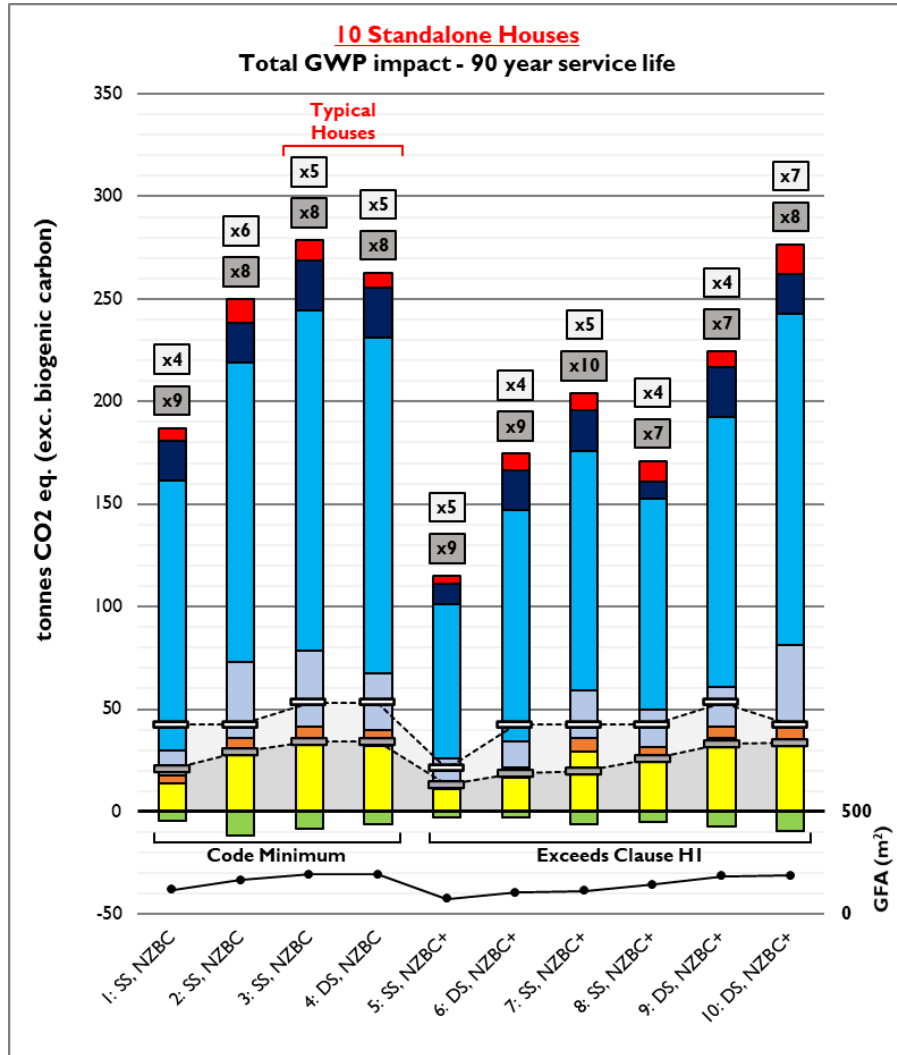




Transition to a Zero Carbon Built Environment: research, challenges and opportunities

Dr Casimir MacGregor, BRANZ

How do new houses compare?



- Modelled emissions over 90 year service life
- Some materials missing e.g. electrical, plumbing, kitchen and bathroom units
- Current materials manufacturing technology. This should progressively decarbonise over time
- Some increase in renewables supplying grid electricity – **will be updating this year for ICCC and MBIE grid scenarios**
- Energy – simulated to maintain a temperature of 18°C – 25°C. Includes heating + cooling, hot water, lighting, plug-in appliances.
- Houses 7 – 10 times higher than the allowable 1.5°C carbon budget (GFA basis)
- High performance houses are not necessarily low carbon houses
- Further work commencing this year

- Carbon budget (occupancy basis)
- Carbon budget (GFA basis)

Early BRANZ climate change research

SR94 ***Implications of climate change for the construction sector: Houses*** (2000) by Michael Camilleri

First in a series of reports that focused on climate change adaptation and mitigation.

2007: Lynda Amitrano and others ***An Assessment of the Need to Adapt Buildings for the Unavoidable Consequences of Climate Change*** for the Australian Government Department of the Environment and Water Resources & Australian Greenhouse Office.

HEEP, BEES and Zero and Low Energy Houses (ZALEH) research

2013 ***Whole of Building Whole of Life Framework*** - The purpose of the framework is to establish a level playing field for evaluation and reporting of the environmental impacts of building designs in comparison with an appropriate reference building, based on life cycle assessment (LCA)

2015 ***Measuring our sustainability progress: Benchmarking New Zealand's new detached residential housing stock*** – a longitudinal study

Why a **research programme**?

- Timing of climate change **urgent**.
- A need for **leadership** and action to bring industry along
- To help **create capability** for the building and construction industry to respond to climate change in an **inclusive** and **bicultural** manner.
- Create research that we **need** to help direct climate action i.e. fill in gaps in knowledge





Transition to a Zero Carbon Built Environment **Aim and Objectives**

Programme aim: By 2050 the building and construction industry is delivering net-zero carbon buildings in an affordable way.

Objective 1: Cost effective *low carbon solutions* have been developed to decarbonise new and existing dwellings and non-residential buildings by 2030.

Objective 2: Cost-effective, *low carbon solutions* are routinely implemented to inform design, maintenance and construction of dwellings and non-residential buildings from 2025.

Key stakeholders



Programme Advisory Group



THE DEEP SOUTH

Te Kōmata o
Te Tonga

National
SCIENCE
Challenges

National
SCIENCE
Challenges

**BUILDING BETTER
HOMES, TOWNS
AND CITIES**

Ko Ngā wā Kainga hei
whakamāhorahora

The Programme in 2021

- **Enhancing expertise:**

Building on past Levy investment to further programme objectives.

- **Building capability to address knowledge gaps:**

Strengthening under investment to accelerate research

- **Supporting industry to transition to zero carbon**

Key messages

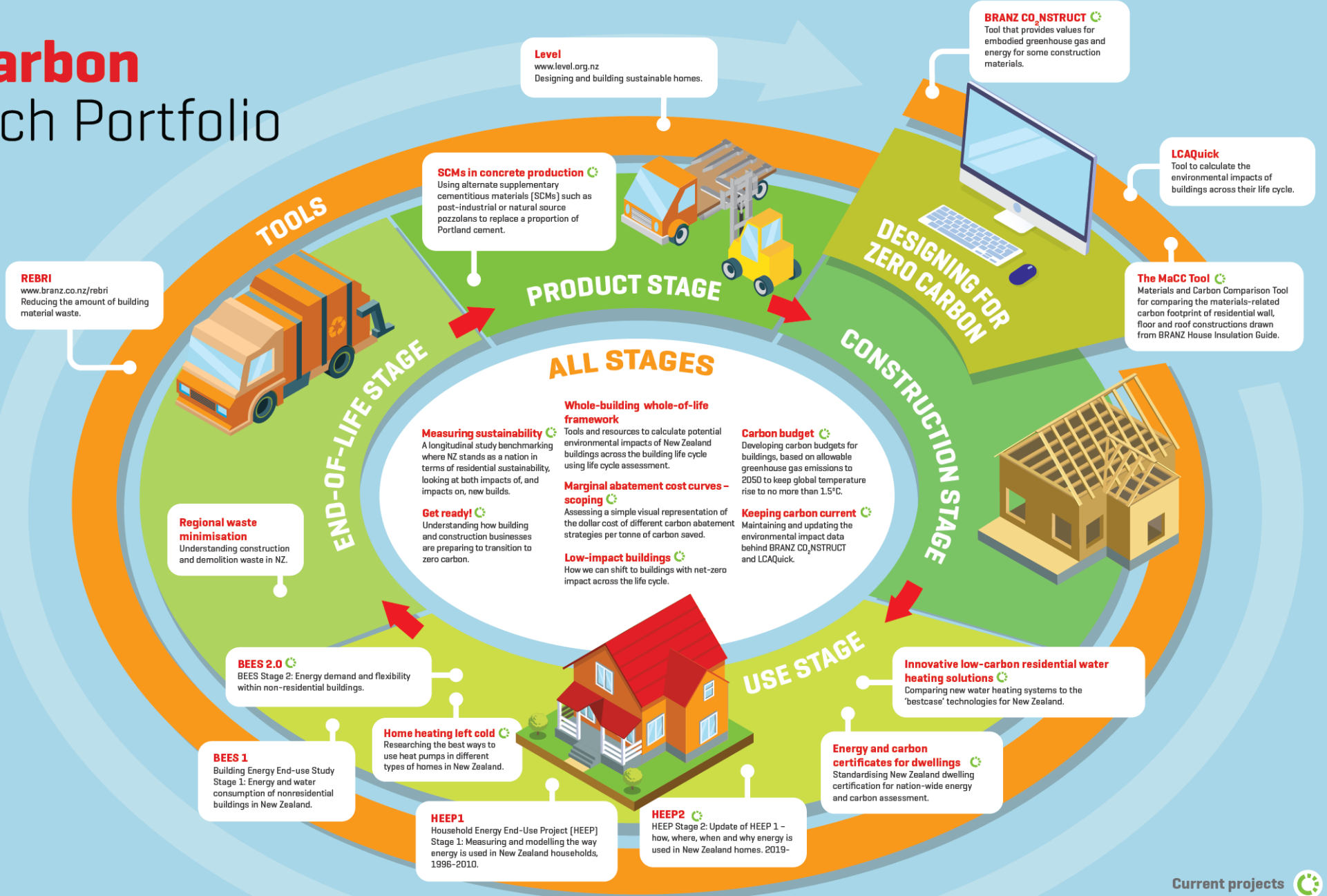
- BRANZ is **demonstrating leadership** in relation to climate action
- BRANZ is **building capability and collaborations** to address key climate change challenges.
- BRANZ has a key role to play as a **knowledge broker**.
- BRANZ uses our resources, science, experience and networks to **help stakeholders achieve their goals**.

Towards research impact

- Development of **LCAQuick** and free training for industry
- The continued development of the **Eco-Design Adviser service**
- The programme provided evidence and advice to **MBIE's H1 review**.
- **Working with Kainga Ora** evaluating carbon, life cycle cost, energy, moisture risk to help Kainga Ora decide which of 4 construction systems will be taken forward to developed design.
- Working with the **Ministry of Education** on their Environmental Action Plan - waste mini and zero carbon elements.
- Working with **New Zealand Green Building Council** and **Passive House Institute of New Zealand** to support industry eg handbook of high thermal performance construction details.
- A partnership to build capability with **Massey University**, School of Built Environment



Zero Carbon Research Portfolio



Research addressing low carbon solutions

- **Reducing GHG emission reduction in new buildings:**
 - Low impact buildings project
 - Innovative low carbon residential water heating solutions
 - Marginal abatement cost curves (Part 1 and [Part 2](#))
 - Supplementary cementing materials in concrete production (Concrete New Zealand)
 - Bio-based materials- NZ wood fibre insulation proof of concept
 - How can materials and durability contribute to future zero carbon buildings
 - Scoping for next generation carbon footprinting tools
 - Carbon Case for Resilient Design - Rosa Gonzalez (UoA) PhD scholarship
 - Designing Low Carbon Architecture in NZ - Emily Newmarch (VUW) PhD scholarship

Reducing GHG reduction in existing buildings

- Energy and Carbon Performance Certificates (residential)
- BEES addressing energy demand
- Heat pump efficiency project (residential)
- Decision making tool for zero carbon refurbishment (Massey University)
- Measuring our sustainability progress (second update)
- Housing stock strategies for meeting NZ's 2050 carbon target
- Towards a New Zealand Building Stock model
- Seismic Design and retrofit of Hillside houses

Implementing change

- **Transition pathways:**

- Get ready - preparing building and construction businesses for the transition to zero carbon (with University of Otago Business School)
- The Future of Work- skills, competencies and expertise needed to transition to zero carbon
- Roadmap to a solution for evaluating building performance for low carbon homes

- **Supporting Industry stakeholders:**



Education 2021

- Nationwide seminar series on carbon: 21 centres Oct/Nov 2021
- Seminar for NZIA Auckland August 2021
- Webinars:
 - Sustainable materials (September 2021)
 - LCAQuick (October 2021)
- Videos: series of 5 videos on designing low-carbon houses (October 2021)

Thank you

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<https://www.branz.co.nz/environment-zero-carbon-research/>