



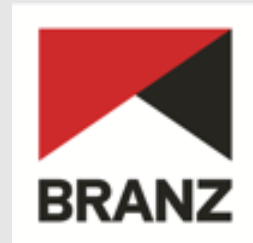
## **Towards Improved Housing Retrofits in New Zealand**



*Mark Jones & Stephen McNeil*

# How did we get where we are?

Over the last few years, BRANZ has developed and fine-tuned its strategy through listening to the industry, other research organisations and our key stakeholders.



Challenging Aotearoa NZ to create a building system that delivers **better outcomes for all**

## Emphasis on

- *Increasing the Impact of Our Research*
- *Behavioural Change*
- *Systems Transformation / Systems Approach*
- ***Increased Collaboration & Coordination***

# The Strategy Identifies Traits to Evolve the Way We Work

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## Comfort with ambiguity

We are comfortable with not having all the answers.



## System thinking

We become system thinkers so that we can develop initiatives and projects that will support lasting change at a system level.



## Learning mindset

We are open to change, are willing to experiment more and fail fast in order to find the right solution.



## Strengthen our connections to others

We work with individuals from across all the system to communicate, share expertise and together deliver system goals.



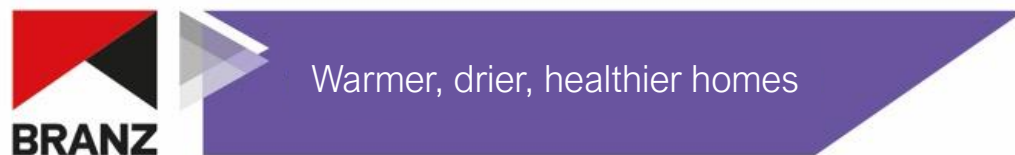
## Shaped by the needs of others

Our work continues to be shaped by the needs of others in the system so that we become comfortable with an increased reliance on driving behaviour change with, and through, others.



# One Approach has been the Development of Programmes

Working on issues that the industry is struggling with:



*With  
Emphasis On*

- ***Improving our understanding***
- ***Providing solutions***
- ***Implementing knowledge*** through increased uptake of research findings.
- **Getting the best teams in place**
  - Strong collaboration between research organisations across NZ and internationally
  - Stronger linkages with industry & stakeholders
  - Creating impact & change together



# WDHH Programme Goal & Objectives

The WDHH Programme takes into consideration other similar industry, government and researcher-led initiatives.

**Goal:**  
All New Zealand homes to have warm,  
dry & healthy environments *by 2030?*

**Objective 1:**  
Addressing Indoor  
Environment  
Issues

**Objective 2:**  
Improving the  
Building Envelope  
Performance

**Objective 3:**  
Developing  
Performance and  
Quality Measures

**Objective 4:**  
Improving  
Knowledge and  
Understanding of  
the Benefits.



## Programme focus on Both New Build and Existing Homes

**But** we know from carrying out the BRANZ House Condition Surveys & National Housing Surveys for several years that:

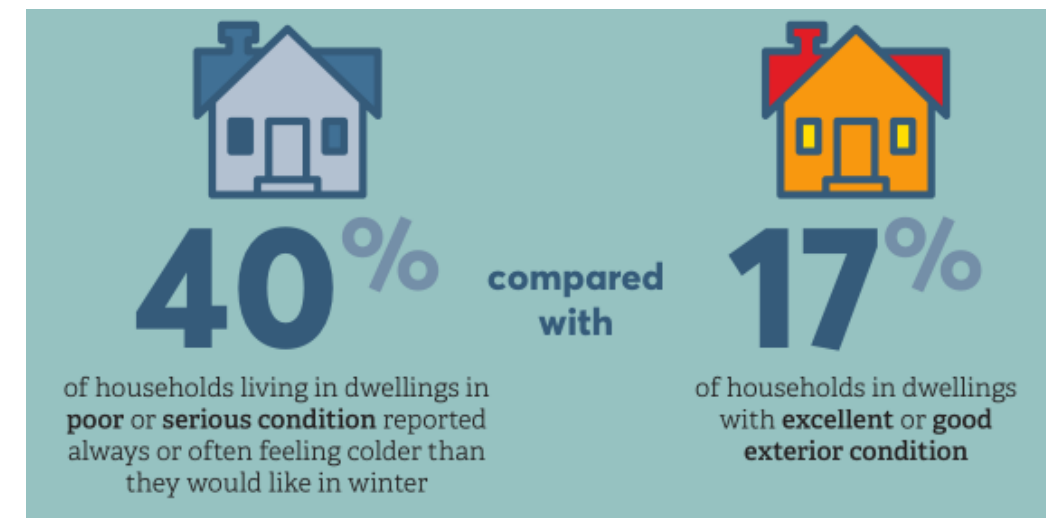
Many NZ houses are in poor condition & are poorly performing

- Household composition
- Household Income
- Ethnicity
- Tenure

Our existing stock  
needs to be improved



 **MOULD** was visible in **49%** of all houses

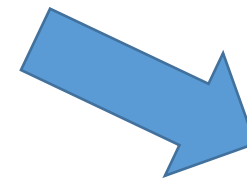




# BRANZ Experimental Building Research – Retrofit Scope



- Used for various research projects
- Typical 1980's construction
- Single glazed, aluminium window frames
- ~R2.0 insulation

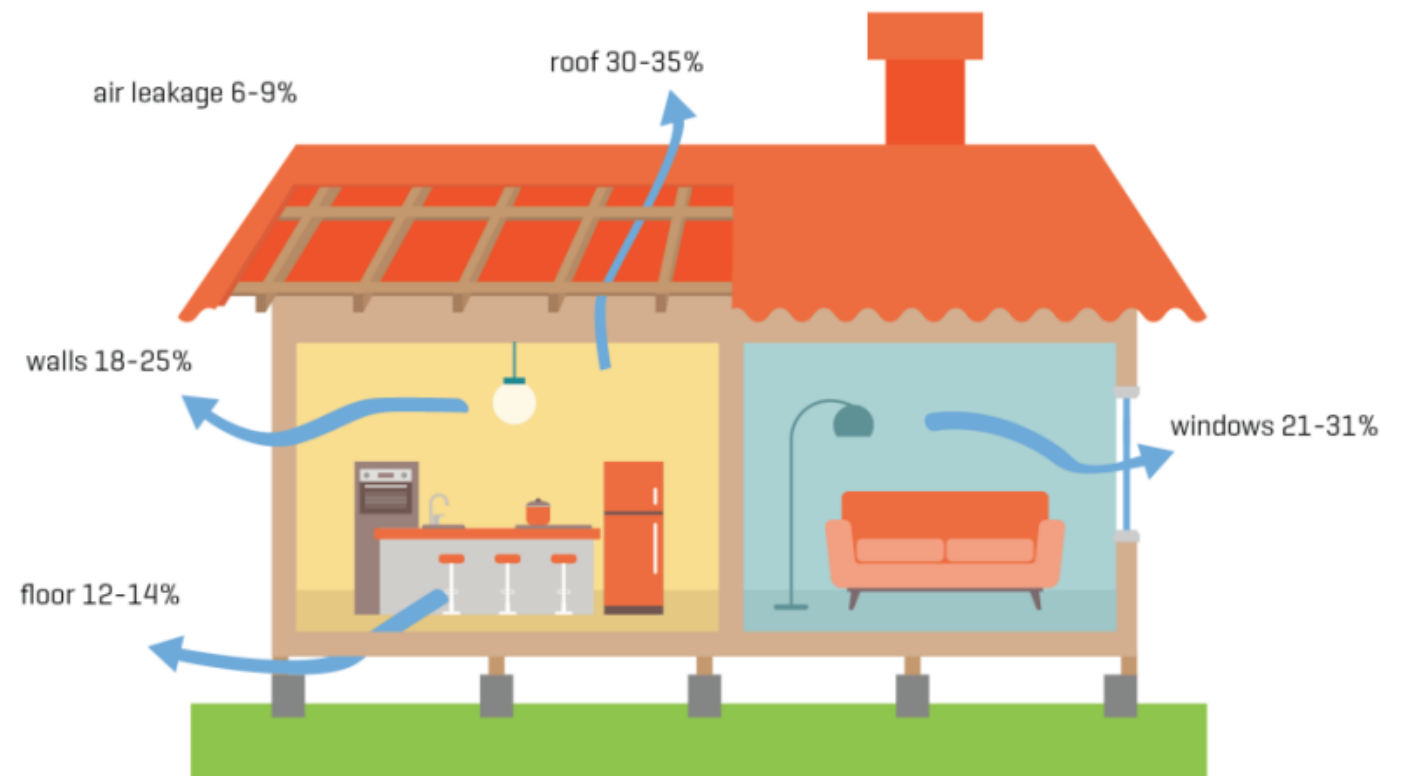


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Deutschen Wirtschaft  
German-New Zealand  
Chamber of Commerce Inc.



## Retrofit Scope – questions & comments to ponder/discuss

- Collaboration & aligning expertise and goals
- Taking the journey together
- How can overseas building technology be integrated into the New Zealand building context?
- What are the challenges?
- Where is assistance needed?
- Industry training?





## Higher Performing Buildings

BRANZ ventilation building research  
and how it informs deep retrofit

# The Experimental Building

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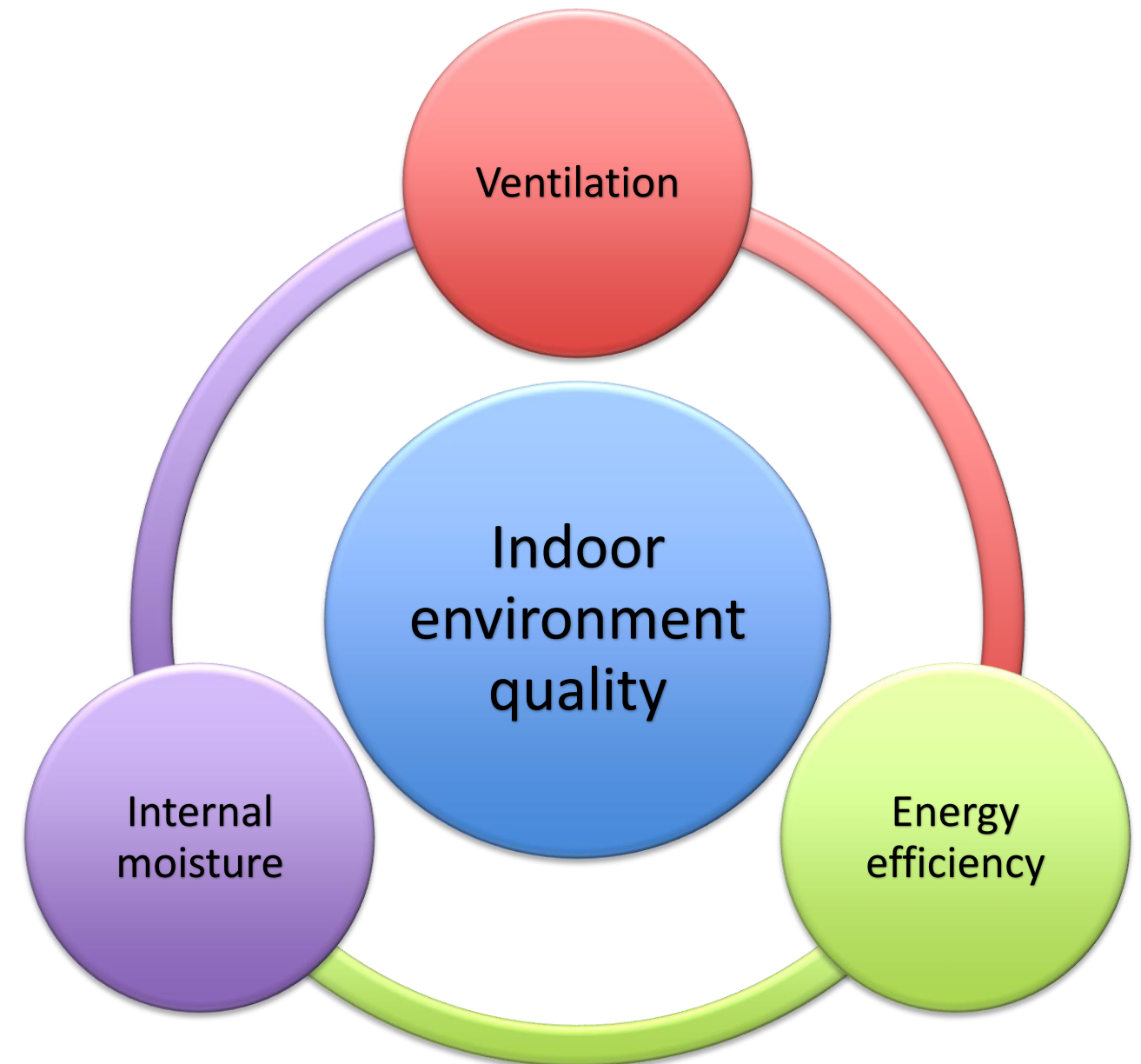


- Typical 1980's construction
- Single glazed, aluminium window frames
- ~R2.0 insulation
- Used for various research projects
- Variable airtightness

## Research takeaways

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- We should be using moisture risk as the key driver of improved airtightness, not energy
- Inadequate ventilation biggest risk factor or interstitial moisture issues
- Durability concerns more pressing as insulation levels increased



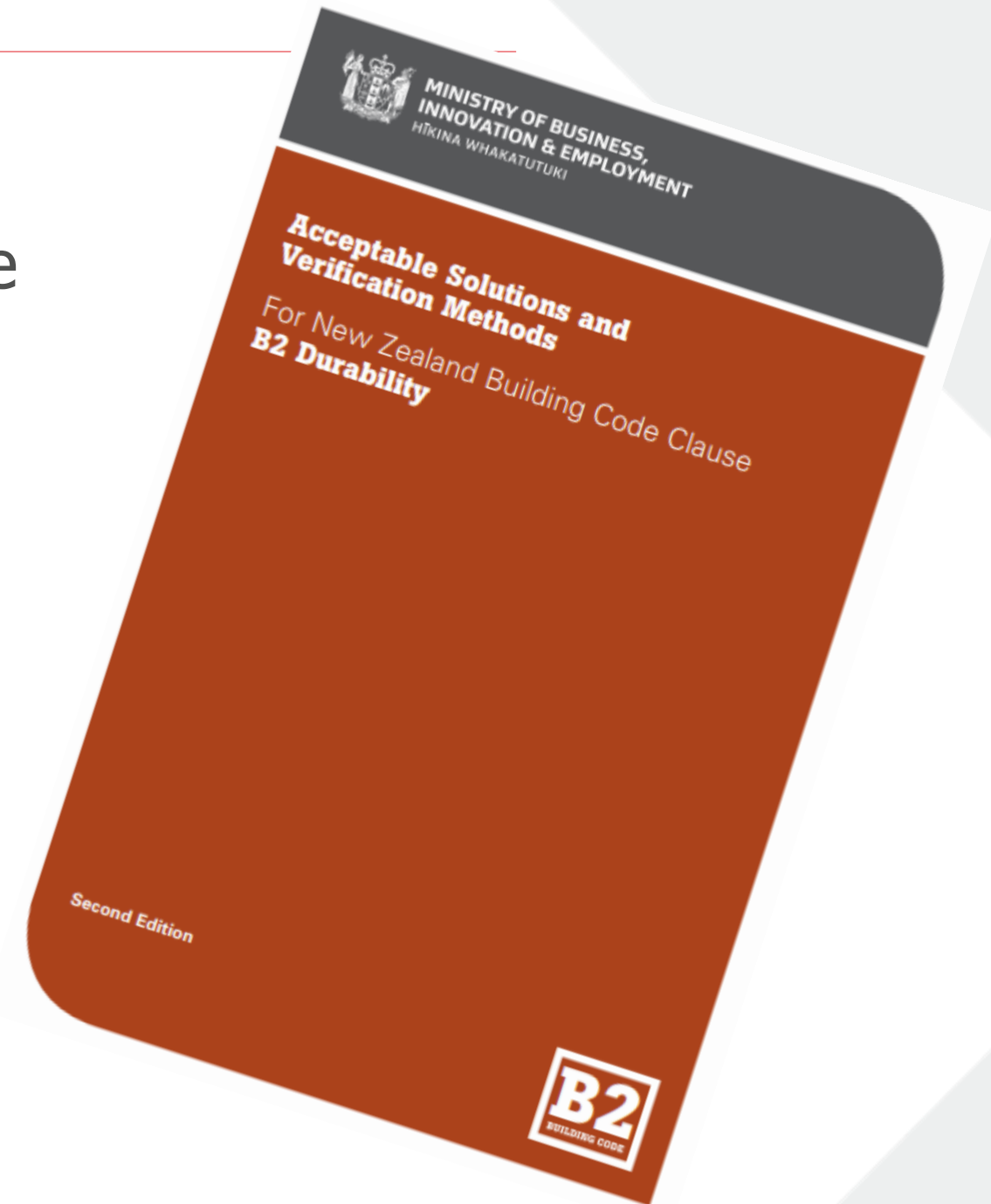
# Deep Retrofit Challenges...

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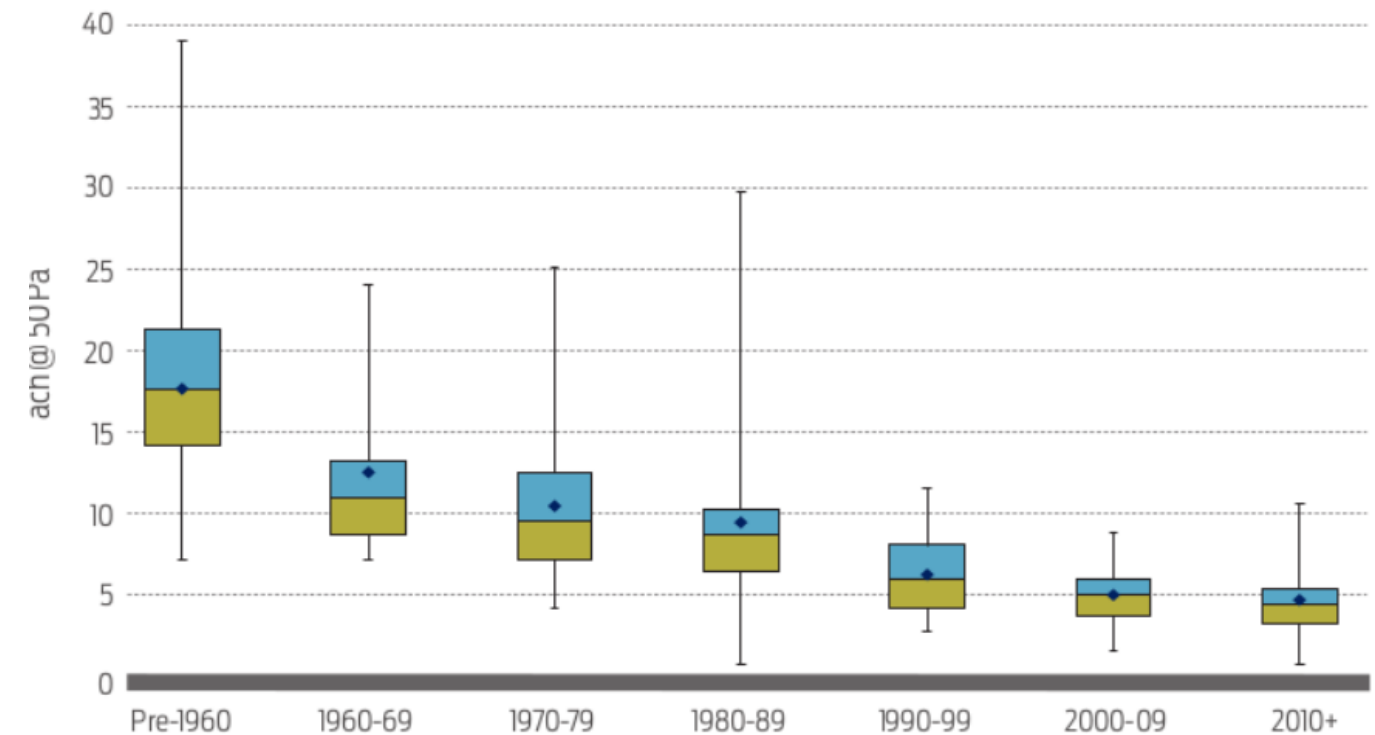
## Deep Retrofit Challenges...

- NZBC clause B2 – durability
- Requires a demonstrated service life dependent on ease of replacement
  - 15 years claddings
  - 50 years structure
- Verification method B2/VM1



# Deep Retrofit Challenges...

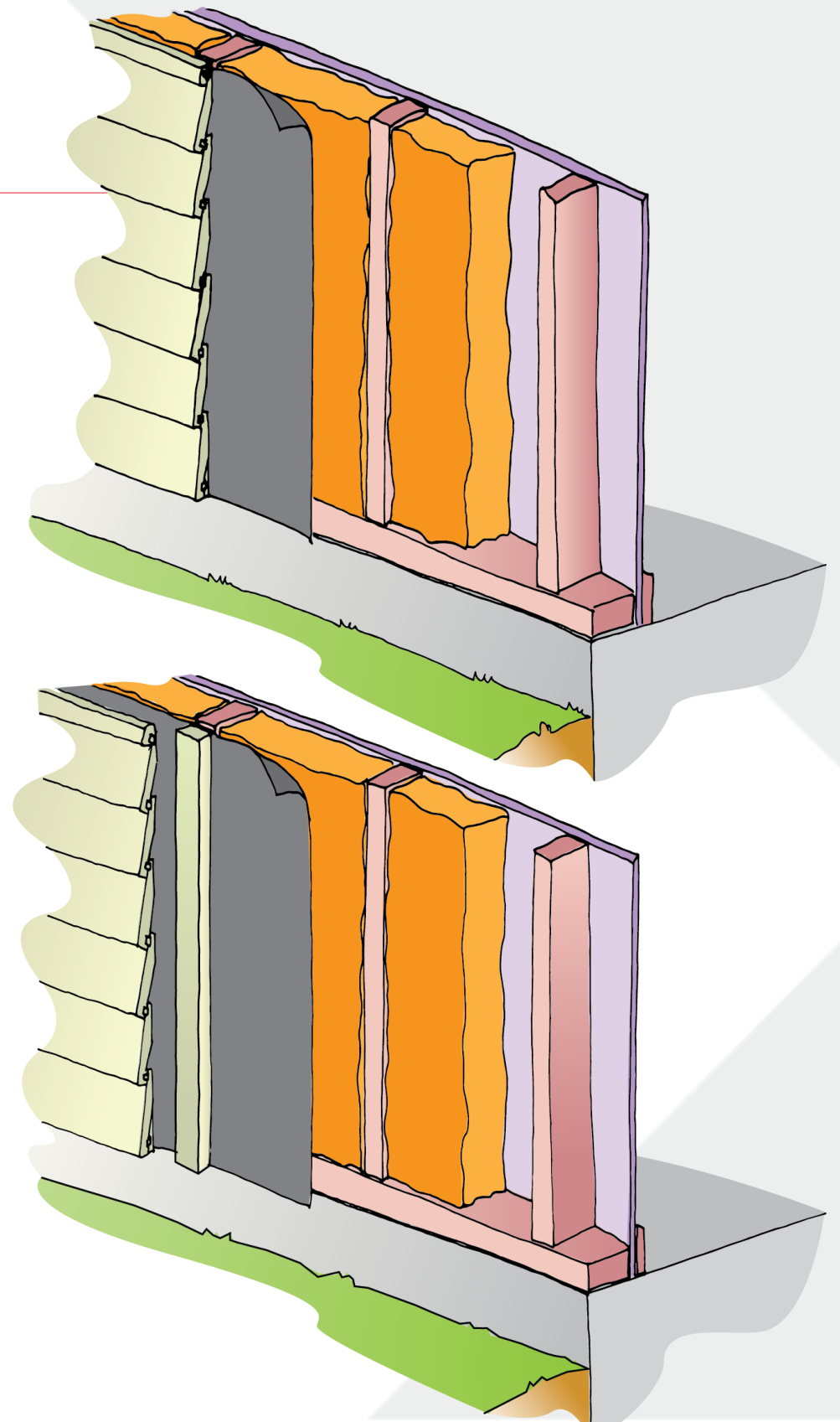
- Interrelation of E2, E3 and G4
- Not just about products, it's the system
- Guidance in a range of solutions – and how to achieve/assess with generic materials.



# Weathertightness



- Serious water leakage problems following deregulation of the sector
- Change to cavity construction
- Testing requirements
- Window installation challenges





## Retrofit Scope – where does BRANZ want to go

- Current insulation (R-values –  $m^2KW^{-1}$ ) – H1 5<sup>th</sup> ed

Building element	Construction R-values ( $m^2 \cdot K/W$ ) <sup>(1)</sup>					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Roof <sup>(2)</sup>	R6.6	R6.6	R6.6	R6.6	R6.6	R6.6
Wall	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0
Floor						
Slab-on-ground floors	R1.5	R1.5	R1.5	R1.5	R1.6	R1.7
Floors other than slab-on-ground	R2.5	R2.5	R2.5	R2.8	R3.0	R3.0
Windows and doors <sup>(3)</sup>	R0.46 <sup>(3)</sup>	R0.46 <sup>(3)</sup>	R0.46	R0.46	R0.50	R0.50
Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62

R-values needed will depend on energy usage intensity targeted.

To reach indicative BFCC targets would expect  $>R3$  for walls in some climate zones + improved windows

## Retrofit Scope - aims

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- Single solution for this building
- Aim is make solution easy to apply, reducing designer/builders perceived risk
- For windows – a general flashing solution
- For the Wellington climate zone



## Retrofit Scope - windows

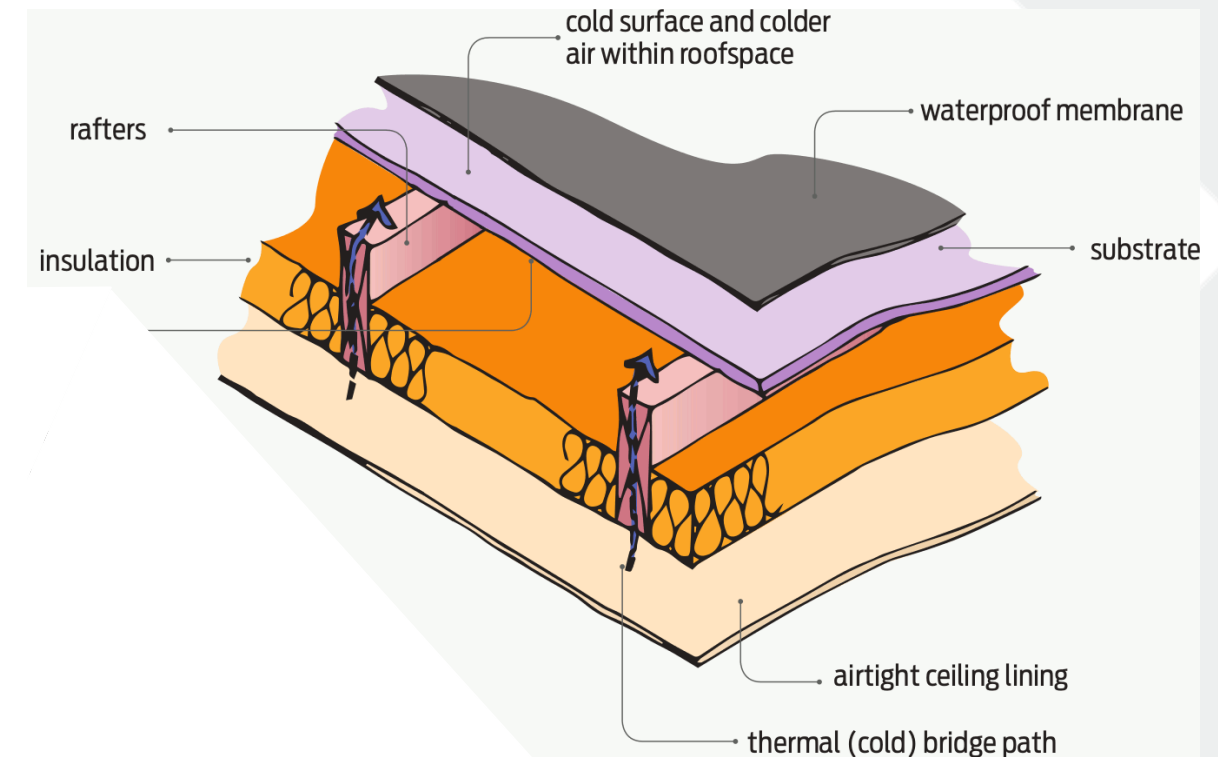
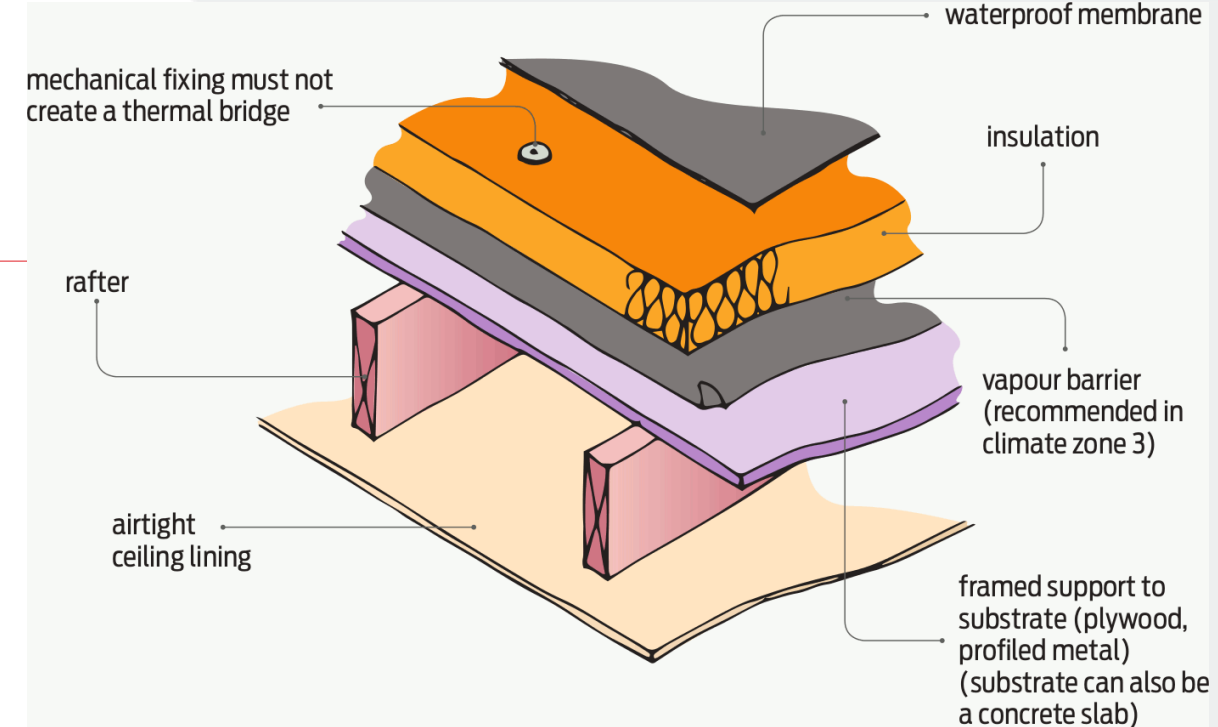
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- To reach BFCC levels, triple glazing likely in southernmost climates
- High R-value frames
- Shading mechanisms to mitigate overheating
- Challenge with ensuring weathertightness
  - Recessed windows
  - Flashings (directing water outside the cladding line)
  - Timber frame less tolerant



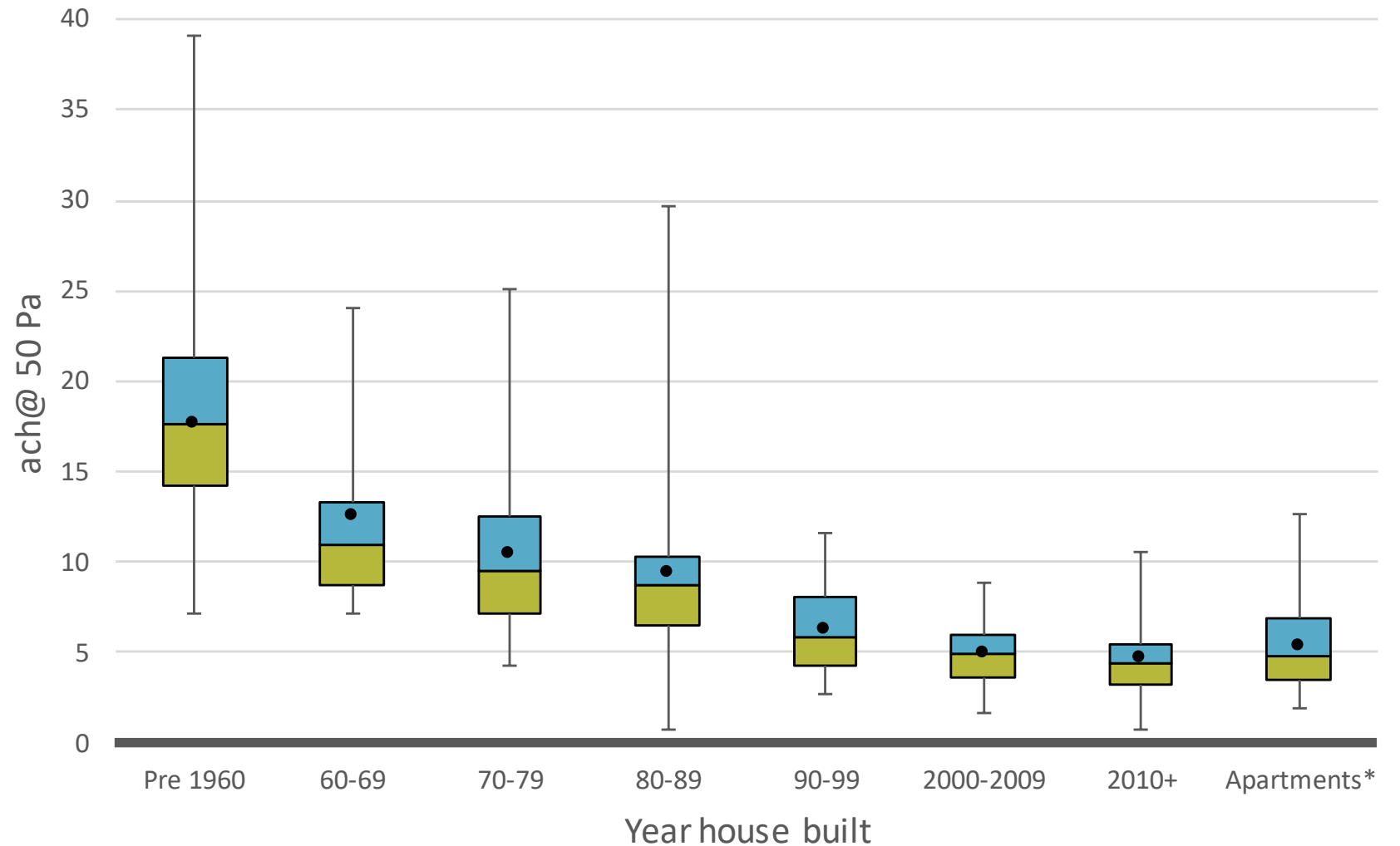
## Retrofit Scope - roofs

- Traditional cold roof has potential problems as R-value increased
- Warm roofs
  - Mixed insulation?
  - External insulation (cladding insulation panels as one example)
  - Embodied carbon a challenge



## Retrofit Scope – cant forget ventilation

- Insufficient ventilation biggest risk factor for interstitial moisture
- Ventilation options:
  - Demand controlled
  - Heat recovery
  - Extract only
    - Makeup air supply



Thank you

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