BUILDING PERFORMANCE

Sustainable Building Practices

EMISSIONS FROM BUILDINGS

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Building System Performance

Standards New Zealand: Pacific Islands Standards Week
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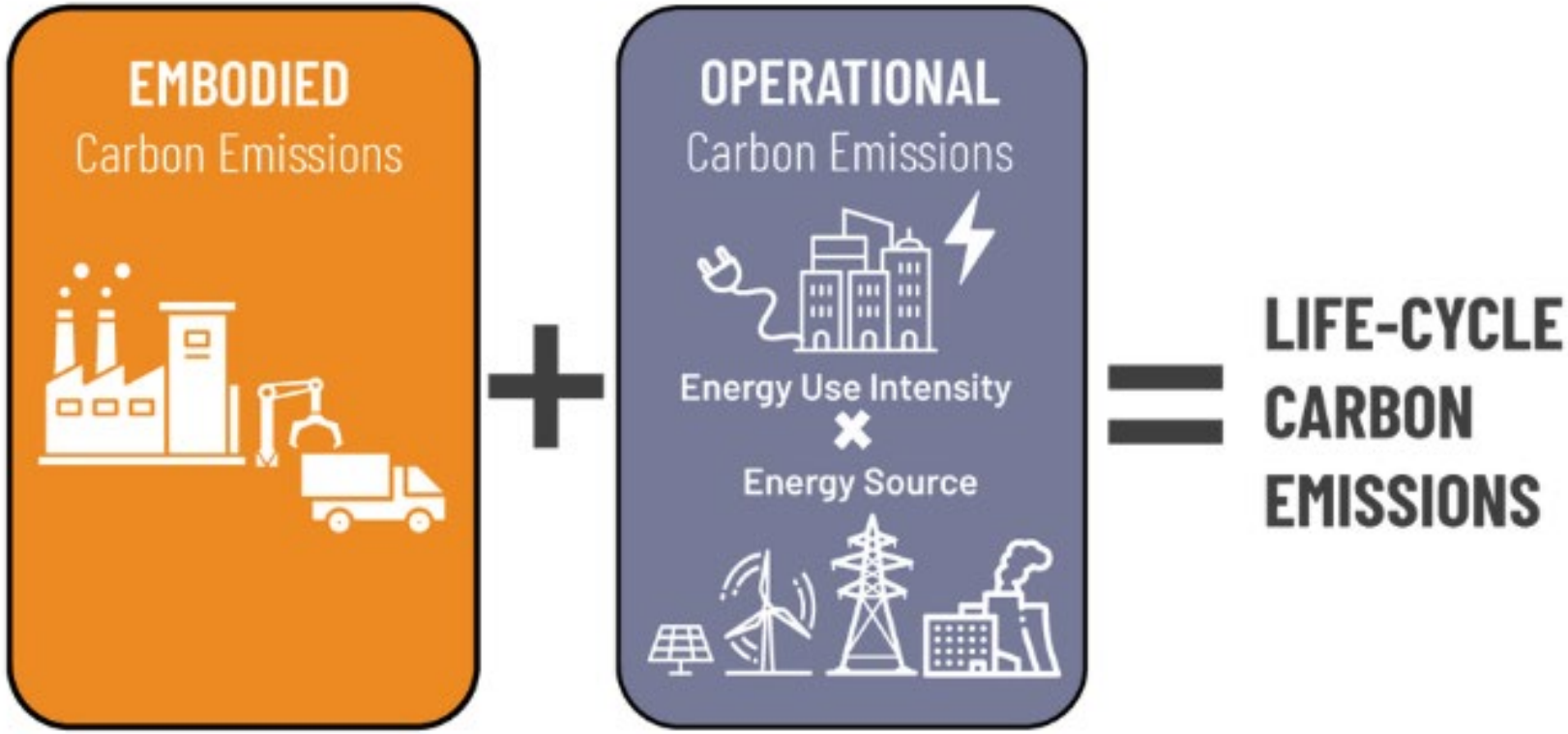
Agenda

Emissions from Buildings: Embodied and Operational carbon

Role of standards in reducing emissions

Key Takeaways

Building related emissions

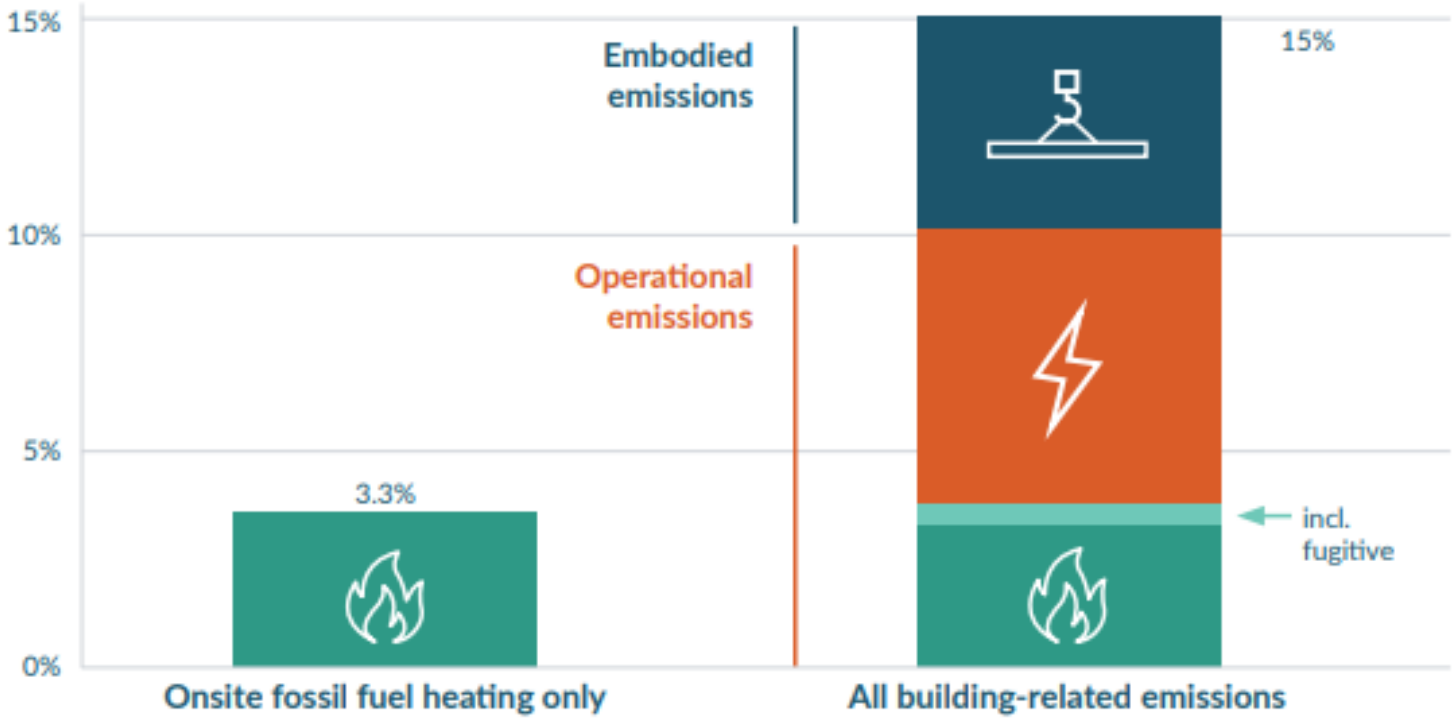


- Policy/regulation focus has been on **operational emissions** to date
- Embodied emissions are **harder to see and measure**

Why building-related emissions matter

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

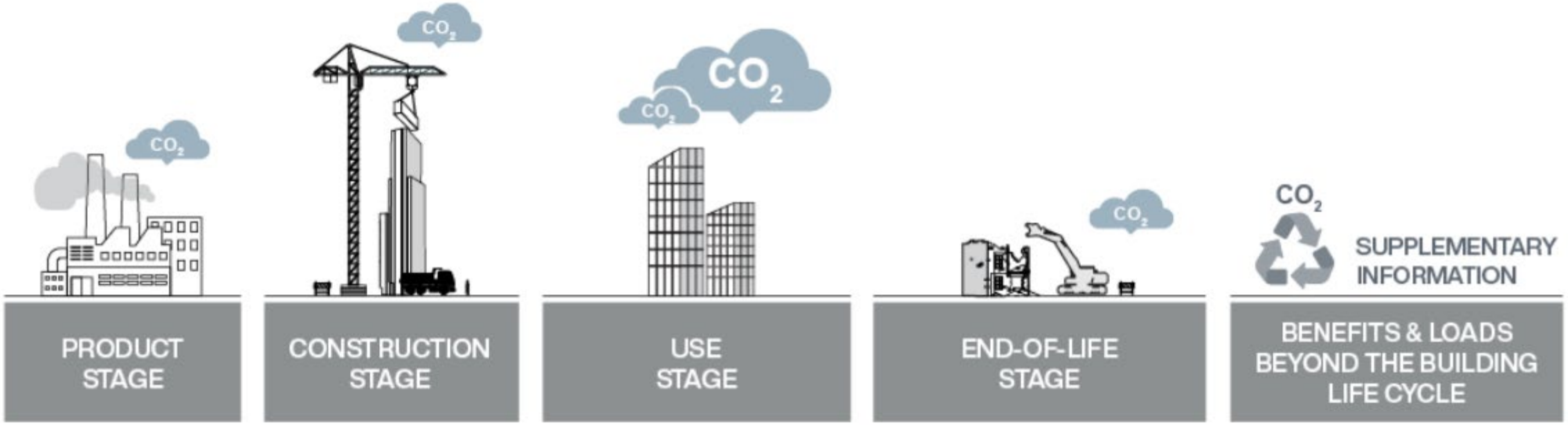
Constructing and using buildings creates emissions in the energy, transport, waste and industry sectors. Reducing building-related emissions provides more opportunities for other sectors



What is Embodied Carbon?

Embodied carbon of something is **all the greenhouse gas emissions** that occur at each stage of the thing's **life cycle.** Measured in units of kg CO_2-e.

Life Cycle Assessment/Analysis (LCA) for a building's life cycle:



A1-A3 A3-A4 B1-B7 C1-C4 D

Building related emissions in the LCA framework:

END OF LIFE STAGE

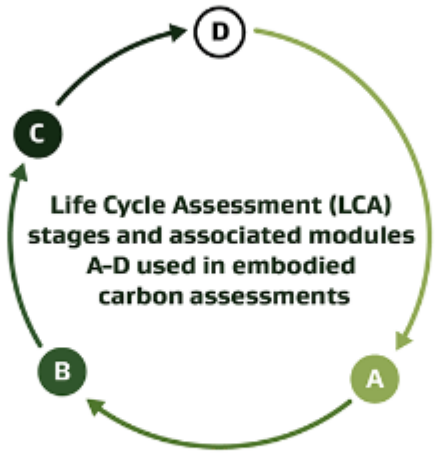
- C1 Deconstruction and demolition
- C2 Transport to disposal facility
- C3 Waste processing for reuse, recovery, or recycling
- C4 Disposal

USE STAGE

- B1 Use
- B2 Maintenance
- B3 Repair
- B4 Replacement
- B5 Refurbishment

BEYOND THE SYSTEM BOUNDARY

- D Reuse-Recovery-Recycling-potential



Life Cycle Assessment (LCA) stages and associated modules A–D used in embodied carbon assessments

BUILDING OPERATIONS

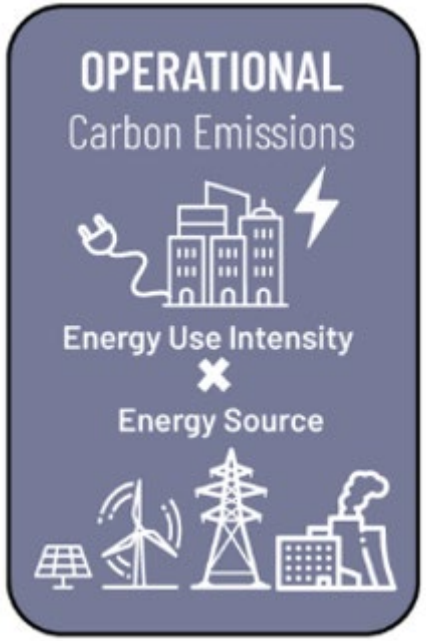
- B6 Operational Energy
- B7 Operational Water

PRODUCT STAGE

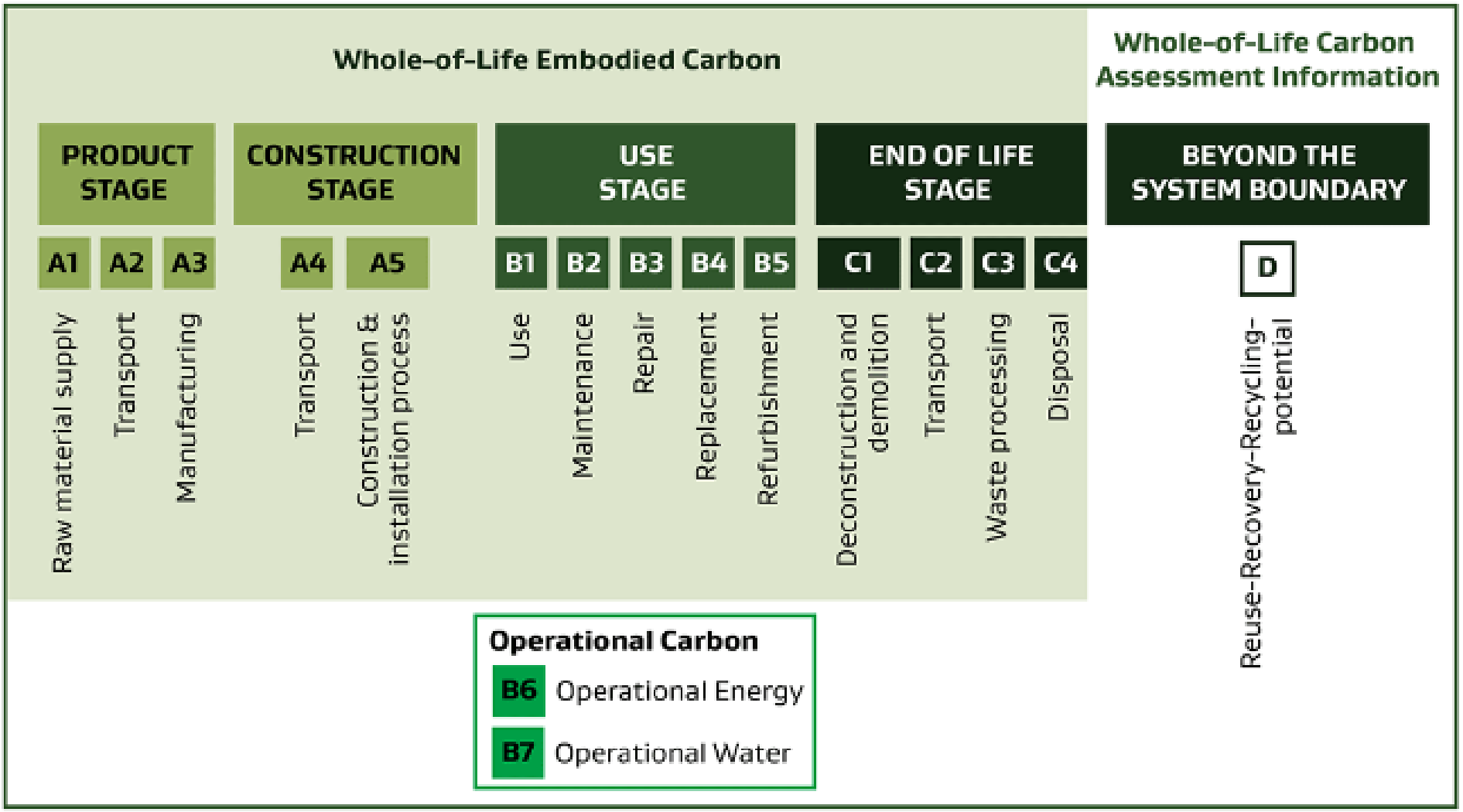
- A1 Raw material extraction and supply
- A2 Transport to manufacturing plant
- A3 Manufacturing and fabrication

CONSTRUCTION STAGE

- A4 Transport to project site
- A5 Construction and installation process

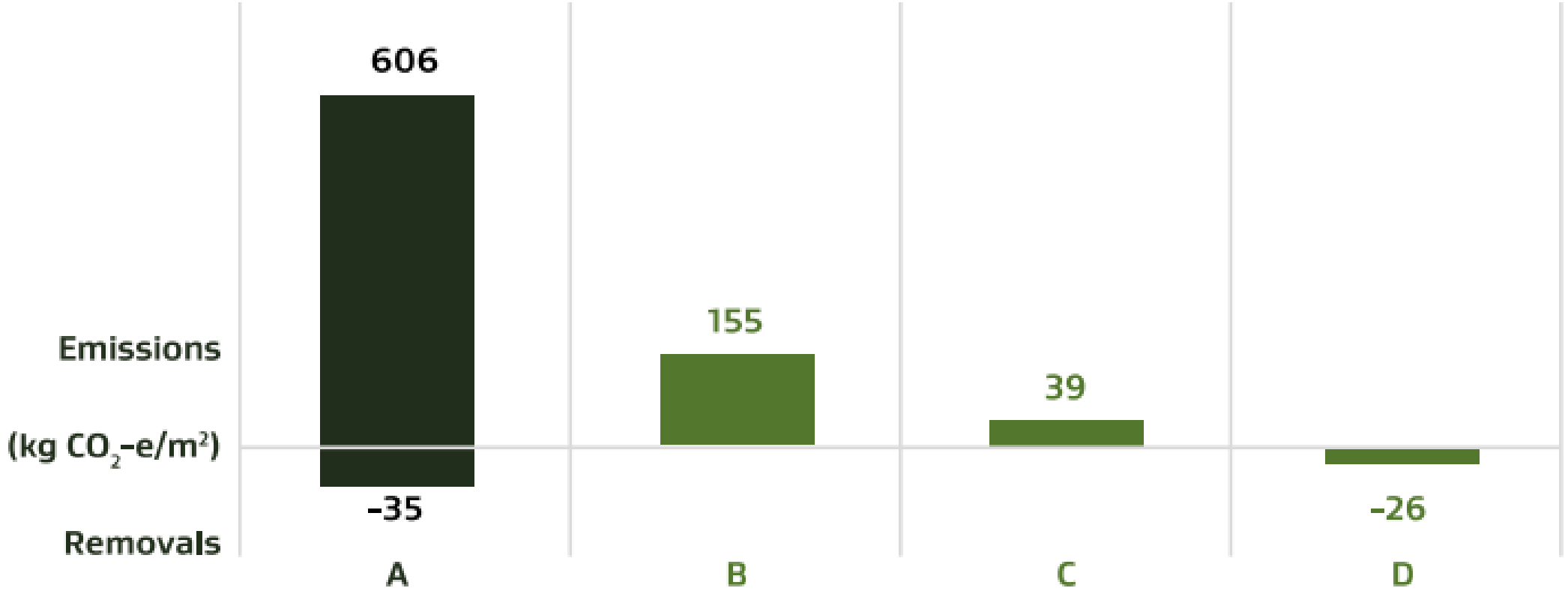


LCA for buildings – defined in standards:



Embodied carbon of a New Zealand school building:

Broken down by life cycle stages (A-B-C-D)



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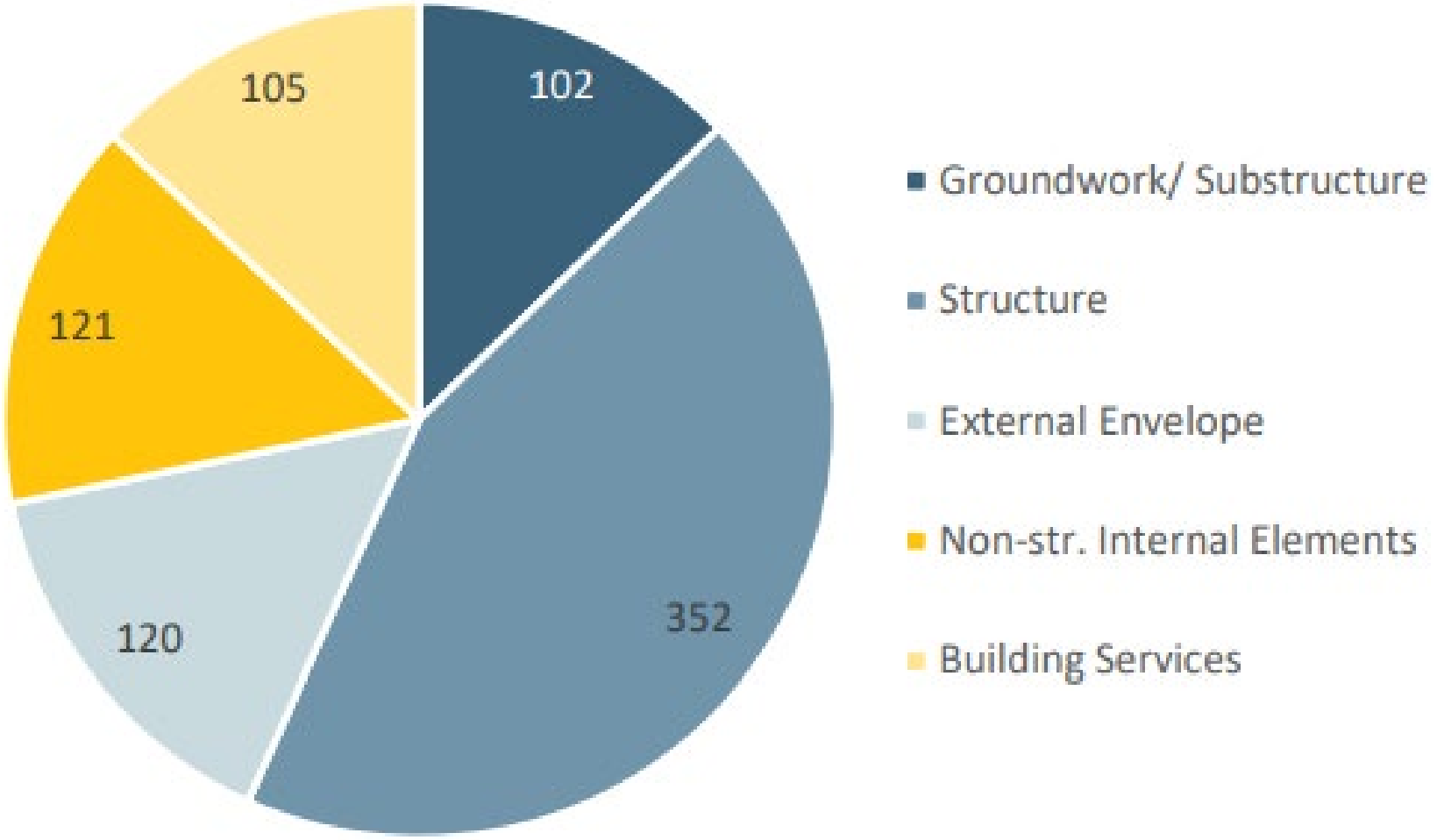


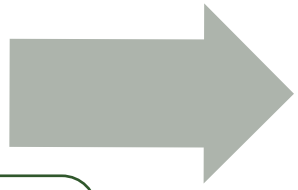
Measuring embodied emissions and reporting breakdowns identifies hotspots

The role of Standards

ISO and **EN** (European) suites of standards define the LCA framework for buildings and construction:

Building level standard

- EN 15978 & ISO 21931-1
- Carbon footprint of a building



Product level standard

- EN 15804 & ISO 21930
- Carbon footprint of a product/material

ISO structure

ISO/TC 59/SC 17: Sustainability in buildings and civil engineering works

13	2	28	24
Published ISO standards *	ISO standards under development *	Participating members	Observing members

- Standardization in the field of sustainability of new and existing construction works
- Environmental, economic, and social aspects of sustainability and circular economy are included as appropriate
- **Includes rules for assessing the life cycle impacts of construction products and buildings** (ISO 21931-1 & ISO 21930)

Adapting for the local context

Best ways to reduce emissions will depend on local factors (New Caledonia)

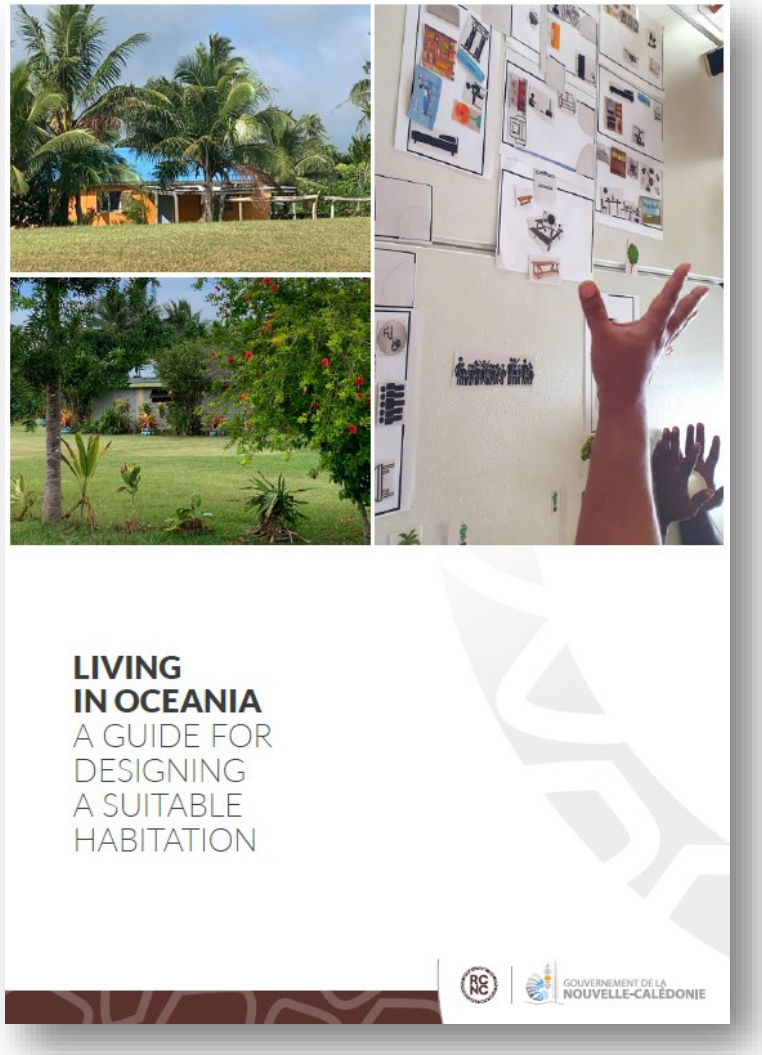
Bio-sourced materials

Feuilles de pandanus.

Rammed earth (earthen concrete).

Coconut leaves

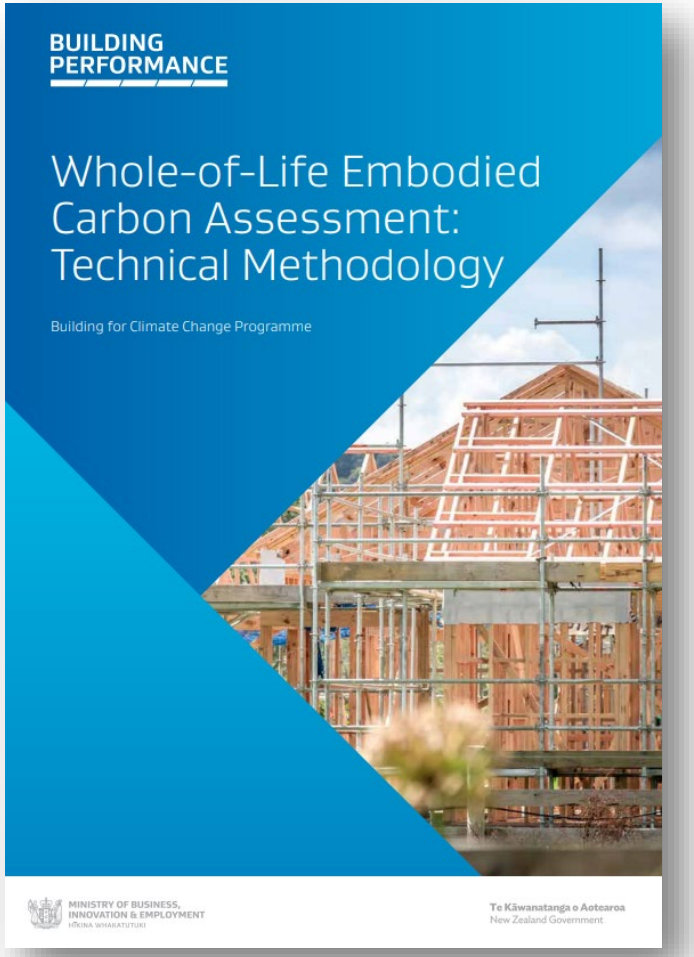
Bamboo.



Standards as a basis for national methodologies

New Zealand Embodied Carbon Technical Methodology (2022)

- Specific for New Zealand buildings
- Builds on rules set out in international standards
- Drives greater consistency and accessibility of embodied carbon assessments
- Basis of proposed future regulation of embodied emissions in the NZ Building Code



Key Takeaways

- Embodied emissions are hard to see and quantify

Measure → Manage → Reduce

- International standards set out rules to support consistent measurement of embodied carbon

- These can be used as a basis for national policies which incorporate the local context on how to reduce emissions

Questions