

BUILDING PERFORMANCE

Energy efficiency requirements
for new homes, and the future
direction of the Building for
Climate Change programme

Healthy Homes for a Sustainable Future
Conference

22 May 2023



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Te Kāwanatanga o Aotearoa
New Zealand Government

Early beginnings



Germany

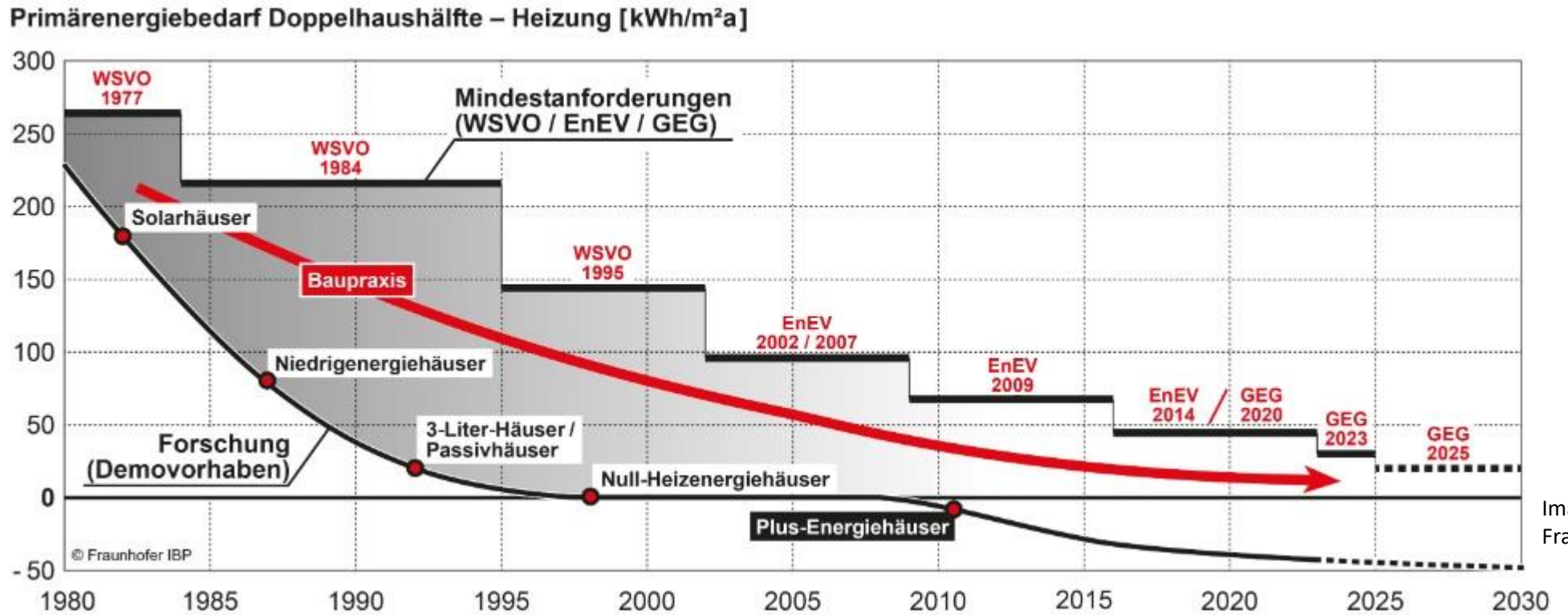


Image credit:
Fraunhofer IBP

New Zealand

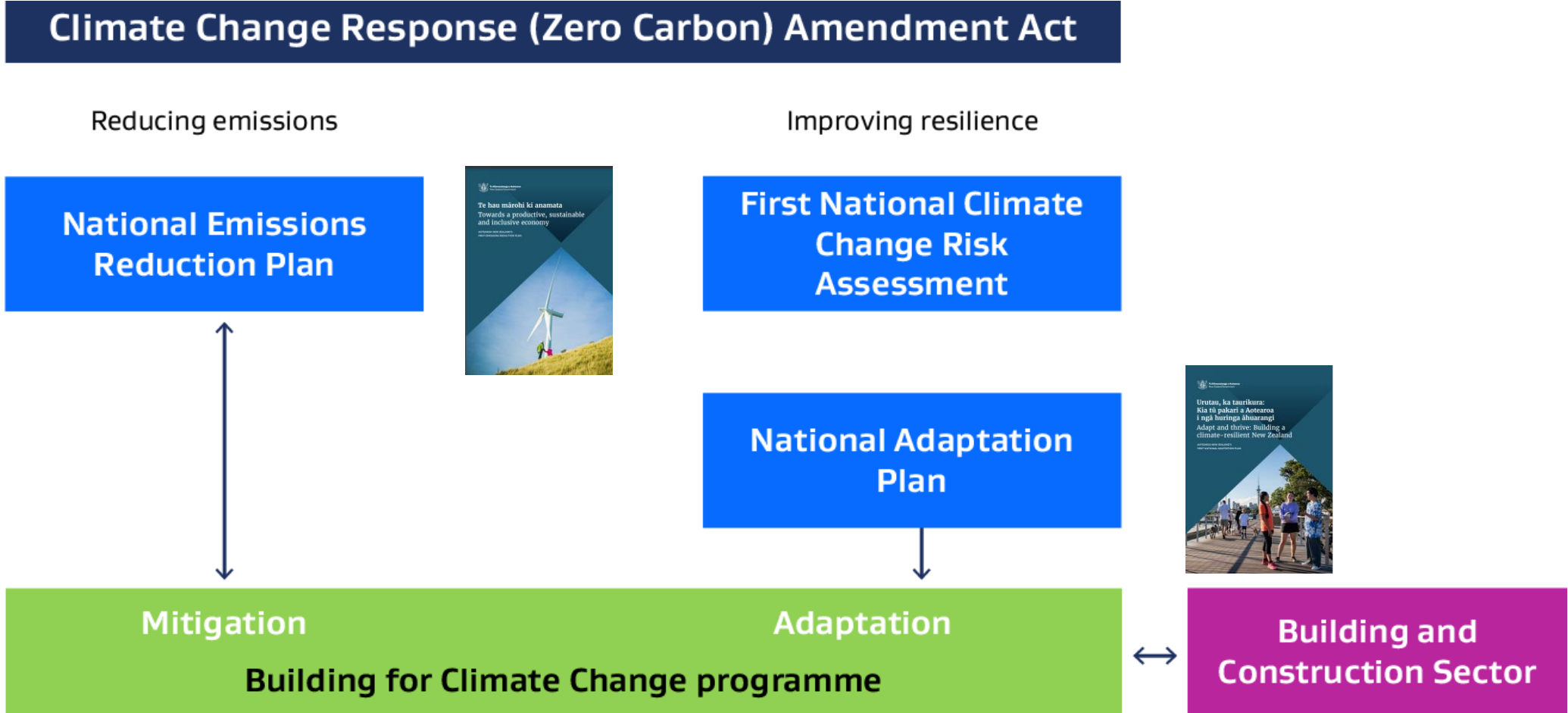
↑
1978: first NZ-wide insulation requirements

↑
2000: South Island & Central Plateau stricter insulation requirements

↑
2008 update: included introduction of double-glazing

↑
2023 H1 update

All-of-Government climate change work



Vision



By 2050, New Zealand's building-related emissions are near zero, while providing healthy places to work and live for present and future generations

Homes and buildings are resilient to the impacts of climate change and meet people's social and cultural needs.

Emissions Reduction



Climate change requires us to think about how we build in a completely different way – putting embodied carbon reduction and operational efficiency at the core of our building designs and processes.

Adaptation



We also need to ensure that our built environment can withstand the impacts of climate change.

Objectives	1. Reduce Embodied Carbon of Buildings	2. Reduce Operational Emissions
Focus Areas	1. Reduce embodied carbon of construction materials and buildings	3. Improve building energy efficiency
	2. Accelerate the shift to low-emissions buildings	4. Shift energy use from fossil fuels
	5. Establish foundations for future emissions reduction	

Reducing Whole-of-Life Embodied Carbon

1. Reduce embodied carbon of construction materials and buildings

- Implement Whole-of-Life Embodied Carbon Reduction framework
- Support construction innovation
- Work with waste and transport sectors

2. Accelerate shift to low-emissions buildings

- Examine financial barriers
- Recognise and share good practices
- Use Government purchasing power to drive change

Transforming Operational Efficiency

3. Improve building energy efficiency

- Implement H1 amendments
- Implement Transforming Operational Efficiency framework
- Energy performance ratings for commercial, public and large residential buildings

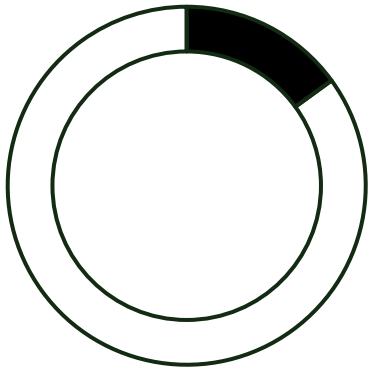
4. Shift energy use from fossil fuels

- Develop gas transition plan
- Examine impacts on different communities and users

5. Set foundations for future emissions reduction

- Work with Māori
- Develop data, evidence and tools
- Behaviour change programme
- Support workforce transition
- Establish enabling legislative framework

Why building and construction emissions matter

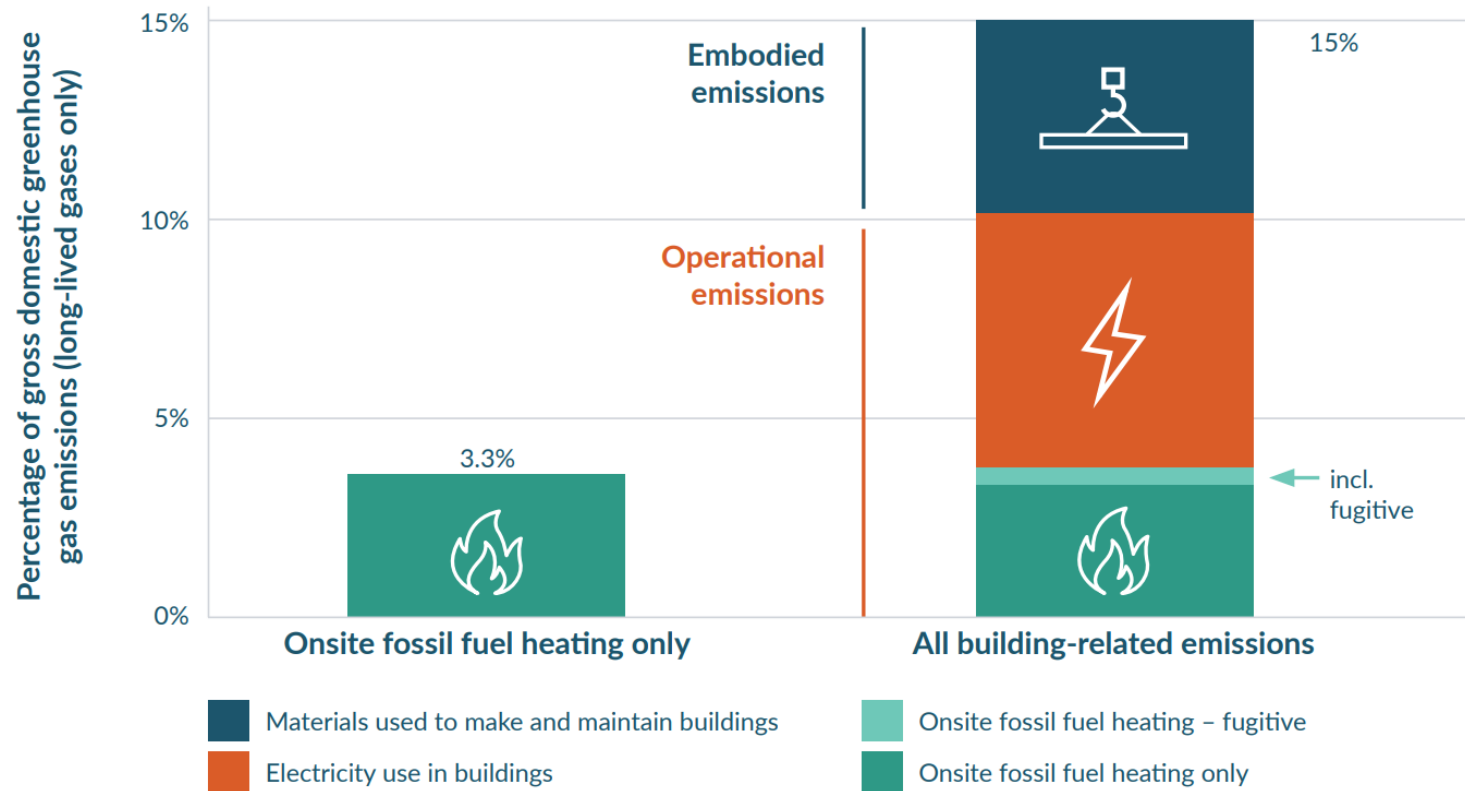


The building and construction sector is responsible for 15% of Aotearoa New Zealand's long lived greenhouse gas emissions



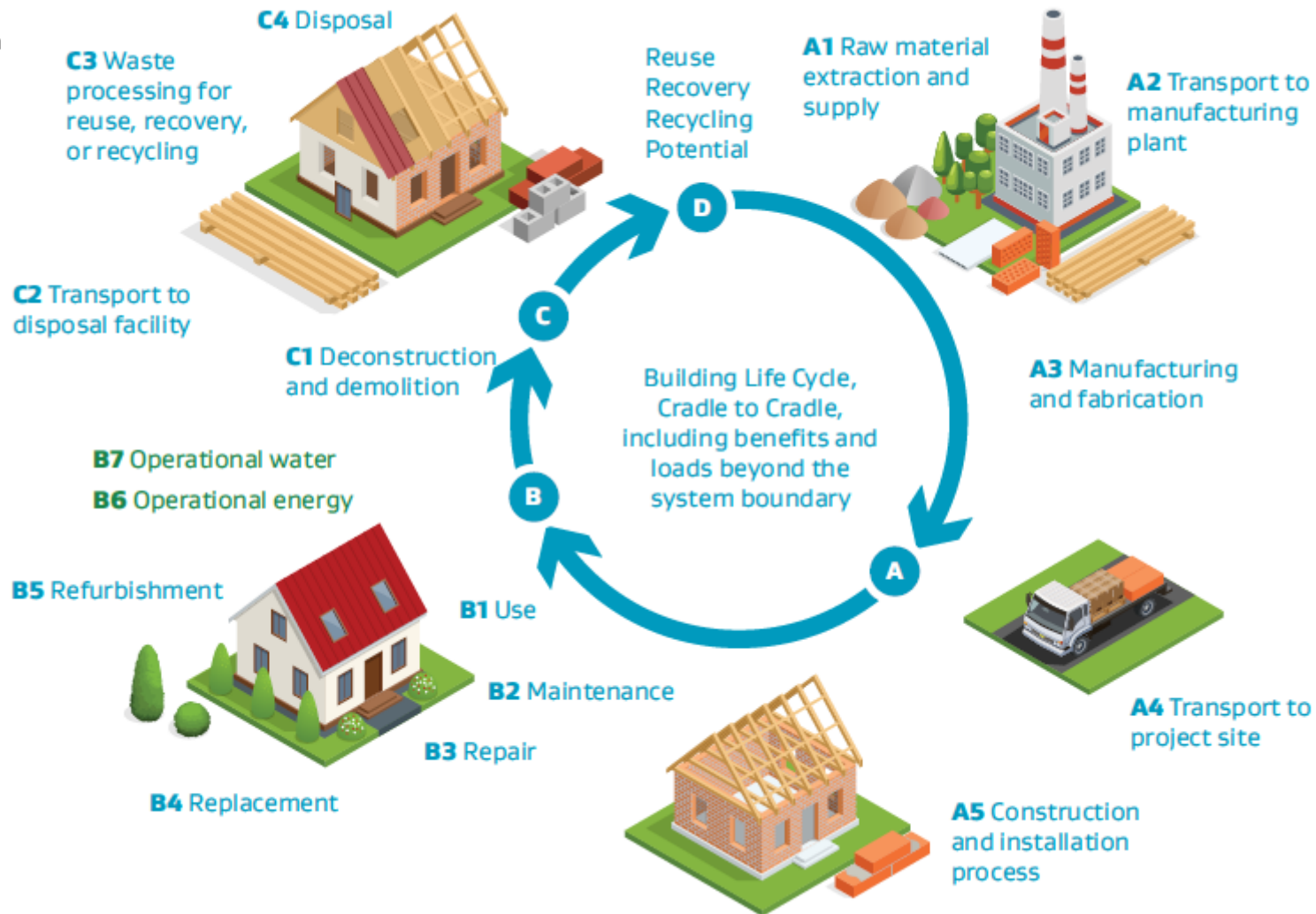
Constructing and using buildings creates emissions in the energy, transport, waste and industry sectors. Reducing building-related emissions provides more opportunities for other sectors

Building and construction related emissions as a proportion of Aotearoa's gross greenhouse gas emissions (excluding biogenic methane) in 2018

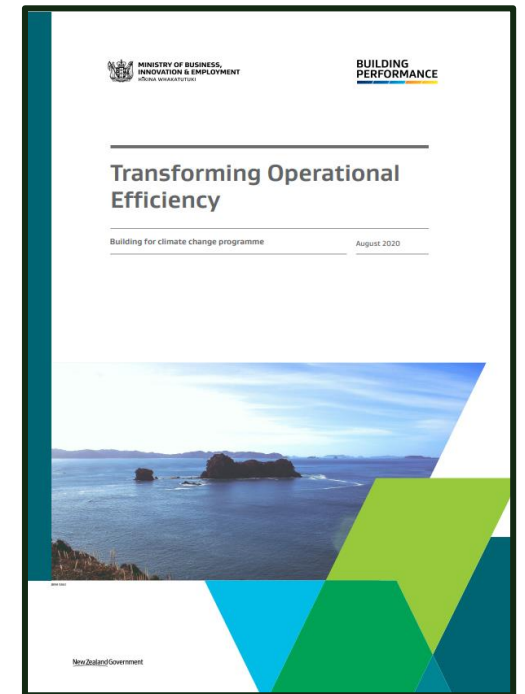
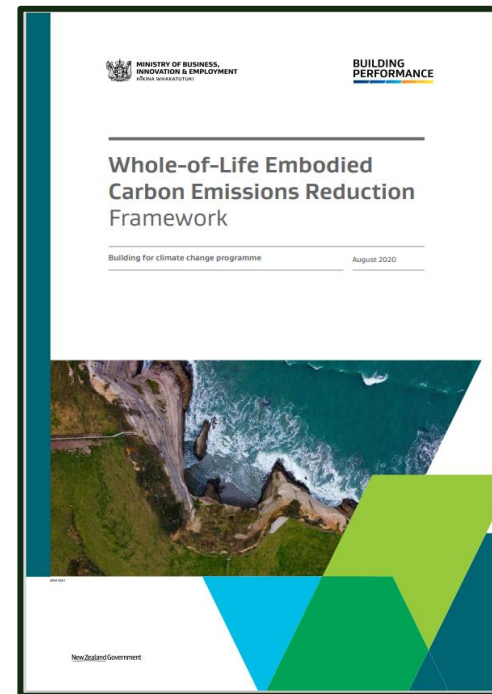


Whole of Life Embodied Carbon and Operational Efficiency

Illustration of activity at each life cycle stage of a building and associated Life Cycle Analysis (LCA) modules

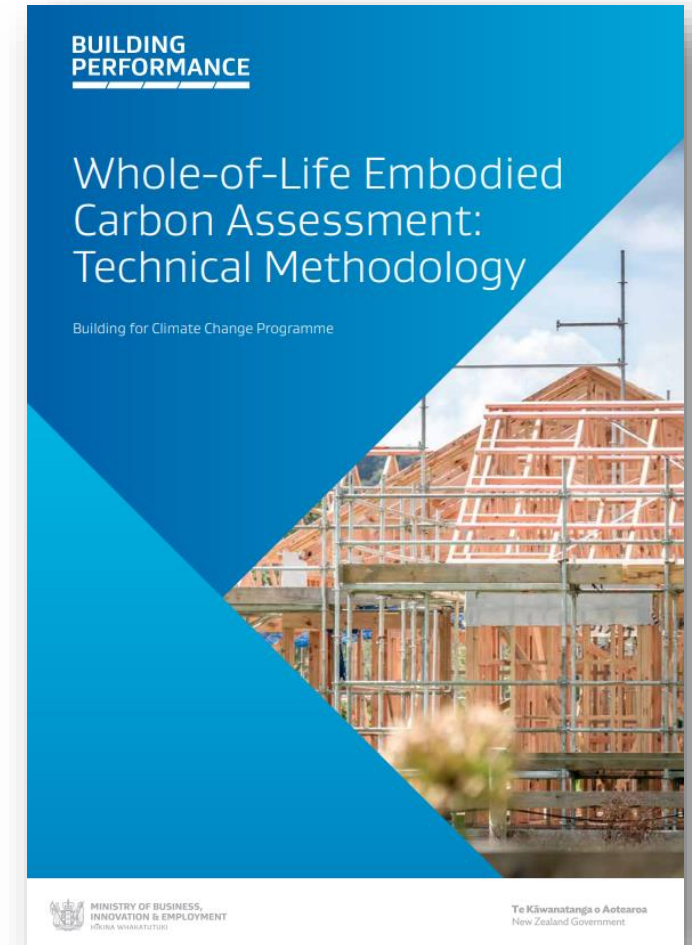


- Frameworks published and consulted on in 2020
- Proposed requirements to assess and report on new buildings' emissions
- Over time, propose to cap emissions
- Will require Building Code changes (or another regulatory instrument) to implement
- Accompanied by good data and tools, support for new skills & behaviour change
- Consultation and engagement with sector while proposals are developed



Developed following a **targeted consultation** in 2021.

- Give direction on technical issues,
- Support consistency of embodied carbon assessments already happening in NZ,
- Align the efforts of government agencies ‘leading the way’ with Carbon Neutral Government Programme (CNGP) requirements,
- Introduce the idea of embodied carbon assessments to those not familiar with the concepts.



Operational Emissions

- Methodology currently being finalised
- Sets out an approach to assess a building's predicted operational efficiency, and the calculations for carrying out this approach
- Key principles:
 - Consistent
 - Transparent
 - Accessible/ Understandable
 - Outcomes-driven
- Will require energy modelling protocol and user tools



- Making it clear emissions reduction and building resilience is the responsibility of the sector
- Energy Performance Rating Requirements for new and existing commercial, public, industrial and large-scale residential buildings
- Waste Minimisation Plan requirements when building or demolishing buildings



Energy Performance Certificate

Reference number: 9858-8089-0235-9472-1990

Dwelling type: Ground floor flat
 Date of assessment: 15 May 2012
 Date of certificate: 15 May 2012
 Type of assessment: RDSAP, existing dwelling
 Total floor area: 97 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures.

Estimated energy costs of dwelling for 3 years: £2,673

Over 3 years you could save: £1,269

Estimated energy costs of this home			
	Current costs	Potential costs	Potential future savings
Lighting	£133 over 3 years	£133 over 3 years	
Heating	£2,159 over 3 years	£1,635 over 3 years	You could save £1,269 over 3 years
Hot Water	£291 over 3 years	£186 over 3 years	
Totals	£2,673	£1,454	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This includes energy use for running appliances like TVs, computers and coolers, and any electricity generated by microgeneration.

Energy Efficiency Rating

Rating	Current	Potential
A (94-100)		
B (81-93)		
C (69-80)		
D (55-68)		
E (39-54)		
F (21-38)		
G (1-20)		

The graph shows the current energy efficiency of your home. The higher the rating the lower your fuel bills are likely to be. The potential rating shows the effect of undertaking the recommendations on page 3. The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Internal or external wall insulation	£4,000 - £14,000	£702	Yes
2 Floor insulation	£300 - £1,200	£165	Yes
3 Draught proofing	£90 - £120	£45	Yes

See page 3 for a full list of recommendations for this property.

To find out more about the recommended measures and other actions you could take today to save money, visit www.direct.gov.uk/havingenergy or call 0300 123 1234 (standard national rate). When the Green Deal launches, it may allow you to finance your home warmer and cheaper to turn it up at no up-front cost.

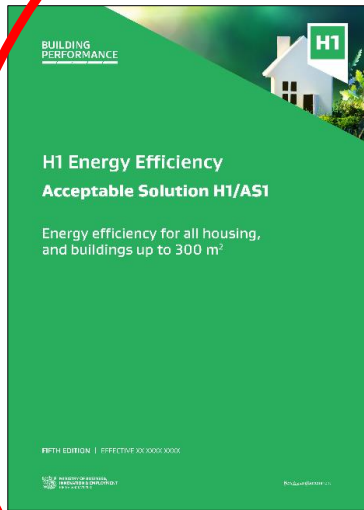
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Clause H1—Energy efficiency provisions

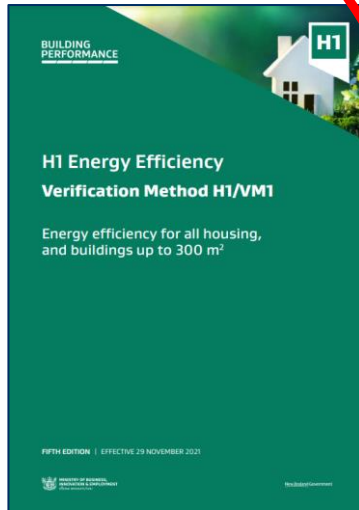
Provisions	Limits on application
Objective	
H1.1 The objective of this provision is to facilitate efficient use of energy.	Objective H1.1 applies only when the energy is sourced from a <i>network utility operator</i> or a depletable energy resource.
Functional requirement	
H1.2 <i>Buildings</i> must be <i>constructed</i> to achieve an <i>adequate</i> degree of energy efficiency when that energy is used for— (a) modifying temperature, modifying humidity, providing ventilation, or doing all or any of those things; or (b) providing hot water to and from <i>sanitary fixtures</i> or <i>sanitary appliances</i> , or both; or (c) providing artificial lighting.	Requirement H1.2(a) does not apply to <i>assembly service buildings, industrial buildings, outbuildings, or ancillary buildings</i> . Requirement H1.2(c) applies only to <i>commercial buildings</i> and <i>communal non-residential buildings</i> whose floor area is greater than 300 m ² .
Performance	
H1.3.1 The <i>building</i> envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to— (a) provide <i>adequate thermal resistance</i> ; and (b) limit uncontrollable airflow.	
H1.3.2 [Revoked]	
H1.3.2A [Revoked]	
H1.3.2B [Revoked]	
H1.3.2C [Revoked]	
H1.3.2D [Revoked]	
H1.3.2E <i>Buildings</i> must be constructed to ensure that their <i>building performance index</i> does not exceed 1.55.	Performance H1.3.2E applies only to <i>housing</i> .
H1.3.3 Account must be taken of physical conditions likely to affect energy performance of <i>buildings</i> , including— (a) the thermal mass of <i>building elements</i> ; and (b) the building orientation and shape; and (c) the airtightness of the building envelope; and (d) the heat gains from services, processes and occupants; and (e) the local climate; and (f) heat gains from solar radiation.	
H1.3.4 Systems for the heating, storage, or distribution of hot water to and from <i>sanitary fixtures</i> or <i>sanitary appliances</i> must, having regard to the energy source used,— (a) limit the energy lost in the heating process; and (b) be constructed to limit heat losses from storage vessels and from distribution systems; and (c) be constructed to facilitate the efficient use of hot water.	Performance H1.3.4(b) does not apply to individual storage vessels that are greater than 700 litres in capacity. Performance H1.3.4(c) applies only to <i>housing</i> .
H1.3.5 Artificial lighting fixtures must— (a) be located and sized to limit energy use, consistent with the <i>intended use</i> of space; and (b) be fitted with a means to enable light intensities to be reduced, consistent with reduced activity in the space.	Performance H1.3.5 does not apply to lighting provided solely to meet the requirements of Clause F6 .
H1.3.6 <i>HVAC systems</i> must be located, constructed, and installed to— (a) limit energy use, consistent with the <i>intended use</i> of space; and (b) enable them to be maintained to ensure their use of energy remains limited, consistent with the <i>intended use</i> of space.	Performance H1.3.6 applies only to <i>commercial buildings</i> .

Performance

H1.3.1 The *building* envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to—
(a) provide *adequate thermal resistance*; and



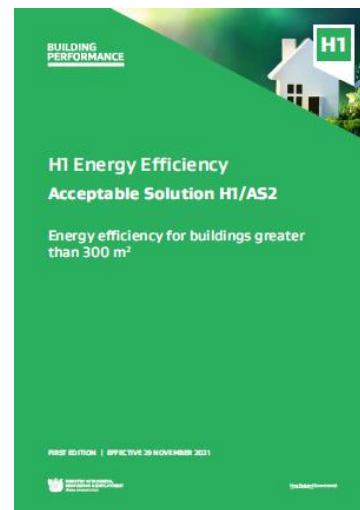
H1/AS1



H1/VM1

All housing

Small buildings up to 300m²
(Communal residential, communal non-residential and commercial buildings)

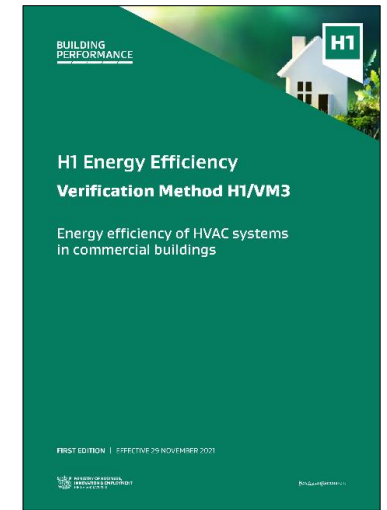


H1/AS2

Large buildings over 300m²
(Communal residential, communal non-residential and commercial buildings)



H1/VM2

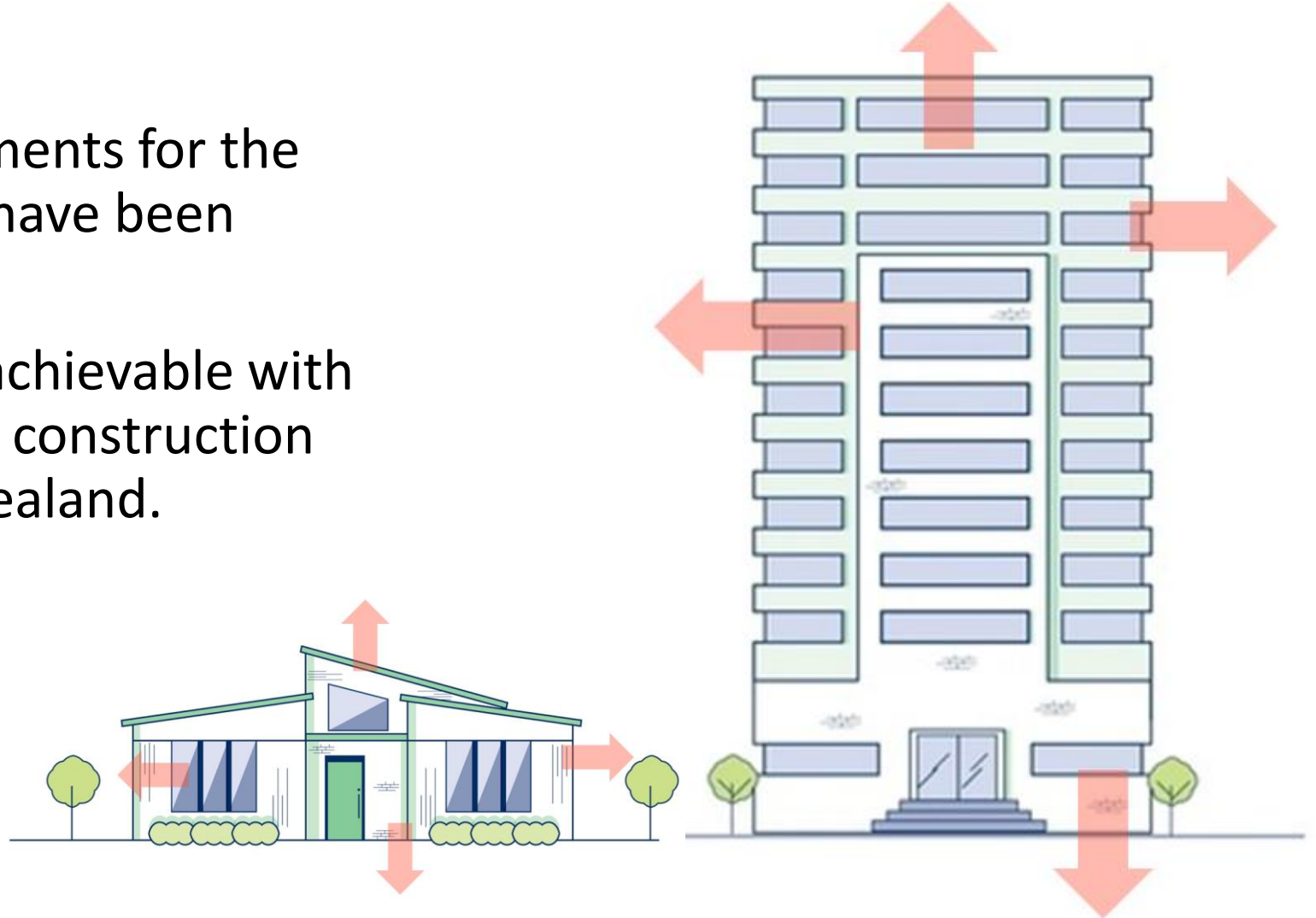


H1/VM3

HVAC systems in commercial buildings

What has changed?

- Insulation requirements for the thermal envelope have been increased
- New R-values are achievable with current design and construction practices in New Zealand.



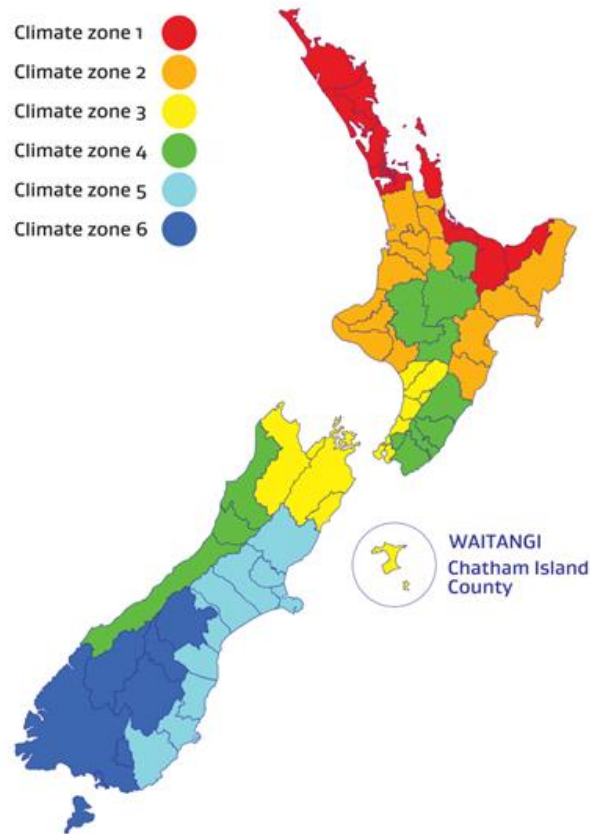


TABLE 2.1.2.2B: Minimum construction R-values for building elements that do not contain embedded heating systems

Paragraph 2.1.2.2 b)

Building element	Construction R-values (m ² ·K/W) ⁽¹⁾					
	Climate zone 1	Climate zone 2	Climate zone 3	Climate zone 4	Climate zone 5	Climate zone 6
Roof ⁽²⁾	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 ⁽³⁾	R0.46 ⁽³⁾	R0.46 ⁽³⁾	R0.46	R0.46	R0.50	R0.50
Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62

Expected impacts of H1 update



- Help make new homes and buildings warmer, drier and healthier, with less impact on the environment.



- Reduce the energy needed to heat new homes by up to 40%.

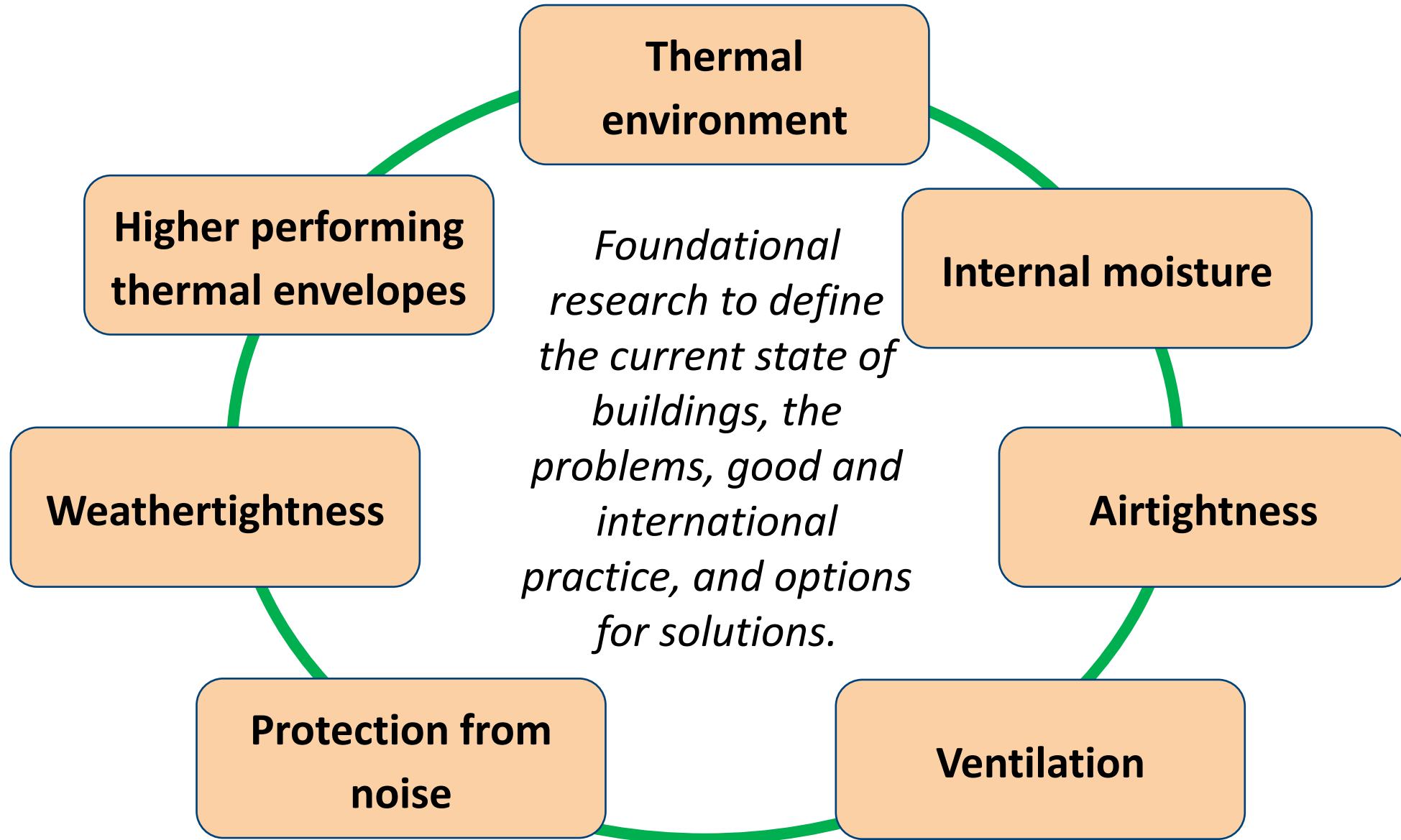


- Reduce the energy needed to heat and cool larger buildings by 23 per cent on average.



- Benefits - reduced carbon emissions, health benefits, cost savings

Potential future changes



Building code update process

**Defining the current state
problems, providing
evidence, and identifying
options for solutions**

Analysing possible options for solutions

**Updating the
Building Code**

Research

Evidence

*Define the current state
of buildings, the
problems, good and
international practice,
and options for solutions.*

*MBIE's analysis of
options*

*Cost, carbon, and
health benefit
analyses*

*MBIE's analysis to
decide on
solutions*

*Potentially update
the NZBC*

*Cost, carbon, and health
benefit results*

Shorter list of options

Solutions to be developed

Pātai ?

Visit the Building Performance website at [Building.govt.nz](https://www.building.govt.nz)

Read the Emissions Reduction Plan

Read the National Adaptation Plan