would like at least some time in winter (48%) – see *Affordable comfort* in *Build* 204.

A preliminary look at data from a sample of the sensors that monitored temperatures in living rooms and bedrooms over summer 2023/24 shows temperatures were averaging over 24°C in the evening, with little difference between the two rooms. Around half of living areas were over 25°C at 6pm. Overnight temperatures in bedrooms were only around 2°C lower than during the day, at 22°C, with a quarter of bedrooms over 24°C at 2am (see Figure 2).

Of the 111 bedrooms monitored, 36% could be classed as overheating according to the Chartered Institution of Building Services Engineers (CIBSE) 1b industry criteria. Of the 45 monitored in Auckland, 58% met the CIBSE criteria whereas only one house did in Wellington. Exposure to high indoor temperatures can affect occupant health and wellbeing – for example, impacting sleep and exacerbating some health issues.

Designing for summer comfort

Considered design is critical in providing healthy, low-energy homes. Good passive design will ensure the building responds to the local climate and site conditions, maximising occupant comfort and health while minimising the need to use energy for heating and cooling.

Energy modelling can play a crucial role by evaluating a home's performance before finalising major design decisions. This approach helps predict outcomes for occupants and allows for minimising the size of airconditioning (AC) systems. It also enables designers to analyse trade-offs such as window size and orientation throughout the year.

Window size and orientation and the inclusion of external shading elements such as eaves are vital for managing solar gain, maximising warmth in winter and preventing overheating in summer. Suitable window placement is also key to achieving effective passive ventilation, especially in medium-density constructions where cross-ventilation can be challenging.

If effective passive ventilation cannot be achieved, a mechanical system should be considered. Design considerations should include window location, orientation and form to optimise exposure to cooling breezes and ensure good airflow paths and selecting windows that enhance ventilation while minimising unwanted heat gain. Horizontal openings near the floor are particularly effective for ventilation compared to vertical ones.

To design effective shading, it is important to have a good understanding of sun paths at the site at different times of the year. See *Optimising summer shade* in *Build* 201 and BRANZ Bulletin 656 *Designing to avoid houses overheating* (use the QR codes on page 61) for how to calculate depth of eaves and more fundamentals on design to avoid overheating.

Keeping cool at no or low cost

In existing homes, retrofitting external shading and strategic planting of vegetation will provide shade in summer to help keep the heat out, but allow the sun in during winter. Insulation can also help. Research has dispelled the common misconception that insulation causes overheating in homes, especially in summer. Insulation reduces the transfer of heat between the inside and outside of a

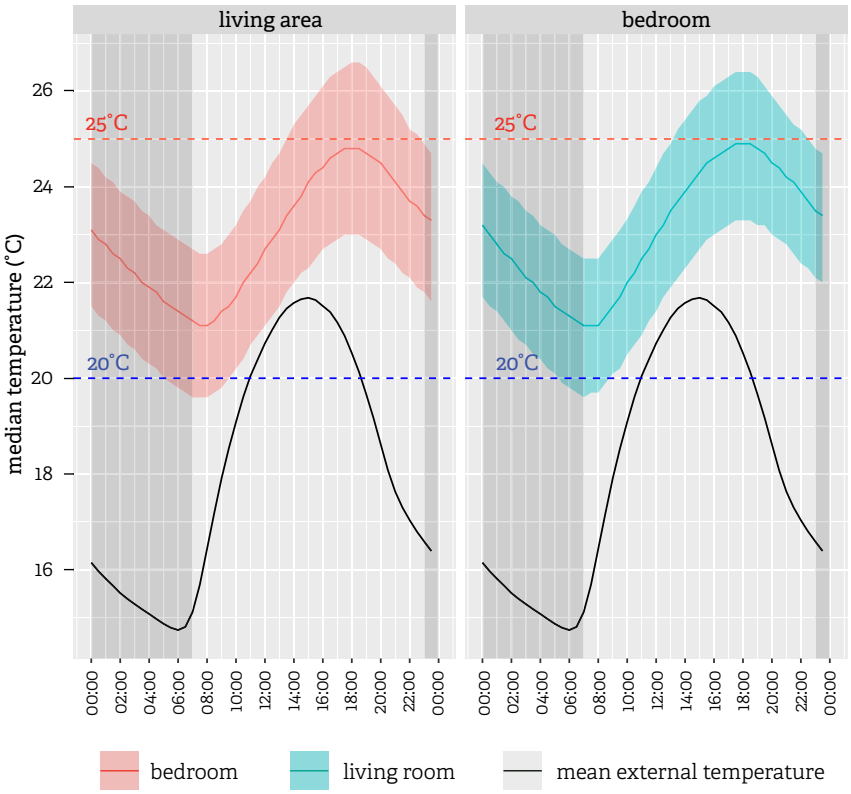


Figure 2: Half-hourly median and 25/75% temperature percentiles – living areas and bedrooms. HEEP2 summer 2023/24 sample, 20°C and 25°C thresholds and mean external temperature (black) shown for reference.

building, keeping the indoor temperature more stable and comfortable throughout the year. In winter, insulation prevents heat loss and keeps the home warmer. In summer, insulation prevents heat gain and keeps the home cooler.

While most New Zealand homes now have a heat pump that can be used for cooling, many householders will be keen to avoid the additional costs on their energy bills. Increasing use of heat pumps in summer for cooling also has implications for the electricity grid.

The HEEP2 survey showed that daily use of these appliances for cooling in summer is relatively low, but sporadic use is not uncommon. Of those that had a heat pump or air conditioner, 18% reported using it to cool their living areas every or most days in summer and an additional 24% reported use on some days. Overall, 72% reported active cooling at least some time in summer, but for 30% of these, it was hardly ever (see Figure 3).

Passive cooling techniques were much more common, with 82% of householders reporting opening doors and windows to create a cross-breeze (see Figure 4). Using windows and doors effectively in this way for ventilation and temperature control can go a long way to keeping the home comfortable in warmer months.

While closing curtains/blinds can help – and was reported by 55% of respondents in HEEP2 – it is far more effective to use

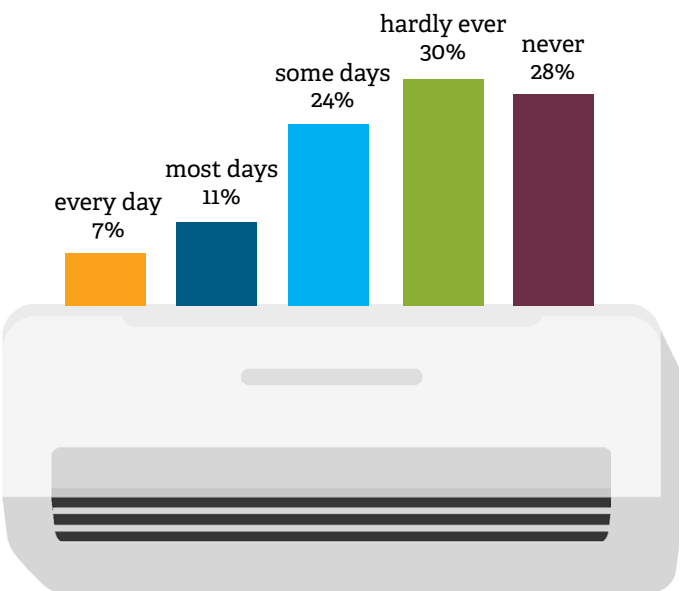


Figure 3: Frequency of reported use of a heat pump or AC for cooling the living area in summer.

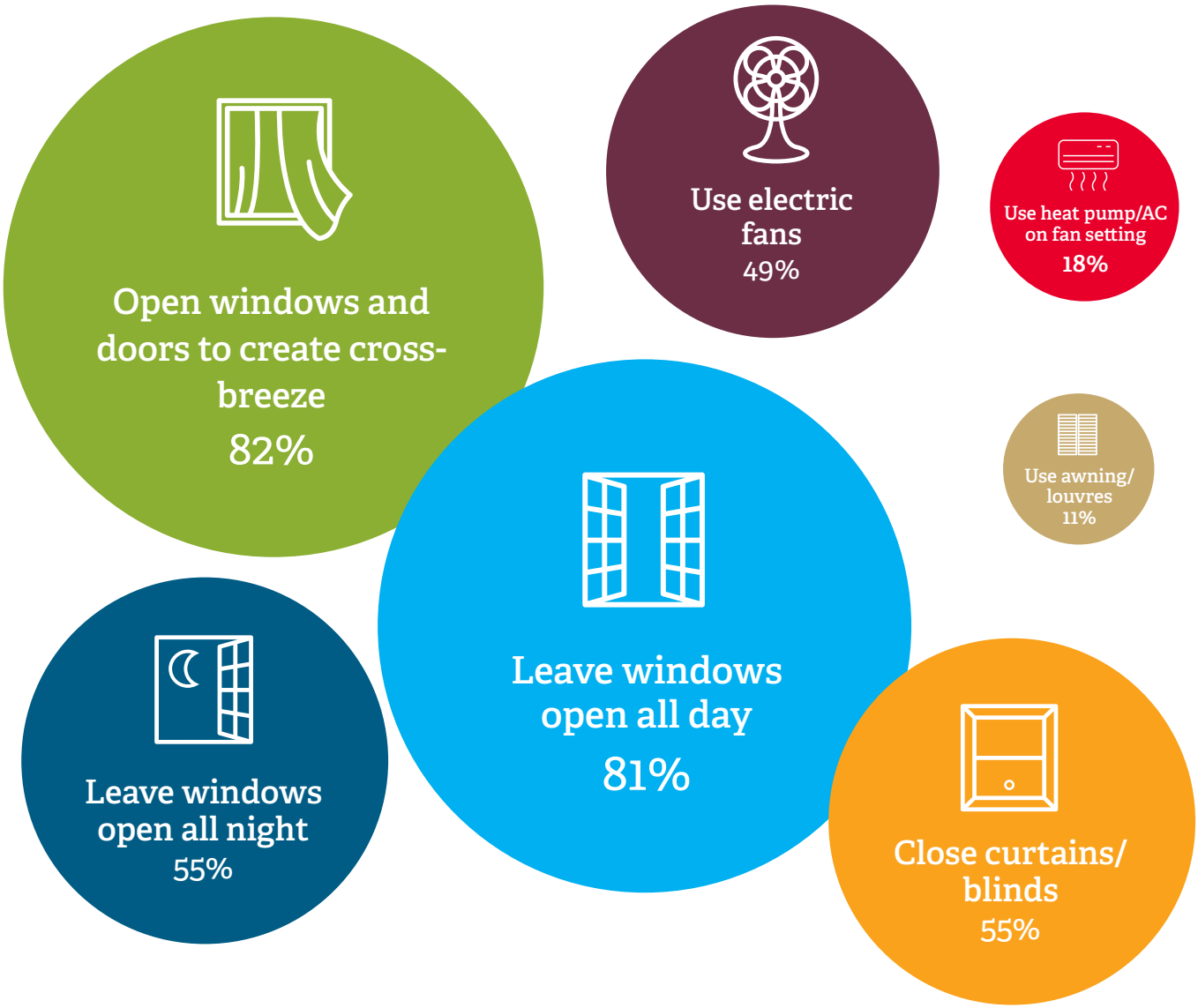


Figure 4: Things people did to help keep their home cool in summer.

external shading such as awnings, louvres or shutters. These are commonly used in Mediterranean countries to prevent the sun from reaching the inside of the house. Internal shading (curtains/blinds) is less effective at reducing solar heat gain because the solar radiation has already come through the glass and the shading itself absorbs the radiation. While some heat is radiated back to the outside, most remains within the interior space.

The HEEP2 survey also showed that use of electric fans was relatively common, used by 48% of survey respondents. However, using a heat pump on fan-only mode was relatively rare. Creating air movement through the use of fans can help make you feel more comfortable (as it helps the body to evaporate sweat), but using ventilation for cooling is far better as it can bring colder air into the house. Combining ventilation (bringing cooler air in) with a fan (to create air movement) can be an effective solution.

Summary

Results from HEEP2 suggest homes that are too warm in summer is a common problem for many New Zealanders. This article offers a few insights into a complex topic of growing importance.

FOR MORE

Read more about HEEP2

See BRANZ Bulletin 656 *Designing to avoid houses overheating*

See *Optimising summer shade* in *Build* 201

Carbon-neutral retrofitting for climate change

The significant impact of the building sector on the environment justifies the need to strengthen energy efficiency strategies for both new and existing building stock. While building performance guidelines and requirements have been established for new construction, existing building stock remains a challenge.

BY DR ZAHRA JALALI, PROFESSOR ALI GHAFFARIANHOSEINI AND PROFESSOR AMIRHOSEIN GHAFFARIANHOSEINI, SCHOOL OF FUTURE ENVIRONMENTS, AUCKLAND UNIVERSITY OF TECHNOLOGY

Aotearoa's housing stock is ageing and many existing buildings use outdated energy systems that are inefficient and contribute to climate change or are susceptible to climate change impacts. Carbon-neutral retrofitting is a viable way of adapting buildings to climate change without exacerbating climate change impacts, but there are challenges.

Carbon-neutral building retrofit technologies

Conventional retrofitting options aim to minimise operating energy. Carbon-neutral retrofitting options consider whole life cycle energy, including the impact of embodied carbon.

Carbon-neutral building technologies aim to reduce operational energy consumption and carbon emissions by incorporating a range of aspects such as renewable energy sources, building design features, energy system improvements and energy storage solutions:

Many of Aotearoa New Zealand's houses are ageing and might use outdated energy systems.

- Renewable energy systems use renewable sources like solar, biomass and wind to produce heat and electricity for buildings. They include technologies such as solar panels, heat pumps and wind turbines. Solar systems are versatile for various climates, while heat pumps and wind turbines depend on specific regional and climatic conditions.
- Passive design strategies, also known as building design features, focus on reducing energy needs by improving daylight, ventilation and insulation. Examples include window glazing, shading and green roofs, which help reduce energy use across different climates.
- Energy efficiency in heating, ventilation and air conditioning (HVAC) systems is critical as they account for a significant portion of building energy use.
- Energy storage systems such as thermal storage and batteries help balance energy supply and demand. Batteries support renewable energy systems by addressing power fluctuations.

Implementing carbon-neutral retrofit technologies also presents challenges such as high upfront costs, limited installation space and the complexity of calculations and decision making.

Optimisation techniques and generative design

Incorporating climate change effects into life cycle assessments of retrofit design is essential to ensure that retrofitting solutions remain effective in the future. Comprehensive evaluation indicators are needed to ensure the effectiveness and sustainability of retrofit designs, particularly as extreme weather events and temperature fluctuations become more common in the long term.

Achieving optimal results with carbon-neutral retrofit design is challenging as three key factors must be balanced: environmental impact, energy efficiency and cost of investment and operation. It is difficult to find a solution that achieves an acceptable level for all these factors. Optimisation techniques are an efficient way of selecting the most effective retrofitting solutions. These strategies consider the long-term costs, future energy efficiency and carbon emissions associated with different retrofitting options.

Generative design, unlike traditional design, focuses on setting procedural rules, constraints and flows to automate the design process and achieve optimal design solutions. Generative design is especially practical for achieving contractional objectives and complex decision making in design. When optimising building retrofits to achieve climate change goals, careful consideration of several factors is needed:

- Future weather projection and energy demand prediction – projections of weather parameters such as temperature, cloud cover, wind speed and humidity, which significantly influence building energy demand, using climate change models and incorporating those projections into prediction models of future energy consumption.
- Energy performance improvement and prediction of renewable energy production – measures such as improved insulation, passive strategies and HVAC upgrades combined with energy and thermodynamic modelling enable efficient retrofit design.
- Life cycle optimisation for retrofitting – using optimisation techniques to minimise the lifetime cost of retrofitting (investment and operation costs), minimising environmental impacts and embodied energy and maximising energy efficiency.

Generative design and optimisation techniques have the potential to transform carbon-neutral building retrofitting processes by ensuring that retrofit designs are not only functional but also resilient and cost-effective in the long term.

Future research prospects

The predicted long-term consequences of climate change create a need for mitigation and adaptation actions. Carbon-neutral retrofits that combine adaptation and mitigation retrofit design foster synergies between the two strategies. Carbon-neutral retrofits play a crucial role in this process by minimising energy consumption and greenhouse gas emissions while simultaneously enhancing a building's resilience to climate-induced stressors.

However, despite the proven benefits of climate-resilient retrofit options, there are significant challenges in the implementation of climate-resilient carbon-neutral retrofits. This is because prediction thermal models are complex, computationally heavy and difficult to apply in real-world design practices.

Regardless of the potential benefits of carbon-neutral retrofit solutions, there is a huge gap in evaluating the effectiveness of the measures in terms of cost feasibility, environmental impacts and energy efficiency outcomes. To unlock the potential of these solutions and bridge this gap, systematic evaluations and robust data analysis are essential to enhance decision making and ensure that design meets retrofit goals while balancing cost, environmental impact and energy efficiency.

By Colin Barkus, *Build* Editor, BRANZ

Designing for our most vulnerable

Quality of life for the growing number of older New Zealanders living with dementia is significantly affected by the daylight environment in their homes. New Levy-funded research, using a methodology developed by a BRANZ Scholarship recipient, will inform practical design and retrofit guidelines.

Age Concern New Zealand estimates that around 70,000 New Zealanders currently live with dementia – and that number is growing fast as our population ages. Dementia is an umbrella term used to describe a range of symptoms affecting memory, cognitive ability and communication.

Studies by global health organisations have found that housing design contributes significantly to the quality of life of older people living with dementia. However, in Aotearoa New Zealand, disability design typically focuses on designing or retrofitting for accessibility.

Indoor daylight environment matters

'That is only part of the issue', says Dr Alessandro Premier, Senior Lecturer at Auckland University's School of Architecture and Planning and lead investigator for new Levy-funded research that will develop New Zealand-specific dementia-friendly design and retrofit guidelines.

'The indoor daylight environment is very important for people living with dementia. It can affect their capacity to perceive space around them, their

The CCREATE-AGE facility in which the co-design workshops will take place.

behaviour and their ability to sleep – all things that affect quality of life. This is an underinvestigated area.'

This year, a team of experienced researchers coordinated by Dr Premier will work directly with people living with dementia to address this gap. They will draw on the expertise of lighting specialists, advocacy bodies such as Alzheimers New Zealand and the New Zealand Dementia Foundation and specialists in housing design and retrofitting. They will be supported in this effort by the specialised resources of CCREATE-AGE – a centre established by Auckland University to improve the health and wellbeing of older people through co-created research.

'Ultimately, we will co-develop and validate a set of practical design and retrofit guidelines that will address daylight controls such as window design and solar shading but also look at the nature of indoor surfaces – right down to the materials and surfaces used – which can influence the perception of light,' Dr Premier explains.

People at the centre

A new people-centred post-occupancy evaluation (POE) methodology, pioneered by recent BRANZ Scholarship recipient Jane Waterhouse, will be key to the early phase of the project. Researchers will visit the homes of people in the early stages of dementia to obtain subjective and objective measurements of how the daylight environment affects their quality of life.

'The POE phase is when we'll learn a lot and obtain appropriate data and evidence on the daylight environment of these people,' Dr Premier says.

'With the help of CCREATE-AGE, we've been able to connect with potential participants who can provide informed consent and are comfortable engaging with us in this way.'

Closing the circle

Next will come a focus group with all stakeholders to review findings and discuss interventions that might work in the New Zealand context.

That will be followed by a series of co-design workshops, where participants in the POE phase and caregivers will gather at the CCREATE-AGE centre to experience and explore potential design solutions.

'The CCREATE-AGE facility is a lovely, new, safe space in a recently retrofitted home in which people can sit quietly and work together on ideas that might help them in their own homes,' says Dr Premier.

'It's extremely important that we close the circle by bringing the ideas and potential solutions back to the people living with dementia and their caregivers. They are the ultimate users of this knowledge.'

A draft set of design and retrofit guidelines will then be reviewed by all stakeholders before release – expected in August 2026.

'We are excited about co-designing housing solutions for the daylit environment that are grounded in the everyday experiences of older New Zealanders living with dementia. It's a critical step towards improving quality of life for a growing proportion of our population.'

By Gordon Chen, BRANZ Scholarship recipient, Associate Professor Anthony Abu and Professor Gordon MacRae, Faculty of Engineering, University of Canterbury

Seismic detailing of steel joints and fire performance

A research project found the practice in Aotearoa of seismically compatible detailing does not always improve the fire performance of a beam-column joint compared to joints designed without it, as occurs overseas. One answer for better fire performance may be to look at British fire performance practices.

As buildings in Aotearoa New Zealand are often designed with earthquakes in mind, their steel beam-column joints are detailed to provide greater flexibility and provide an explicit, controlled failure hierarchy. This is not the case in other countries where seismicity is less of a concern.

The improved detailing is sometimes said to improve structural behaviour under fire conditions. However, observations during and after numerous fires – both accidental and experimental here and internationally – have shown joint behaviour and failure modes do not align with their behaviour under earthquake conditions. The question is, does our seismically compatible joint detailing truly improve structural performance under fire conditions?

The fire performance of seismically compatible detailing follows, and the results and conclusions of a research project looking at the issues are summarised.

Earthquake design influences on joint detailing

Seismic design in Aotearoa should provide good structural behaviour through capacity design. This controls the failure of the building by ensuring desirable and gradual failure mechanisms (ductile links) are the weakest part of the building, while undesirable and sudden failure mechanisms (brittle links) remain stronger.

The whole-building response is governed by the weakest mechanism, akin to a chain failing at its weakest link (see Figure 1). Alongside other likely issues, the following key detailing considerations are made to ensure good performance of these joints using pre-engineered connections as defined by the Steel Connect tables (SCNZ 14.1:2007 and 14.2:2007):

- Joints are considered brittle links and should be stronger than other parts of the building.
- The behaviour of the link should be predictable for inter-storey

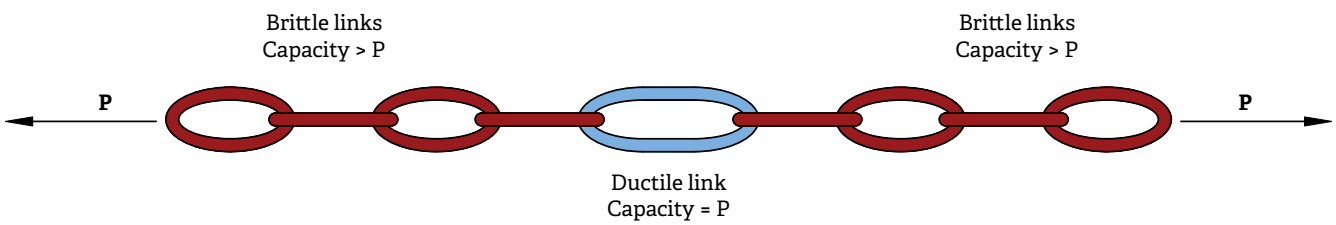


Figure 1: Capacity design can be visualised as a chain governed by its weakest link. The behaviour of the system is ductile if the ductile link is the weakest.

drifts of at least 2.5% (rotations of 0.025 rad, 1.4°) to avoid introducing additional forces such as those from beam-column contact (see Figure 2).
- The failure of the joint itself should be ductile by preferring ductile mechanisms such as bolt hole bearing over brittle mechanisms such as bolt fracture – a capacity design of the joint and its components.

Fire condition demands

Fire conditions also pose significant challenges to a building's structural stability. Each of these challenges corresponds to the detailing considerations for seismic conditions previously mentioned:

- Reduction of strength and stiffness of steels at high temperatures combined with thermally induced axial forces.
- Large beam deflections due to reduced stiffness, thermal expansion and significant axial loads, which contribute to large beam end rotations.
- Non-uniform material degradation due to varying localised temperatures of different steel components and more rapid degradation of different types of steels such as heat-treated high-strength steel bolts.

The magnitudes and mechanisms of the fire effects do not resemble those from seismic conditions. The reduction of material strength reduces joint capacities. Large axial compression develops from restrained thermal expansion and later large beam tension forms during catenary action and subsequent cooling (see Figure 3). Combined with the reduced joint capacity, this often causes an inelastic non-linear response of the joint.

Large rotations, which may reach and even exceed 0.16 rad (9.2°) (corresponding to beam deflections of L/20 as per the standard fire test, against which steel protection schemes are usually certified), often result in beams bearing against columns, elongation or tearing of bolt holes and fracture of bolts (see Figure 4).

If the rotations are large enough that the beam bottom flange bears against the column, significant moments can develop that may invalidate nominally pinned or simply supported design assumptions. High-strength steel bolts degrade much faster than mild steel beams, plates and columns and often end up governing the joint failure.

Study of seismically compatible detailing in a fire

During the research, detailed finite element simulations were conducted to quantitatively compare joint designs used in Aotearoa – representing seismically compatible detailing – with British joint designs representing non-seismically compatible detailing.

Three joint types were investigated:

- A fin plate joint – also known as a web side plate joint.
- A fin plate with a top flange plate – a local specific detail that

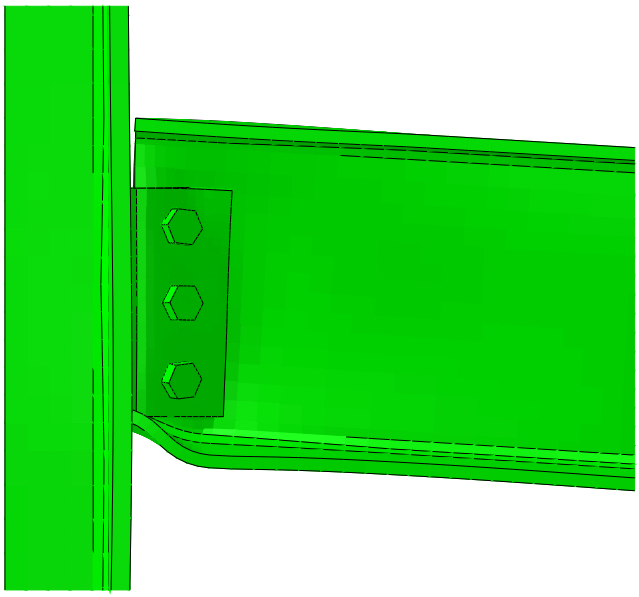


Figure 2: Under beam end rotations as small as 2–3°, the beam flanges may bear against the supporting column, inducing additional compressive forces that may lead to complex non-linear effects such as localised buckling of the beam flange.

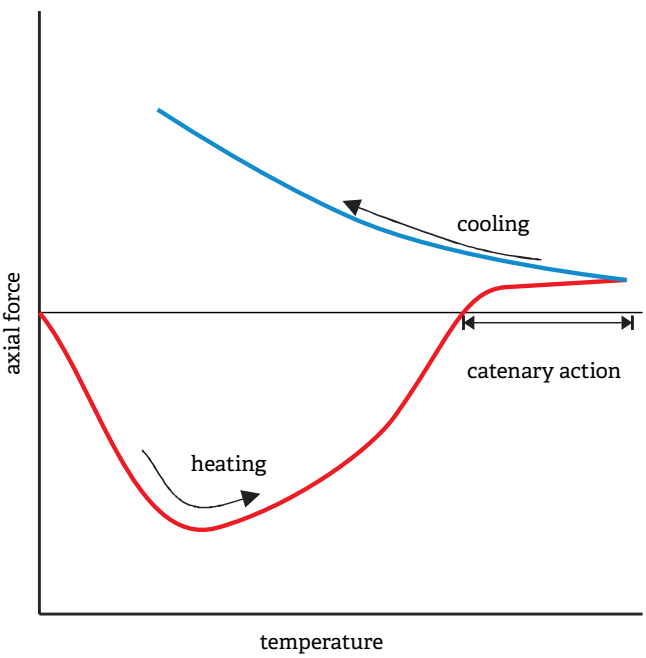


Figure 3: Qualitative representation of axial forces experienced by a beam and its joints throughout the course of a fire.

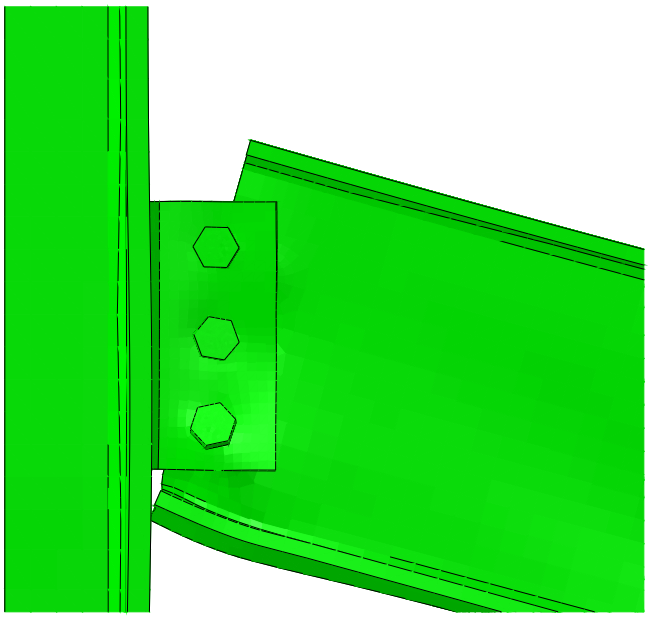


Figure 4: Large beam end rotations – approximately 15° shown – of a joint under fire conditions.

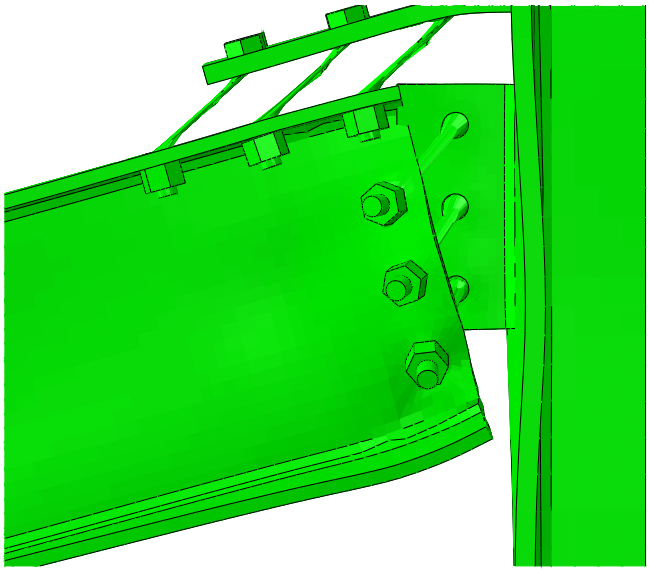


Figure 5: Bolt fracture governs many of the failures under fire conditions.

may be included with nominally pinned joints to aid axial force transfer.

- A moment end plate joint.

These joints connected the beam and columns of an interior bay frame exposed to the standard fire. Columns were protected, and connections and non-composite beams – with a limiting temperature of 590°C – were unprotected. The response of frames with either local or British details was analysed and compared, followed by a parametric study varying each joint type to assess the effects of specific detailing differences such as plate thickness, bolt size or beam-column gap.

The numerical study showed little difference in terms of failure characteristics between the New Zealand and British fin plate or moment end plate joints. In fact, the details from Aotearoa showed earlier failure times than their British equivalents. However, inclusion of a top flange plate to the fin plate joint significantly increased fire resistance when compared to the bare fin plate joint.

Failures of the fin plate connection with or without a top flange plate connection (Figure 5) were governed by bolt fracture despite seismic detailing practices supposedly moving the failure mode away from the bolts. This was because of the much more rapid degradation of high-strength steel bolts compared to mild steel plates and members.

Bolts failed sooner when thinner plies were included due to reduced thermal mass leading to faster heating. For example, a bare fin plate joint with an 8 mm plate (local detailing) failed after 15.0 minutes compared to 15.5 minutes for a 10 mm fin plate (British detailing). Failures of the local and British moment end plate joints were governed by beam plastic hinge fracture, occurring slightly later in the more flexible British detail (49.6 minutes vs 47.8 minutes), which shared some damage with the plastic hinge zone. The detail in Aotearoa concentrated damage to the plastic hinge zone only.

Conclusions and recommendations

- Aotearoa's seismically compatible detailing does not always improve the fire performance of a beam-column joint compared to joints designed without seismically compatible detailing and may, in fact, result in reduced performance. Conclusions and recommendations from overseas studies to improve connection fire performance – for example, the use of slotted holes and alternative joint types such as angle cleats – therefore also apply to construction here.
- Bolt failures often governed the response of the joints despite ambient temperature design practices shifting the failure to the plies.
- Capacity of the bolts under high temperatures should be checked alongside the ambient temperature design.
- Bolt fracture could be delayed or avoided by delaying temperature rise by, for example, using thicker plies to increase thermal mass, preventing direct fire exposure through shielding and encasement from a floor slab or thermal protection and using additional or larger bolts.
- Top flange plate connections can improve the fire resistance of the fin plate joint while simultaneously offering benefits under seismic conditions.
- Experimental studies on seismically compatible detailing in Aotearoa should be conducted to provide further strength to these arguments.

By Colin Barkus, *Build* Editor, BRANZ

Turning down the heat

As summer draws to a close, many Kiwis continue to struggle with overheating homes. Fingers have been pointed at the minimum insulation requirements in clause H1 *Energy efficiency* of the New Zealand Building Code, but the problem is complex. BRANZ research is laying the foundations for solutions.

Intuitively, the problem seems obvious. Boost the minimum insulation requirements for roofs, walls, windows and floors in new homes – as happened when clause H1 of the Building Code was reviewed in 2021 – and occupants will stay cosier in winter but swelter their way through summer.

'That is a very common misconception,' says BRANZ Senior Building Physicist Steve McNeil.

'Insulation works by reducing the transfer of heat, helping to keep the indoor temperature more stable and comfortable. The usual focus is on retaining heat in winter, but in summer, insulation reduces heat gain – particularly from the roof space – and helps to keep the home cooler. The increased insulation requirements under H1 have not, on their own, caused an overheating problem. Design plays a crucial role – particularly when it comes to managing solar gain.'

Flexibility in compliance methods

Furthermore, Steve points out that two of the three available methods for showing compliance with the insulation requirements of H1 (see page 71) allow some

flexibility in the quantity and placement of insulation.

'In the past, the majority of designers have chosen the schedule method because it's clear cut and easy to follow. But it's a bit of a blunt instrument and with some roof styles can be challenging to achieve. This is one of the reasons we've seen decreased use of the schedule method since the recent H1 revisions,' he says.

'The calculation and modelling methods give a bit more freedom, allowing thermal resistance to be shifted around the building. The calculation method allows insulation to be reduced in some places and increased in others as long as the overall thermal resistance doesn't drop below that of a reference building. The modelling method is more sophisticated and applies climate, occupant loads and other factors to assess energy use against a similar reference building. It has the potential to provide rich information about how a building is likely to perform. Using these methods, designers and their clients can therefore engage a bit more with the design – thinking about the home's physical characteristics, the climate and how occupant comfort might be optimised.'

The calculation and modelling methods won't single-handedly prevent potential overheating problems in new homes, Steve adds. In fact, the calculation method focuses on heat loss, not heat gain. But they do enable designers to think about occupant comfort at the same time as achieving compliance.

Model designs

Longer term, BRANZ sees computer modelling underpinned by accurate and consistent data as a pathway to compliant designs that also ensure good thermal performance throughout the year in all new homes.

Insulation would be one of many considerations factored into such simulations. BRANZ research has shown that, to achieve year-round occupant comfort, homes need to be looked at as a system.

BRANZ's Steve McNeil.

'Factors such as the orientation of the building site, the number and position of windows, and shading and ventilation are critical to understanding outcomes,' Steve says.

'Add in good data on home occupancy and occupant behaviour – which we're now getting from our HEEP2 project (see page 58) – and simulations become more robust and trustworthy assessments of building performance. We've also worked collaboratively with NIWA, MBIE and Kāinga Ora on the climate data used for simulation. It includes future climate scenarios, which will help us create buildings resilient to future conditions.'

Regardless of the compliance route chosen, Steve says that, the earlier in the design process that likely performance is assessed, the more cost-effective design choices can become – reducing the risk that expensive, poor-performing choices will be locked in.

Sector-wide support needed

Moving to modelled designs that comply with the requirements of H1 while placing occupant comfort at their centre will require buy-in, commitment and support from across the sector, Steve says.

'We recognise that designers and builders would need to be trained and motivated to choose such a compliance pathway. Models will need to be consistent, easily accessible, easy to use and accurate. For example, they'll need to be supported by accurate data for all climate zones.

'In addition, overheating is best assessed using hourly computer models. The good thing is, computing power is increasingly cheap, so barriers to hourly simulations are reducing all the time.'

Steve adds that things are evolving similarly internationally, citing the ISO 52016-1:2017 *Energy performance of buildings* as an example.

'The committee has gone to significant efforts to create a standard that uses the same inputs for both hourly and monthly methods, overcoming one of the frequent criticisms of hourly models. This gives much greater transparency and the ability for designers to understand daily trends – particularly with overheating.'

More broadly, Steve says support will be needed from the Building Code. While achieving national home energy efficiency aspirations that can consistently be applied, he says the Building Code should support a degree of design flexibility so occupant comfort can be achieved in homes in any part of the country.

There is also the vexed question of how the upfront cost of potential solutions compares with the long-term household energy costs that result. BRANZ provided analysis to support MBIE's recent H1 consultation, comparing the upfront and ongoing costs

of using the calculation and modelling methods for compliance – should the schedule method be discontinued. BRANZ is conducting further analysis to help the sector better understand the short-term and long-term financial implications of designing, building and living in better-performing homes.

Groundwork through BRANZ research

In addition, BRANZ is leading research that will lay the groundwork for a model-led approach to designing for thermal efficiency, indoor air quality and occupant comfort.

One new project aims to develop industry-wide capability in building simulation, particularly energy modelling, to improve knowledge and practices. The research will identify and address skill gaps, standardise practices and provide industry support.

Another project will develop a framework for reducing the impacts of our future climate on building performance. Recognising the high likelihood that climate change will exacerbate existing problems with building performance – including overheating in summer – the research will explore solutions that consider homes as a system. It will consider the cost and carbon impacts of ventilation, airtightness, indoor environmental quality and interstitial moisture together, and examine how effective retrofits might be achieved.

FOR MORE

Read more about BRANZ healthy homes research

H1 compliance methods

MBIE describes three methods for showing compliance with the H1 *Energy efficiency* insulation provisions for housing and small buildings.

Schedule method – prescribes tabulated minimum construction R-values for the roof, walls, windows, doors, skylights and floors of a building based on its location in the country. To comply using this method, the minimum R-value for each of these elements must be achieved.

See BRANZ H1 schedule method tool: www.branz.co.nz/energy-efficiency/h1-schedule-method-tool/

Calculation method – based on simple equations and allowing a designer to customise the insulation levels between different building elements to give the same relative heat loss as a building that complies with the schedule method.

See BRANZ H1 calculation method tool: www.branz.co.nz/energy-efficiency/h1-calculation-method-tool/

Modelling method – uses computer modelling to demonstrate that the proposed building does not require more heating and cooling energy than a reference building that complies with the schedule method. It provides the greatest flexibility to customise insulation levels.

By Andrew Baird, Beca (co-lead), Jan Stanway (co-lead), Muhammad Rashid, Silvester Clark and Sara Hinz, WSP, and Greg Preston, BIP

Improving the seismic performance of non-structural elements

A code of practice for the seismic performance of non-structural elements is being developed to help deliver buildings that better stand up to earthquakes.

Following the 2010/11 Canterbury earthquakes, the 2013 Seddon earthquake and the 2016 Kaikōura earthquake, many buildings could not be reoccupied despite sustaining only minor structural damage – largely due to the failure of non-structural elements (NSEs). This caused major disruptions to local businesses and communities.

Over the last decade, the building and construction industry has worked to identify how buildings can be designed and constructed to perform better in earthquakes. That work has highlighted the need for guidance on:

- enhancing NSE design practice
- better defining roles and responsibilities
- improving the coordination of NSEs.

To address this need, the Building Innovation Partnership (BIP) has been working on a code of practice for the seismic performance of non-structural elements (NSE CoP). Phase 1 of the NSE CoP is the culmination of a year's effort and brings clarity and consistency to the procurement, design and construction of NSEs. It looks beyond seismic restraint to take a more holistic view of building performance and NSE functionality. It begins defining what we mean by seismic performance and the steps needed to ensure performance criteria are met.

NSE CoP and building performance

Building performance is multi-faceted and seismic performance is central in Aotearoa New Zealand (see Figure 1).

The NSE CoP:

- clarifies in non-technical terms the impact of NSE components and systems selection on overall building performance
- offers guidance on how design teams should communicate seismic performance of NSEs, enabling building owners to understand the expected functionality and performance of the building or facility following seismic events
- assists designers and consultants to specify NSEs in line with facility/building performance requirements
- assists designers and consultants to understand and coordinate seismic design interfaces between NSEs
- creates a common language akin to an STC rating for designers and contractors to communicate the selection requirements and required seismic performance of NSEs damaged when the building moves during earthquake shaking
- allows suppliers to categorise their products for apples-with-apples comparisons
- provides recommended quality assurance requirements.

Who is it for?

The seismic performance of a building is a holistic issue that touches all disciplines in planning, design and construction. Accordingly, the NSE CoP provides guidance to clients, project managers, quantity surveyors, designers, contractors and subcontractors.

What does it cover?

Phase 1 is the first iteration of the NSE CoP. It aligns with other MBIE guidance such as low-damage design guidelines,and follows a similar structure.

Part A

Part A is directed towards clients, their representatives, project managers, multi-disciplinary project teams, contractors and subcontractors. It includes important information on how to develop the project brief to align with business goals and business continuity plans. It also clarifies the project design methodology and processes through the project phases and into construction.

Part B

Part B defines the performance requirements for NSEs and will be used by project managers and multi-disciplinary project teams,

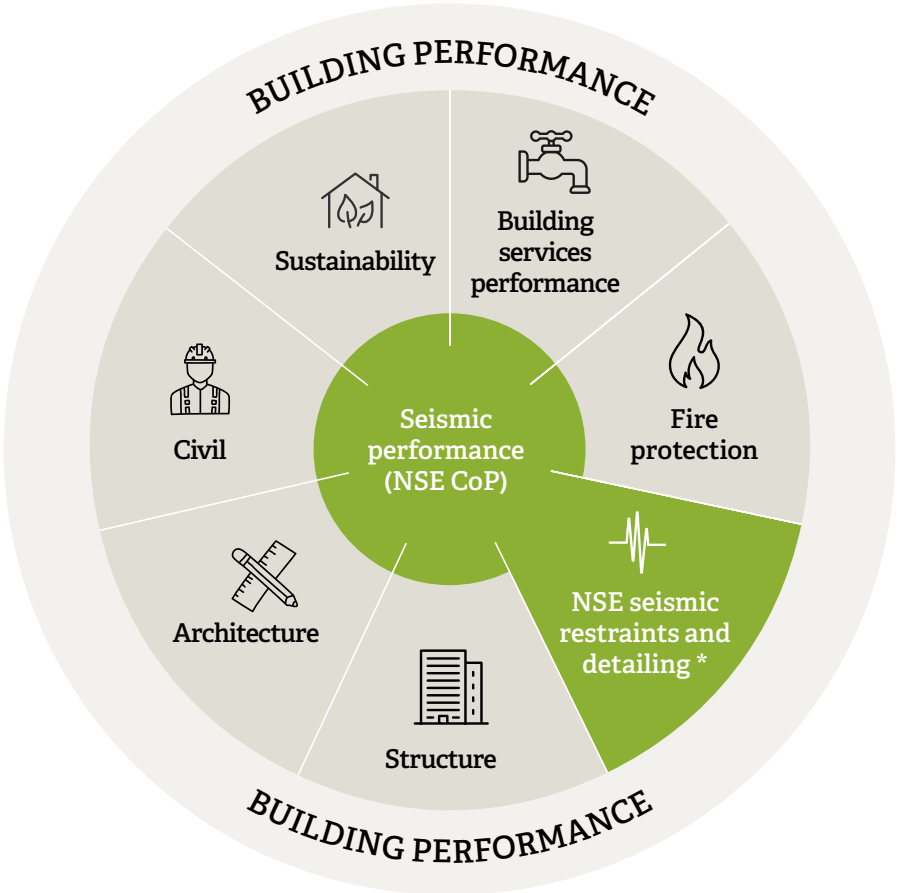


Figure 1: Use of NSE CoP to achieve overall building performance.

***NZS 4129, NZS 4541, AS/NZS 2785, AWCI CoP, etc.**

suppliers, contractors and subcontractors. It also provides guidance on the requirements for seismic qualification of NSEs and testing protocols where testing is required to confirm the seismic performance of NSEs.

Part C

Part C provides technical guidance on the seismic design of NSEs and is directed primarily towards structural engineers and NSE technical designers. It shows how the performance requirements set out in Part B can be met.

To date, it provides technical guidance on:

- lightweight partition walls
- suspended ceilings
- linear suspended services
- suspended equipment
- floor-mounted equipment
- automatic fire sprinkler systems
- exterior glazing systems.

Technical guidance on other NSEs is proposed for Phase 2.

Future iterations

Phase 1 is just the start. While the NSE CoP is for the whole industry, by necessity, the first phase has a strong design focus. However, Phase 2 will focus more sharply on the requirements of the contractor and subcontractor. There is a need to define how to specify and guarantee the performance of substitute components, particularly when they are imported and may or may not have been tested and certified in their place of origin.

Even for locally manufactured components and systems, there is no clear pathway for seismic qualification. Suggesting appropriate testing protocols and other ways of seismically qualifying equipment such as the definition of 'inherently rugged' are planned for Phase 2.

This project is funded by the Building Research Levy, with additional funding from the Building Innovation Partnership and support from MBIE's Science Partnership Scheme.

FOR MORE

View the NSE CoP online

By Nick Helm, Freelance Technical Writer, TenPoint

Direct route to a circular economy

As the construction sector takes its first tentative steps toward a circular economy, could emerging technology provide the catalyst to get the transition moving?

Construction is a dirty business. Up to half of all the waste that ends up in New Zealand landfill comes from construction and demolition activity, according to the Ministry for the Environment. Every home constructed produces an average of 4 tonnes of discarded timber, metal and plastics that's destined for a one-way trip to the dump. .

It's not just a local problem. In an effort to clean up its act, the global construction sector has explored several strategies to reduce waste and move to more sustainable practices. One option that has enjoyed some success in other countries, including Australia and the UK, is transitioning to a circular economy.

Use and reuse

A circular economy is an economic model that minimises waste and maximises the use of reusable and recycled resources. Unlike the traditional linear economy, which follows a take, make, dispose pattern, a circular economy emphasises the continuous reuse of resources in a closed loop. In theory, it's a game changer, but it has proven extremely difficult to take even the first steps, especially in an industry criticised for being as stuck in its ways as construction.

Ideally, you could stand outside a building, wave a scanner across it and all the assets would pop up in a big database.

Several notable organisations, including Google, say the way to smooth and accelerate the transition lies with digital technology. The idea is that, by gathering and analysing data about materials, logistics and people, digital technology can help identify challenges, highlight areas of systemic waste and guide more informed decisions to better address the issues holding things back. From this work, four transition technologies have emerged – asset tagging, geospatial data, complex data analysis and connectivity.

Asset tagging

Asset tagging provides information about the condition and availability of products, components and materials. Access to this information can extend the lifespan of an asset, enable additional use cycles and contribute to resource recovery at the end of its life.

In construction, it often involves placing a unique RFID tag or QR code on each asset. These link the asset to a database that can tell you exactly what the asset is, where it came from, who sent it, when it arrived, what it's for, where it's supposed to be used, how to handle it safely and a myriad of other useful information.

'Basic asset tagging solves a hugely problematic issue on many sites – how to track materials,' says Professor Robert Amor from the School of Computer Science at the University of Auckland. 'It can be very difficult to check quantities by hand. The manufacturer tagging each asset with an RFID or barcode means it's possible to scan assets as they arrive, automating the process and making it much faster and more accurate.'

In a circular economy, it's useful to know this information over the full history of the asset. For instance, if a beam in a building is a candidate for reuse, what happened to it over its lifetime? Was it properly maintained? Has it been through a fire or seismic event? In theory, asset tags

Up to half of all the waste that ends up in New Zealand landfill comes from construction and demolition activity.

can provide this information.

Ideally, you could stand outside a building, wave a scanner across it and all the assets would pop up in a big database. 'Unfortunately, even the most advanced tagging technology still falls well short,' says Professor Amor.

Passive RFID, which operates without a power source, is a relatively close-proximity technology, with an effective range of no more than a few centimetres. Active RFID systems solve this problem, but the tags are expensive and batteries inevitably run flat, making it unsuitable for the multi-decade life cycle of a built asset.

Geospatial information

By itself, geospatial information is essentially location data, but when combined with asset tagging, it provides the ability to track assets, materials, components, products and people. Depending on how the geodata is collected, it can track assets around a construction site or across the world.

In a circular economy, it's particularly useful for linking BIM models together in a geographic information system (GIS). Although they can be highly detailed 3D or 4D representations, BIM models are often isolated, only considering the construction site and buildings and the immediate surroundings. On the other hand, many GIS systems lack detail of buildings at all, even at the urban or city level.

'As we think in a bigger picture about how we use and reuse our cityscapes and urban areas, it's much more important that we bring these systems together,' says Professor Amor.

He believes connecting the two would greatly improve planning outcomes as they enable much more detailed simulations and high-accuracy analysis of the impacts on land use and our urban environments.

'Take seismic planning, for example. Imagine that, from within a nationwide GIS system, you could drill down to street level in any city and inspect each building, look at its age, construction materials, foundations, ground types and so on. All that information already exists, we just can't get to it in ways that make it useful.'

Complex data analysis

Complex data analysis or big data refers to number crunching on a scale beyond what's possible with traditional computer systems. With advanced, cloud-based processing power, computers can now analyse vast datasets in real time, allowing for faster, more informed decisions and better deployment of resources in built assets.

One of the most anticipated uses for big data in construction is the ability to link the physical and digital worlds together – the so-called digital twin.

A digital twin is a complete representation of a building (or other asset) in software. It's possible to simulate events – everything from a traffic jam to a major earthquake – and see how the model responds. The more detailed the model and sophisticated the simulation, the more likely the simulated outcomes will match what would happen in the real world.

'That's where big data will most impact construction. The ability to make better real-world decisions via information you gained in the digital world is an enormous step forward. It benefits almost everything in a circular economy, from waste minimisation to resource allocation. It's just a better, more granular understanding of what's happening in real time in our buildings and cities,' says Professor Amor.

Connectivity

The trick, however, lies in the data – accessing vast quantities of the stuff in real time. Some buildings already have high-quality data feeds, but again, it's often used in isolation and not shared as widely as it could be.

'If the data's siloed, the decisions are siloed too. We're not making global decisions, which would optimise how we run our construction projects to make better towns and cities, help people move around and limit waste and pollution. And that's because we lack a way to bring all that data together.'

Unfortunately, there are few standards when it comes to data. One organisation will use a completely different dataset and software system to the next. As a result, data often isn't shared, and when it is shared, it is often of limited interoperability simply because the data isn't in the right format, it lacks quality or not enough was collected.

'Until we can figure out how to all use good data and good data formats that everyone understands, connecting together and sharing information in a useful way is going to be very difficult,' says Professor Amor.

'It's really hard to take the next steps toward a circular economy and do better because the data doesn't support us doing better.'

By Liz Hill, Senior Associate, MinterEllisonRuddWatts, and Jake Woolgar, Registered Building Surveyor, ASJ

What opening the market means

Reforms to the Building Act opening the local market to overseas products are potentially exciting but also present challenges. Caution is advised.

In 2024, the government put the construction industry squarely in its sights, with a raft of proposed changes aimed at reducing red tape, costs and time. This article considers the potential impacts of reforms to the building consent system and the Building (Overseas Building Products, Standards, and Certification Schemes) Amendment Bill..

Reforms to the building consent system

While the scope and details of the reform are still to be announced, a number of changes have been proposed:

- Allowing councils to group together to deliver building control functions, larger regional building consent authorities (BCAs) and a single point of contact for the submission of plans – with inspections contracted to existing BCAs. This may lead to fewer inconsistencies between councils and could allow experienced and qualified people from larger territorial authorities (TAs) to assist with complex consents in small TAs where expertise may be lacking.
- Self-certification by qualified building professionals (including group home builders building identical homes each year) for low-risk basic residential dwellings – an expansion of the current system used by electricians and gasfitters. This needs to be carefully managed. Only those with good track records should be invited to participate with regular auditing of work by the relevant regulatory body.
- Encouraging the use of remote building inspections – a process used by some councils already. This may be appropriate for some types of inspection, but a significant percentage of inspections fail currently so caution needs to be used.

In September 2024, legislation was enacted allowing substitution of a comparable building product (that achieves an equivalent level of performance) as a minor variation – without the need for an amended building consent.

The availability of more products means consumers will have greater choice.

The Amendment Bill

Early last year, the government announced its intention to increase competition in the building materials market by enabling the use of building materials from trusted overseas jurisdictions to be used in New Zealand without current local certification.

The Amendment Bill proposes:

- recognition of building products or methods certified by an overseas scheme's standards to confirm compliance with the Building Code or for inclusion in any Acceptable Solution or Verification Method
- recognition of overseas standards and domestic/international certification schemes
- BCAs accepting the use of products that comply with specific overseas standards equivalent to or higher than those in New Zealand
- BCAs not being liable for products manufactured in accordance with the standard or certified as meeting the standard.

How those decisions will be made remains unclear, and while it is difficult to comment on some of the proposed reforms before they are finalised, some changes are required to ensure an efficient and cost-effective construction industry.

Benefits and opportunities

The availability of more products means consumers will have greater choice, increasing competition in the industry, and adding resilience to the market when shortages occur such as the plasterboard shortage of 2022. It will encourage innovation that may advance the construction industry in New Zealand.

This is complemented by the ability to swap comparable products as a minor amendment, meaning shortages can be more easily managed. Changes can be made faster without works being impacted.

While these changes hold the promise of increased efficiency and greater choice, they also bring a set of challenges that must be carefully managed.

Challenges

While these changes hold the promise of increased efficiency and greater choice, they also bring a set of challenges that must be carefully managed. The use of overseas products and standards needs to be approached with caution, ensuring that New Zealand's unique building environment and practices are adequately considered.

New Zealand's climate, environment, seismic activity and landforms mean building practices differ from those in other jurisdictions, creating their own set of concerns. For example, in New Zealand, the predominant use of timber framing differs from other regions where more steel and concrete are used. This means products may perform differently in New Zealand, despite their approval and use without problems in another jurisdiction.

For high-risk elements such as cladding, joinery or structural components, it may be difficult to find contractors prepared to work with products that differ from those usually found in New Zealand. Designers may be less inclined to specify unfamiliar products and council inspections may be more time consuming.

Many of the proposed reforms may seem benign on their own but may present challenges when combined. For example, the ability to substitute products as a minor amendment may mean overseas products are used in place of those consented and issues might arise that weren't identified at the time of building.

This may be exacerbated if remote inspections are used, and builders self-certify in circumstances where there is a new, unfamiliar product.

Opening the market to more overseas participants may also create risk for building owners. Overseas suppliers or manufacturers will still be responsible for their products, but pursuing a warranty or other claim and obtaining technical support or components for maintenance may be more challenging. This may result in designers, builders and developers bearing more of the risk of failure.

The success of these reforms will depend on robust oversight, clear guidelines and the willingness of all industry stakeholders to adapt and collaborate. As these changes unfold, it will be crucial to maintain a balance between innovation and safety, ensuring that the construction industry continues to thrive while delivering high-quality, resilient buildings for New Zealanders.

By Dr Troy Coyle, CEO, HERA

Clever design for a low-carbon future

As the need to lower carbon emissions in buildings grows, research shows that, with clever choices at the design stage, substantial cuts can be made. This article lays out the evidence for reducing emissions in low-rise commercial buildings.

By applying circular design principles, the construction sector can make a significant contribution to New Zealand's carbon reduction targets. New HERA research highlights that carbon emissions in low-rise commercial buildings can be reduced by more than 50% with strategic design choices.

HERA's research is particularly relevant as our construction sector remains a major contributor to carbon emissions. Embodied carbon – the emissions generated from material extraction, processing, transportation and construction – plays a significant role, making it critical to rethink how buildings are designed from the outset to accommodate reuse and recycling of building components at end of life to support the circular economy.

The role of circular design in low-carbon construction

Circular design aims to extend the life cycle of building materials and structures while reducing waste and embodied carbon. HERA's low-carbon circular design hierarchy is much like the waste hierarchy, which provides guidance on waste reduction by prioritising reduction, reuse and recycling – offering a structured

approach to minimising a building's environmental impact.

The framework emphasises:

- designing for longevity – ensuring structures exceed their minimum lifespan through maintenance, repair and refurbishment
- adaptive reuse – creating buildings that can be repurposed for future uses, reducing the need for demolition and new construction
- designing for disassembly – allowing buildings to be easily dismantled and materials reclaimed for reuse
- material efficiency – selecting low-carbon materials and minimising overspecification to reduce waste
- sustainable material choices – prioritising materials with environmental product declarations (EPDs) and high recycled content.

By implementing these principles, designers, engineers and contractors can make tangible progress towards reducing the sector's carbon footprint.

The top five takeaways for practitioners

For built environment professionals, reducing embodied carbon requires a shift in thinking:

- Think cradle to cradle – consider the entire life cycle of materials from production to end of life to maximise reuse and reduce waste.
- Optimise design for material efficiency – avoid overspecifying structural elements and instead thoughtfully optimise to ensure strength without excess material use.
- Be careful about claims that one material is better than another – instead be open to consider various materials and how each material's advantages can be maximised through clever design and specification to meet national carbon reduction targets.
- Stay up to date with material innovations – ensure that old thinking is not applied to low-carbon options that might be available.
- Use up-to-date life cycle assessment (LCA) tools – many current tools lack data on the latest low-carbon materials, leading to skewed results. Ensuring accurate assessments will provide a clearer picture of potential carbon savings.

Collaboration for a sustainable future

Implementing these strategies requires a collaborative effort among all stakeholders in the building sector. Designers, engineers, contractors and clients must work together to prioritise low-carbon and circular design principles from the project's inception through to completion. This collaborative approach ensures that sustainability is integrated into every stage of the building process, leading to more environmentally friendly and resilient structures.

By utilising frameworks such as HERA's low-carbon circular design hierarchy, industry professionals can make significant strides towards a more sustainable and circular built environment.

FOR MORE

View HERA's low-carbon circular design hierarchy (free of charge)

Case study – small changes, big carbon savings

HERA examined six low-rise case-study buildings through LCA to evaluate the impact of different design choices on carbon emissions.

The reference building, a 2014 Christchurch office building, was used to benchmark various design alternatives. It was chosen because its cradle-to-cradle embodied emissions were closest to the average among the nominated buildings. The building had a conventional steel-concrete composite flooring system using a metal decking floor system, and its main seismic resistant system used concrete shear walls in one direction and steel moment-resisting frames in the other. The superstructure was supported on a raft foundation.

The study explored how low-carbon material choices, structural adaptations and alternative design approaches could influence embodied carbon. These results demonstrate that use of the hierarchy, when applied strategically, can significantly lower the carbon footprint of commercial buildings.

Tables 1 and 2 show the significant potential for carbon reduction, based on HERA's case study, for carbon reductions using the hierarchy and specific design guidance for low-rise commercial buildings.

TABLE 1: EMBODIED CARBON OF SUPERSTRUCTURE WITH POTENTIAL CARBON REMOVALS ($KGCO_2E/M^2$).

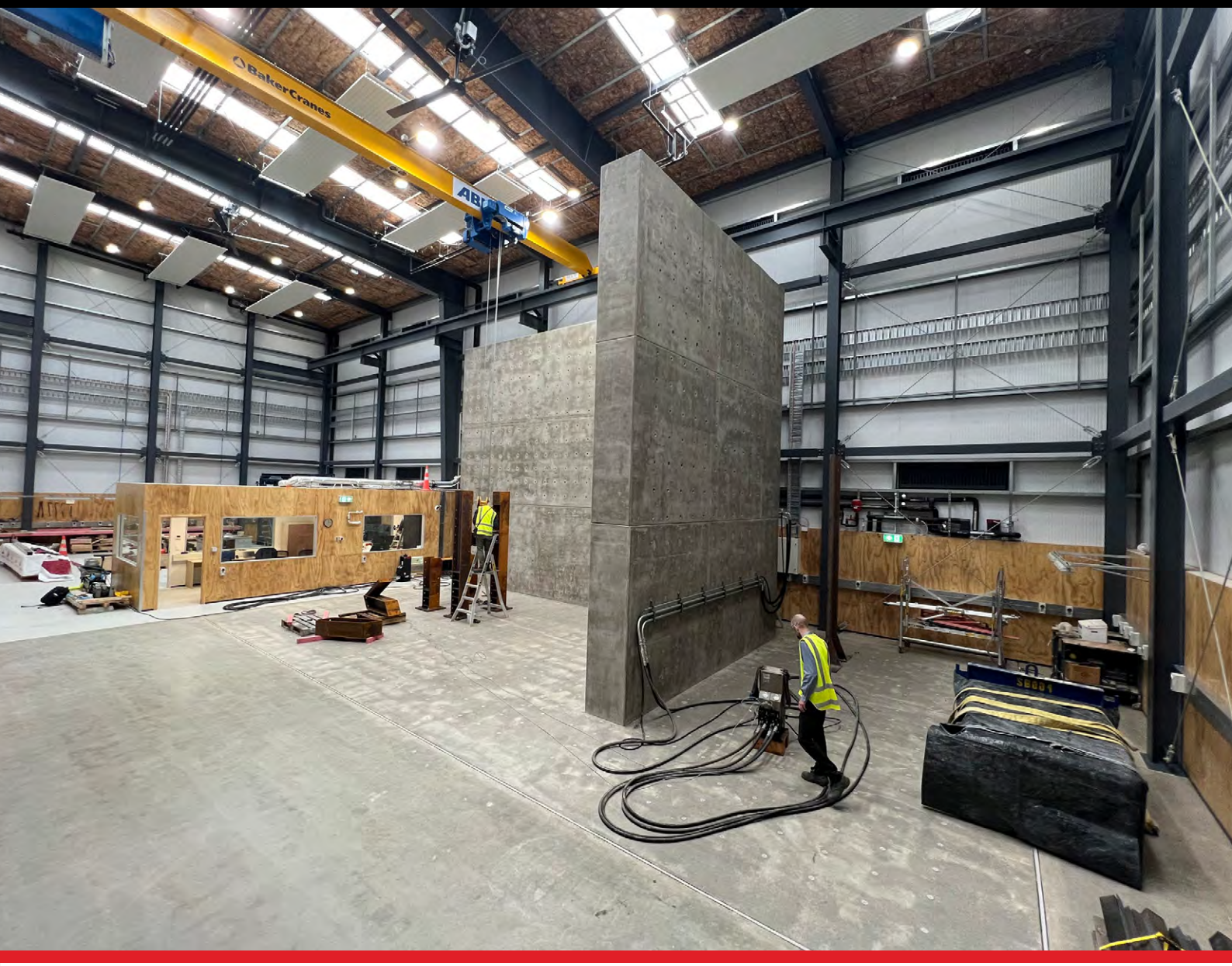
Options	Fossil carbon					Whole-of-life biogenic carbon
	A	C	D	Cradle to cradle (A–D)	Difference relative to option 1	
1	377	14	-143	248	-	0
1a	187	17	-8	196	-21%	0
1b	166	17	-8	175	-29%	0
1c	356	14	-143	227	-8%	0
2	408	22	-51	379	53%	-13
2c	370	22	-51	341	-10% (relative to option 2)	-13
3	362	26	-150	238	-4%	-93
4	306	10	-155	161	-35%	0
4a	90	13	-2	101	-59%	0
4b	81	13	-2	92	-63%	0
5	250	20	-140	130	-48%	-93
5a	52	23	-1	74	-70%	-93
6	48	22	-10	60	-76%	-182

* The negative sign indicates a reduction relative to the reference.

TABLE 2: IMPACTS OF THREE LOW-CARBON CIRCULAR DESIGN STRATEGIES FROM THE HIERARCHY.

No	Strategy	Solution	Superstructure carbon emission ($kgCO_2e/m^2$)						
			Life cycle modulus			Total (non-biogenic)	Biogenic	Carbon reduction %	Cumulative carbon reduction %
			A	C	D				
Reference building			377	14	-143	248	0	NA	
1	Design for disassembly	Reversible connection in flooring systems	377	13	-153	237	0	5	5
2	Design for longevity	Seismic resilience (steel frame design)	377	13	-169	221	0	6	11
3	Low-carbon intensity	Specify low-carbon concrete (LC-40%)	356	14	-169	201	0	8	19
		Specify low-carbon structural steel	166	17	-33	150	0	21	40
		Specify low-carbon reinforcing rebs	80	17	9	106	0	17	57

This research was supported by the Building Research Levy and the Heavy Engineering Research Levy (administered by HERA).



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Challenging Aotearoa New Zealand to create a building system that delivers better outcomes for all.

By Scott Thompson, Partner, MinterEllisonRuddWatts, and Matthew Blaikie, Climate and Sustainability Leader, Arup New Zealand

Nature-positive infrastructure

There's growing recognition globally that biodiversity needs to be factored in to infrastructure and construction projects to prevent further species loss, while natural resources need to be used in ways that avert dangers such as flooding. Nature-positive infrastructure is an emerging concept that holds answers.

Some experts have ranked biodiversity loss and ecosystem collapse as the third-most severe global risk over the next 10 years. Given the built environment is responsible for around 30% of all biodiversity loss, Aotearoa New Zealand's construction and infrastructure sector will play a pivotal role in how we mitigate this risk.

In Aotearoa, major infrastructure projects typically seek to avoid, remedy or minimise their negative impact on the environment, consistent with obligations under the Resource Management Act 1991. However, nature-positive infrastructure, a concept gaining momentum globally, provides an opportunity to challenge how infrastructure is perceived, planned, designed and constructed – to deliver truly positive outcomes for both communities and the environment.

Wild flowers alongside a road in Western Australia.

What is nature-positive infrastructure?

Nature-positive infrastructure is an emerging concept and a universally accepted definition is still evolving. In 2023, the International Federation of Consulting Engineers and the World Wide Fund for Nature produced a Playbook for Nature-positive Infrastructure Development, which identifies several common principles for the term:

- A nature-positive approach should 'put nature and biodiversity gain at the heart of decision-making and design'.
- It needs to go 'beyond reducing and mitigating negative impacts on nature as it is a proactive and restorative approach focused on conservation, regeneration and growth'.
- In effect, nature-positive infrastructure would either incorporate nature and biodiversity considerations as part of the project design or be accompanied by substantial ecological restoration and enhancement.
- Nature-positive infrastructure should thoroughly consider climate change as well.

For infrastructure to be truly nature-positive, it must achieve a biodiversity net gain – an outcome that is infrequently, if ever, attained. Keyn Glas in the UK is a rare example of a project that aimed to go beyond essential mitigation of negative impacts to actually enhancing biodiversity. Working with Highways England, Arup designed a landscape scheme alongside the A30 in Cornwall that takes a regenerative land management approach to restoring habitats and historic landscapes, sequesters carbon, delivers biodiversity net gains and reduces the risk of climate change impacts such as flooding.

The benefits of designing nature-positive infrastructure are far-reaching, from increased biodiversity and resilience to economic and social improvements. In a world facing climate and biodiversity crises as well as strong population and urban growth, there is an obvious need to secure such benefits from our infrastructure.

Contracting for nature-positive infrastructure

Aotearoa's current regulatory framework does not expressly provide for nature-positive infrastructure. Other jurisdictions are taking a directive approach. For example, the UK's Environment Act 2021 mandates that all developments must achieve a biodiversity net gain of at least 10% to be maintained over 30 years.

In the absence of legislative mandate, parties to construction and infrastructure projects in Aotearoa can choose to contract proactively for nature. This may prove necessary for organisations that have biodiversity and carbon targets as well as contractors and designers working with large international organisations, including funders, who have internal and/or regulated obligations and commitments to biodiversity and carbon targets.

Goals are best identified at the outset of projects so that they can be incorporated into and carried through existing contractual frameworks.

Include specific provisions

Parties can empower their commercial and legal teams to negotiate tailor-made provisions to accommodate specific nature-positive goals. These are best identified at the outset of projects so they can be incorporated into and carried through existing contractual frameworks. Parties should ensure that such goals are clearly defined and measurable within these frameworks so that any loss resulting from a breach can be measured and is legally enforceable.

Construction and infrastructure contracts may account for nature by requiring certification under the IS rating scheme – used for evaluating the economic, social and environmental performance of infrastructure across its lifespan. Another excellent starting point is The Chancery Lane Project, which provides simple guidance for creating and implementing climate-aligned clauses and other legal resources relating to environmental considerations. The guidance is freely accessible online and includes a bank of clauses specific to construction contracts.

As an example, Edgar's Clause, designed for insertion into landscape architect appointments and building contracts, requires the landscape architect to work with other professionals to ensure that the development achieves a specified percentage biodiversity gain that will be maintained for at least 30 years. It also imposes a minimum percentage of native flora and an obligation that only native trees are specified for use in the landscaped area.

How to include in procurement briefs

The Playbook for Nature-positive Infrastructure Development is a living document. In September 2024, a new chapter on early life cycle stages and procurement strategies was published. It sets out how funders, developers, government departments and agencies and contractors can incorporate content on nature-positive infrastructure into their procurement process project briefs and scopes of work.

A developing opportunity

Collaboration within the construction and infrastructure sector and across countries will help to promote the concept of nature-positive infrastructure. The more resources and examples, the greater and faster the uptake. While biodiversity loss is a risk, we have an opportunity to be creative and innovative with our infrastructure to contribute to the solution and prove that nature restoration and commercial viability can coexist.

NOTE: This article is not intended as legal advice.

FOR MORE

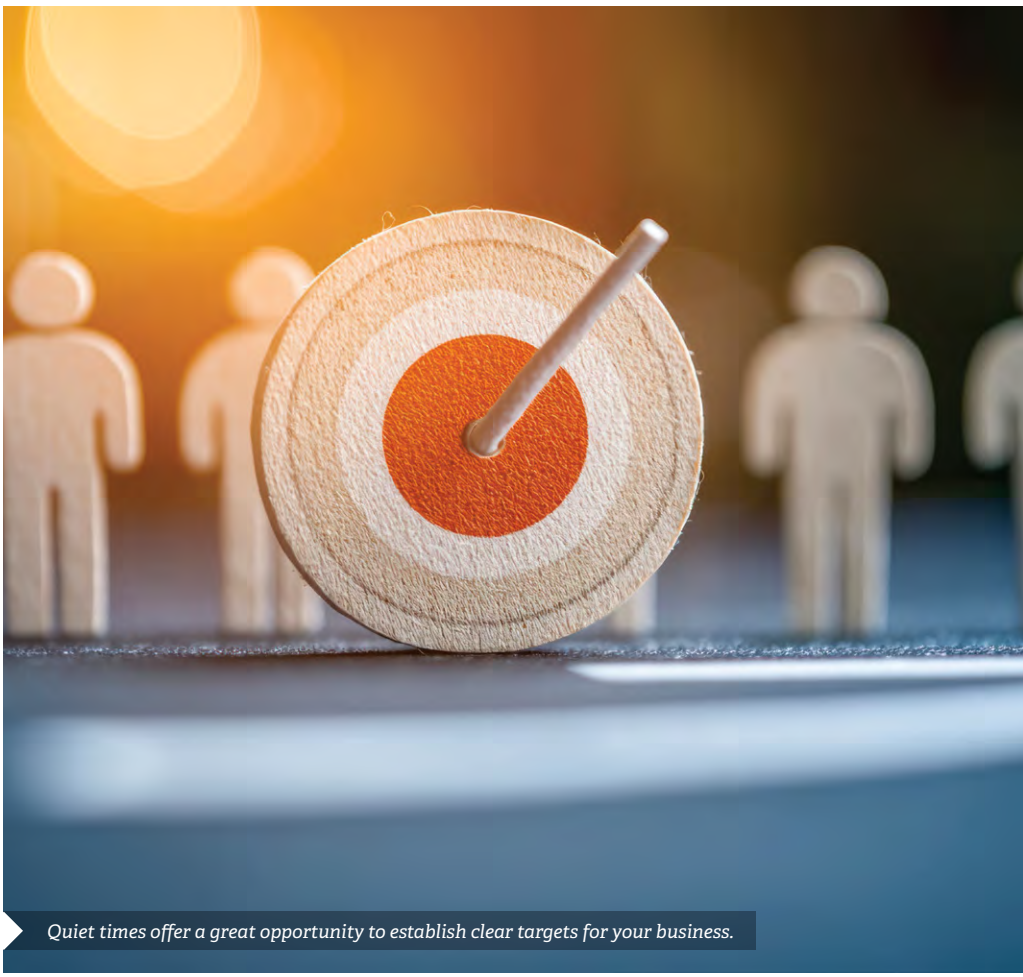
MinterEllison nature positive infrastructure series

By Hayley Potts, Business Advisory Services Client Manager, Baker Tilly Staples Rodway Tauranga

Make the most of quiet times

In the fast-paced world of business, busy periods often leave little time to step back and see how things are running. But when things slow down, that can create an opportunity.

Quiet times offer the chance to refine strategies, streamline operations and set your business up for growth. This article outlines key areas to focus on such as reviewing your pricing strategy, improving processes, attracting new clients, managing debtors and optimising payment terms, assessing product and service offerings and setting key performance indicators (KPIs).



Quiet times offer a great opportunity to establish clear targets for your business.

Products and service review

It is always valuable to know what your competitors are charging and how your pricing compares. Are your offerings similar, or do you provide additional value that gives you a competitive edge? Consider whether your offerings could be updated or improved. Reviewing pricing should include assessing which of your product lines or offerings are the most profitable. Could you focus future growth around them?

Likewise, are you happy with the pricing and quality of products you're sourcing for clients? Could you get a better deal? Gathering feedback from your clients can provide insight into potential areas for expansion or refinement. Regularly reviewing your product and service

lines ensures that they stay relevant and competitive in the market.

Improving processes

Start by creating a list of the tasks you complete regularly. For each task, evaluate time spent and whether any efficiencies can be gained by improving the process. It is also a good idea to investigate specialised data capture software packages. These can save time on inputting data, and many link with your accounting system, potentially offering long-term efficiencies. There is a wide range of software that can save time with quoting, tracking billable hours, cost allocations, invoicing and back-costing.

Attracting new clients

Why do clients do business with you? Consider giving them more reasons. If you are confident in your services, ask current clients to leave online reviews for your business, which can boost trust and provide confidence to prospective clients. Evaluate your online presence – is your website or social media actively showcasing your expertise? A strong, up-to-date digital presence that clearly displays your strengths can be a powerful way to attract more clients. Networking and referrals can play an important role. Building strong relationships with industry peers, clients and your local community can improve opportunities for word-of-mouth recommendations.

Managing debtors and optimising payment terms

Are your clients paying on time? If not, it may be worth reviewing your current payment terms. Are they consistent with industry standards? Open communication about payment expectations can also make a big difference. Regular reminders may help reduce delays. Take time to audit outstanding debts and follow up with clients who are overdue. Establishing a clear, proactive follow-up system can help reduce delays and improve your financial stability.

Key performance indicators

Have you established clear targets to work towards? Setting specific, measurable KPIs can help you track progress and stay focused. These targets could be financial such as revenue goals or profit margins or action-based such as the number of sales leads generated or client enquiries followed up. Consider breaking these down into smaller, more manageable goals or weekly or monthly benchmarks to make tracking easier.

KPIs provide motivation and help you identify areas where your business is excelling or needs improvement, enabling you to make data-driven decisions. When setting KPIs, avoid inadvertently driving behaviour that is not beneficial to growth, such as taking a sales focus without gross-margin awareness.

Taking action

To start reviewing growth opportunities and reflecting on business practices, find a quiet place and start brainstorming. Taking advantage of slow periods can position your business for long-term success so consider the review as an opportunity to grow and adapt.

Use this time to review your pricing, streamline your processes and find ways to attract new clients. Staying on top of debtor payments and evaluating your payment terms will improve your cash flow, while regularly reviewing your products and services ensures they remain competitive and aligned with client needs. Finally, setting clear KPIs will provide measurable targets to keep your business on track and drive future growth.

By addressing these areas during quieter times, you will build a stronger, more resilient business ready to thrive when things pick up again. As always, it is wise to consult with your business advisors to ensure the strategies you implement align with your specific needs and circumstances.

By James Warren, Partner, Charlotte Evans, Senior Associate, and Sean Gourley, Solicitor, Dentons Kensington Swan

Designers, health and safety, and the Building Code

Designers should bear in mind that, while their building designs may comply with the Health and Safety at Work Act at the time they are prepared, they are still liable for any future changes to the legislation – and changes may be on the horizon.

Legislation such as the Building Act 2004 and the associated New Zealand Building Code ensures a baseline standard for most buildings in New Zealand. However, in some situations, designers are required by legislation to meet a higher quality of construction than is required by the Building Act alone.

The basics of the Act

The Health and Safety at Work Act 2015 (HSWA) is an important example of such legislation. It operates in the construction industry by setting requirements for workplace managers to ensure the safety of workers. These requirements are also imposed on designers to ensure the safety of workers during construction.

Beyond managing risks during the construction phase, the HSWA also regulates the design of finished workplaces. By regulating design, the HSWA can impose higher standards for designers than those that the Building Code requires. In addition, and unlike the Building Code, HSWA obligations can change as soon as new guidelines are released, new risks are identified and new technologies evolve to provide safer risk management strategies.

They can also apply to both new and existing buildings. While reform towards a

A safer, higher-quality design protects from the risk of changing standards.

more focused role for WorkSafe and work health and safety is under consultation, the obligations of designers serve as a noteworthy example of the scope of the current HSWA.

Designers' usual obligations

Designers of buildings have many points of reference to ensure the effectiveness, durability and safety of their designs. These begin with the Building Act and the Building Code, but a finished design will almost always include reference to other technical and engineering guidelines published by Standards New Zealand, other government agencies and professional bodies.

However, a designer's obligations under the HSWA will not always be fulfilled solely by compliance with regulations and guidance. In some circumstances, a design may give rise to liability under the HSWA despite compliance with rules, guidelines and the Building Code.

In recognition of the important role designers have in managing health and safety risks from the outset of the design process, WorkSafe has released good-practice guidance for persons conducting a business or undertaking who are involved in the design of structures, plants or substances.

HSWA obligations

Duty holders involved in the design process of any structure, plant or substance must collaborate to reduce health and safety risks to workers as far as reasonably practicable. This means that designers must consider what risks might arise from their design and amend their design accordingly to minimise them.

For example, imagine the design of a new stormwater system down a steep incline that, applying the Stormwater Code of Practice (CoP), would lead to a manhole with a drop of over 20 m. While the designer of the system is obliged to design to the CoP, they also need to consider the risks to health and safety posed by the use of their design.

In this case, due to the significant risk posed to the health and safety of workers using the manhole, a revised design minimising the drop to a safe distance would be required, even if the new design resulted in some additional building costs. In this scenario, the HSWA requires designers to do more than rely on the relevant CoP. This may come with additional costs.

These additional requirements imposed by the HSWA can create situations where a designer's obligations to their employer and their obligations under the HSWA are seemingly in conflict. For example, a designer of a factory may face pressure to keep the cost of their design low even if that means increasing risks to workers. In such a situation, it is worth bearing in mind that most design contracts require compliance with the HSWA, and others involved in construction also face obligations under the HSWA.

The HSWA also incentivises businesses to design safe buildings. Unsafe buildings that create risks to workers may require costly mitigation measures. Owners and designers can usually address and minimise risks at the design stage to increase the productivity and value of the business and decrease its risk of future liability.

A key limitation to HSWA obligations is that they only relate to workplaces. Designers of residential buildings are unlikely to be caught by HSWA obligations relating to their finished designs as residential buildings are not captured by the definition of 'workplace'.

However, designers will have HSWA obligations in relation to the construction of their design. While a design is being built, a designer must ensure, usually through consultation with the builder, that their design minimises risk to those who construct the structure at a workplace and to others the construction could impact.

The risk of changing standards

If a building complies with the Building Code when it is built, the owner is often not required to improve the building as higher standards are introduced until such time as renovations are undertaken. In contrast, if the HSWA, its guidelines, perceptions of risk or safety technologies change, the resulting higher safety standards may apply to all workplaces regardless of whether they are existing or newly created.

Owners of buildings and their designers need to bear in mind that, while a design may comply with the HSWA of the day, there is a risk that changing standards and new technologies may render once-compliant workplaces inadequate in managing workplace risks. This may require a redesign or costly mitigation measures.

With the HSWA approaching its 10-year anniversary, reform towards more focused HSWA obligations may be on the horizon. However, designers do not have a crystal ball to show them how HSWA obligations may change. The current reality is that HSWA obligations are ever changing.

Each change may be small when viewed in isolation, but as technologies and perceptions of risk evolve, what is considered a reasonably practicable measure to avoid risk will also change. A safer, higher-quality design within a designer's scope protects from the risk of changing standards. It will result in a benefit to the owner in the longer term, even if this results in additional costs at the outset.

By Ministry of Business, Innovation and Employment

Skills maintenance – exploring options for self-certification of building work

The Minister for Building and Construction Hon. Chris Penk has announced a proposal for further reform of the building and construction sector. The Government will look at developing a new opt-in self-certification scheme for trusted building professionals and accredited businesses carrying out low-risk building work.

This is just a proposal at this stage. Until new legislation is implemented, only electricians and gasfitters can self-certify.

The industry has wanted this for many years and they will soon be able to have their say. Under the proposal, building professionals, such as builders, plumbers and drainlayers, will be able to self-certify their own work, for low risk builds – without the need for inspection. You will need to think about what this will mean for you as an LBP. Read the Minister's Cabinet paper and his public announcement of the proposal to see what is behind the proposal, and what needs to be done:

- Exploring options for self-certification of building work – mbie.govt.nz
- Trusted building professionals able to self-certify – beehive.govt.nz

If people view the risks associated with self-certification as being too high, or the costs of establishing the scheme are prohibitive, the government could use the changes set out in the 'granny flats' proposal as a way of "testing" self-certification on a smaller scale with less risk involved.

As with any changes to the Building Regulatory System, there is a process including policy work and consultation prior to any updates or new legislation being implemented.

The following is reproduced from the Building Performance website www.building.govt.nz.

The Government has agreed to progress work on developing a new opt-in self-certification scheme for low-risk residential building work done by qualified building professionals and accredited building companies.

Options for a new opt-in self-certification scheme are part of the Government's wider programme to streamline our building system to make it faster and easier to build in Aotearoa New Zealand.

The new scheme will remove or reduce the third-party review role of Building Consent Authorities (BCAs) for qualified building professionals and accredited building companies carrying out low-risk residential building work. This would be done by:

- enabling a broad range of groups to be eligible to apply for participation in self-certification, including individual

practitioners and accredited companies such as volume builders
- requiring that participants in the scheme demonstrate an appropriate, specified level of competency and experience and be trustworthy
- limiting the type of work that can be self-certified to lower risk activities, for example, work on a simple residential dwelling.

The new self-certification scheme has the potential to reduce the load on BCAs, shift accountability to those who are doing the work, improve the efficiency of the building consent system, and reduce costs.

MBIE will now proceed with detailed policy work and engagement with the sector to explore options for the design of a new self-certification scheme including:

- oversight and monitoring of the scheme
- the extent to which BCAs would be removed from the assurance process and the role of insurance
- developing a more detailed criteria for the regime and an assessment of costs and benefits.

All changes to the Building Regulatory System undergo a thorough process including consultation prior to any updates or new legislation being implemented.

This gives the opportunity for feedback to be provided in shaping any changes to building regulations, and ensures we consider all perspectives before making any decisions to progress with proposed changes.

FOR MORE

Explore options for self-certification of building work

Trusted building professionals able to self-certify

Quiz

1. **Under current legislation, who is able to self-certify?**
   a. Builders
   b. Electricians
   c. Gasfitters
   d. Plumbers and drainlayers
   e. a and d only
   f. b and c only

2. **What are some of the options that need to be explored for the design of the self-certification scheme?**
   a. The oversight and monitoring of the scheme
   b. The extent to which BCAs would be removed from the assurance process and the role of insurance
   c. Developing a more detailed criteria for the regime and an assessment of costs and benefits
   d. All the above

3. **Is an LBP able to self-certify their work now under this proposal?**
   a. No, the proposals have not been finalised or approved by government
   b. Yes, electricians and gasfitters can self-certify, so I should be allowed to as well
   c. Both the above

Answers: 1. f, 2. d, 3. a.

By Ministry of Business, Innovation and Employment

Skills maintenance – complaints not upheld

Many complaints go before a team investigating complaints against LBPs, yet many are not upheld. There's a range of reasons why.

The Building Practitioners Board considers complaints against LBPs. To assist the Board, the Registrar of LBPs delegates the task to the Investigations Team within Occupational Regulation, MBIE. The Registrar will provide a report to the Board for consideration. If the Board decides to hold a hearing and an LBP has breached a ground for discipline, the complaint is upheld and the Board will then decide on an appropriate penalty.

If sufficient evidence is not obtained, the complaint may be 'not upheld' by the Board,

Recent 'not upheld' decisions show that professionalism, good record keeping and open communication with the client are not simply good business sense, they can also provide evidence in response to potential complaints.

In one of those 'not upheld' decisions, the respondent was contracted to build an extension on a 1950s holiday home. The build was delayed at the framing stage by weather events and insurance claims related to Cyclone Gabrielle.

The Board decided to investigate whether the respondent had, contrary to section 317 of the Act:

a. carried out or supervised building work in a negligent or incompetent manner
b. carried out or supervised work that does not comply with a building consent
c. failed to provide a record of work (RoW)
d. breached the Code of Ethics
e. conducted himself in a manner that brings, or is likely to bring, the regime into disrepute.

Regarding the Code of Ethics allegations, these were the specific points:

10. You must comply with the law.

21. You must price work fairly and reasonably.

25. You must conduct your business in a methodical and responsible manner.

The specific Code of Ethics matters under investigation related to the absence of a building contract (Provision 10) and his contract administration processes (Provisions 21 and 25).

The Board's findings

Negligence or incompetence

The complainant commissioned a report from a building consultant after a commercial dispute following the weather event. The report was to work out what stage the job was at.

The consultant's report raised compliance issues, including, among others, that there had been no inspection of the piles and foundations and that the flooring was installed without following the manufacturer's instructions. The respondent provided evidence that the building consent authority had issued a waiver for that inspection because there was engineer oversight. The respondent explained that the flooring was installed in that way so the machinery could get to the retaining wall that was being built. This would also allow the framing work to continue.

The Board noted that, while not everything was up to acceptable standards, the respondent did not act in a negligent or incompetent manner.

Contrary to a building consent

Building consents provide detailed plans and specifications for building work and are issued on the understanding that the building work will meet the provisions of the Building Code.

The early designs submitted for a building consent included the engineering design of the retaining wall. However, during the RFI process, the designer omitted the retaining wall design in favour of battering the slope. A subsequent change to on-site conditions meant that battering would not be sufficient, so the respondent asked for input from the designer and the engineers, and construction of the retaining wall carried on.

The Board decided that there was not any building work that was different from the building consent.

Failure to provide a record of work

An LBP must provide a record of work when they complete their restricted building work.

The building work stopped because of contractual issues. The respondent provided evidence that they were attempting to return and continue the work, and there was no formal contractual termination. The respondent said the first they heard they would not be continuing was when they received the complaint, and because of this, the Board found that work was complete when the complaint was made.

As the complaint was made before the work was complete, the respondent had not committed the disciplinary offence of failing to provide a RoW.

Code of Ethics and disrepute

The high threshold test applied to negligent or incompetent conduct also applies to Code of Ethics breaches and disreputable conduct in that the conduct must be sufficiently serious enough for the Board to make a disciplinary finding.

The respondent provided copies of a contract and disclosure information for the project during submissions prior to the hearing. The complainant accepted that they had been provided with those documents so the Board will not investigate the allegation further.

Regarding the respondent's contract administration processes, the issue under investigation was whether the respondent dealt with cost fluctuations and variations in the correct way. Again, the respondent provided the Board with copies of correspondence with the complainant that showed that they were following a process and communicating with the complainant regarding those items. The Board decided that further investigation was not necessary.

The outcome

The Board decided not to uphold the complaint as the respondent did not commit a disciplinary offence.

Quiz

1. **What did the respondent do when a change in site conditions meant battering the bank would not be sufficient?**
   a. They did it anyway because it was on the plans
   b. They asked for input from the designer and engineers
   c. They just decided to build the retaining wall

2. **How did the respondent defend himself against the complaint that he failed to provide a record of work?**
   a. By providing evidence that he was attempting to return and continue the work
   b. There was no formal contractual termination, so he believed he was still contracted to complete the work
   c. Both the above

3. **What did the respondent provide as evidence against the Code of Ethics allegations?**
   a. That a contract and disclosure information for the project was sent to the client
   b. They provided copies of correspondence with the client that showed they were following a process
   c. They were communicating with the client
   d. All the above

Answers: 1. b, 2. c, 3. d.

BRANZ evaluates building products and systems to ensure they are fit for purpose. Details of recently issued and reissued BRANZ Appraisals follow. For the latest official list of valid Appraisals, please refer to the BRANZ website at www.branz.co.nz.

New Appraisals

ARDEX Warm Roofing System

APPRAISAL NO. 1233

The ARDEX Warm Roofing System is an insulating, waterproof roofing system for limited-access, low-slope roofs and protected decks with concrete, timber or steel substrates. It consists of a thermal insulation layer and various waterproofing membranes as a roof or deck finish.

For more, contact ARDEX New Zealand Ltd
Ph: 09 636 0005 | Web: ardex.co.nz

RLA WPU and WPM Exterior Waterproofing Membranes

APPRAISAL NO. 1272

RLA WPU and WPM Exterior Waterproofing Membranes are liquid-applied waterproofing membranes for use under ceramic or stone tile finishes on external decks and balconies.

For more, contact RLA Polymers Pty Ltd
Ph: +61 39 728 1652 | Web: www.rlapolymers.com.au

RLA WPU and WPM Wet Area Membranes

APPRAISAL NO. 1273

RLA WPU and WPM Wet Area Membranes are liquid-applied waterproofing membranes for use under ceramic or stone tile finishes in internal wet areas.

For more, contact RLA Polymers Pty Ltd
Ph: +61 39 728 1652 | Web: www.rlapolymers.com.au

Thermakraft® RAINARMOR Self Adhesive Roof and Wall Underlay

APPRAISAL NO. 1277

Thermakraft® RAINARMOR Self Adhesive Underlay is a self-adhesive, synthetic underlay for use over rigid wall underlays, under cavity or direct-fixed wall claddings or over rigid sarking on pitched roofs.

For more, contact Kingspan Insulation NZ Ltd
Tel: 09 273 3727 | Web: www.kingspaninsulation.co.nz

Reissued Appraisals

StoTherm Insulated Facade System

Appraisal No. 478

StoTherm Insulated Facade System is a cavity-based exterior insulation and finishing system (EIFS) wall cladding. It is designed to be used as an external cladding system for residential and light commercial type buildings where domestic construction techniques are used.

For more, contact Stoanz Ltd
Ph: 04 801 7794
Web: www.sto.co.nz

Volclay® Waterproofing System

Appraisal No. 507

The Volclay® Waterproofing System consists of products that are based on or use sodium bentonite as the principal waterproofing component. The system is used as a damp-proofing or waterproofing membrane below ground to protect basements and other underground structures against water penetration and water vapour transmission from the ground. The system is also used to waterproof decks where they act as a roof to spaces below. The system is based on two membranes, Voltex® and Swelltite®, with other accessory products completing the system.

For more, contact Allco Waterproofing Solutions Ltd
Ph: 09 448 1185
Web: www.allco.co.nz

StoArmat Miral Render Systems

Appraisal No. 515

StoArmat Miral Render Systems consist of the StoArmat Miral Render System and the StoMiral Render System. The StoArmat Miral Render System is a fibreglass mesh-reinforced, synthetic resin solid render. This is for use over a solid backing of concrete masonry, clay brick veneer, in-situ or pre-cast concrete, autoclaved aerated concrete (AAC) block and EPS block. The StoMiral Render System is a fibreglass mesh-reinforced, mineral, solid render for use over clay brick veneer.

For more, contact Stoanz Ltd
Ph: 04 801 7794
Web: www.sto.co.nz

Strataflex Wet Area Waterproofing Membrane

Appraisal No. 519

Strataflex Wet Area Waterproofing Membrane is a self-adhesive sheet waterproofing/anti-fracture membrane for use under ceramic or stone tile finishes in internal wet areas.

For more, contact Trade Supplies Ltd T/A Surtec
Ph: 09 441 6292
Web: www.technokolla.co.nz

Nova-SK, Novaflex and Polibit Roof and Deck Waterproofing Membranes

Appraisal No. 520

Nova-SK, Novaflex and Polibit Roof and Deck Waterproofing Membranes are waterproofing membranes for nominally flat, pitched and curved roofs, gutters, parapets and decks. The products are installed as double-layer systems on roofs with mineral chip or paint finish and on decks with a mineral chip finish and protected by a raised deck system. On concrete roofs and decks, the products are installed as a single-layer system and protected by paving slabs or screed.

For more, contact Soprema New Zealand Ltd
Ph: 03 578 0214
Web: www.soprema.com.au

Thermakraft Covertek 407 Roof and Wall Underlay

Appraisal No. 651

Thermakraft Covertek 407 Roof and Wall Underlay is a fire retardant, synthetic building underlay for use under roof and wall claddings. The product consists of a micro-porous water-resistant film laminated between two layers of non-woven spun-bonded polyolefin.

For more, contact Kingspan Insulation NZ Ltd
Ph: 09 273 3727
Web: www.thermakraft.co.nz

Masonry Overlay System

Appraisal No. 706

The Masonry Overlay System is an exterior insulation and finishing system for concrete masonry, in-situ or pre-cast concrete walls.

For more, contact Rockcote Resene Ltd T/A Resene Construction Systems
Ph: 03 338 6328
Web: www.reseneconstruction.co.nz

TRADE-SEAL Pipe and Services Penetration Seal

Appraisal No. 719

TRADE-SEAL is a wall cladding pipe and service penetration seal consisting of an elastic EPDM sleeve fitted with a self-adhesive flange.

For more, contact Marshall Innovations Ltd
Ph: 07 543 0948
Web: www.mwnz.com

GoldenEdge® MDF Panelbrace™ Wall Bracing Systems

Appraisal No. 779

GoldenEdge® MDF Panelbrace™ Wall Bracing Systems are a range of wall bracing systems based on 9 mm and 12 mm GoldenEdge® Regular MDF. GoldenEdge® MDF Panelbrace™ Wall Bracing Systems are used to resist earthquake and wind loads on timber-framed buildings designed and constructed in accordance with NZS 3604.

For more, contact Nelson Pine Industries Ltd
Ph: 03 543 8800
Web: www.nelsonpine.co.nz

Craftstone Real Stone Veneer System

Appraisal No. 793

The Craftstone Real Stone Veneer System is a cavity-based external wall cladding system for residential and light commercial type buildings where domestic construction techniques are used.

For more, contact Petros Holdings Ltd
Ph: 09 447 3918
Web: www.craftstone.co.nz

Sika Exterior Waterproofing Membrane

Appraisal No. 811

Sika Exterior Waterproofing Membrane is a two-part waterproofing membrane for use under trafficable floor finishes on external decks and balconies.

For more, contact Sika (NZ) Ltd
Ph: 0800 SIKA NZ
Web: www.sika.co.nz

Sika Interior Waterproofing Membrane

Appraisal No. 812

Sika Interior Waterproofing Membranes are two-part and single-part waterproofing membranes for use under trafficable floor finishes in internal wet areas.

For more, contact Sika (NZ) Ltd
Ph: 0800 SIKA NZ
Web: www.sika.co.nz

TESCON EXTOSEAL Sill Tape

Appraisal No. 815

TESCON EXTOSEAL Sill Tape is a flexible flashing tape for use around framed joinery openings as a secondary weather-resistant barrier. The system is installed into and around the framed joinery opening over the building underlay and exposed frame to cover both the face and edge of the opening framing.

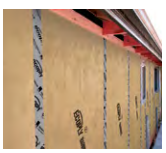
For more, contact Pro Clima (NZ) Ltd
Ph: 04 589 8460
Web: www.proclima.co.nz

Soprema Roofing Membrane Systems

Appraisal No. 819

Soprema Roofing Membrane Systems are a range of double-layer, torch-applied, fully bonded reinforced modified bitumen membranes for use on nominally flat or pitched roofs and decks.

For more, contact Soprema New Zealand Ltd
Ph: 03 578 0214
Web: www.soprema.com.au

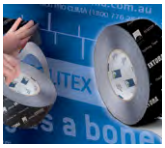


Ecoply® Barrier Rigid Air Barrier

Appraisal No. 827

The Ecoply® Barrier Rigid Air Barrier is sealed plywood sheets and tapes designed for use as a rigid wall underlay and air barrier (sheathing) behind cavity wall cladding systems. Ecoply® Barrier is also for use as a wall bracing system to resist wind and earthquake loads on timber-framed buildings.

For more, contact Carter Holt Harvey Plywood Ltd
Ph: 0800 326 759
Web: www.chhply.co.nz



TESCON EXTORA Sealing Tape

Appraisal No. 838

TESCON EXTORA Sealing Tape is a flashing tape for use around the head and jambs (not sills) of framed joinery openings as a secondary weather-resistant barrier. TESCON EXTORA Sealing Tape can also be used as a jointing tape for rigid wall underlays (fibre-cement sheet and H3.2 treated plywood) before they are overfixed with a flexible wall underlay. TESCON EXTORA Sealing Tape can also be used to seal flashing upstands to the wall underlay and as a lap sealing tape for flexible wall and roof underlays.

For more, contact Pro Clima (NZ) Ltd
Ph: 0800 776 254
Web: www.proclima.co.nz

SUPER-STICK Flexible Flashing Tape

Appraisal No. 846

SUPER-STICK is a flexible flashing tape used around framed joinery openings as a secondary weather-resistant barrier.

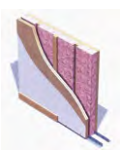
For more, contact Marshall Innovations Ltd
Ph: 07 543 0948
Web: www.mwnz.com

Thermakraft Aluband Window Flashing Tape

Appraisal No. 878

Thermakraft Aluband Window Flashing Tape, in conjunction with the Thermakraft Corner Moulded Piece, is a flexible flashing tape system for use around framed joinery openings as a secondary weather resistant barrier.

For more, contact Kingspan Insulation NZ Limited
Ph: 09 273 3727
Web: www.thermakraft.co.nz



Metra Inter-Tenancy Wall System

Appraisal No. 985

Metra Inter-Tenancy Wall System is a sound-insulating and fire-rated wall system based on Metra Panels, providing a fire resistance rating (FRR) of 30/30/30 for the 130 mm system and 60/60/60 for the 172 mm system.

For more, contact Metra Systems Ltd
Ph: 0800 156 100
Web: www.metrapanel.co.nz

Resene Construction Systems Masonry Render System

Appraisal No. 998

The Resene Construction Systems Masonry Render System is a reinforced solid plaster system for use as a finishing system over substrates of concrete masonry, clay brick veneer, in-situ or pre-cast reinforced concrete.

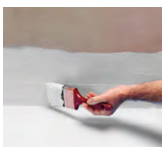
For more, contact Rockcote Resene Ltd T/A Resene Construction Systems
Ph: 03 338 6328
Web: www.reseneconstruction.co.nz

Evolight S Torch-on Membrane System

Appraisal No. 1043

Evolight S Torch-on Membrane System consists of SBS modified, polyester reinforced, bitumen torch-on membranes for roofs, decks and balconies.

For more, contact MBP (NZ) Ltd
Ph: 09 921 1994
Web: www.MBPLtd.co.nz



Dunlop Express Wet Area Waterproofing

Appraisal No. 1047

Dunlop Express Wet Area Waterproofing is a premixed liquid-applied waterproofing membrane for use under ceramic or stone tile finishes in internal wet areas.

For more, contact ARDEX New Zealand Limited
Ph: 09 636 0005
Web: www.ardex.co.nz

VENT Ventilated Wall and Drainage Cavity Batten

Appraisal No. 1099

The VENT Ventilated Wall and Drainage Cavity Batten is an extruded fluted batten, designed for use as a non-structural cavity batten in cavity-based wall cladding systems. The VENT Ventilated Wall and Drainage Cavity Batten is designed for use with timber-framed buildings.

For more, contact Blue Building Solutions Ltd T/A VENT
Ph: 0508 258 369
Web: www.vent.nz

Advertisers' index

Win an XHD lithium cordless jobsite Bluetooth radio worth $229

The XHD lithium cordless jobsite Bluetooth 18V radio is built to endure tough work environments. With an IP54 rating, it's protected against dust and water splashes while its rugged protective frame and sturdy handle are engineered to withstand bumps and knocks.

The 2.4-inch colour digital display makes navigating stations and features effortless, and the radio enables 30 station presets across FM bands. Bluetooth 5.0 offers a strong and stable 10-metre range, allowing you to stream music directly from your devices. The radio features an internal USB port to charge your phone or other device and integrated smartphone storage to keep it safe and protected.

For wired connections, the radio includes an AUX IN port and an Adaptor terminal port, giving you flexible options for music playback. Its high-powered dual 15-watt stereo speakers deliver rich, powerful sound that fills any workspace.

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Entries close on 17 April 2025. The first correct entry drawn wins. The Editor's decision is final. No employees of BRANZ or their relations may enter. Congratulations to the latest winner, Clive Leslie from Morrinsville.

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Key industry contacts

StoArmour Facades

The StoArmour lightweight concrete facade panel system is tested, specified and installed to surpass New Zealand's harsh environmental conditions that can infiltrate residential or multi-level facades. Tested against moisture ingress, extreme weathering, and fire to satisfy all the building performance requirements.

System Verification:
Weathertightness: E2/VM1 & AS/NZS 4284.
Fire Spread: BS 8414-2 & ISO 5660.
Fire Resistance Rating: 120/120/120.

Invested in building, sto.co.nz

Elizabeth Towers, Tauranga
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Construction: Hawkins
Sto Contractor: Colin Mackenzie Plastering
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