JUNE 2024

Australian Sustainable Built Environment Council | **ASBEC**

EMBODIED CARBON EMISSIONS
IN AUSTRALIA'S BUILT ENVIRONMENT

ISSUES PAPER
PRODUCED BY:

asbec AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

NABERS

Australian Government
Department of Climate Change, Energy, the Environment and Water

thinkstep anz

Mansfield ADVISORY

WHO WE ARE

The Australian Sustainable Built Environment Council (ASBEC) is a collaborative forum of peak bodies in the built environment, focused on sustainable, productive and resilient buildings, communities and cities.

asbec
AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

THE PROJECT

Figure 1. GBCA and thinkstep-anz (2021): Embodied Carbon and Embodied Energy in Australia's Buildings.

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Australian Government
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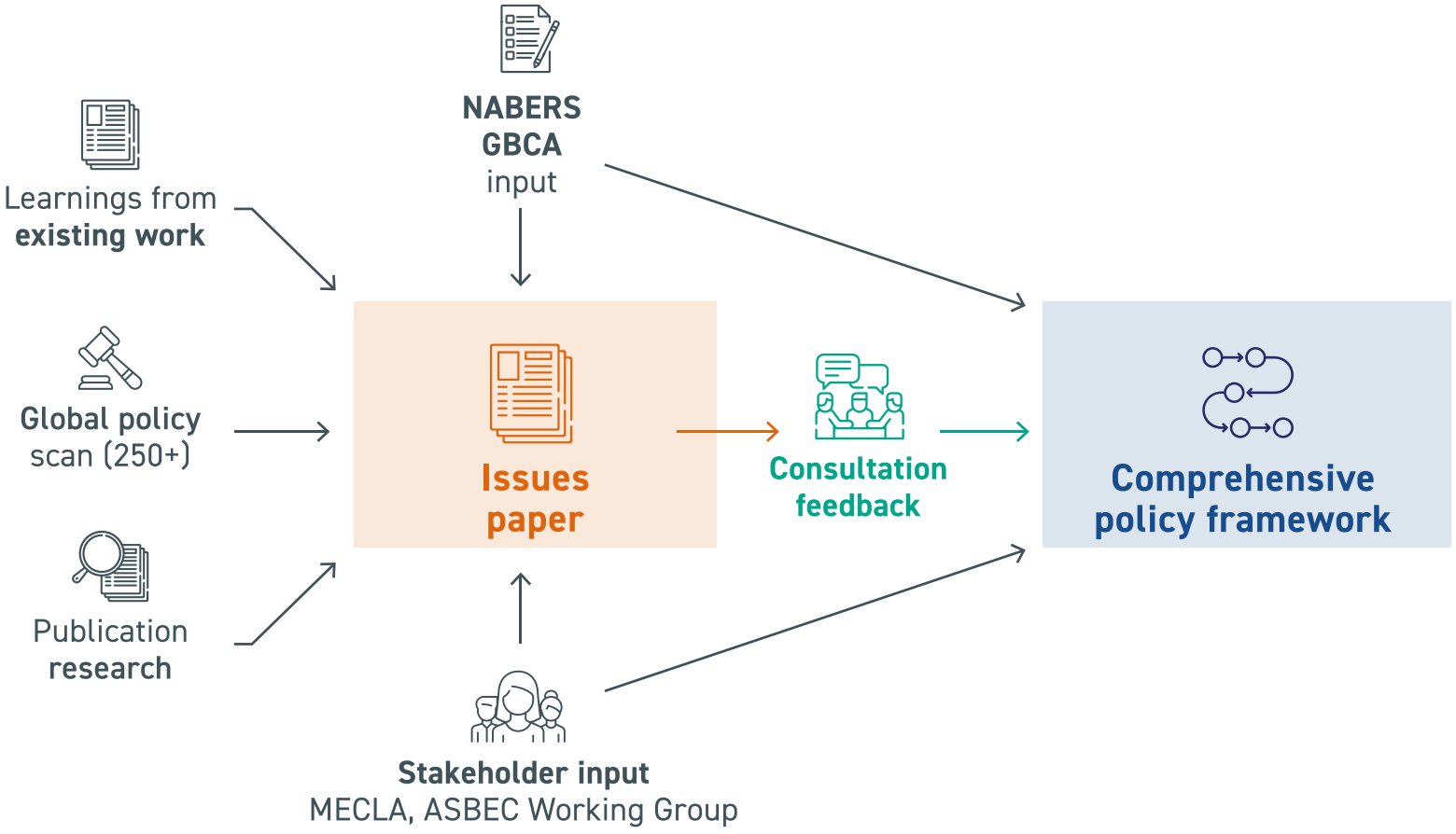
Scaling and deepening **NABERS' work**

Supporting the **supply chain** to deliver better products and services

Supporting the **value chain** to deliver bette design and construction outcomes

Adapted for the **needs of different segments and sectors**


NABERS
GBCA
input
Learnings from
existing work
Global policy
scan (250+)
Publication
research
Issues
paper
Consultation
feedback
Comprehensive
policy framework
Stakeholder input
MECLA, ASBEC Working Group

THE SEVEN DECARBONISATION DILEMMAS

1. DIRECTION

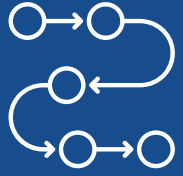
2. DEVELOP

3. DISCLOSE

4. DEMAND

5. DESIGN

6. DETAIL

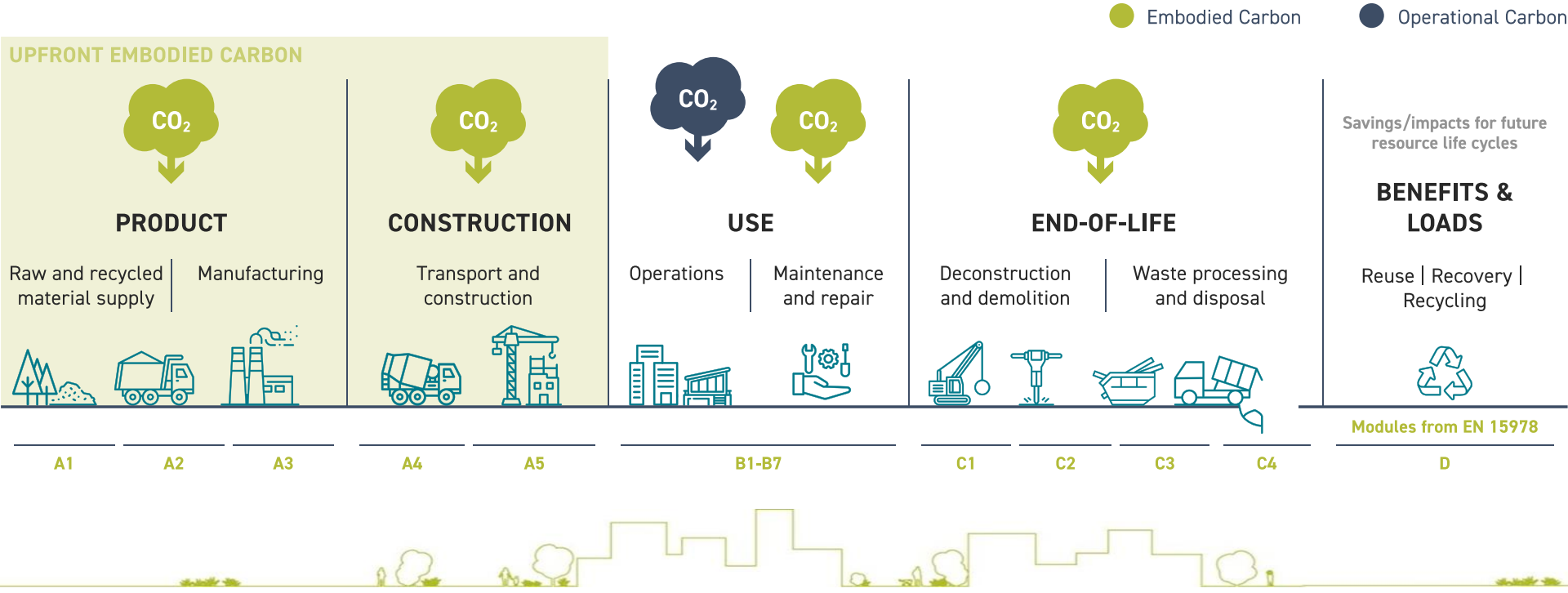


7. DELIVER

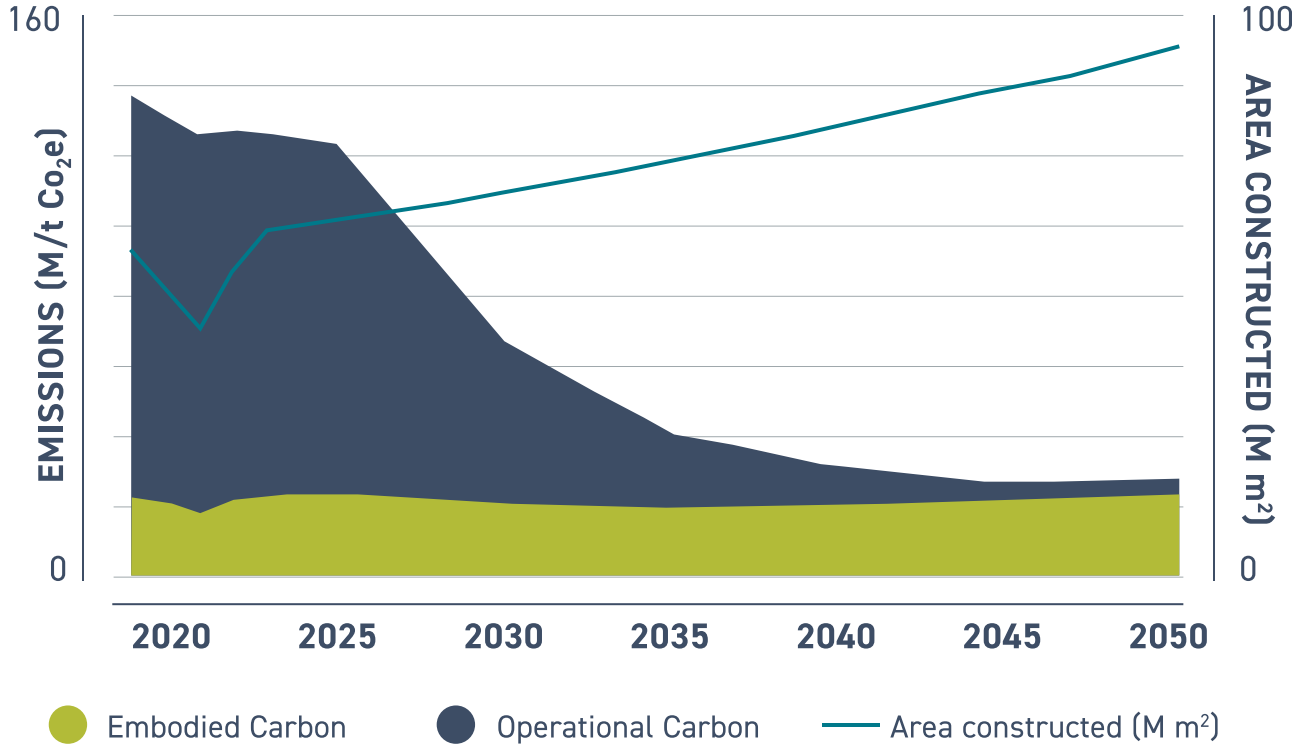
CARBON IN THE BUILT ENVIRONMENT

CARBON IN THE ASSET LIFECYCLE

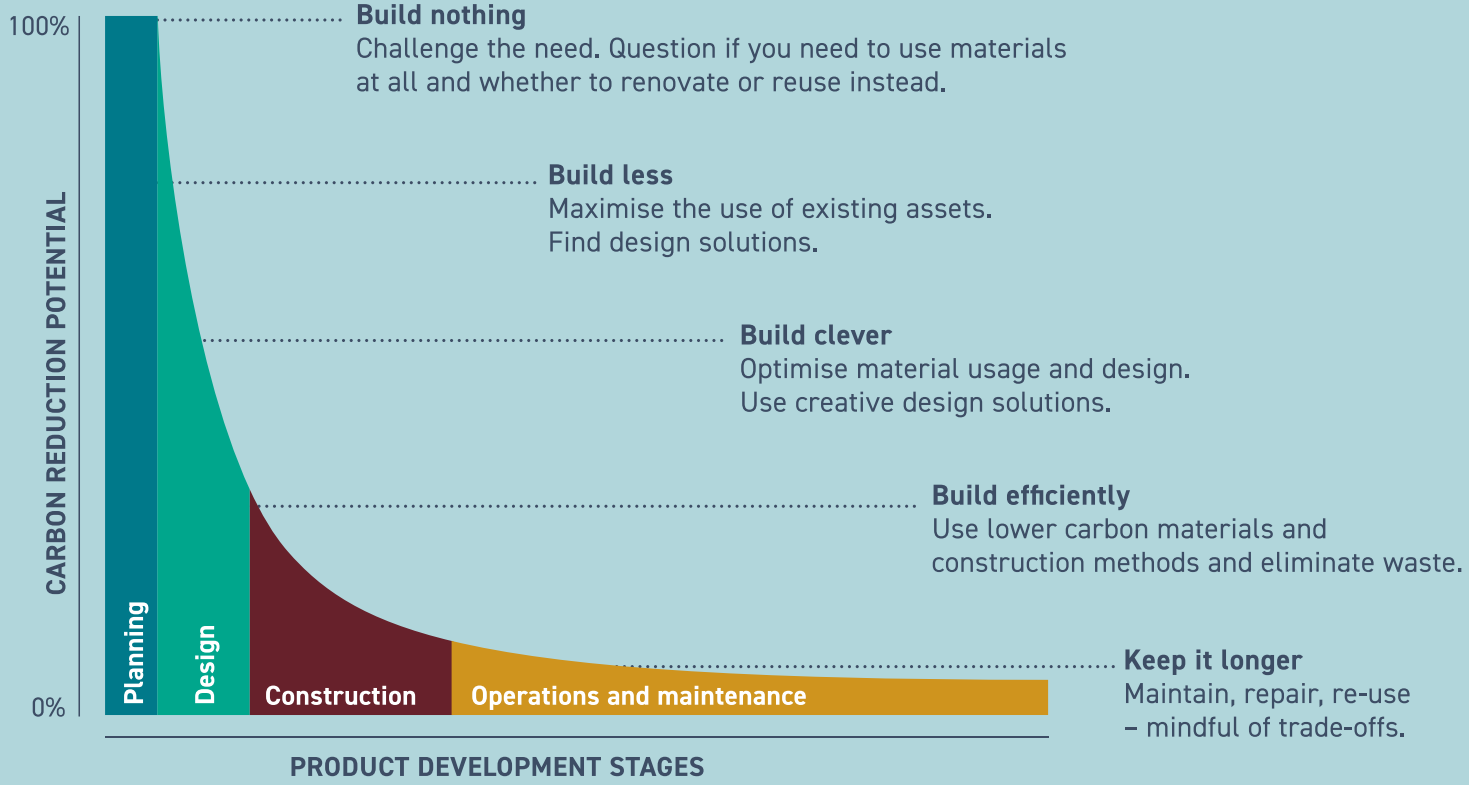
The focus of the Issues Paper is **upfront embodied carbon (A1-A5).**
This is aligned with the scope of the NABERS Embodied Carbon measurement methodology.



BUILDING EMISSIONS IN AUSTRALIA



DECARBONISATION HIERARCHY




RESEARCH

RESEARCH METHOD

- → Not reinventing the wheel
- → 2022-2023 NABERS and Infrastructure Australia industry consultation
- → *Every Building Counts* as a launch pad
- → Desktop research – papers, policies, action plans, etc

Learnings from **existing work**

Global policy scan (250+)

SHAPED BY STAKEHOLDERS

- → Alignment with NABERS Embodied Carbon
- → Strategic input from GBCA
- → Direction from DCCEEW (Commonwealth)
- → MECLA webinar & survey March 2024
- → ASBEC Working Group April & May 2024

NABERS
GBCA

Stakeholder input
MECLA, ASBEC Working Group

250

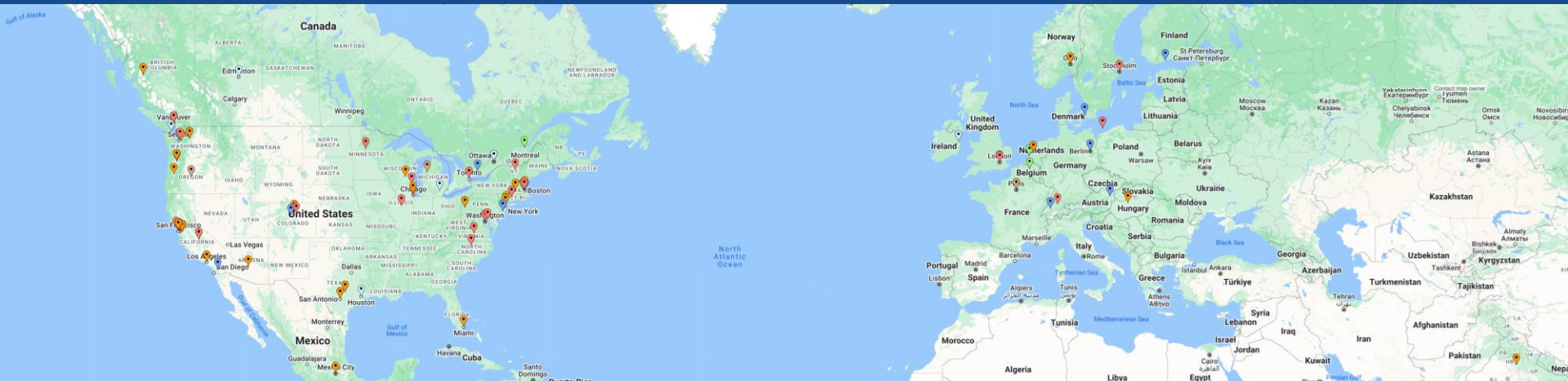
250 national, state and city regulations, policies and action plans from over 20 countries, including 104 regulatory instruments were reviewed.

34

34 sources were researched using a defined parameter set to extract critical information to inform Australia's directions for government and industry.

30

30 leading policy sources from 11 countries were analysed.



INTERNATIONAL POLICY OVERVIEW

We analysed 30 international policies and plans from 11 leading countries. In the table below we have summarised them by their source country. Details of policies analysed appear in the Annex.

Where the information has not been provided or we have been unable to source it, we have shown this with a dash.

Country	Buildings / Infrastructure Requirements	Products Requirements	EPDs	Upfront A1 – A5	Use Phase Embodied B1 – B5	Operational B6	End of Life C1 – C4 (D where noted)
Canada	Major construction projects 30% reduction in embodied carbon.	Cement, ready-mix concrete, precast and prestressed concrete elements and concrete masonry block.	Y	Y	N	N	Y
China	Reduce operational emissions, report embodied carbon. Residential and public buildings.		–	Y	Y	Y	Y
Denmark	New buildings above 1000 m² must comply with the limit value of 12 kg CO_2-equivalent/m²/year.		Y	A1 – A3	B4	Y	C3, C4, D
Finland	Expected reporting and future limit values for buildings. Not yet clear.	Will be declared.	–	–	–	–	–
France	Embodied carbon is capped for new buildings and building extensions. Includes carbon storage. Expressed as kg CO_2eq/m². The entire life cycle impact for the building is calculated for information purposes.		–	Y	Y	N for cap calc Y for info only	C&D
Ireland	Carbon Management Systems for large infrastructure projects with whole lifecycle GHG assessment.	Longer-life and lower-carbon cement blends in public contracts, minimum clinker replacement of 30%. Use EPDs when directly procuring cement or concrete products.	Y concrete only	Y	Y	Y	Y
Netherlands	Measure, reduce and target (reducing the embodied carbon of major construction projects measured by 'MPG'). All new residential and office buildings over 100 m².	Suppliers of steel, iron and concrete to implement sustainable extraction and production policies. Recommends bio-based materials for reducing embodied carbon.	Y	Y	Y	N	C&D
Singapore	Green Mark rating tool incentivises embodied carbon measurement and reduction. Heavy focus on energy efficiency. Mandate for new public sector buildings over 5,000 m² air-conditioned area to use Green Mark certification.	Concrete, glass and steel.	–	Y	–	Y	–

TABLE CONTINUES ON NEXT PAGE

LESSONS FROM INTERNATIONAL POLICY PAPERS AND RESEARCH

We analysed the following sources of embodied carbon information to understand potential policy levers against a matrix of research parameters:

- National, state, territory and local government policy and papers
- International government papers
- Australian and international rating tools
- Australian and international industry papers and academic reports

The insights and takeaway messages from these sources are captured in the table below. The detailed research findings are in the **Annex**.

Topic	Insights	Takeaway
Nature of lever	→ Mostly voluntary guidance, providing recommendations rather than policy mandates.	Levers that become mandatory as jurisdictions /sectors mature would allow those developing to catch up while setting high expectations for those which are already performing well.
Composition of lever	→ Most common mechanism is reporting. → Several different types of baselines proposed. → Targets often based on lessons learnt.	Australia will need to create its unique response to addressing embodied carbon based on context. We can learn from the content of many international sources to create the right mix.
Time period of lever	→ Time-based targets and model scenarios at different points in the future – commonly 2025, 2030 and 2050.	Aligning Australia's embodied carbon policy with the time periods of policies of other governments, as well as Australia's net zero by 2050 target, would foster partnership and show commitment. Implementing some national action by 2025 will demonstrate alignment.
Applicable construction type	→ Some apply high-level guidance to all buildings, or all buildings applying for certification. → Often focus on larger buildings, such as industrial buildings, publicly-owned buildings and buildings with a minimum gross floor area (commonly more than 1,000 m^2, though can be up to 100,000 ft^2 or 100,000 m^2.) → Rather than construction types, some narrow their focus to building materials and products.	Australia is following the European approach and is moving to address emissions at an asset level.
Performance requirements/ scale	→ Most do not suggest specific minimum performance requirements. → Some align measures of success with existing targets as defined by the Paris Agreement and longer-term national targets.	By aligning embodied carbon policy with international targets such as those outlined in the Paris Agreement, Australia would also be aligned with policy and guidance from other countries. This would need to be balanced with addressing local emission-intensive industry challenges.
Scope of life cycle modules	→ Life cycle modules included vary. → Most focus on upfront carbon emissions. → End of life carbon and beyond the life cycle modules are not included as much as up front or use stage embodied carbon.	There is a global understanding that embodied carbon policy should include modules A1 – A3 (products) at a minimum. Many include A4 and A5 when focused on the asset level.

TABLE CONTINUES ON NEXT PAGE

A SNAPSHOT OF WORK UNDERWAY NOW

The following efforts of governments to lower embodied carbon in infrastructure and buildings are underway (as of May 2024).

THE AUSTRALIAN GOVERNMENT

The Department of Climate Change, Energy, the Environment and Water (DCCEEW) is investing in projects to explore upfront carbon:

- partnering with multiple departments to develop sector decarbonisation plans, including for the built environment and transport
- updating the Trajectory for Low Energy Buildings and Addendum
- the NABERS Embodied Carbon tool
- this ASBEC project to provide a Comprehensive Policy Framework to address upfront carbon emissions at all levels of government
- funding Australian Institute of Architects designing for embodied carbon curriculum
- funding Infrastructure Australia's Embodied Carbon Projections for Australian Infrastructure and Buildings
- release of the Net Zero in Government Operations Strategy
- release of the Environmentally Sustainable Procurement Policy
- developing a National Circular Economy Framework.

The Department of Infrastructure, Transport, Regional Development, Communications and the Arts is supporting the decarbonisation of transport infrastructure. Among others, they support the Infrastructure and Transport Ministers' Meeting to:

- develop a nationally consistent approach to measure embodied carbon for infrastructure, which will support industry action to reduce emissions and facilitate future benchmarking and target setting (led by Infrastructure NSW)
- develop a nationally consistent approach to valuing carbon for economic appraisal and policy evaluation (led by Infrastructure Australia)
- explore policy levers available to governments to reduce embodied emissions, including principles for identifying opportunities to harmonise national policies to reduce embodied emissions, as well as informing governments' selection of these policies (led by Transport for NSW with the Australian Government).

The Department of Industry, Science and Resources is:

- partnering with DCCEEW to develop an emissions reduction sector plan for the built environment
- supporting the Building Ministers' Meeting on a strategy to 'discuss the measurement of indirect and embodied carbon emissions generated by the building sector, with a view to determine whether to pursue a nationally consistent approach'.

ANNEX to ASBEC Issues Paper: EMBODIED CARBON EMISSIONS IN AUSTRALIA'S BUILT ENVIRONMENT

This document forms an annex to the Embodied Carbon Issues Paper released by ASBEC on 14 June 2024. It provides the research background materials that informed the paper's development.

The following information in contained in this Annex:

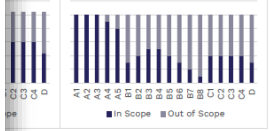
1. List of common issues identified in stakeholder engagements over 2022-2024
   a. Summary slides presented in MECLA webinar
   b. Longer list of issues considered
2. Summary of research papers, including:
   a. List of primary sources
   b. Summary of research findings across all sources, sorted by research parameter
   c. Full reference list for papers
3. International policy sources
   a. List of government policies and action plans investigated
   b. Sources chosen for deeper analysis (highlighted in the table)
4. Supporting actions from government
   a. Sample commitments from international jurisdictions
   b. Sorted into type of action: research, training, procurement, legislation, demonstration, guidance, reporting, plan, media, engagement, incentives, other
5. Condensed reference list for primary research sources

1. Govt projects as leaders
2. Govt lease reqts
3. Measure, disclose, targets
4. Signal then mandate in NCC
5. Govt procurement mandates
6. Funding mandates
7. Planning incentives
8. Consistent reporting reqts
9. Support low carbon projects
10. Link to net zero targets

THEME 02
Measure

Need for a consistent, comparable **system of measurement**

Coverage of lifecycle modules across examined documents (Australia only)



g government actions

DECARBONISATION DILEMMAS

THE SEVEN DECARBONISATION DILEMMAS

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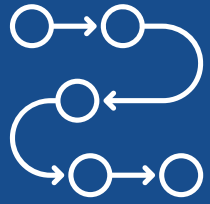


7. DELIVER

HELP US SOLVE OUR SEVEN DECARBONISATION DILEMMAS

There are 45 potential solutions presented in the Issues Paper

- → We need your input – help us to recommend transformative policy solutions
- → We need to prioritise the options

Tell us what we have missed

Help us to understand

- → What solutions have the greatest impact?
- → What solutions do we have the best ability to implement?
- → Within what timeframe could these solutions be achieved?

1. DIRECTION

Bringing lower-carbon construction to the mainstream

INTENT

- → Guiding industry towards decarbonisation
- → Using the power of regulation to lift the bar
- → Ensuring carbon-consciousness for all construction
- → Using systems of measurement to verify outcomes
- → Signalling that high-carbon assets are unacceptable
- → Signalling that high-carbon products require transition
- → Collaborating for success

POSSIBLE SOLUTIONS

We need your input!

1. DIRECTION

1.1 The Australian Building Codes Board (ABCB) should signal intent

1.2 Include upfront embodied carbon requirements in NCC

1.3 Use planning policies to mandate and incentivise

1.4 Ensure regulation rules out greenwash

1.5 Support local government

1.6 Collaborate for success

2. DEVELOP

Building industry capacity to decarbonise

INTENT

- A skilled and growing workforce
- Educational resources and platforms
- Support for developing industry capacity to deliver

2. DEVELOP

POSSIBLE SOLUTIONS

2.1 Start developing capacity

2.2 Fund free learning content

2.3 Include the entire value chain

2.4 Adapt existing content

2.5 Train practitioners to develop EPDs

3. DISCLOSE

Methods, data and reporting

INTENT

- → Consistent measurement framework
- → Credible and comparable data for products and materials
- → Reporting that supports progress and decision making
- → Understanding trade-offs

3. DISCLOSE

POSSIBLE SOLUTIONS

3.1 Develop standard national methods for reporting

3.2 Support EPD development

3.3 Fund and host a national database for approved product carbon footprint data

3.4 Standardise bills of quantities

4. DEMAND

Clarity, consistency and confidence

INTENT

- Clear signals to drive segment (e.g. commercial, residential, infrastructure) and supply chain response
- Consistent demand which builds the business case for change
- Confidence to specify and use lower-carbon products

4. DEMAND

POSSIBLE SOLUTIONS

4.1 Share risk and opportunity

4.2 Establish a model for specifying low-carbon assets and products on projects

4.3 Ensure specified products are installed on site

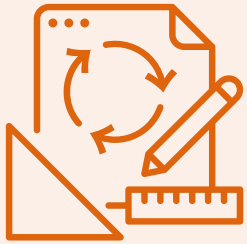
4.4 Set up materials carbon scheme for detached residential

4.5 Explore the emerging MECLA pledge

4.6 Use the C40 Cities Clean Construction Commitments

4.7 Set up small-scale incentive schemes

4.8 Develop financial and fiscal incentives to support transition



5. DESIGN

The best decisions from concept to completion

INTENT

- → Apply the full decarbonisation hierarchy
- → Start at concept. Question everything
- → Whole-design process through project
- → Optimisation of carbon impacts
- → Carbon-conscious optioneering

5. DESIGN

POSSIBLE SOLUTIONS

5.1 Start early

5.2 Design solutions before product choices

5.3 Build less, build smarter

5.4 Re-model value engineering

5.5 Incentivise new solutions

6. DETAIL

The best product options

INTENT

- Best product options are known, trusted and available
- Industry is working to create better options
  - Decarbonise manufacturing
  - New lower-carbon product offerings
  - More reused products and recycled content
  - Prefabrication and modularisation
  - Lower-carbon construction methods
  - Designing out waste
- Standards support adoption of new products
- Products have third party-verified carbon data

6. DETAIL

POSSIBLE SOLUTIONS

6.1 Make NABERS requirements for product carbon data the norm

6.2 Support EPD development

6.3 Support startups and SMEs with product compliance

6.4 Support products from hard-to-abate industries to transition

6.5 Proof-test new products at larger scale

6.6 Continue electrification of product manufacturing with renewable energy

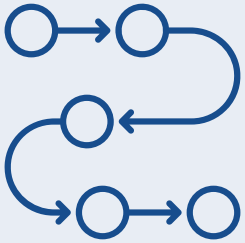
6.7 Investigate prefabrication and modularisation

6.8 Increase fossil fuel-free construction

6.9 Increase product stewardship

6.10 Speed-up updating of performance-based requirements

6.11 Collaborate early across the whole value chain



7. DELIVER

Delivering lower-carbon assets

INTENT

- Lower-carbon projects planned and delivered
- Project processes support lower-carbon outcomes
- Contribute through pilots and developing case studies
- Government and industry both responsible

7. DELIVER

POSSIBLE SOLUTIONS

7.1 Make lower-carbon construction more visible

7.2 Mandate to expect and reward decarbonisation

7.3 Apply the new NABERS Embodied Carbon tool for buildings

7.4 Create a library of case studies

7.5 Consider adoption of carbon value


What's next?

SURVEY: YOUR FEEDBACK MATTERS

- What is missing from the issues list that is critical?
- What additional best practice policy or action plan content should we consider?
- What interventions will enable your industry sector to transition fastest?
- Your opinion on the suggested dilemmas and what needs to be done
- Which solutions have the greatest impact or ability to implement and within what timeframe?

Help us solve our decarbonisation dilemmas!

Share your insights until 26 July 2024

asbec
AUSTRALIAN SUSTAINABLE BUILT ENVIRONMENT COUNCIL

Thank you

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