

INCA CONSULTING

EVALUATION OF THE *LOW EMISSIONS BUILDING MATERIALS (LEBM) PROGRAM*

Final Report

embodied carbon low clients industry
set organisation use Develop
standards measuring materials working
products updating LEBM project new
EPDs design building carbon recognised

Prepared for:
Science, Economics and Insights Division
NSW Department of Planning and Environment

23 June 2023

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Cover image

Word Cloud generated from the project's survey of MECLA members in relation to measures undertaken by the respondents' own organisations to increase the use of LEBMs.

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LIST OF ACRONYMS

CO ₂ -e	Carbon dioxide equivalent
DPE	NSW Department of Planning and Environment
EPA	Environment Protection Authority
EPD	Environmental Product Declarations
GBCA	Green Building Council of Australia
GREP	Government Resource Efficiency Policy
INSW	Infrastructure New South Wales
ISCA	Infrastructure Sustainability Council
KEQ	Key Evaluation Question
LEBM	Low Emissions Building Materials
LESP	Low Emissions Specification Program
MECLA	Materials and Embodied Carbon Leaders' Alliance
NABERS	National Australian Built Environment Rating System
NSW	New South Wales
OECC	Office of Energy and Climate Change, NSW Treasury
PCG	Program Control Group
PEP	Protection of the Environment Policy
PLG	Program Leadership Group
SEPP	State Environmental Planning Policy
TfNSW	Transport for New South Wales

EXECUTIVE SUMMARY

Introduction

The manufacture of common building materials such as concrete, steel, glass, aluminium, bricks, tiles, and asphalt are highly emissions intensive. In NSW, the production and use of these materials are responsible for 13 million tonnes of carbon dioxide equivalent or 10% of NSW's annual total emissions.

Through the Low Emissions Building Materials (LEBM) Program, the NSW Government sought to influence large companies and their suppliers as well as NSW Government entities, to support the market transition to LEBM. The overall goal of the program was to stimulate demand for low emissions materials by partnering with industry, focusing mainly on the demand side of the market by enhancing and incentivising voluntary adoption of emission intensity targets for construction materials.

The LEBM Program was funded for two years with a budget of \$800,000 from the Climate Change Fund. A delayed start meant the program effectively operated for 18 months, from January 2021 to June 2022. The focus areas of the program were to:

- Understand key stakeholders and interventions to bring about voluntary adoption of low emission materials within the building and construction sectors.
- Collaborate and support existing standard providers for widespread adoption of agreed low emission standards within the sector.
- Undertake research to support the adoption of selected LEBM
- Create a clear value proposition for the adoption of standards associated with low emission building materials.
- Raise the awareness of design, procurement and finance professionals of the opportunities to use low emission materials.
- Support NSW Government entities to use LEBMs and use government purchasing power to drive demand for green building products and shift market norms.
- Develop understanding, skills and expertise in NSW to meet growing global demand for LEBMs.

The key activities under the program were:

- Establishment and support of the Materials and Embodied Carbon Leaders' Alliance (MECLA), an industry-led, voluntary network bringing industry, researchers, government and other stakeholders together to drive reductions in embodied carbon in the building and construction industry.

- Engagement with government, industry and standards organisations to drive reductions in embodied carbon emissions in the public sector.
- Support for development of a digital materials calculator by the Infrastructure Sustainability Council of Australia (ISCA).

Evaluation approach and methods

The evaluation was commissioned by DPE to provide an assessment of program outcomes and to elicit a range of perspectives on the NSW Government’s LEBM Program, in part to inform potential strategies to reduce embodied carbon emissions, and ultimately achieve net zero emissions by 2050. The evaluation sought answers to six key evaluation questions, with eight sub-questions.

The evaluation methods included the following:

- Identification of a purposive sample of 50 stakeholders, including program owners, MECLA leadership, MECLA members, and representatives of relevant NSW Government agencies and standards/ratings organisations.
- In-depth interviews with 26 of the above stakeholders, undertaken via MS Teams.
- A (non-representative) online survey of the MECLA membership, which elicited 39 responses (approx. 40% response rate).
- Analysis and reporting, including refinement of drafts using program stakeholder and peer review feedback.

Key findings

KEQ 1: How did program management arrangements support effective delivery?	
1a. How well did the governance arrangements provide oversight and direction?	Finding 1 The program governance arrangements were transparent, fit-for-purpose and supported implementation.
1b. How well were the risks monitored and managed over the 2-year program?	Finding 2 Program risks were appropriately, systematically and transparently managed.
KEQ 2: To what extent has the program been delivered on time and budget?	
2a. Was the program delivered on time? What were the reasons for this?	Finding 3 Two of the three program milestones were delivered on time. The third milestone, relating to embedding interventions into standards and certification schemes, has progressed more slowly than anticipated, due to complexities and dependencies that



	<p>require a longer timeframe to resolve. However, progress has been made in relation to ratings schemes, with GBCA signalling their intention to incorporate embodied carbon into their Green Star rating once the NABERS embodied carbon measurement is finalised, and ISCA progressing its digital materials calculator initiative.</p> <p>Supporting factors for timely delivery included contracting the key deliverable of MECLA establishment and management to a consortium of external organisations (and individuals in those organisations) that were known for their work in the field, were highly driven and well-connected in industry. By doing so, the Government was able to achieve its objective by leveraging the strong existing networks of the external organisations. Another factor that supported timely implementation was the program management practices utilised as part of program governance, including monthly board meetings, status reporting and risk management logs.</p>
<p>2b. Was the program delivered on budget? What were the reasons for this?</p>	<p>Finding 4</p> <p>The program was delivered within the specified budget (in fact with a surplus). Factors that supported delivery within budget included regular reporting and monitoring of program expenses, as well as fixed budgets with the external contractors that were responsible for the key deliverables.</p> <p>Finding 5</p> <p>The LEBM Program delivered important outcomes for a modest Government investment.</p>

KEQ 3: What contribution has the program made to the achievement of net zero emissions by 2050?

<p>3a. What barriers were encountered for increasing supplier/consumer demands of priority LEBMs into the NSW market? What resolution has been done to resolve this?</p>	<p>Finding 6</p> <p>The main perceived barriers to growing the market for LEBMs are lack of agreed standards and benchmarking, lack of Government imperatives, the cost of transitioning to LEBMs for some areas of manufacturing, a persistent lack of understanding about embodied carbon and LEBMs in some areas of the industry, and insufficient policy alignment.</p>
<p>3b. How likely will the program achieve its target to save 1 Mt CO₂-e annually by 2030?</p>	<p>Finding 7</p> <p>There is insufficient evidence from the program to know how closely the identified trajectory is being followed forecast and whether the desired emissions savings will be achieved by 2030. Baseline modelling indicated that the target was achievable and identified trajectories based on different scenarios. But it should be noted that emissions reductions were not expected to be realised during the life of the program. The focus of the LEBM</p>



	<p>Program has been to lay the foundations and undertake the preparatory work of capacity building and energising industry in preparation for the materials based interventions to come.</p> <p>A further obstacle is that a clear methodology for the measuring CO₂-e savings has not yet been realised.</p>
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KEQ 4: What were the unanticipated outcomes of the program, both positive and negative?

Finding 8

MECLA's success in engaging industry was much greater than anticipated. Membership grew to more than double of that anticipated, and represented a broad range of interests and stakeholder groups not just in NSW but across Australia. Members were also more collaborative than anticipated. Impacts of this collaboration include development of knowledge and understanding, cooperation, collaborative development of resources and events, instances of collaborations that extended beyond the MECLA environment, and an engagement and energising of members which was taken back to members' own organisations.

Finding 9

MECLA has helped facilitate cross-organisational and cross-sectoral relationships that otherwise may not have happened. Participation in MECLA activities helped to facilitate important connections that may have been more difficult to establish outside the network.

KEQ 5: To what extent did the program promote awareness to support development and research of LEBMs including embodied carbon related innovative tools and resources to target stakeholders? How did these support their needs and change in behaviour?

Finding 10

Promotion of awareness about embodied carbon and LEBMs was a strong outcome of the program.

Finding 11

MECLA has amplified the discussion around LEBMs on both the demand and supply sides. These discussions have also been helpful in debunking myths.

KEQ 6: How did the program ensure NSW leads by example?

6a. How did the program support development of embodied carbon policies and programs within NSW Government?

6b. How did the program support NSW Government agencies

Finding 12

While the program has not directly changed NSW Government procurement policies and practices (yet), it has supported the drive toward these policies and practices by:

- providing a clear industry signal of its readiness to address the problem of embodied carbon, despite the potential cost this might represent to industry

<p>drive for procurement of LEBMs?</p>	<ul style="list-style-type: none"> • educating and generating momentum in the industry for addressing the problem of embodied carbon emissions in construction • providing a forum to promote greater understanding between Government and industry, test ideas and foster strategic relationships. <p>Finding 13</p> <p>NSW is widely seen by industry and other stakeholders (e.g. academics) as providing national leadership in working to reduce emissions from embodied carbon.</p>
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Recommendations

The following recommendations have arisen out of the learnings from the program and offer some guidance for further work, including the ongoing pursuit of the ultimate outcomes of the LEBM Program. Justification of each recommendation is provided in Section 6 of the report.

1. The NSW Government should consider the contracted delivery model, demonstrated by the arrangements for the MECLA deliverable, where appropriate, and where the success of that deliverable depends on broad and deep reach into industry, and where external contractors might be better placed than the Government to deliver outcomes.
2. The NSW Government should support MECLA to continue to pursue and develop a national agenda and engage governments in other jurisdictions.
3. The NSW Government should consider how best to continue to support MECLA as it moves towards a self-sustaining model, including consideration of ongoing funding as well as opportunities at a jurisdictional level for assisting MECLA to broaden its support (including financial support) nationally.
4. Although the LEBM Program has finished, the longer-term outcomes have not yet been achieved. The NSW Government should continue to work toward achieving the LEBM Program's longer-term outcomes, particularly in relation to development and adoption of standards and changing NSW Government procurement policies. A process for monitoring the specification of LEBMs in procurement policies should be developed.
5. The NSW Government should continue to clarify methods and processes for monitoring CO₂-e savings.

1 PROGRAM OVERVIEW

1.1 Context and background to the program

Background

According to the World Green Building Council, buildings are responsible for 39% of global carbon emissions. This includes 28% generated during the operational phase to heat, cool and power them, and the remaining 11% from materials and construction (known as embodied carbon).¹ In Australia, the figure is even higher, with embodied carbon emissions accounting for 16% of our emissions burden.² Significant efforts have been made over the past few years focusing on reducing operational emissions through energy efficient design, smart building technology and promotion of behavioural change. As operational emissions decrease, embodied carbon emissions are destined to become the dominant source of greenhouse gas emissions. In fact, the Green Building Council of Australia (GBCA) forecasts that without intervention, embodied carbon emissions will be responsible for 85% of the built environment's carbon emissions by 2050³.

The manufacture of common building materials such as concrete, steel, glass, aluminium, bricks, tiles, and asphalt are highly emissions intensive. Across Australia, the estimated annual share of embodied carbon emissions from new infrastructure development is estimated to be about 6%. In NSW, the production and use of these materials are responsible for 13 million tonnes of carbon dioxide equivalent or 10% of NSW's annual total emissions⁴.

There is a variety of schemes in Australia that set minimum, as well as optional, sustainability specifications for building and infrastructure developers, however they tend not to include specifications for the reduction of embedded carbon emissions. Indeed, one of the key challenges in reducing embodied carbon in the Australian built environment is that there is currently no agreed framework to measure, benchmark or certify embodied carbon. A project is underway, led by the National Australian Built Environment Rating System (NABERS), in collaboration with key industry stakeholders, to develop a new national framework for measuring embodied carbon.

¹ World Green Building Council (2019) Bringing Embodied Carbon Upfront. Available: <https://worldgbc.org/news-media/bringing-embodied-carbon-upfront>

² GBCA (2019) Embodied carbon & embodied energy in Australia's buildings. Available: <https://new.gbca.org.au/news/gbca-news/gbca-and-thinkstep-release-embodied-carbon-report/>

³ Ibid

⁴ Adapt NSW (2023) NSW greenhouse gas emissions. Available: <https://www.climatechange.environment.nsw.gov.au/nsw-emissions>

Global demand for materials that have lower embodied emissions (low emissions building materials, or LEBMs) is predicted to grow over the coming years. But there are blockages to growing the LEBM market in NSW and more broadly in Australia, on both the demand and supply sides. Some have likened the situation to the ‘chicken and egg’ conundrum: manufacturers may develop and supply LEBM alternatives if those procuring materials do not demand them, but they do not demand them because they are not required to, and because the lack of locally made materials can make them difficult and expensive to source. However, the NSW building materials manufacturing industry risks being out-competed by imported LEBMs if the industry does not innovate and accelerate on the supply side. Action is needed to drive demand for low-emissions products while simultaneously supporting suppliers to meet new demand. Meanwhile, industry is looking to the NSW Government to send a clear market signal that LEBMs will be mainstreamed and become a standard procurement requirement.

The Low Emissions Building Materials Program

The Low Emissions Building Materials Program (LEBM Program) aimed to grow the demand for low emissions building materials in the construction and infrastructure sectors by driving the modification, adoption and use of voluntary standards. The program operated over 18 months, from January 2021 to June 2022, with a budget of \$800,000. Funding was provided from the Climate Change Fund, which was established in 2007 by the NSW Government to address the impacts of climate change, encourage energy and water saving activities and increase public awareness and acceptance of climate change.

The focus areas of the program were to:

- Understand key stakeholders and interventions to bring about voluntary adoption of low emission materials within the building and construction sectors.
- Collaborate and support existing standard providers for widespread adoption of agreed low emission standards within the sector.
- Undertake research to support the adoption of selected LEBM
- Create a clear value proposition for the adoption of standards associated with low emission building materials.
- Raise the awareness of design, procurement and finance professionals of the opportunities to use low emission materials.
- Support NSW Government entities to use LEBMs and use government purchasing power to drive demand for green building products and shift market norms.
- Develop understanding, skills and expertise in NSW to meet growing global demand for LEBMs.

1.2 Evaluation approach

The evaluation was commissioned to provide an assessment of program outcomes and to elicit a range of perspectives on the NSW Government's LEBM Program, in part to inform the next stage of planning of strategies to reduce embodied carbon emissions, and ultimately achieve net zero emissions by 2050.

2 FOUNDATIONS

2.1 Program logic

Through the LEBM program, the NSW Government sought to influence large companies and their suppliers as well as NSW Government entities, to support the market transition to LEBM. The program initially focused on the top three materials that have the largest NSW emission contribution (steel, cement and aluminium).

The overall goal program was to stimulate demand for low emissions materials by partnering with the industry focusing mainly on the demand side of the market by enhancing and incentivising voluntary adoption of emission intensity targets for construction materials (raw products). The program sought to build assurance across the design, specifiers, procurement and project management professionals that LEBM will meet time, cost and quality requirements. Ultimately, the goal is to save one metric tonne of CO₂-e annually by 2030.

A program logic for the LEBM Program was developed by the Office of Energy and Climate Change (OECC) and is included in Figure 1.

Under the program logic, the NSW Government funded targeted activities aimed at growing the market for LEBMs in NSW.

- LEBM Program staff included the Program Manager supported by the program governance structure of the OECC.
- MECLA was the principal vehicle for progressing many of the activities. It was initiated as an industry-led network to drive reductions in embodied carbon in the construction industry. Responsibility for establishment and development of MECLA and provision of a secretariat for two years, was contracted to consortium of three partner organisations: Presync, WWF and Climate-KIC. It was envisaged that MECLA would continue to operate once established for as long as it was needed, but would become predominantly self-funding after the end of the LEBM Program.
- ISCA was contracted to develop a digital materials calculator for the construction industry.

These identified activities and responsibilities in the LEBM Program are set out in Table 1.

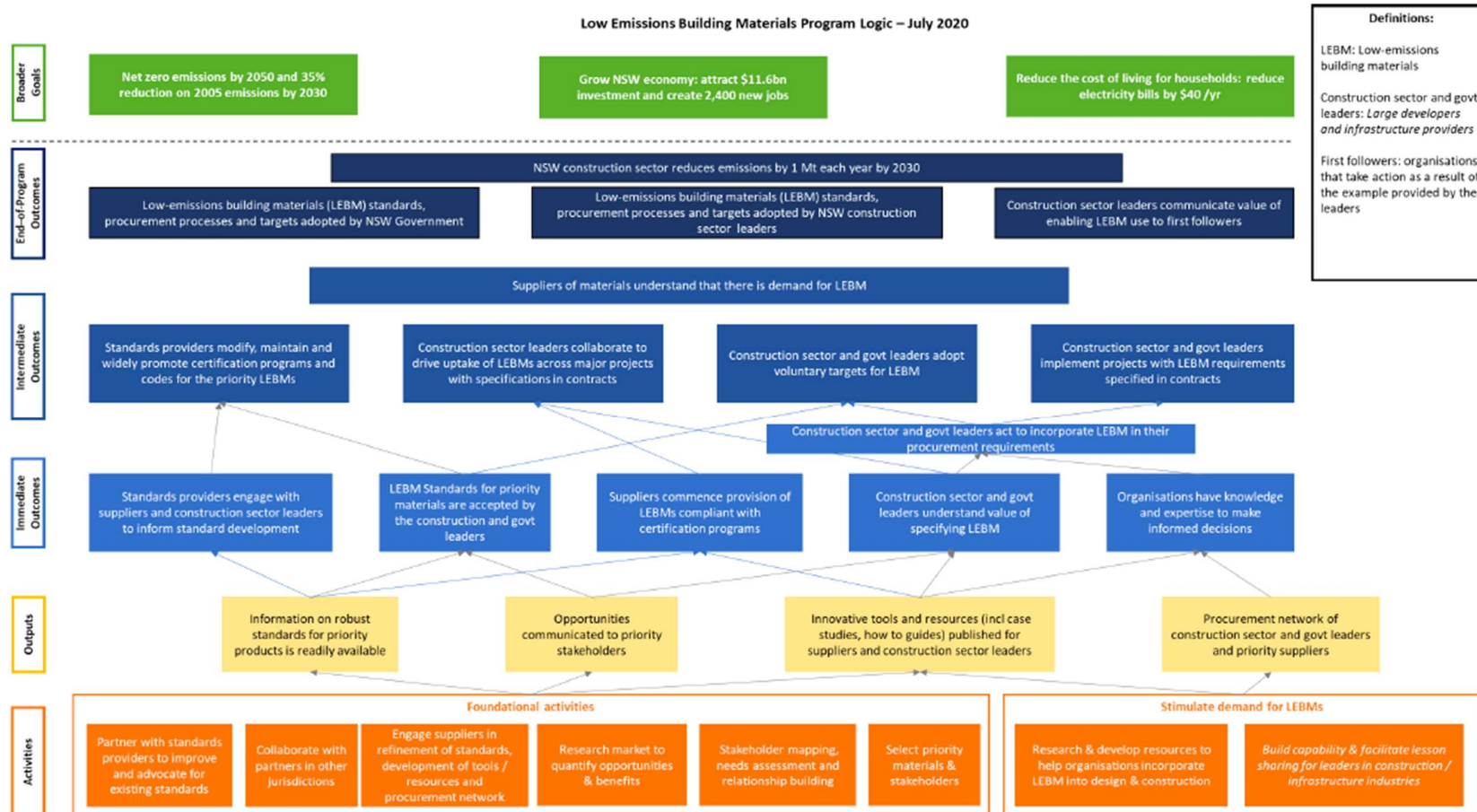
Table 1: Activities identified in the Program Logic and responsibilities for implementation

Activities identified in Program Logic	Responsible stakeholders
Partnering with standards providers to improve and advocate for existing standards	LEBM Program staff
Collaborate with partners in other jurisdictions	LEBM program staff, MECLA
Engage suppliers in refinement of standards, development of tools/resources and procurement network	MECLA, ISCA
Research market to quantify opportunities and benefits	MECLA
Stakeholder mapping, needs assessment and relationship building	MECLA, LEBM Program staff
Select priority materials and stakeholders	MECLA, LEBM Program staff, OECC.
Research and develop resources to help organisations incorporate LEBM into design and construction	MECLA
Build capability and facilitate lesson sharing for leaders in construction/ infrastructure industries	MECLA, LEBM Program staff

The aim was through these activities, to provide information, tools and opportunities for communication and collaboration across the construction industry in NSW as well as more broadly across Australia, that would energise and drive both supply and demand for LEBMs, as well as identifying and addressing barriers to uptake of more sustainable building materials.

It was envisaged that by the end of the program, LEBM standards, targets and procurement processes would be adopted by the NSW Government and NSW construction sector leaders, and thus through the collaborative effort on both demand and supply sides, NSW would accelerate reductions in embodied carbon emissions, meeting a target of 1mt CO₂-e per year by 2030. It was envisaged that meeting this target would ultimately assist NSW to meet its commitment of achieving net zero emissions by 2050.

Figure 1: Program logic



2.2 Key evaluation questions

The following key evaluation questions were developed by DPE. The questions reflect the understanding that only some of the program outcomes are measurable at this stage, at the end of the two-year program term.

Table 2: Key evaluation questions

Key evaluation questions	Sub-questions
1. How did program management arrangements support effective delivery?	1a. How well did the governance arrangements provide oversight and direction?
	1b. How well were the risks monitored and managed over the 2-year program?
2. To what extent has the program been delivered on time and budget?	2a. Was the program delivered on time? What were the reasons for this?
	2b. Was the program delivered on budget? What were the reasons for this?
3. What contribution has the program made to the achievement of net zero emissions by 2050?	3a. What barriers were encountered for increasing supplier/consumer demands of priority LEBMs into the NSW market? What resolution has been done to resolve this?
	3b. How likely will the program achieve its target to save 1 Mt CO ₂ -e annually by 2030?
4. What were the unanticipated outcomes of the program, both positive and negative?	n/a
5. To what extent did the program promote awareness to support development and research of LEBMs including embodied carbon related innovative tools and resources to target stakeholders? How did these support their needs and change in behaviour?	n/a
6. How did the program ensure NSW leads by example?	6a. How did the program support development of embodied carbon policies and programs within NSW Government?
	6b. How did the program support NSW Government agencies drive for procurement of LEBMs?

3 EVALUATION METHODS

3.1 Scope

The evaluation Terms of Reference required an outcome evaluation to assess the program's progress towards its intended outcome and set out learning and improvement activities to respond to the insights garnered through monitoring data and evaluation findings.

Specifically, the evaluation was required to directly answer the six KEQs and sub-questions. These questions incorporated both process and outcome dimensions.

The program reference period was January 2021 to June 2022.

3.2 Evaluation approach

The evaluation approach was finalised in consultation with DPE, incorporating key elements of the previously developed Evaluation Plan. The approach is described below.

Identification of stakeholders

A purposive sample of key stakeholders was identified in consultation with the program owners. The key stakeholder list sought to include a range of stakeholders including:

- Program owners (i.e. program staff at the Office of Environment and Climate Change, NSW Treasury)
- MECLA leadership (secretariat, subcommittee chairs, members of the Program Control Group (PCG)/Program Leadership Group (PLG))
- MECLA members
- Representatives from key NSW Government purchasing agencies
- Representatives of standards and ratings organisations.

A priority list (i.e. those considered to be leading figures in relation to the program, such as MECLA chairs/co-chairs, members of the PCG and PLG etc) was developed including 50 of the above stakeholders, who were to be invited for interview. The remaining members of MECLA were identified to receive an invitation to provide input via an online survey (see below).

Stakeholder interviews

The core research activity was the conduct of interviews with around 30 priority stakeholders. In the first instance, Treasury emailed 50 identified stakeholders to inform

them about the evaluation and that they would be contacted by the evaluation team and offered an interview. Shortly after, the evaluation team emailed all priority stakeholders and invited them to participate in an interview.

Semi-structured discussion guides were developed, which were approved by DPE prior to the conduct of interviews (Appendix A). Online meetings were scheduled using Microsoft Teams. Where possible, members of the same work team or same MECLA subcommittee were interviewed as a group. All those who responded to the invitation (including follow-up emails) were interviewed. In total, 26 stakeholders participated in the interviews. These included:

- 2 program owners (DPE/Treasury)
- 4 members of the MECLA Secretariat
- 14 MECLA co-chairs and members
- 2 certification/ratings agency representatives
- 4 representatives of NSW Government agencies.

Interviews with individuals lasted 30-45 minutes, while group interviews lasted 45-60 minutes. All interviews were audio recorded (with permission of the participants) and transcribed.

Survey of MECLA members

In order to broaden consultation for the evaluation, a short online survey (average completion time was 9.5 minutes) was developed to seek input from the broader MECLA membership (excluding those who were invited for interview, around 100 people). The survey questions were based on the MECLA discussion guide questions. The survey was conducted by Inca Consulting using the Survey Monkey platform using a custom link.

In total, 39 MECLA members completed the survey (approximately 40% response rate). A summary of the collated survey results is included at Appendix B.

Analysis and reporting

Qualitative data (transcripts) were analysed in Excel software using thematic coding, drawing on a grounded theory approach (in which codes and insights are identified from the data, rather than from a pre-conceived theory, following Glaser and Strauss 1967). Where appropriate, data from different stakeholders was triangulated and where required, checked with the relevant stakeholders (by phone or email).

The MECLA member survey data was exported in Excel, and tables and graphs developed from the data. Crosstabulations of relevant questions were undertaken, however limited respondent numbers meant that these were not suitable for detailed analysis. Respondent comments were exported verbatim, and where appropriate, were coded and enumerated manually.

Program documents were read and key information extracted according to each KEQ.

A matrix including the KEQs and all data sources was developed. Qualitative and quantitative data pertaining to each question were summarised, leading to the development of key findings against each KEQ. From this matrix, the report was drafted, referring back to the raw data as needed. The draft report included draft recommendations which were discussed at the Recommendations Workshop (see below). Feedback on Draft 1 was taken into consideration for Draft 2. Feedback on Draft 2 from program stakeholders and peer reviewers were taken into consideration for the Final Report.

Emerging outcomes workshop

An emerging outcomes workshop involving 10 program stakeholders was conducted via Microsoft Teams on 21 April 2023. The workshop included a presentation of emerging outcomes from the evaluation. Participants provided feedback on the presentation to be considered in drafting the final report.

Recommendations workshop

A workshop in which the draft recommendations were reviewed by a group of five key program stakeholders was conducted via Microsoft Teams on 13 June 2023. Feedback from this workshop helped to refine the final recommendations.

Peer review

Draft 2 was reviewed by DPE's peer reviewers. A review report was provided on 20 June 2023 indicating key areas in which the report could be improved. This feedback was considered and addressed for this final version.

3.3 Limitations

The evaluation included some important limitations.

Data limitations

A key factor that limited the evaluation was the availability of quality data to match the program outcomes. The ultimate indicator of success would be measured CO₂-e savings, but the methodology for quantifying CO₂-e emissions from embodied carbon has not



yet been agreed and detailed targets for each material have not yet been developed, so there is no way of determining whether the program is progressing according to a trajectory defined by interim targets. A clear line of sight to some other program outcomes was limited by incomplete or low quality data, as well as the loss of program knowledge that accompanied the departure of some key program stakeholders prior to the evaluation.

The data limitations primarily impacted the confidence of our findings in relation to KEQ 3b and KEQ4 (which might not be exhaustive). We believe there was sufficient evidence to support our findings in relation to all other KEQs.

Limitations of the research

The evaluation had a very short timeframe, with results required within six weeks of commencement. Furthermore, the research schedule required that the bulk of the research be undertaken over the Easter period, which included public holidays and school holidays. This proved difficult to conduct stakeholder research due to a number of people taking leave at this time of year. Interviewing was limited to a three-week period (inclusive of public holidays). Despite efforts to include as many stakeholders as possible, ultimately DPE's time constraints meant that consultation was limited to those who were available during the research phase.

A further limitation of the research concerned the methodology which, due to timing constraints and the lack of a baseline, used reported data about the program from key informants to inform outcomes, rather than using an experimental or pre-/post-intervention design. So, for example, assessment of increased awareness about LEBMs was undertaken by asking numerous informants about awareness levels, rather than measuring awareness levels before and after the program. Where possible, validation of stakeholder perspectives was undertaken via triangulation of data (using other stakeholder reports, written reports, website content etc).

4 FINDINGS

4.1 KEQ 1: How did program management arrangements support effective delivery?

KEQ 1a. How well did the governance arrangements provide oversight and direction?

Finding 1

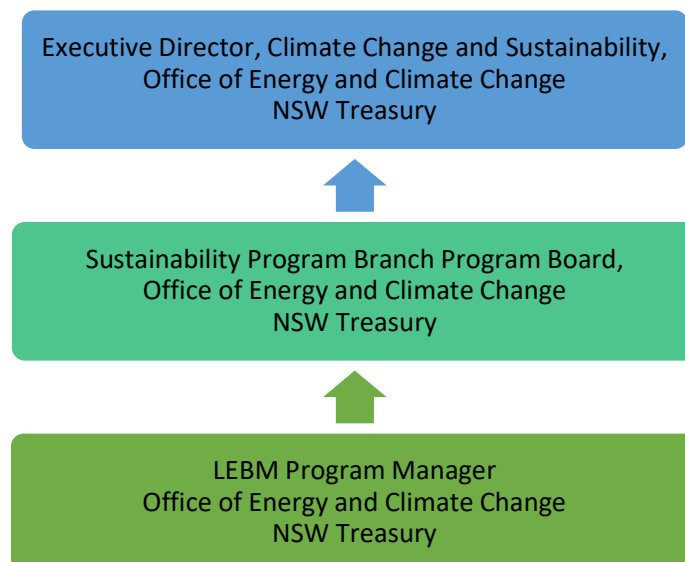
The program governance arrangements were transparent, fit-for-purpose and supported implementation.

Between the start of the program in January 2021 and April 2022, responsibility for the program sat with the Executive Director, Climate Change and Sustainability within DPE. The program was initially managed within the Sustainability Advantage Program.

In April 2022, the program was moved to the newly established Office of Energy and Climate Change (OECC) within NSW Treasury. The resulting program governance structure is represented in Figure 2.

Program governance used established processes in the Sustainability Programs Branch (SPB), namely regular meetings of the SPB Program Board. The minutes of some meetings were provided to the evaluators indicating that progress reporting took place on these occasions.

Figure 2: LEBM Program governance structure (April-June 2022)

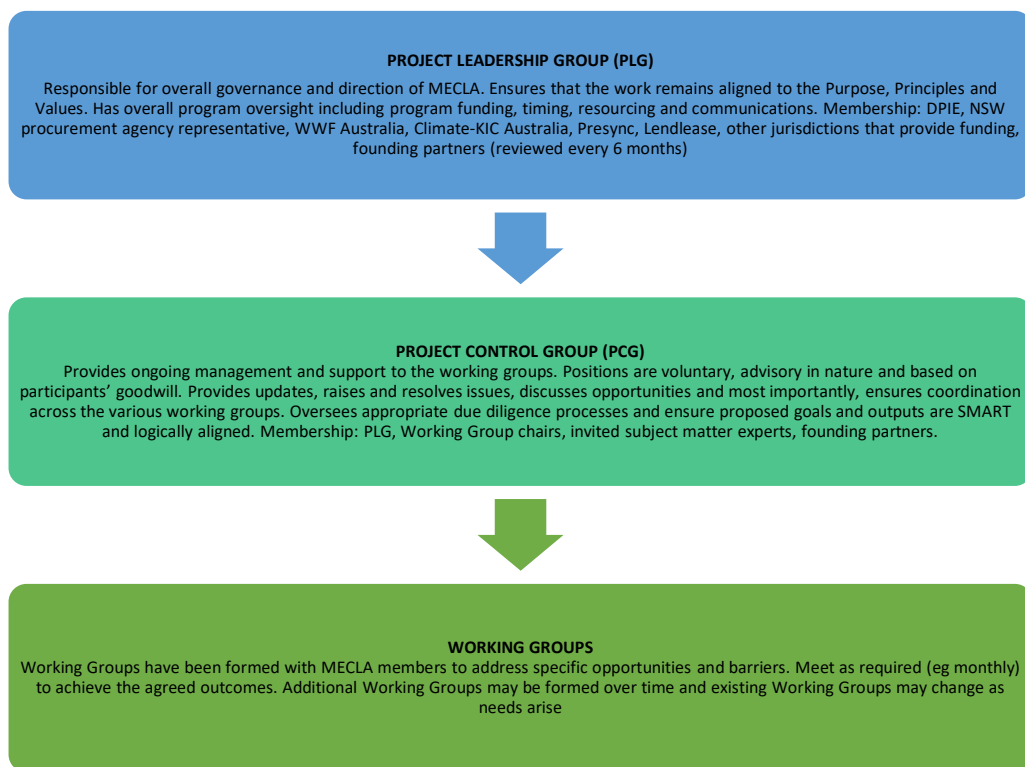


Source: Program Delivery Plan LEBM Program

The LEBM Program Manager confirmed that the governance structure successfully supported implementation of the program.

MECLA, one of the initiatives of the program, was established with its own governance structure (Figure 3). The structure includes three levels of management, including an overarching Project Leadership Group, a Project Control Group, and then eight working groups each with a Chair or two Co-chairs. The governance structure was transparent and supported project implementation by providing clear guidance to the working groups.

Figure 3: MECLA governance structure



Source: MECLA website

KEQ 1b. How well were the risks monitored and managed over the 2-year program?

Finding 2

Program risks were appropriately, systematically and transparently managed.

Program risks were monitored and managed by the Program Board in its regular meetings, and using a constantly updated risk register matrix, which was made available to the evaluation. Risks were classified as negligible risk/ low risk/ medium risk/ high

risk. A treatment plan for each risk, as well as the residual risk and review date, were identified. All 11 identified risks were resolved by the stipulated review date.

4.2 KEQ 2: To what extent has the program been delivered on time and budget?

KEQ 2a. Was the program delivered on time? What were the reasons for this?

Finding 3

Two of the three program milestones were delivered on time. The third milestone, relating to embedding interventions into standards and certification schemes, has progressed more slowly than anticipated, due to complexities and dependencies that require a longer timeframe to resolve. However, progress has been made in relation to ratings schemes, with GBCA signalling their intention to incorporate embodied carbon into their Green Star rating once the NABERS embodied carbon measurement is finalised, and ISCA progressing its digital materials calculator initiative.

Supporting factors for timely delivery included contracting the key deliverable of MECLA establishment and management to a consortium of external organisations (and individuals in those organisations) that were known for their work in the field, were highly driven and well-connected in industry. By doing so, the Government was able to achieve its objective by leveraging the strong existing networks of the external organisations. Another factor that supported timely implementation was the program management practices utilised as part of program governance, including monthly board meetings, status reporting and risk management logs.

The Program Delivery Plan identified three key milestones for the LEBM program (Table 3). The first and second milestones were delivered on schedule, but the third milestone was not completed during the program period.

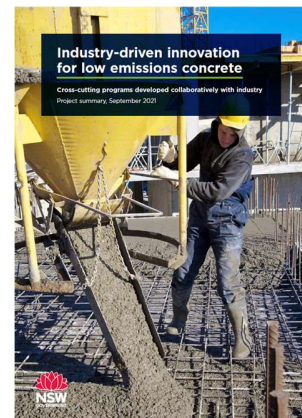
Table 3: LEBM Program delivery milestones, planned and actual

Milestone	Activity	Planned commencement date	Planned completion date	Actual completion date
1. Market research	Drivers for change, stakeholders, and required interventions identified.	15/2/2020	1/8/2020	1/8/2020
2. Engagement with Industry Bodies and Customers	Drivers for change (to LEBM) and interventions tested and confirmed with stakeholders	1/6/2020	30/6/2022	30/6/2022

Milestone	Activity	Planned commencement date	Planned completion date	Actual completion date
3. Embedding Interventions into Standards and Certification Schemes	Workshops with industry and building materials market participants; development of tools and business cases for specific stakeholders and materials assessed; Interdependent NZE Programs cross-promoted to stakeholders	1/9/2020	30/6/2022	In progress

Milestone 1 was a market research piece investigating the market drivers for change in the concrete industry. The document, entitled *Industry-driven innovation for low emissions concrete*, was delivered on time prior to the commencement of the program, in 2020 (see picture).

Milestone 2 involved a range of activities undertaken by DPE’s Program Manager and by the newly formed industry leaders group, MECLA. The activities undertaken by DPE are summarised in Figure 4, while the activities undertaken by MECLA are summarised in Figure 5.



Milestone 1 deliverable

Milestone 3 involved working with industry and Government stakeholders to embed LEBMs into standards and ratings schemes. The target outcome was to have LEBM standards adopted by at least two standards agencies and two flagship infrastructure projects. These outcomes have not yet been delivered, and none of the standards agencies have embedded embodied carbon in their schemes. It was recognised quite early in the program that these outcomes may have been overly ambitious in the timeframe, which prompted the development of the business case for a follow-on program focusing on the development of specifications for specific building materials. The LEBM program, and MECLA, instead focused on supporting industry to, among other things, be in a position to embed specification into their own projects.

More progress has, however, been made in relation to embedding embodied carbon into ratings schemes, with GBCA signalling its intention to include embodied carbon once the NABERS embodied carbon measurement tool is finalised and the ISCA digital materials calculator currently in pilot phase.

Figure 4: LEBM Program activities, Jan 2021-Jun 2022

Jan-Jun 2021	<ul style="list-style-type: none"> • Contractors engaged to deliver MECLA • Supported Clean Tech Program to develop a joint proposal for continuing LEBM Program post-2022 • Engagement with industry to achieve 70 founding MECLA members • Development of a baseline and LEBM Program intervention model in conjunction with PreSync. • Consultation with internal NSW Government stakeholders/agencies • 1st MECLA conference • ISCA report on baseline Scope 3 emissions • ISCA report describing digital specifications for digital materials calculator • ISCA Progress Report on development of digital materials calculator
Jun-Dec 2021	<ul style="list-style-type: none"> • Engagement with industry to achieve 100 founding MECLA members • Continued consultation with internal government and external stakeholders. • Support other Department staff and Deloitte in co-development of business plan for Environmental Trust Funding submission. • Peer review of intervention model. Confirmation that target of 1 Mt. p.a. post 2030 of Scope 3 emissions is achievable • 2nd MECLA conference • Engaged Construction Leadership Group to discuss workplan • ISCA update on development of digital materials calculator & IS Lite
Jan – Jun 2022	<ul style="list-style-type: none"> • Engagement with key NSW agencies to review linkages between LEBM Program, MECLA, and other Govt workstreams • Started Review of International Market and Policy Levers for uptake of LEBM. • Workshop on harmonising existing materials calculators (BASIX, NABERS, Building Commissioner and Infrastructure Sustainability Council) • Workshop on drafting embodied carbon related tender pre-requisite for use in NSW Government procurement • Consulted with INSW and Construction Leadership Group to establish a working group to steer LEBM specifications for NSW govt procurement. • Supported MECLA for May industry event incl. key Government speakers. • Engaged MECLA working groups on "Disclosure and the role of environmental planning policies". Internal agencies updated industry on latest policy and tool developments. • Held "Drafting Embodied carbon related tender pre-requisite for use in NSW Government procurement" workshop. GREP was identified as policy to include requirement - finalising timeline & engagement requirements. • Engaged GREP team re actions to embed embodied carbon related tender pre-requisite in GREP. GREP team is finalising timeline and engagement requirements with MECLA. • ISCA update on development of digital materials calculator & IS Lite (now IS Essentials) & release plan • ISCA Final Report

Source: LEBM Monthly Status Reports

Figure 5: MECLA outputs 2021-22

Membership 0 (January 2021) ↓ 42 (April 2021) ↓ 140 (June 2022)	5 Publications Low Embodied Carbon Steel Brochure Dictionary of Carbon Low Emissions Aluminium Brochure Upfront Carbon Discussion Paper International Review of Policies and Programs for Low Emissions Building Materials	11 Videos Launch COP26 Government & industry event Spotlight events MECLA Chair's Update
8 Events MECLA Launch, 22 April 2021 Spotlight on Aluminium (1), 10 June 2021 MECLA public event, 3 August 2021 Spotlight on Timber, 15 September 2021 Spotlight on Steel, 1 December 2021 Spotlight on Concrete and Cement, 14 March 2022 MECLA Government and Industry event, 16 May 2022 Spotlight on Aluminium (2), 2 June 2022		8 Working Groups WG1 – Demand side WG2 – Evaluation WG3/4 – Knowledge & language WG5 Materials (supply side) 5a – Steel 5b – Concrete & cement 5c – Aluminium 5d – Other materials 5e – Building services 5f – Engineered timber WG6 – Residential
6 Jurisdictions engaged NSW ACT Victoria Queensland South Australia Western Australia	Standards & ratings agencies engaged NABERS BASIX GBCA ISCA	Other Website Linked In (1200 followers) Monthly newsletter (900 subscribers) YouTube channel

Sources: MECLA Final Report & MECLA website

One supporting factor for the timely delivery of milestones was contracting out the key deliverables of the review of market drivers and the establishment and management of MECLA to external organisations (and key, highly driven and well-connected individuals within those organisations) that were known for their work in the field and who were already engaged with industry. By doing so, the Government was able to achieve its objective by leveraging the strong existing networks of the external organisations. Another factor that supported timely implementation were the program management

practices utilised as part of program governance, including monthly board meetings, status reporting and risk management logs.

KEQ 2b. Was the program delivered on budget? What were the reasons for this?

Finding 4

The program was delivered within the specified budget (in fact with a surplus). Factors that supported delivery within budget included regular reporting and monitoring of program expenses, as well as fixed budgets with the external contractors that were responsible for the key deliverables.

The program budget comprised two components: labour expenses (LEX, which paid for the OECC Program Manager); and operational expenses (OPEX, which includes everything else (e.g. contractor fees, event expenses, publication expenses).

Budget documents show that the program recorded an *underspend* each year and for the program overall. It should be noted that two outstanding program invoices amounting to \$40,000 were not included in the budget reconciliation because these payments occurred after 30 June, 2022. If these payments are included, then the total underspend amounts to \$87,261.

Table 4: Program expenditure – budgeted and actual

	BUDGETED			ACTUAL			
	OPEX	LEX	Total expenditure	OPEX	LEX	Total expenditure	Surplus
2020-21	\$247,000	\$153,000	\$400,000	\$205,828	\$125,967	\$331,795	\$68,205
2021-22	\$243,000	\$157,000	\$400,000	\$272,113	\$68,831	\$340,944	\$59,056
Total	\$490,000	\$310,000	\$800,000	\$477,941	\$194,798	\$672,739	\$127,261

Source: LEBM Program Budget Actuals (DPE)

Factors that supported delivery within budget included regular reporting and monitoring of program expenses, as well as fixed budgets with the external contractors that were responsible for the key deliverables.

Finding 5

The LEBM Program delivered important outcomes for a modest Government investment..

The evaluation found that the program delivered some important outcomes and laid the foundation for critical work that may follow, which may lead to a lowering of CO₂-e from embodied carbon emissions, and it achieved this for a relatively modest Government investment. Specifically:

- The program employed one FTE staff member to administer and undertake program activities.
- The NSW Government's investment of \$800,000 drew investment from the private sector amounting to more than \$250,000, as well as further investment and commitments from other jurisdictions (e.g. \$50,000 from the South Australian Government, \$100,000 from the Queensland Government)⁵.
- The founding members undertook significant work prior to, and beyond, the commitment of Government funds, which effectively made them in-kind contributions.
- As well as the additional financial investment to the program, a large commitment of volunteer time was invested by MECLA members, undertaking tasks such as organising and chairing working groups, writing presentations and publications, meeting with stakeholders, undertaking field visits and much more.

4.3 KEQ 3: What contribution has the program made to the achievement of net zero emissions by 2050?

KEQ 3a. What barriers were encountered for increasing supplier/consumer demands of priority LEBMs into the NSW market? What resolution has been done to resolve this?

Finding 6

The main perceived barriers to growing the market for LEBMs are lack of agreed standards and benchmarking, lack of Government imperatives, the cost of transitioning to LEBMs for some areas of manufacturing, a persistent lack of understanding about embodied carbon and LEBMs in some areas of the industry, and insufficient policy alignment.

Stakeholders consulted for the evaluation were asked to identify the main barriers to growing the market for LEBMs in NSW. Figure 6 shows the coded results from the MECLA member survey (the question was open ended and was coded manually). The discussion below draws on both the survey and stakeholder interviews.

Lack of agreed standards and approach to benchmarking

The most frequently mentioned barrier was the absence of clear mandatory standards and a nationally agreed approach to measuring and benchmarking embodied carbon emissions. Without clear guidance and consistency across the industry and across material types in relation to measurement and benchmarking, it is difficult to compare materials and to set procurement targets, which would then drive demand. While the industry awaits the much-anticipated NABERS calculation framework and tool for

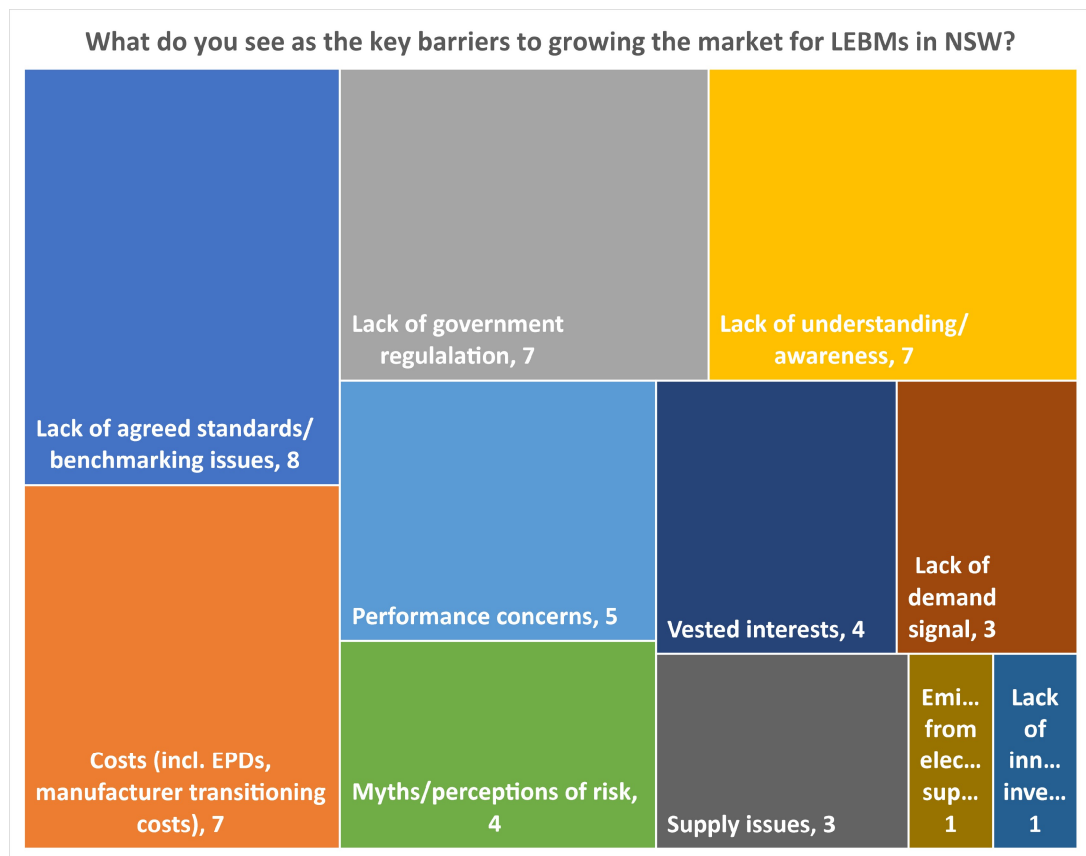
⁵ MECLA Milestone 6 Report, p. 6.

measuring upfront carbon emissions, the industry refer to standards that exclude embodied carbon, and are either using a variety of interim calculation tools, or are not calculating embodied carbon emissions at all.

‘The construction standards are outdated and slow to change with the advent of more sustainable materials.’

‘Lack of standards to allow [low emission] materials to be used to replace existing materials which adversely affect carbon emissions.’

Figure 6: Key barriers to growing the market for LEBMs - MECLA Survey results (coded responses, participants could identify more than one factor) (n=33)



Lack of Government imperatives to send a demand signal

Another key barrier to growing the market for LEBMs identified by the stakeholders was insufficient imperatives from the Government. This includes insufficient demand signals from public sector procurement, by way of the requirements public sector agencies have for the procurement of contractors, and a lack of regulation.

'No enforcement of the use of LEBMs through Government regulation, as have been effectively implemented in other countries.'

'The adoption of (perceived) risk associated with LEBM. Policy makers have a wish list for LEBM, but when it comes to contractors and asset owners (including government roads authorities), that wish list falls by the wayside.'

'Clear policy and targets from government.'

(Responses from the MECLA member survey)

'I'm a big fan of regulation, I think that a lot of people aren't going to do anything unless they're kind of forced to do it. So I say bring more of that in.' (MECLA Co-chair, university)

'If governments can say, "We are going to procure X number of our major infrastructure projects using these materials, it's going to happen. So if you don't have your low carbon materials, you won't win the tender. That sort of thing should drive investment."' (MECLA member, consultant)

'[The Government] could do lots of things. They could change building codes to require lower carbon materials. That would be one thing, they could change planning laws to require it. But I'm also conscious there's political and other difficulties in moving to those steps, but they're obvious things they can do. They can regulate it in a second.' (MECLA member)

It should be noted that the leadership of Transport for NSW in addressing this issue and progressing the Scope 3 emissions⁶ reduction agenda in Government was acknowledged by a number of stakeholders. Another key public sector agency, Infrastructure NSW, has also recently become engaged in developing a plan to reduce Scope 3 emissions.

One way the LEBM Program has sought to address the issue of a lack of mandatory standards around embodied carbon and an absence of Government imperatives with its contractors, has been the development by MECLA of a 'Pledge Prerequisite' which requires head contractors to set and monitor targets to reduce embodied carbon in building materials as a pre-requisite to being able to tender for government work⁷.

⁶ Scope 1 and 2 emissions refer to greenhouse gas emissions (including but not limited to carbon) that are owned or controlled by a company. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by it.

⁷ MECLA (2023) Working Group 1 – Demand. Available: <https://mecla.org.au/wg1/>



'So what we've said to government is, "Why don't you say to people, we don't care what your target is, you've just got to have one, you've got to be on the journey of reducing your embodied carbon to tender with us"... We said like that's a baby step that's really easy for a company to do. And then over time, they might start to say that they've got a particular threshold that they're expecting.' (MECLA member)

According to MECLA, the Pledge Prerequisite has attracted significant interest amongst governments nationwide. And while reportedly unrelated to MECLA's Pledge Prerequisite, in February 2023, the NSW EPA signalled its intention to draft clauses into the Protection of the Environment Policy (PEP) that will require contractors to meet targets around embodied carbon⁸.

Costs associated with transitioning to low carbon manufacturing

The considerable costs to pivot to low carbon emission materials in some industries was cited as a significant barrier to the growth of the LEBM market in Australia, resulting in an over-reliance on often expensive imported materials. The most commonly mentioned example was the Australian steel industry, which has a large investment in traditional technology that has a long life, and which cannot pivot easily to a low embodied carbon product. The aluminium industry was also cited as a complex case, with significant investment required to pivot Australian manufacturing to more sustainable, high-recycled content products.

Another cost issue raised by stakeholders related to the development of environmental product declarations (EPDs). The costs of obtaining these certifications, compounded when manufacturers produce a range of products, were said to be a barrier, particularly for smaller manufacturers. However, without consistent certification with EPDs, comparing available materials is difficult and can act as a disincentive to manufacturers whose 'greener' products may not be able to compete with traditional products on price. It was suggested that financially supporting smaller companies to develop EPDs would be a useful action for governments to take.

'Funding to support more EPDs for smaller companies. Consistent benchmarking of asset types and generic products at a state and national level.'

'Cost of EPDs, clear policy and targets from government.'

'Funding for companies to benchmark their materials with EPDs.'

⁸ NSW Government Gazette (2023) Number 97– Environment Friday, 24 February 2023. Available: https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gazette_2023_2023-97.pdf

(Responses from the MECLA member survey)

Persistent lack of industry awareness

While MECLA is believed to have done a very good job of informing, education and raising awareness in the industry about embodied carbon and LEBMs, and in promoting understanding of complex issues across stakeholder groups, it was thought that there was still some way to go in sections of the industry. It was suggested that there is still insufficient participation in MECLA by the decision makers – by the corporate heads who could drive the embodied carbon reduction agenda in their organisations. Another important group thought worthy of targeting is the cohort of students who are about to enter the industry, and by extension their teachers.

'It's a complex supply chain. The clients want low carbon solutions, and we have them. But there's probably ten people in the middle that need to be educated to understand what it is, and the complexity of contract models which is preventing the uptake of low carbon concrete. So, I think that's what we've been really trying to do in the Working Group, to try and look at that and break those things down.'
(MECLA member)

'Universities have mandated to teach [zero carbon] now. And architects are mandated to demonstrate capacity to become registered. Some of the resources we're talking about that MECLA hold would be very appropriate to feed into that. So they could become part of continuing CPD programs.' (MECLA member)

Risks – actual and perceived

Stakeholders identified the perception of risk – by procurers as well as manufacturers – as a barrier to accelerated uptake of LEBMs. Some in the industry were said to be cautious in relation to certain LEBMs, which were perceived to compare unfavourably in terms of performance with traditional equivalents. Whether these risks around performance are real or only perceived, it is an issue that the industry needs to contend with.

Other risks that may act as a barrier include budgetary risks where LEBM costs are high, supply chain risks, particularly where low carbon materials must be sourced from overseas, caution around trying new products, and an inclination toward risk aversion by decision makers, both in the industry and governments.

Competing interests around certain issues

A notable feature of the feedback from MECLA members was the surprising collegiality among industry members, who generally were said to place the bigger picture interest above the commercial and competitive interests of the companies they represent. An

example was the collaboration and sharing, including of commercial intellectual property, in WG5b in discussing concrete and cement.

However, some members felt that vested or competing interests were a barrier to moving forward on certain issues, namely measurement approaches for embodied carbon, benchmarking, and in some instances, promoting one proprietary material over another.

Supply chains and the demand-supply conundrum

Another major barrier identified in the research related to the supply of LEBMs, particularly given the current Australian market's orientation toward manufacture of traditional materials, and reliance on importing low carbon alternatives. To this extent, Australia is seen by many as being in its infancy regarding large-scale manufacture of many LEBMs, compared with many other countries.

'The availability of products and supply chain issues. The lack of environmental product disclosures for currently available products.'

'Lack of sovereign manufacturing due to lack of infrastructure and investment in reuse/ recycle/ reprocessing locally.'

'I can only comment on concrete. Low carbon concrete can't be used for some applications. The main issue is it can't be used for post-tensioned elements which can represented well over 50% of the total volume of concrete. There are some low carbon concretes on the market that don't have this issue but they are more expensive than regular concrete.'

One MECLA member (from the manufacturing sector) outlined the multi-factored issues that create the demand-supply conundrum:

'With Scope 3, we're dependent on down the chain towards the suppliers. And the suppliers are willing to supply, but they need the demand in order to make the capital investments, to create the supply. So it needs to be demanded. And so it's that loop. And for us, there are barriers along every link of that chain that perhaps don't come to light under normal modes of operation. So for example, for our clients, their specifications might not accommodate for us to deliver to them on low carbon materials – if there's a slight uplift on cost, and it's always going to come down to cost on particular contracts. Or if you can't guarantee that there's going to be supply in a particular region, because we deliver all across the country from remote to metropolitan areas. And we're within the timeframes of a project when we work for



a client. And those projects are always on a critical path, and if anything is going to extend that critical path, which if it requires a concession...is going to add to the critical path, then it's not going to get done within the timeframe.' (MECLA member)

Lack of policy alignment between Government agencies

The other barrier raised by a few stakeholders, particularly in the interviews, was a perceived lack of policy coordination in the NSW Government, a sense that agencies are to some extent working in silos, without a clear aligned 'roadmap' with a staged approach and interim targets. As one Government stakeholder commented:

'In terms of a consistent approach in the NSW Government, the best thing that this program could do is to create a Zero Carbon Materials Roadmap 2050. And have clear milestones - what do we want to achieve with concrete, steel, asphalt and other materials by 2030? Where do we want to be 2035? 2040? 2045? 2050? A really nice roadmap, a 10-page document or something like that, that provides clear evidence of the milestones. And that's something that should be shaped up with the delivery agencies.' (Government stakeholder)

4.4 KEQ 3b. How likely will the program achieve its target to save 1 Mt CO₂-e annually by 2030?

Finding 7

There is insufficient evidence from the program to know how closely the identified trajectory is being followed forecast and whether the desired emissions savings will be achieved by 2030. Baseline modelling indicated that the target was achievable and identified trajectories based on different scenarios. But it should be noted that emissions reductions were not expected to be realised during the life of the program. The focus of the LEBM Program has been to lay the foundations and undertake the preparatory work of capacity building and energising industry in preparation for the materials based interventions to come.

A further obstacle is that a clear methodology for measuring CO₂-e savings has not yet been realised.

In early modelling by PreSync in the Quantitative Baseline Measurement (QBM) project, a range of scenarios were modelled including electricity grid transition to renewables and interventions such as MECLA. The project developed a trajectory toward 2030 and postulated that the LEBM program target of reductions of 1 million t CO₂e per year from 2030 does appear achievable⁹.

⁹ MECLA (2022) Milestone 6 Report

The modelling assumes a start date for measurable emission reductions of 2024, so there it was not planned to be able to see attributable reductions during the life of the LEBM Program. Rather, the LEBM Program could be seen as laying the foundations for these interventions, by engaging industry and government stakeholders, generating industry led proposals and fostering commitment – all necessary preparatory work in its own right.

Another issue with forecasting progress toward the 2030 target is that interim targets have not been agreed for the initiative and measurement methodologies for embodied carbon are still being debated. A clear methodology for the measurement of CO₂-e savings is not evident in program documentation.

4.5 KEQ 4: What were the unanticipated outcomes of the program, both positive and negative?

Finding 8

MECLA’s success in engaging industry was much greater than anticipated. Membership grew to more than double that anticipated, and represented a broad range of interests and stakeholder groups not just in NSW but across Australia. Members were also more collaborative than anticipated. Impacts of this collaboration include development of knowledge and understanding, cooperation, collaborative development of resources and events, instances of collaborations that extended beyond the MECLA environment, and an engagement and energising of members which was taken back to members’ own organisations.

When MECLA was launched, the founding members had hoped to build the network to around 40 members. This figure was achieved around the time of MECLA’s launch. Through a process of targeted recruitment, communications and word-of-mouth by the MECLA founding members and by the LEBM Program Manager, membership reached 100 before the end of the first year, and by the end of the LEBM Program stood at 140+. Members also represented a broad range of interests and stakeholder groups, and were located across Australia.

Another feature of the membership was that members were more engaged and collaborative than anticipated. Something that surprised many was how collaborative members were, even if they found themselves in a working group with direct competitors.

‘They basically got a whole bunch of competitors around the table, talking, working together... And there’s some great sharing going on between them.’ (MECLA member)



'I've been incredibly impressed and amazed at the amount of collaboration we're getting across industry. So from contractors, suppliers, consultants, government, across the whole spectrum, a real desire to share information and share knowledge. It's been very refreshing to see people within the industry who I thought would not collaborate or share information or share learnings, come out and very openly do that, for the benefit of the greater good. It's been really quite eye opening.' (MECLA member)

'It's the first time in my professional career that I can really openly see people willing and wanting to collaborate, to do something that, quite frankly, they can't do by themselves. It does take a whole industry to do it. And the only way you're going to move that industry is through collective knowledge sharing and collaboration.' (MECLA member)

'Embodied carbon relies on so many systems that you actually have to play at an industry level, which is why we like the idea of MECLA. And the value of it, and it's a unique organisation, there's no organisation that has contractors, consultants, suppliers, everyone coming together. And it's exactly a fit for purpose organisation for solving this particular problem.' (MECLA member)

Part of the explanation for the appeal of MECLA and its success in recruiting members, is that the network has provided a forum for different parts of the industry, as well as experts and government, to meet, share knowledge, have conversations they previously haven't had, and collaborate. Prior to MECLA, members said that no such forum existed. The MECLA survey found that the top three perceived strengths of MECLA were the breadth of its membership, the opportunities to collaborate, and its capacity to bring stakeholders together. Comments from members about the perceived strengths of MECLA included:

The collaborative and open-minded approach of pre-competition alliance.

The ability to bring industry and other stakeholders together.

Cross-sector collaboration, impartiality from industry interests or politics, ability to engage the whole sector.

Collaboration across sectors that wouldn't usually work together and awareness raising.

It has created a large network of highly motivated and knowledgeable people to work with a shared goal

Collaboration across supply chains seeking a common positive outcome.

Another factor is what one of the MECLA Secretariat called ‘enlightened self-interest’, combined with genuine values alignment. Indeed, we found that for many members we consulted, their involvement with MECLA was a passion project, and MECLA came along at the right time.

‘The sustainability reps in these companies, we’re giving them permission to drive harder in their company. And by coming together with other peers, they’re bearing the same thing. And so there’s a really virtuous cycle and a virtuous momentum building. So yes, it’s tricky from a logistics and an organizational point of view, to bring an alliance like this together. But I think the timing has just aligned, and the science is just getting so much stronger, that the awareness of this issue is greater. And that’s why I think it’s built the way it has.’ (MECLA Secretariat)

One further factor that assisted with the growth in membership was the timing alongside COVID-19. As the COVID-19 situation worsened, business travel was largely abandoned as meetings pivoted online. This was a benefit to MECLA as it meant that participation was not limited by location:

‘I genuinely think by doing almost everything online, we’ve been able to achieve a great deal. Certainly, we’ve been able to extend beyond a NSW centric view. Because yes, the funding came from NSW. But all of our foundation meetings were held online, so we could cover the whole continent, without geography being a barrier. I think that’s been great. And from a productivity point of view, by not having to go to meetings, not having to travel and so on, we have definitely punched well above the normal weight of a week’s slotted hours.’ (MECLA Secretariat)

The impacts of the collaboration taking place in the context of MECLA are numerous. Firstly, members learned from each other, particularly about materials other than their own areas of focus, which has fostered understanding and cooperation, as well as working together (rather than competitively) to propose an industry position on some complex issues. The increased knowledge and ‘feel-good’ factor generated by collaborative involvement in something ‘that matters’ has energised a number of members who have taken ideas and strategies back to their own organisations. Instances of fruitful partnerships that were initiated in the MECLA space were described. The collaboration of members in the working groups produced numerous resources that

have been made available through the MECLA website.

Finding 9

MECLA has helped facilitate cross-organisational and cross-sectoral relationships that otherwise may not have happened. Participation in MECLA activities helped to facilitate important connections that may have been more difficult to establish outside the network.

As well as its value in awareness raising and knowledge sharing, MECLA was valued for the networking and strategic relationship building opportunities it has afforded. We heard from a range of stakeholders on both the supply and demand side, from both industry and government sectors, that participation in MECLA activities had helped to facilitate important connections that may have been more difficult to establish outside the network.

'What I could share from our group is the kind of conversations that we're seeing between developers and contractors who are both in the group right, and they're starting to cooperate and looking at how to better procure low embodied carbon materials.' (MECLA member)

I definitely think the strengths are around networking or building connections between different industry organisations and external partners, like universities.' (MECLA member)

Networking is a really big part of it, because you get to the opportunity to meet people that are of a similar mindset. And it's really hard to be a manufacturer in Australia, but you try and work through these things. You get to talk to other people in the same position, and get ideas off each other about what can and can't be done in manufacturing and building products. But I think connections through to academia and the EPA, and the people that have been presenting in our group... We've had numerous people from the EPA, and from the federal government, we've had a lot of presentations from different people. And it gives you the opportunity to hear what regulations are coming in, and how that's going to impact things going forward.' (MECLA member)

4.6 KEQ 5: To what extent did the program promote awareness to support development and research of LEBMs including embodied carbon related innovative tools and resources to target stakeholders? How did these support their needs and change in behaviour?

Finding 10

Promotion of awareness about embodied carbon and LEBMs was a strong outcome of the program.

The LEBM Program, through MECLA, produced an array of resources that aimed at informing and increasing awareness amongst industry and government. These resources were set out in Figure 5 under KEQ1a. MECLA met or exceeded most of the targets established under the Evaluation Plan (Table 5).

Table 5: MECLA success indicators, target and actual

Indicator	Target	Actual
No. new case studies	8	20
No. of new factsheets on selected LEBMs	7	2
ISCA Materials Calculator launched as digital service	Yes	Yes
Industry leadership group (MECLA) established	Yes	Yes
No of industry leaders participating	40	140+
No of industry leaders adopting LEBM standards, benchmarks, ratings schemes etc	40	40+ ¹⁰
Event program developed and published for MECLA	10	8
Number of new research developed/delivered	-	2

Successful awareness raising and education were the strongest areas of success identified through the MECLA member survey and stakeholder interviews. In the survey, 64% of respondents thought that MECLA had been *very effective* or *somewhat effective* in growing the market for LEBMs. When asked to justify their answers, 15 out of 39 (39%) mentioned that MECLA had increased awareness/understanding.

¹⁰ Data sourced from: (a) MECLA survey, Q7 where the following number indicated their organisations undertook these measures: measure and disclose (28), use of LEBM specifications/standards (23), update procurement practices (20). (b) Stakeholder interviews where at least 15 indicated their organisations undertook one or more of these measures.



The interviews reflected a similar sentiment. The area in which MECLA was thought to have been most successful was in raising awareness, informing and educating the sector about embodied carbon, LEBMs, and key issues such as measurement, materials that are difficult to abate, and challenges facing manufacturers.

It's been a great space for bringing people from different parts of the built environment supply chain together. I think that's one of the strengths. Having conversations, sometimes difficult conversations that you wouldn't normally have. I think it's been fantastic for raising awareness, generally, about embodied carbon and the importance of reducing embodied carbon. I think it's been a really useful space for people to share the different work that they are doing. Lots of people in lots of different organisations are doing similar work. Pretty much every team is trying to find a way to measure embodied carbon on their projects, and they're all using different systems that they're making up themselves. So what MECLA does is it gives them a chance to come together and say, 'Hang on, why are we all trying to reinvent the wheel at the same time? Why, can't we leverage off each other's efforts, or at least share some of the challenges and how to overcome them?' (MECLA member, property)

Finding 11

MECLA has amplified the discussion around LEBMs on both the demand and supply sides. These discussions have also been helpful in debunking myths.

As well as raising awareness, many stakeholders thought MECLA has successfully stimulated conversations that industry wasn't necessarily having, or at least wasn't having in a co-ordinated way that involved the breadth of stakeholders.

'I do think there's something in there, but it's hard to measure, about the role MECLA is playing in harmonization, or alignment, for embodied carbon, and quantifying that I think it's very difficult. I do think there's something in that, that we won't see until later. But certainly having all the people having these conversations has to be doing quite a lot for that, I think.' (Government agency)

'Having conversations, sometimes difficult conversations that you wouldn't normally have. I think it's been fantastic for raising awareness, generally, about embodied carbon and the importance of reducing embodied carbon, I think it's been a really useful space for people to share the different work that they are doing.' (MECLA Member)

A consequence of some of these conversations that began occurring in the MECLA environment, has been the opportunity to debunk certain myths around embodied carbon and LEBMs. For example, one MECLA member recalled an impactful Spotlight event presentation by a property company working on a large multi-stage development, which demonstrated that using LEBMs did not necessarily equate to an increase in costs. According to the presentation, when the company first sought to include LEBMs, the contractor's quote was far too expensive. But the company learned, over the course of the multi-stage project, that if they gave their contractor sufficient time to undertake research with their suppliers, that the cost of the alternative materials could be significantly brought down. By the time they costed the final stage of the project, the quote was about the same using LEBMs as it would have been using traditional materials. The member who recalled the presentation commented:

'[The contractors] were pricing risk, and not the actual materials. So now the clients and contractors know that it doesn't cost more. It is just opening up those conversations early. It's just finding the right supplier, and that's been a real eye opener.' (MECLA member)

Another member (in concrete manufacturing) talked about the propensity of tenderers to cost projects higher because they don't understand LEBMs sufficiently, and using these new materials are seen as a risk they need to mitigate in pricing the project:

'I've seen it so many times, that because it's new, people might factor in extra costs or risks, or they say, 'The client's asked for it so let's charge them more'. It's been really interesting, but you kind of walk people through it. You hold their hands and demystify and debunk [their beliefs].' (MECLA member)

4.7 KEQ 6: How did the program ensure NSW leads by example?

KEQ 6a. How did the program support development of embodied carbon policies and programs within NSW Government?

KEQ 6b. How did the program support NSW Government agencies drive for procurement of LEBMs?

Finding 12

While the program has not directly changed NSW Government procurement policies and practices (yet), it has supported the drive toward these policies and practices by:

- providing a clear industry signal of its readiness to address the problem of embodied carbon, despite the potential cost this might represent to industry
- educating and generating momentum in the industry for addressing the problem of embodied carbon emissions in construction
- providing a forum to promote greater understanding between Government and industry, test ideas and foster strategic relationships.

The answer to the question concerning the impact of the program on the NSW Government is a complex one. In short, the program has clearly had an impact, although the impact may be more indirect than direct in terms of instigating action.

MECLA has played a significant role in engaging government in the conversation, through their events program, the resources, the working groups and through direct engagement. MECLA has helped government stakeholders to develop their understanding the key issues:

'I've personally had probably 40 conversations with various government agencies, talking about a particular policy idea we had from my working group. And in that process, every time I do it, we're teaching them.' (MECLA co-chair)

The Government stakeholders consulted for the evaluation agreed that MECLA has been an important initiative that has very successfully engaged and built momentum within industry. Through MECLA, the industry has become better informed about embodied carbon and a range of issues that are central to the effort to reduce emissions. The initiative has created industry champions who are keen to engage with both their own and with Government. The initiative has engaged industry to consider and collaborate, and to propose ideas to address some difficult issues. MECLA has provided a forum for Government stakeholders to engage productively with industry and to test ideas, e.g. both Transport for NSW and Infrastructure NSW have used the MECLA forum to help refine principles for Government work on decarbonisation. The forum has also enabled both Government and industry to better understand each other's positions.

'There was this lovely ability for government to test ideas with industry, through MECLA, and for industry to test ideas, to share ideas, to push back, to push harder.' (MECLA Secretariat)

One Government stakeholder pointed to the critical factor that MECLA and the Government are aligned in their mission and focus:

'It's a trusted, independent [network]. We can really identify what the issues are, and their agenda is our agenda, which is increasing acceleration and uptake of low emissions building materials.' (Government stakeholder)

Industry is a critical player in this space. Without the support of, and partnership with industry, the Government would find it very difficult to initiate any regulatory actions or introduce imperatives to use LEBMs. Under the LEBM Program, through the vehicle of MECLA, industry's awareness and knowledge about embodied carbon and the need to pivot to LEBMs, has increased, and is calling on the Government to act to regulate and create imperatives. Governments (not just in NSW, but across the country) now know that industry will be behind them if they follow the path toward regulation – even though it may cost industry to do so.

'I think where [MECLA's] probably added value is they've created the right environment for industry to push government to do something. And so for government to then have that sort of license to go and set rules and targets around something that might be a little bit costly to industry, knowing that industry is going to be quite happy to have it.' (Government stakeholder)

A representative from NABERS made similar observations about the influence of MECLA on their measurement tool initiative, in that MECLA cultivated awareness, knowledge, understanding, as well as motivation and momentum on the industry side, which effectively sped up the pace of the NABERS measurement tool project, because they realised the tool was something industry wanted and needed urgently:

'I think you can probably say [the development of the NABERS measurement tool] sped up. But I think the method was kind of indirect. It sped up because the industry was having these conversations and aligning themselves, and understanding in their own time, what embodied carbon was, so that when we were having conversations with them separately, through the NABERS project, there was already a level of understanding, of not only embodied carbon, but also various positions of industry.' (NABERS representative)



Several stakeholders, in Government as well as in MECLA, put at least some of MECLA's success down to being 'the right thing at the right time'. They maintain that interest in addressing embodied carbon was building, in both industry and government circles. Key companies such as Lend Lease, Mirvac and Built had been looking at the problem of embodied carbon for some time, while manufacturers such as Boral and Holcim were engaged in developing low emissions products. On the Government side, while most stakeholders agree that activity has been slow, the NSW Government announced in 2021 an update to the State Environmental Planning Policy (SEPP) to include embodied carbon. More recently, according to Government stakeholders consulted for this evaluation, the NSW Government has accelerated the drive toward embedding embodied carbon reduction into policy. There is widespread agreement that Transport for NSW, with the largest Government infrastructure portfolio, has provided leadership in NSW by identifying and following best practice in shifting to low emissions materials. From our research, it appears that the EPA and INSW (which is responsible for infrastructure planning and procurement across the whole of the NSW Government) are also now accelerating their drive toward LEBM adoption.

Finding 13

NSW is seen by industry and academia across Australia as providing national leadership on reducing emissions from embodied carbon.

Our consultations with the array of stakeholders for this evaluation heard a very clear message, that NSW is leading the pack in Australia. They point to the traction embodied carbon initiatives have in NSW; the establishment of MECLA in NSW and the support of the NSW Government for the initiative from the outset; the foresight of the MECLA founders and the NSW Government to promote the initiative nationally; the work that NABERS is doing, funded by the NSW Government that will have national application; the work of Transport for NSW in this space, which has provided a model for other infrastructure agencies; as well as the emerging activity across Government in this state.

'What I've really liked about what NSW Government are doing in supporting MECLA, is that MECLA is national. It would be ludicrous for it not to be, and counter to all of its aims. So that's really important and generous. And it's great now that other states are looking to come on board and help finance it. So it's been a real leadership moment for the New South Wales Government.' (MECLA co-chair)

'I'm switching to what you would call an 'honorary New South Welshman' [the speaker was from Victoria], because the NSW Government is one of the prime drivers in this group, and the fact that you can have NSW Government



representatives come to our working groups and meetings, and they are saying, “Hey, we’re doing this and this”. It’s being taken very seriously within the NSW Government, they’re pushing this and, and they are the real government leaders in this space.’ (MECLA member, consultant)

‘There’s a genuine recognition that we don’t have time to reinvent the wheel and to have jurisdiction by jurisdiction doing sequential change, that we can rapidly accelerate if we leverage what’s been done elsewhere.’ (MECLA Secretariat)

Stakeholders were able to point to a number of key projects taking place in NSW, which are prioritising reduced embodied carbon designs. Some are Government projects (such as the Parramatta Light Rail development, which was awarded the highest ISCA rating¹¹) but many are emerging from the private sector, most famously the planned Atlassian Central Tower in Sydney which will contain 50% less embodied carbon than a typical building of its size. Our consultations with MECLA members suggested that the private sector is to a large extent leading the way, with several organisations routinely including LEBM specifications in their projects. One member from the brick manufacturing industry, for example, talked about the range of carbon-reducing activities their company has been engaged in for the past two decades:

‘We’ve got 29 manufacturing plants around Australia and we’re trying to make and reduce the carbon of our products. We started this journey in 2000, when someone asked me one day, how much energy goes into make a brick, and what’s the carbon footprint? And I started working it out. And we know that we have reduced our carbon emissions across the group in Australia by 42%, since 2005. And we’re a big emitter, because we use a lot of gas. That’s a huge drop. So we’ve done things like consolidation, improved our processes, changed products, and we’ve also shut down old, inefficient plants, and we’re building a windmill, we’re building a state of the art one at the moment. And I’ve got 10 to 15 different research projects going, trying to make lower embodied carbon substitute materials. So we have solar roof tiles that can actually generate energy and reduce carbon of the overall house.’

Indeed, two-thirds of the respondents in the MECLA survey said their organisations were already using LEBM specifications. A sample of responses is provided below to illustrate the activity that is occurring before any mandates are introduced.

¹¹ Australian Financial Review (2022) Better building standards will take us to net zero faster, 25/10/22. Available: <https://www.afr.com/companies/energy/better-building-standards-will-take-us-to-net-zero-faster-20221024-p5bs8o>



Develop net zero roadmap for every project at inception. Develop specification advice for projects on LEBM. (MECLA member – design/architecture)

We actively propose a traditional and a LEBM concept for each project and actively present to the client. Proposing to embed in business case and flow through to procurement. (MECLA member – design/architecture)

Proposing to embed in business case and flow through to procurement. (MECLA member – Government programs)

We quantified the embodied emissions of our three-year capital works program (it's huge). We have also been part of a low emissions cement pavement trial. (MECLA member – Government programs)

Set an absolute zero target for 2040. Prepared roadmap, low EC design guide and set project targets/quick wins. Established pilot projects. Loads. Alliance deals with suppliers. (MECLA member – property)

As suppliers of concrete we recognise that our industry is a major polluter. We have set sustainability goals which we will achieve with new manufacturing techniques and educating our clients. (MECLA member – materials manufacture)

Our organisation is measuring and tracking embodied carbon and supporting the industry to lower its emissions. (MECLA member – design/architecture)

Opportunistic use of recycled concrete and brick aggregate material in demonstration projects. (MECLA member – construction)

We supply materials so are providing CO2 data. working on new technology (both IT and materials) to reduce CO2. working with input vendors through procurement. (MECLA member – materials manufacture)

Building with mass timber, independent carbon sequestration analysis investment and publishing findings. (MECLA member – materials manufacture)

We have published EPDs for our various products. We have made a net zero 2050 commitment and have extensive plans underway to decarbonise. We actively engage in the Australian Standards process to promote LEBMs. We are strong advocates for LEBMs and work hard to educate our customers, and other key stakeholders on how the entire building industry (not just the construction materials industry)

needs to adapt to meet the global climate challenge. (MECLA member – materials manufacture)

Changed supply arrangements to procure LEBM, participated in trade events to promote the local availability of LEBM, independently audited to verify claims, third party certification of products, involvement in MECLA and industry forums. (MECLA member – materials manufacture)

Carbon footprint reporting and efforts to reduce scope 3 now with clients - bringing low carbon material options in design and delivery. We have developed a Circular Design Framework which guides our infrastructure project design and delivery. (MECLA member – engineering)



5 CONCLUSION

Australia's record on curbing embodied carbon emissions currently lags behind many other countries that have been more aggressive in implementing policies to encourage the use of low carbon building materials, as well as investing in research, development and manufacturing of new LEBM technologies. The NSW Government's recent focus on embodied carbon, including through its LEBM Program, represents a significant step forward that has positioned NSW as the leader amongst the Australian jurisdictions in this space.

The LEBM program aimed to stimulate and accelerate demand for low emissions materials through partnership with industry. The rationale was that though informing and raising awareness in the construction industry, that industry would become energised and begin to drive supply and demand for LEBMs. At the same time, the program sought to engage with Government agencies to seek to drive improvements in procurement policies and practices, and to support the mechanisms and tools that were needed to facilitate low emissions materials manufacture and procurement. By the end of the program, it was envisaged that LEBM standards, targets and procurement processes would be adopted by the NSW Government and NSW construction sector leaders, and through collaborative effort on both demand and supply sides, NSW would accelerate reductions in embodied carbon emissions, meeting a target of 1mt-e per year by 2030. It was an ambitious undertaking for just 18 months.

Through the vehicle of MECLA, the program has been most successful at raising awareness and educating industry, facilitating and stimulating important conversations that need to take place within the industry, and providing a forum for industry and government to meet, discuss and test ideas with each other. Stakeholders agree that this has been no small achievement, indeed it has been a critical one.

Over the 18 months that the program was active, progress was made in incorporating embodied carbon into existing ratings schemes such as GBCA's Green Star scheme and ISCA's Infrastructure Sustainability (IS) scheme. The program progressed a critical gap on which future progress depends, namely how to measure and calculate embodied carbon emissions through its support for the development of ISCA's digital materials calculator and influence on accelerating the development of the NABERS embodied carbon measurement tool.

However, the initial objective of embedding embodied carbon into standards and ratings schemes was overly ambitious for the timeframe. Indeed, the initiative demonstrated that the objective of changing standards is one that involves a number of

interdependencies and will take considerably longer to achieve, and will need to remain a focus for the Government for the foreseeable future.

6 RECOMMENDATIONS

The following recommendations have arisen out of the learnings from the program and offer some guidance for further work, including the ongoing pursuit of the ultimate outcomes of the LEBM Program.

Issue 1 – Contractor model for aspects of program delivery

The LEBM program demonstrated the benefits of contracting a consortium of experienced, well-connected external contractors for elements of program delivery, where the deliverable relies on strong links to industry. It was widely believed, by both industry and government stakeholders, that a Government department undertaking this task would be unlikely to achieve the necessary industry buy-in the way the contractor was able to, due to their established links across industry and the reputation in the sector of both the contracted organisations and the individuals leading the project.

The program demonstrated the efficacy of establishing a governance model that gives the funding department a place at the table (i.e. in the Project Control Group), but where it sits at arm's length from day-to-day delivery. Such a model might also provide cost efficiencies as a result of leveraging the contractor's existing networks.

Recommendation 1

The NSW Government should consider the contracted delivery model, demonstrated by the arrangements for the MECLA deliverable, where appropriate, and where the success of that deliverable depends on broad and deep reach into industry, and where external contractors might be better placed than the Government to deliver outcomes.

Issue 2 – National scope of MECLA

The decision to expand MECLA as a national body has been an important one due to the way the construction industry operates (i.e. beyond jurisdictional borders). As well as giving the network a national focus, going national has extended membership, strengthened representation across the different sectors, added to the 'brains trust', broadened the opportunities for learning and influence, and broadened the financial contributions base. The NSW Government is to be commended for this far-sighted decision.

Recommendation 2

The NSW Government should support MECLA to continue to pursue and develop a national agenda and engage governments in other jurisdictions.

Issue 3 – Financial support for MECLA

While the term of the LEBM Program has ended, the work of MECLA continues to be important to pursuing the objectives of building both LEBM supply and demand. MECLA continues to serve an important role in educating industry and government stakeholders, facilitating collaboration across industry, and providing a forum for governments to engage and work with industry on reducing embodied carbon emissions. In short, MECLA's work is not yet done. While MECLA endeavours to move toward a self-sustaining model, it will be important to ensure the momentum continues and this may require further financial support, including from Government.

Recommendation 3

The NSW Government should consider how best to continue to support MECLA as it moves towards a self-sustaining model, including consideration of ongoing funding as well as opportunities at a jurisdictional level for assisting MECLA to broaden its support (including financial support) nationally.

Issue 4 – Continuing to progress longer term objectives of the LEBM Program

The objectives for the LEBM Program were likely overly ambitious for an 18-month program with a \$800,000 budget and a staff of one. Clearly the program was not, on its own, and in the space of 18 months, going to achieve the adoption of LEBM standards and change procurement processes, when time and effort had not yet yielded uniform standards and most government agencies were not yet at the point where they were considering LEBM procurement policies. This was borne out by the fact that the third program milestone was not achieved during the program period. In hindsight, it might have been better to identify which parts of the program logic the program could reasonably have been expected to achieve, and develop a staged approach for a follow-on program. It is important that next steps take up where the LEBM Program left off, and continue to progress toward the program's ultimate outcomes, which are critical for achieving the NSW Government's net zero targets.

Specifically, the objective of having LEBM standards adopted by NSW Government procurement processes was not achieved during the program. However this is a critical step in growing the market for LEBMs and needs to continue. During the evaluation

some key NSW Government agencies described their contributions to the move toward LEBM standards becoming a part of procurement processes, but this work needs to continue. The outcomes of this work also need to be monitored.

Recommendation 4

Although the LEBM Program has finished, the longer-term outcomes have not yet been achieved. The NSW Government should continue to work toward achieving the LEBM Program's longer-term outcomes, particularly in relation to development and adoption of standards and changing NSW Government procurement policies. A process for monitoring the specification of LEBMs in procurement policies should be developed.

Issue 5 – Clarifying how to measure CO₂-e savings

The capacity to know how well we are tracking toward achieving the ultimate outcome – to reduce embodied carbon emissions by 1 mt pa by 2030 – is hampered by the ongoing lack of clarity around measuring embodied carbon emissions (which is partly being addressed by NABERS), by a lack of interim targets, and by lack of a clear approach to calculating savings.

Recommendation 5

The NSW Government should continue to clarify methods and processes for monitoring CO₂-e savings.

APPENDIX A – DISCUSSION GUIDES

Low Emissions Building Materials (LEBM) Evaluation

STAKEHOLDER DISCUSSION GUIDE

MECLA MEMBERS

Thank you for participating in this interview, as part of the LEBM Program Evaluation. My name is <NAME> and I work for independent evaluation consultancy Inca Consulting, which has been commissioned to undertake the evaluation on behalf of the Department of Planning and Environment and NSW Treasury. We're undertaking more than 30 interviews with stakeholders for this evaluation, as well as reviewing a broad range of documentation and data. At the end of the research, we will write a report to DPE and Treasury which assesses the LEBM program against a set of evaluation questions. In this report we will not identify any individuals, although we may identify stakeholder groups.

The interview should take around 30-40 mins. I do have a list of questions to ask you, but it will be more like a discussion than a direct Q&A.

I would like to audio record this interview if that's OK. This is purely for my own note-taking, to ensure that I understand and report accurately. Once I have listened back to the interview and taken my notes, I will delete the recording. No recordings or notes will be provided to anyone else, including DPE & Treasury.

Are you happy to proceed on that basis?

Introduction

1. To start with, could you tell me about your role and how you became involved with MECLA?
2. How long have you been in this role? How long have you been on this MECLA subcommittee?
3. Why did you join MECLA? Why specifically this subcommittee? (What are your key areas of interest in relation to LEBMs?)

MECLA and the LEBM program

4. What do you see as the strengths of the MECLA initiative?

5. Are there any weaknesses in this approach?
6. Has it been helpful for the NSW Government to become involved in this area?
Has the Government focused on the right things with this initiative?
7. How effective do you think the MECLA initiative has been in building industry support for the adoption of LEBM standards?

Program achievements

8. What do you see as the key achievements of your subcommittee over the past couple of years? How has MECLA, and this subcommittee, contributed to the goal of growing the LEBM market? (Is there anything you're especially proud of?)
9. Are there any areas in which you'd have liked to see more traction? Why do you think there's been less progress there?
10. Do you think industry is more aware now of the case for using green alternatives to building materials?
11. What are the main barriers to the widespread adoption of LEBMs? How could these barriers best be tackled?
12. Thinking about your own workplace, what measures have your organisations taken to increase the use of LEBMs? [Prompt if necessary: Measuring/disclosing embodied carbon levels; updating procurement practices/policies; use of LEBM specifications and/or standards; other?]
 - a. What impact has this had on projects and the organisations?
13. Do you think the Government could be doing anything else specifically to build demand for the use of green products in construction?

Low Emissions Building Materials (LEBM) Evaluation

STAKEHOLDER DISCUSSION GUIDE (DRAFT)

GOVERNMENT PARTNERS

Thank you for participating in this interview, as part of the LEBM Program Evaluation. My name is <NAME> and I work for independent evaluation consultancy Inca Consulting, which has been commissioned to undertake the evaluation on behalf of the Department of Planning and Environment. We're undertaking more than 30 interviews with stakeholders for this evaluation, as well as reviewing a broad range of documentation and data. At the end of the research, we will write a report to DPE which assesses the LEBM program against a set of evaluation questions. In this report we will not identify any individuals, although we may identify stakeholder groups.

The interview should take around 30 mins. I do have a list of questions to ask you, but it will be more like a discussion than a direct Q&A.

I would like to audio record this interview if that's OK. This is purely for my own note-taking, to ensure that I understand and report accurately. Once I have listened back to the interview and taken my notes, I will delete the recording. No recordings or notes will be provided to anyone else, including DPE.

Are you happy to proceed on that basis?

Introduction

1. To start with, could you tell me about your role and how long you've been in this role??
2. What are your key areas of interest in relation to LEBMs?

The LEBM program

3. Generally, what do you think of the Government's LEBM initiative? Has it been helpful for the NSW Government to become involved in this area?
4. Do you think the Government has focused on the right things with this initiative? Has it chosen the elements that it can have greatest influence over?

Program achievements

5. Has your department/agency changed its procurement policies in favour of LEBMs or 'green' materials? What do the policies now say? When did the change

occur? To what extent was this change a part of the partnership with DPE on the LEBM Program?

6. Which sustainability standards does your agency use? How are the standards applied? (e.g. is there a minimum project size?)
7. If your agency has been routinely using LEBMs for some time (ie more than 2 years), how long have you had these policies? Practically, how has this changed procurement practices?
8. Have these changes had any flow-on or unexpected impacts?
9. Could you please provide a list of the projects in the past two years that have specified the use of LEBMs, including:
 - a. Name and location of each project
 - b. The \$ value of each project
 - c. The \$ value of LEBMs used in each project.
10. Do you think there is now greater awareness in your agency of the case for using green alternatives to building materials?
11. What do you see as the main barriers to the widespread adoption of LEBMs in construction? Have you any ideas about how these barriers might be tackled?
12. Do you think the NSW Government could be doing anything else specifically to build demand for the use of green products in construction?

APPENDIX B – SUMMARY OF MECLA SURVEY RESULTS

Introduction

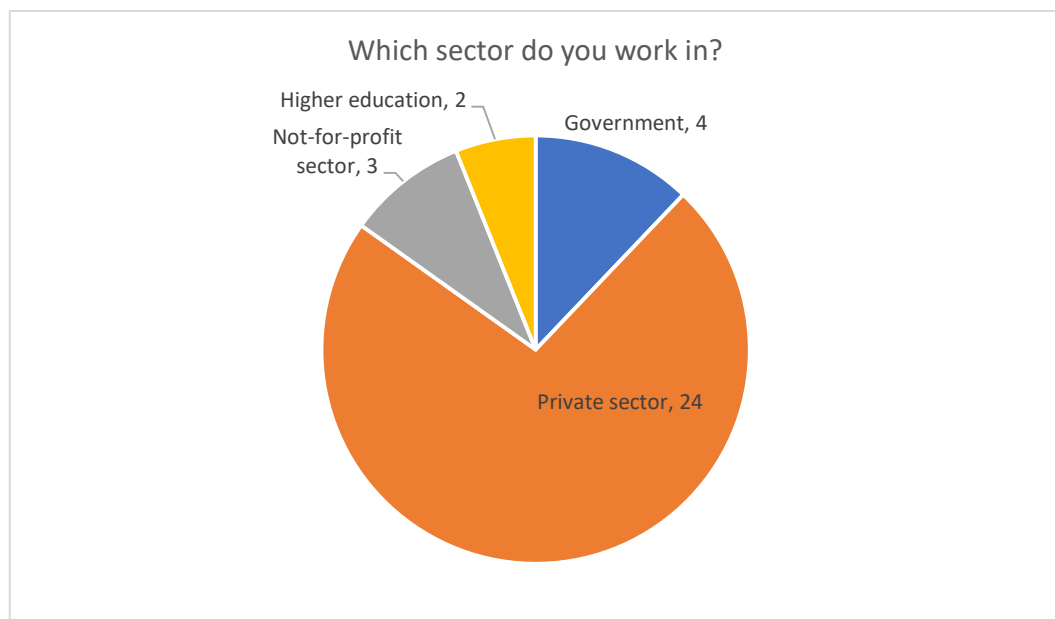
An online survey of MECLA members was undertaken between 12 April and 1 May 2023. The survey questions related to the objectives and outcomes of the LEBM Program Evaluation, and specifically focused on the outcomes of the MECLA initiative.

Once the survey was live, the MECLA Secretariat was asked to email all members, excluding those who had been approached for interview. The link was sent to approximately 100 MECLA members. In total, the survey received 39 responses.

Analysis was undertaken using MS Excel. Verbatim responses were manually coded. The results cannot be interpreted as being representative of the MECLA membership as a whole. Rather, the results provide additional input into the evaluation research.

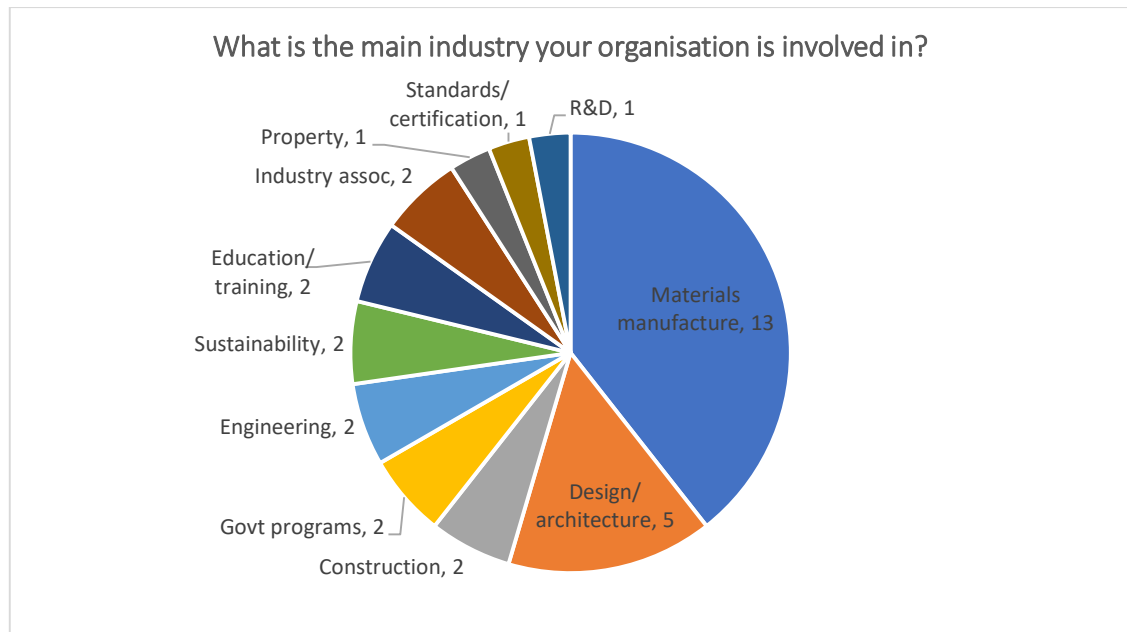
Who responded

Of the 33 people who answered the question about which sector they worked in (6 skipped), nearly three-quarters worked in the private sector, and the rest worked in the government not-for-profit or higher education sectors.



The largest group represented were those who worked in materials manufacture (13 respondent, or 40%). The next largest group worked in design/architecture (5 respondents, or 15%). The remainder worked in the following industries: construction, government programs, engineering, sustainability, education/training, industry/

professional associations, property, standards/certification and research and development.

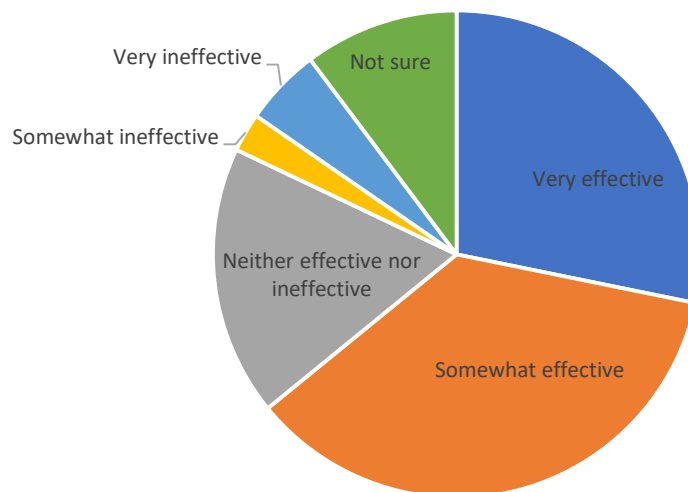


Q.1. How effective do you think MECLA has been at growing the market for LEBMs in NSW?

25 out of the 39 respondents to this question (64%) thought that MECLA has been *very effective* or *somewhat effective* at growing the LEBM market in NSW. Only three respondents (15%) thought the organisation had been *somewhat ineffective* or *very ineffective*.

Answer Choices	Responses	
Very effective	28%	11
Somewhat effective	36%	14
Neither effective nor ineffective	18%	7
Somewhat ineffective	3%	1
Very ineffective	5%	2
Not sure	10%	4
	Answered	39
	Skipped	0

How effective do you think MECLA has been at growing the market for LEBMs in NSW?



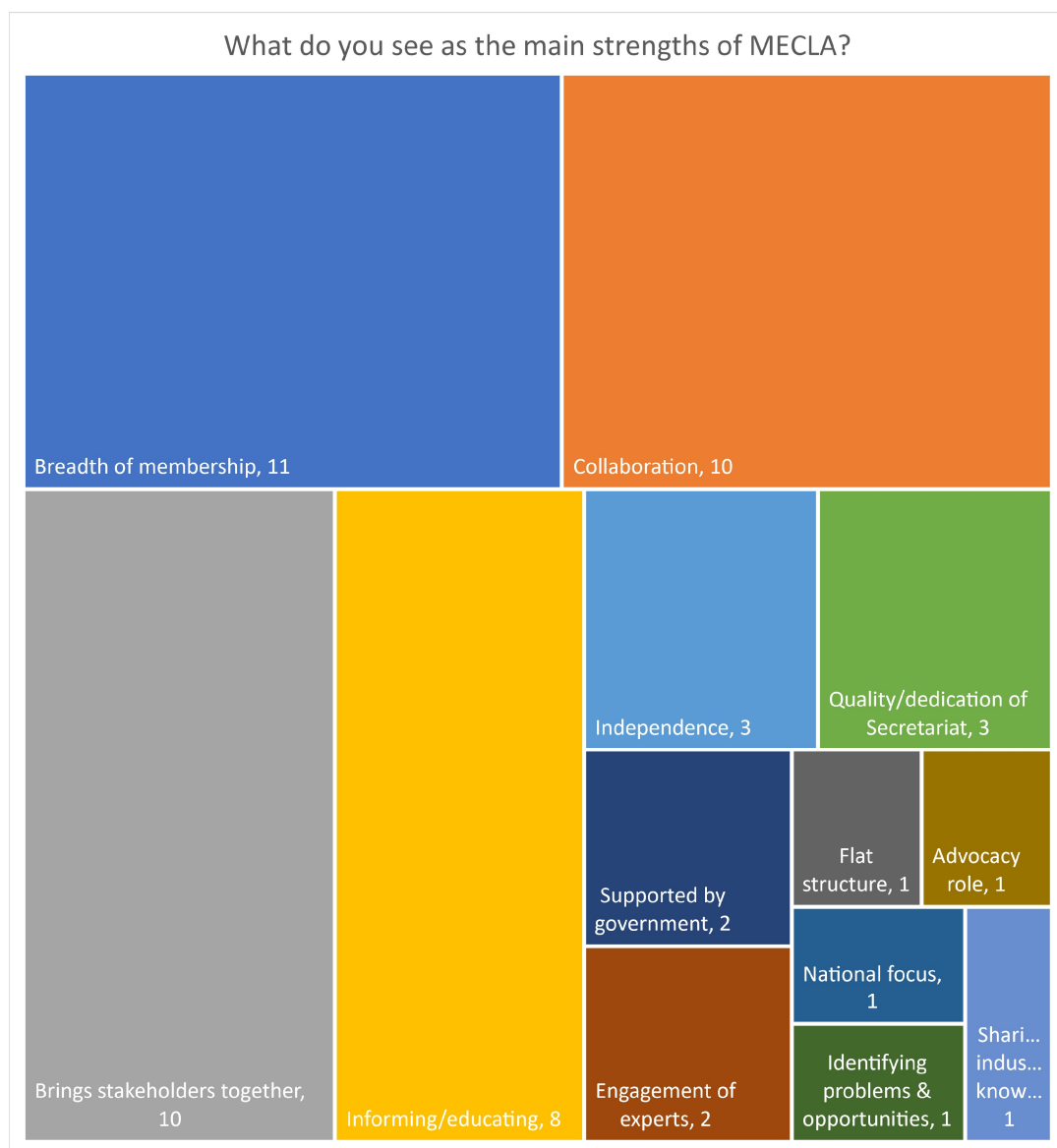
Q2. What are the reasons for your answer in Question 1? (n=39)

Sentiment	No. of mentions
MECLA has increased awareness/understanding	15
More action is needed/insufficient action	9
MECLA has facilitated connections	8
It's too early to tell	5
Not sure of influence	4
MECLA has shifted the conversation	3
MECLA has had direct influence on NABERS tool development	1
MECLA hasn't engaged with all industries	1
MECLA has insufficient power	1
MECLA is too ideological	1
MECLA happened at the right time	1

Q3. What do you see as the main strengths of MECLA? (n=35)

Identified strength	No. of mentions
Breadth of membership	11
Collaboration	10
Brings stakeholders together	10
Informing/educating	8
Independence	3

Identified strength	No. of mentions
Quality/dedication of Secretariat	3
Engagement of experts	2
Supported by government	2
Advocacy role	1
Flat structure	1
Identifying problems & opportunities	1
National focus	1
Sharing industry knowledge	1



Q4. Are you aware of anything that is limiting the impact of MECLA? (n=36)

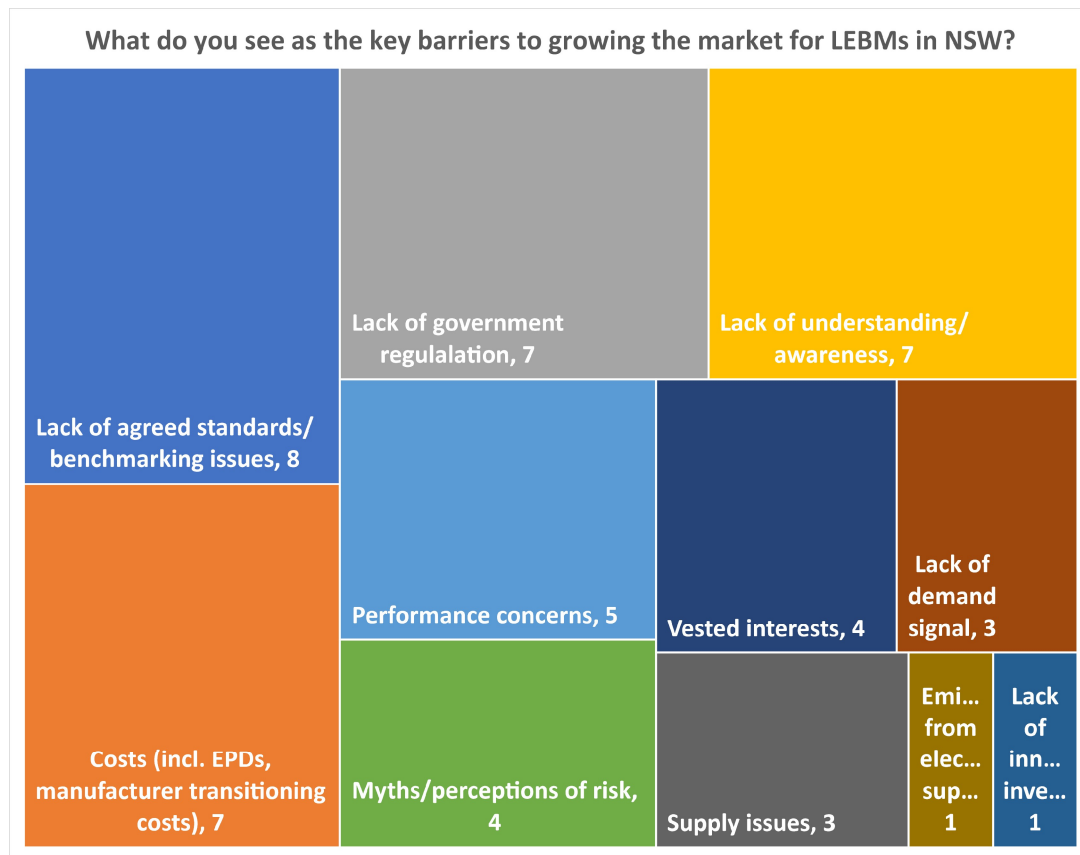
Are you aware of anything that is limiting the impact of MECLA?		
Answer Choices	Responses	
No	8%	3
Not sure	31%	11
Yes (please describe)	61%	22
	Answered	36
	Skipped	3

If Yes, please describe (n=22)

Limiting factors	No. of mentions
Vested interests/conflicts of interest	5
Funding/resourcing	4
Disorganised/too informal	2
Disagreements re measurement	2
Lack of understanding/inertia in supply chain	1
Absence of decision makers	1
Lack of collaboration between working groups	1
Unclear scope	1
Volunteer capacity	1
Strength of leadership	1
Lack of independence	1
Slow pace of change in government	1

Q5. What do you see as the key barriers to growing the market for LEBMs in NSW? (n=33)

Barrier	No. of mentions
Lack of agreed standards/benchmarking issues	8
Costs (incl. EPDs, manufacturer transitioning costs)	7
Lack of government regulation	7
Lack of understanding/awareness	7
Performance concerns	5
Myths/perceptions of risk	4
Vested interests	4
Lack of demand signal	3
Supply issues	3
Emissions from electricity supply	1
Lack of innovation/investment	1



Q6. Where do you think the NSW Government should be focusing its efforts to grow the LEBM market? (n=34)

Area of focus	No. of mentions
Investing in/supporting new technology development (particularly in hard-to-abate industries)	8
Mandate LEBMs in government projects	8
Regulation & standards setting	6
Incentives/funding for EPDs	5
Support MECLA	4
Evidence based policy	4
Support local manufacturing	2
Engaging with NSW & Australian Government agencies	2
Invest in mass timber	2
Utilise AusLCI	1
Setting targets	1
Education	1
Setting realistic timeframes for transition	1

Q6 Verbatim responses

Engaging product manufacturers. Supporting product manufacturers in understanding their emissions and reducing them.

Enforcement of the use of LEBMs through Government regulation

Top down and bottom up: funding EPDs for small businesses and establishing benchmarks for early design feasibility for asset types.

The NSW Government should support the LCA sector's national life cycle inventory database, AusLCI (<https://www.auslci.com.au/>) and consider how LEBMs can use AusLCI to quantify their emissions, as well as how AusLCI can be used to benchmark against standard materials. The AusLCI platform was set up for these purposes, but unless the NSW Government and other key stakeholders take an active interest in the database, we will end up with disperse and contradicting information that will hamper any effort to reduce embodied emissions.

Removing barriers and consolidating efforts (ie multiple initiatives and low impact)

Keep the focus on NABERS Embodied Carbon tool to set the industry standard. Advocate to Aus Govt to publish embodied emissions factors as part of the annual Greenhouse Factors Workbook. Continue to support MECLA.

Continue with MECLA. Influence all govt agencies in NSW to set consistent LE expectations in tendering. Coordinating finance for supplier manufacturers.

High-impact materials - i.e. concrete, steel and aluminium.

Where it will make the most difference.

It needs to up-skill it's technical staff. There is a reluctance to accept new technologies. Sometimes that reluctance is justified but we need government employees to be able to identify what technologies they should adopt and which technologies they should reject.

Requiring transparency in the embodied carbon content of building and construction materials by requiring independently verified carbon footprint data from suppliers to NSW Government projects. Invest in new technologies in hard-to-abate industrial sectors such as steel, aluminium, plasterboard, and glass. Require LEBM such as concrete.

Forestry and mass timber innovation.

Processes/Products with verified EPDs

Investment in manufacture and supply chain, incentivising environmental product disclosures, mandating low emissions building materials on all state construction projects.

Reviewing regulations to enable the uptake of LEBMs

Evidence Based policy, standards and specifications for recycled content and low embodied materials in government construction contracts

Mandating low CO2 products as first option and demonstrate why they can't be utilised. Include circular economy. Remove prescription - go for performance.

Through government procurement strategies.

Facilitate the above risk adoption, as well as allowing sufficient time for concrete producers to put in place a supply chain for LEBM, which cannot be done in a few months, the usual lead time given for large projects.

The NSW Government should be focussing its efforts in a number of ways. Firstly it is the largest procurer of infrastructure and has a large building construction portfolio. All NSW Government projects should include LEBM requirements from all levels from strategic documents, to business cases, to design and construction tenders. Secondly it should continue to support the development of low carbon materials, including green steel and aluminium and low carbon concrete. Thirdly, it should avoid funding black holes such as carbon capture and storage and hydrogen, that are uses as fossil fuel “in the future” delaying projects.

Favourable specification and procurement policies.

Mass timber construction solutions

Use the think-tank of MECLA to define projects facilitating the LEBM market and fund it.

Policy and investment in hard to abate sectors

This LEBM market is much like Amazon Web Services historical example, whereby for LEBM assistance with distribution capabilities for small innovative change makers would be beneficial. AWS example, with Cloud Computing largely made assessable by Amazon Web Services, accelerated change makers capacity for new ideas formed into

flourishing businesses and benefits to the public community. Before AWS it was cost prohibited for many to take Entrepreneurial risk, much like the LEBM market as it is today.

MECLA - they have the support of manufacturers.

Establishing the policy position on responsible / circular procurement / requirement investment in facilitating R&D / funding for local manufacturing

Timber based construction products (e.g. mass timber)

Clear policy and targets

Standards and Specifications Education

It could start with its own buildings and look to have embodied carbon reported for materials.

Create standards to allow alternative materials to be used. Issue contracts on affect on the environment as much as cost. Lead introduction of alternate technologies

Support companies in generating EPDs

Fund MECLA

Q7. Has the organisation you work for undertaken any of the following measures to increase use of LEBMs? (check all that apply)

Answer Choices	Responses	
Measure and disclose embodied carbon levels	80%	28
Use of LEBM specifications and/or standards	66%	23
Update procurement practices	57%	20
Other changes	31%	11
None of the above	6%	2
	Answered	35
	Skipped	4

Q8. Please describe these measures undertaken by your organisation (verbatim)

Measure and disclose embodied carbon levels - My organisation carries embodied carbon quantification in materials and discloses them in world-wide recognised Environmental Product Declarations. Update procurement practices - My organisation has a team specialised in procurement practices and helping organisations update them.

Use of LEBM specifications and standards - My organisation provides advice to buildings and infrastructure developers and recommends the use of LEBM in them.

We actively propose a traditional and a LEBM concept for each project and actively present to the client

Develop net zero roadmap for every project at inception. Develop specification advice for projects on LEBM.

Start2see assists clients with measuring and reporting embodied emissions, mainly through Environmental Product Declarations (EPDs).

Identify and implement Scope 1 and 2 emission reduction initiatives

We quantified the embodied emissions of our three-year capital works program (it's huge). We have also been part of a low emissions cement pavement trial.

Set an absolute zero target for 2040. Prepared roadmap, low EC design guide and set project targets/quick wins. Established pilot projects. Loads. Alliance deals with suppliers.

Developing crude spec templates

Our organisation has promoted the use of low emissions building materials through the creation of global standards that measure overall carbon emissions

As suppliers of concrete we recognise that our industry is a major polluter. We have set sustainability goals which we will achieve with new manufacturing techniques and educating our clients.

Our organisation is measuring and tracking embodied carbon and supporting the industry to lower its emissions.

Modernising/updating our EPDs improving our re-use in single use products. Working with specifiers to choose/understand Process/Product based EPDs. Investigating/R&D use of by-products for green energy and increase their carbon life.

My organisation is a sustainable design consulting agency. We perform embodied carbon and life cycle assessments for clients on construction projects and advise on methods to achieve reductions in environmental impacts of projects.

Review as part of developing guidance for climate resilient materials.

Opportunistic use of recycled concrete and brick aggregate material in demonstration projects

We supply materials so are providing CO2 data. working on new technology (both IT and materials) to reduce CO2. working with input vendors through procurement.

We are a research organisation engaged in the development of LEBMs and encouraging their adoption. One area we see a great need for new work in is the end of life scenarios for the "new sustainable materials"

We are producers and developers of LEBM.

Policy and design directives from managing director down, staff education, updating standard details and specifications. Undertaking project Life cycle carbon assessments. Advocacy.

Ensuring that embodied carbon is recognised in Standards that we develop.

Building with mass timber, independent carbon sequestration analysis investment and publishing findings

LEBM proven early success to date with completion of R&D, Production, Testing, In-Field Installed Success, No Complaints, Commercialisation to market in Australia including registered Australian patent and Worldwide patent, for industrial waste based LEBM. The material as it comes from the Australian Iron Ore, meets an ever-growing market of steel production. And once countries like Australia change from Blast Furnace to Electric Arc Furnace operations with renewal electrical power source, we have a perfect fit for the environment. The new methods of construction may incorporate more steel and REYNARD WOOD type LEBM from this source to save the environment. To continue to harvest trees will become more and more a concern in the future, especially in Australia.

Development of a sustainability program that recognises better performing businesses proposing to embed in business case and flow through to procurement.

Carbon footprint reporting and efforts to reduce scope 3 now. With clients - bringing low carbon material options in design and delivery. We have developed a Circular Design Framework which guides our infrastructure project design and delivery

We have published EPDs for our various products.. We have made a net zero 2050 commitment and have extensive plans underway to decarbonise. We actively engage in

the Australian Standards process to promote LEBMs. We are strong advocates for LEBMs and work hard to educate our customers, and other key stakeholders on how the entire building industry (not just the construction materials industry) needs to adapt to meet the global climate challenge.

Changed supply arrangements to procure LEBM, participated in trade events to promote the local availability of LEBM, independently audited to verify claims, third party certification of products, involvement in MECLA and industry forums.

Measuring and setting targets, LEBM specifications

Measurement and accounting of carbon footprint

We have undertaken LCA's and Circular Economy measurements to demonstrate attractiveness of our geopolymers offerings compared to cement-based concrete

APPENDIX C – SUMMARY OF DATA SOURCES

Type	Source
Program documents	<p>LEBM Program Evaluation Plan</p> <p>Program Delivery Plan Low Emissions Building Materials (v4 & Appendices (1-6) (redacted)</p> <p>CCaS and Net Zero Program Board - Terms of Reference</p> <p>CCaS and Net Zero Program Board minutes:</p> <ul style="list-style-type: none"> - 20 Oct 2021 - 17 Nov 2021 - 15 December 2021 - 14 February 2022 <p>MECLA Final Report (redacted)</p> <p>LEBM program budget_actuals ver1_redacted</p> <p>List of standard setting engaged in MECLA</p> <p>ISCA Final Report (redacted)</p> <p>PUBLICLY AVAILABLE International Review of Embodied Carbon policies</p> <p>Summary of LEBM Program Interventions</p> <p>NSW Government procurement related contact list</p> <p>LEBM Model Turlough 4 interventions Aug21</p> <p>Environmental Trust Low Emissions Standards Business Case</p>
Data collected for the evaluation	<p>Stakeholder interviews</p> <p>MECLA Members Survey responses</p>
Other	<p>Website content from MECLA, NABERS, GBCA, ISCA, NSW Government and others</p>