

Opportunities for Excellence in Standardised Adoption of Recycled Content and Sustainable Material Construction Products in the Transportation Industry

2022 Road Australian Fellowship Program – Group 5 (Victoria)

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1 Executive Summary

This report presents an opportunity for change within the Victorian government in particular the Australian Transport Infrastructure Industry (MTIA). Transportation is the third-largest source of greenhouse gas (GHG) emissions with the highest growth rate. The impact transport infrastructure has on the environment and climate change requires action. Industry and government have a responsibility to partner to meet the challenges of change needed to address national and global community expectations on sustainability.



How are transport infrastructure sectors evolving to meet climate change challenges?

In asking this question, sustainability in transport infrastructure needs to be considered in two fundamental ways. The emissions embodied in construction and the emissions enabled by the infrastructure. This report focuses on the emissions embodied in construction.

To achieve the reduction in carbon emissions required and committed to by Australia, the Transport Infrastructure Industry has recognised that it needs to play its part. A large part of achieving significant contribution to the reduction of embedded carbon in the Transport Infrastructure projects delivered in Australia, is transitioning to a circular economy by the development and use of renewable and sustainable material products.

The Victorian transport infrastructure industry is in many ways leading through the Victorian government's Recycled First policy and the establishment of Ecologiq, a state government body dedicated to the facilitation and introduction of low carbon and recycled products in projects. Despite this, many manufacturers of low carbon and sustainable (recycled and renewable) material products are still finding it difficult to achieve large scale adoption of their products in the transport infrastructure market.

Through the research for this paper, the project team have sought to understand the reasons for the slow adoption of these products in the Victorian (and wider Australian) market. After interviews and discussions with representatives from the Victorian government infrastructure department(s), we spoke with personnel from the manufacturers of three of these products, including the AusGroup/PACT Alliance, Wagner and Downer. We found several key themes which were repeated in all interactions.

These common themes were:



Importance of a centralised Industry framework (policies, processes, guidelines, standards, and specifications) for the approval of sustainable products,



Insufficient internal human resources to champion the initiative and drive change,



Uncertainty with regards to the long-term performance of new products and the correct allocation of long-term risks.

In response to the common themes, the project team have suggested some immediate and longer-term strategies to improve the adoption of sustainable material products in the Australian Infrastructure Industry.

These recommendations include:

1

Develop clear, centralised, and transferable frameworks

2

Establish centralised State resources dedicated to the initiative

3

Clarify the expectations, needs and allocations of risk between authorities/owners, suppliers, contractors, and consultants

2 Introduction

2.1 Roads Australia Fellowship Program Overview

The objective of the Roads Australia Fellowship is to develop the future leaders of our industry. To support this goal, and as part of the annual program, Fellow's work in groups on a research project that demonstrates:

- Understanding of key issues and challenges faced by industry,
- Ability to work together on a collective response,
- Ability to apply presentation skills taught during the mid-year workshop; and
- Ability to communicate a convincing argument to key stakeholders and develop feasible implementation solutions for Roads Australia.

2.2 2022 Research Topic

How are transport infrastructure sectors evolving to meet climate change challenges?

2.2.1 Background

Demonstrating a commitment to environmental sustainability is a core aspect of maintaining a company's social license to operate in today's industry. As the community becomes more alert to the everyday impact of climate change, it is imperative that our industry shows how it is delivering transport infrastructure that is more resilient and is actively contributing to better environmental outcomes. Ensuring businesses and workforces are aligned to this objective is fundamental to locking-in the future opportunities presented by a decarbonised economy and industry.

2.2.2 Project

The project team was asked to respond to the research topic, in collaboration with an industry partner. The project team chose to work with Major Road Projects Victoria (MRPV) to:

- Identify some of the climate change challenges that industry is facing in the delivery or operation of transport infrastructure, and
- Identify risks and opportunities and propose changes that could be implemented.

2.3 The Need for Change

Infrastructure has a significant, lasting influence on sustainability outcomes in Australia. Around 70% of Australia's emissions are associated with infrastructure projects (CEFC,2020).

The impact of transport infrastructure cannot be more apparent than now. Governments and private entities are both investing record amounts on new infrastructure. At the same time, infrastructure is facing increased pressure to prepare for net zero emissions.

Currently sustainability outcomes are not effectively prioritised in infrastructure planning, design, procurement, and operations across the transport infrastructure sector. The transport infrastructure that is being constructed today, can provide the foundation for a sustainable future.

3 Research Focus Area

The transport infrastructure sector has been evolving to meet climate change and sustainability gradually. In 2020 the Victorian government announced the Recycled First Policy which aims to

optimise the use of recycled and reused materials in construction projects. Bidders on major transport infrastructure projects need to demonstrate how they will achieve this, while meeting existing standards and specifications. There have been several successful initiatives to date. However, individual project successes in the implementation and use of sustainable products have generally not been replicated broadly across the industry.

3.1 Preliminary Research – carbon, sustainable, recycled, and renewable materials, products, specifications, and approvals

What factors affect the adoption of recycled and renewable materials and products in the Australian infrastructure construction industry?

Initial broad research undertaken for this project investigated the possible factors preventing the adoption of recycled and renewable materials and products. One key reason for limited broad scale adoption is a lack of a common and documented project owner processes which outlines the framework and steps required for the approval and specification of products on infrastructure projects. The project team determined that an ad hoc approval effort is applied at the individual project level, without an overarching standardised approval process at the state transport authority or national level. This lack of a well understood approval and adoption process stifles the scaled adoption of new products in the industry.

3.2 Hypothesis

The project team's hypothesis is, that the most significant constraint in the transport industry is the lack of a clear, centralised framework for endorsing new sustainable products for standardised adoption.

(Note: a "framework" includes policies, processes, guidelines, standards, and specifications.)

4 Research Methodology

4.1 Key Objectives

The project objective is to determine existing processes for endorsing new sustainable, recycled, and renewable products for industry, determine if there is a more suitable process or areas for improvement; and to sense check any improvements to the process with suppliers who have successfully incorporated sustainable products and materials and those commencing the process.

4.2 Approach

The project team worked with MRPV - as part of Department of Transport (DoT) Major Transport Infrastructure Authority (MTIA) - to understand the existing product approval processes and their development and use within various Victorian transport project authorities.

After collection and interrogating the findings from MRPV and DoT, members of the project team held meetings with representatives from key product suppliers to ascertain what their experience has been with the approval processes across the various state transport authorities. Interviews were adopted rather than formal surveys as a more useful way to gather information and to not restrict the conversation flow and direction, potentially leading to unforeseen insights.

4.3 Key Industry Partners

4.3.1 Authorities

Table 1 shows the authorities engaged during the project.

Table 1. Government authorities

 MAJOR ROAD PROJECTS VICTORIA	<p>Major Road Projects Victoria MRPV is part of Victoria's MTIA, who oversee major transport projects in Victoria. Within MRPV the relevant business areas were identified as:</p> <ul style="list-style-type: none"> • MRPV Technical Services and Engineering teams • MRPV project delivery teams • Ecologiq (MTIA)
 Department of Transport	<p>Department of Transport (DoT) Victoria DoT is the State Road Authority, representing the Asset Owner, Operator and Maintainer for transport infrastructure in Victoria. Engagement for this project involved subject matter experts responsible for assessment of materials and experience in development and application of specifications and guidelines</p>

4.3.2 Product Suppliers

Through the market research and engagement, the project team identified three suppliers to research and interview (Table 2).

Table 2. Product suppliers

 <small>INTEGRITY DELIVERY AGILITY CERTAINTY</small>	<p>AusGroup AusGroup provide integrated maintenance, turnaround and construction services throughout an asset's lifecycle, from the initial construction to sustaining capital projects and ongoing maintenance in the Energy, Resources, Minerals and Renewable sectors. From planning through to the management and execution, AusGroup is both agile and responsive in delivery ensuring our client's needs remains at the centre of everything we do. Focussing on 'pain-free contracting' provides clients with full accountability and continuity from our leadership team through to our operational technicians.</p>
	<p>Wagners Wagners is a leading producer of construction materials and services for Australian and international markets. Established in 1989 in Toowoomba, Queensland. Wagner's Construction Materials and Services (CMS) include cement, concrete, aggregates, bulk haulage services, precast concrete and reinforcing steel. Their New Generation Building Materials (NGBM) business creates higher performing, more sustainable materials that reduce the impact on the environment. This includes Earth Friendly Concrete® and Composite Fibre Technologies products, which are used in projects globally.</p>
 <small>Relationships creating success</small>	<p>Downer Road Services Downer manages and maintains road networks across Australia and New Zealand and manufactures and supplies products and services to create safe, efficient, and reliable journeys.</p>

	<p>Downer are a leading manufacturer and supplier of bitumen-based products and an innovator in the sustainable asphalt industry and circular economy, using recycled products and environmentally sustainable methods to produce asphalt.</p> <p>Downer's road network solutions are underpinned by industry-leading research, development and innovation, unique asset management tools and our commitment to safety, environment and sustainability through industry awarded Zero Harm programs.</p>
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4.4 Desktop Review of Literature

A literature review was undertaken to determine current policies, guidelines and/or applicable standards. The below provides a summary of key documents that informed and shaped the project teams considerations and project approach.

4.4.3 Policy

Victoria's Recycled First Policy 2020

The State Government released the State's Circular Economy Policy called *Recycling Victoria* in February 2020. A key intent of Recycling Victoria is to optimise the use of recycled and reused Victorian materials in transport infrastructure projects through the *Recycled First Policy*.

From 1 March 2020, all tenderers on Victorian major transport infrastructure projects are required to demonstrate within their tender, how they will optimise the use of recycled and reused materials at the levels allowed under current standards and specifications. Tenderers may also identify opportunities to trial new innovative products or opportunities to drive improvements to recycled and reused material quantities. Successful tenderers report against their Recycled First Commitments periodically during delivery which help ensure consideration is given to recycled and reused materials over virgin materials and divert useful materials from landfill. The Recycled First Policy also enables continuous improvements to transport standards and specifications, research and development and creates greener more sustainable transport infrastructure outcomes.

The National Waste Policy and Action Plan 2019

The National Waste Policy and Action Plan provides a national framework for waste management and resource recovery in Australia. The policy applies five key principles of circular economy to waste management which includes increasing the use of recycled materials and building demand and markets for recycled products. Under the Action Plan, the government commits to a target to significantly increase the use of recycled content by governments and industry, which includes an action to determine and report on use of recycled content in road construction.

4.4.4 Materials Assessment Frameworks and Guidelines

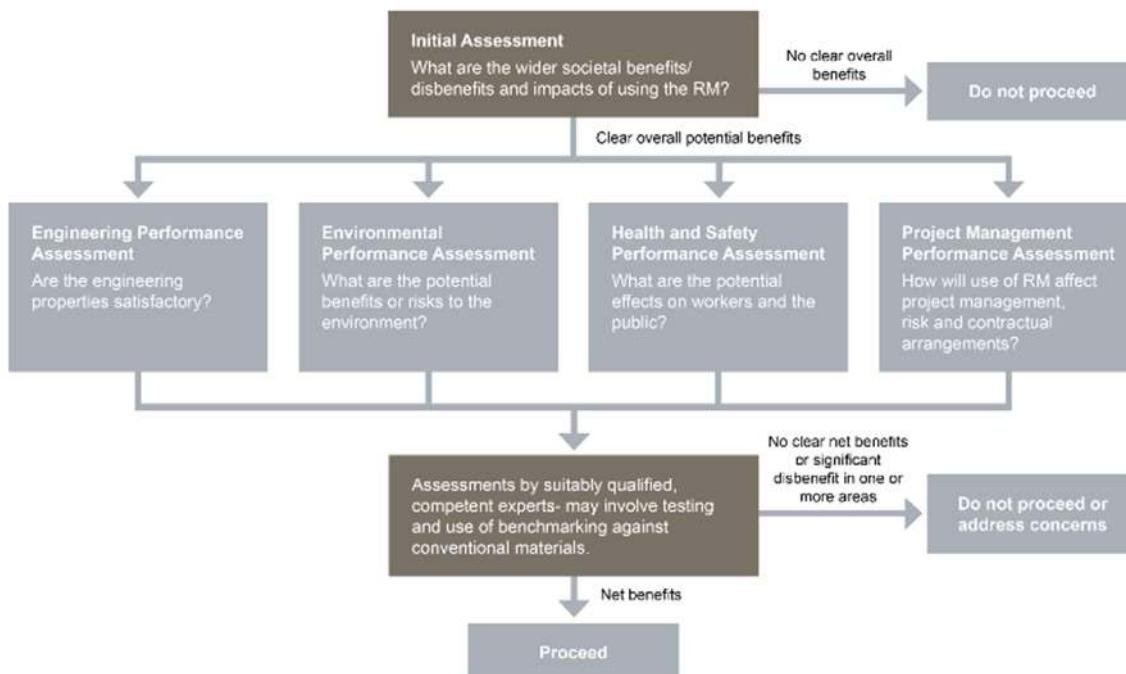
Austroads Guide to Pavement Technology Part 4E: Recycled Materials

Guide to Pavement Technology Part 4E: Recycled Materials presents the latest information about products manufactured from recycling various waste materials accepted through registered recycling and reprocessing facilities (Austroads 2022). This includes the specification, manufacture and application of products derived from the recovery of construction waste from the building industry; reclaimed asphalt pavement (RAP) from pavement maintenance and rehabilitation activities; recycled rubber from end-of-life tyres (crumb rubber); industrial slag from manufacturing processes; fly ash from power generation; recycled plastics; and recycled glass.

Recycled materials are continually finding broader application within industry. It is important that these materials undergo a robust assessment prior to utilisation. An assessment tool has been developed to provide agencies with a framework to rigorously scrutinise emerging materials for

potential impacts to economic, environmental, societal and performance outcomes. This framework improves confidence in the uptake of recyclables through mitigation of risk and uncertainty to deliver higher quality assets (Austroads 2022). Below provides an overview of the framework. More information regarding each of the assessment components can be found within the Guide (Figure 1).

Figure 1. Assessment Framework Overview



Ecologiq Reference Guide: Product and material trials for recycled material use

Ecologiq supports in-principle product trials and validation of recycled material uses in transport infrastructure projects. The guide provides an overview of a typical in-service trial process which can be used to assess the use of recycled materials in construction, and to assess the use of products manufactured from recycled materials. Consideration of trial design to verify the claims of specific products or to assess new construction practices and equipment is needed. By following a robust and comprehensive approach to measuring the performance of new materials and products, trials should provide with the evidence necessary to assess the performance and use of recycled materials in road and rail infrastructure.

ARRB Transport Infrastructure Product Evaluation Scheme (TIPES)

The Transport Infrastructure Product Evaluation Scheme (TIPES) is a process aimed at providing an independent fit-for-purpose assessment of innovative road construction products. TIPES is intended for the evaluation of products that fall outside the scope of established standards and specifications. To date just a couple of pavement materials are successfully registered with TIPES.

4.4.5 Research Reports

Research reports that were referenced for background information during this project include, but not limited to the below documents. These key reports capture the current state of practice in Industry, identify gaps/challenges, and make key recommendations to support and enable improved sustainability outcomes.

- ARRB Best Practice Expert Advice on the Use of Recycled Materials in Road and Rail Infrastructure: Part A Technical Review and Assessment.
- Roads Australia, The Journey to Net Zero Report notes there is huge potential to reduce transport infrastructure related embodied carbon by considering circular and whole of life thinking. The report makes the below relevant recommendations:
 - Recommendation 1.5: Ensure systems thinking, circular economy, and whole of life approaches are utilised.
 - Recommendation 3.4: Advocate for the adoption of sustainable procurement practices in line with ISO 20400
 - Recommendation 3.9: Engage with industry, government, and regulators to create a nationally approved supported approach to measurement, identification and selection of low carbon materials, products, and services.
- Circular Economy (various background information resources)

While currently not all recycled and renewable material products may be deemed fully sustainable and/or fully respond to meeting climate change emissions challenges, various research findings support that increasing use of recycled and renewable materials can contribute substantially to reducing carbon emissions. While there is no clear framework for measuring the circular economy currently in Australia (ACE Hub, 2022). The Circularity Gap Report (UK, 2022) estimates that only 8.6% of the world represents circular economy. Their studies suggest that switching to a circular economy could reduce greenhouse gas emissions by around 39%.

4.4.6 International Practice

PAS 2080: Carbon Management in Infrastructure

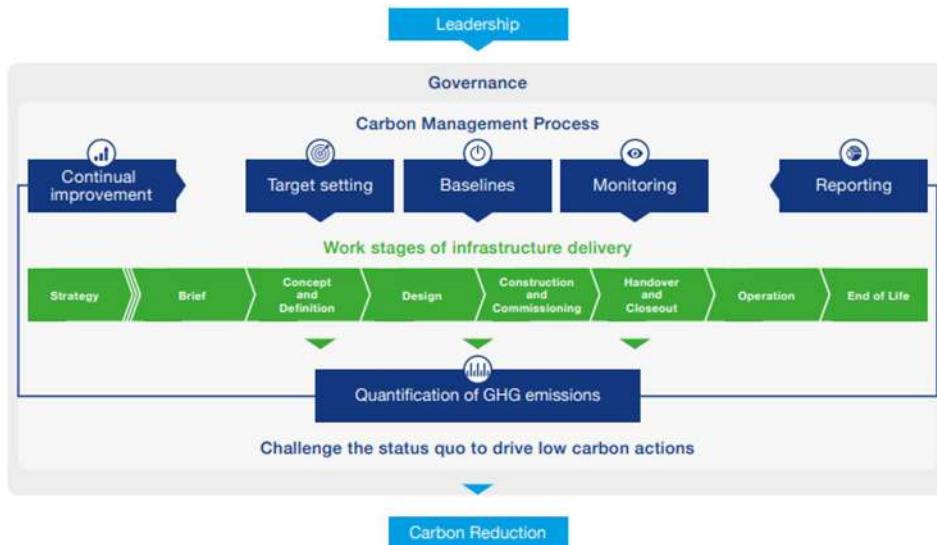
PAS 2080 is a UK standard for managing infrastructure carbon. The framework looks to provide a whole of life process, aiming to reduce carbon and reduce cost through more intelligent design, construction, and use. The process recognises the need for collaboration between all parties (the asset owner, designers, contractors, and suppliers) to achieve carbon reduction in infrastructure.

The framework identifies 5 key drivers for reducing carbon and reducing costs:

- Leadership
- Communication and culture
- Commercial solutions
- Metrics
- Innovation and standards

While the framework is specifically related to carbon management, it provides a useful framework, with the key drivers identified highly applicable to the adoption of recycled content and renewable materials across the life of an infrastructure project (Figure 2).

Figure 2. Carbon Management Process



5 Research Findings

5.1 Desktop Review

Research indicates the increased use of recycled and renewable materials and products to transition to a circular economy is fast evolving. There are already many recycled materials widely used, with significant opportunity to increase greater adoption in a wide range of applications. In Victoria, there are procurement and contracts initiatives in place that are successfully driving the increased adoption of recycled content within infrastructure projects.

While there are some examples of broader frameworks to support implementation, an evident gap is a clear pathway to support development of more enabling standards and specifications and clear measures to support assessment of innovative materials and recycled content applications.

The following risks and opportunities for industry were identified through the projects initial desktop research, preliminary stakeholder discussions and literature review. Initial risks identified include:

- A lack of clearly defined approval processes for materials that are not considered under current standards and specifications.
- Different approval processes, durations and requirements depending on the product and the individual transport authority subject matter experts.
- Limited opportunities for testing and/or approvals within constrained programs.
- Supply chain confirmation and ability to locally source recycled and renewables materials
- Risks of implementing innovative products and materials i.e., a lack of published performance data and evidence base.
- Knowledge sharing risks to protect IP and/or commercial sensitivities.

5.2 Partner Interviews

Interviews were undertaken to validate the initial findings, determine if there are other contributing factors, and identify further opportunities to facilitate the adoption of alternative materials.

5.2.1 Victorian Department of Transport (DoT)

Overview

DoT (Victoria) is the state road authority, representing the asset owner, operator and maintainer for transport infrastructure in Victoria. Engagement for this project involved subject matter experts (SMEs) from the Assets and Engineering team. This group provides an integrated center of excellence for transport engineering standards, capability development, and engineering support to the organisation throughout the asset life cycle. SMEs are also actively contributing to the development and review of national specifications and guidelines, e.g., through Austroads and other forums, including advising on research and development projects and materials trials related to the application of recycled and renewable products.

Discussions confirmed that DoT do not have a formal process for assessment and approvals of such materials. They are assessed against performance and material property requirements from standard specifications, and approvals are determined by a risk-based approach. Typically, there are several 'unknowns' that the state road authority (SRA) request to be answered and addressed by the proponent. DoT have limited resources, so the expectation is, that proponents proposing the product, need to address asset owner queries and demonstrate that the product meets the determined requirements.

The recently released Austroads Guide to Pavement Technology Part 4E, generally represents the current approach across the country and provides a framework for a robust assessment process. It is important that the review and approvals process provides an end-to-end systems approach including:

- Materials – source, processing, testing and quality
- Manufacturing – methodologies and technologies
- Construction – methodologies
- Use – purpose, design life, performance
- End of life – reuse/disposal, consideration for any legacy issues

Challenges

- *Lack of State Road Authority resources*

Specialist inhouse capabilities to undertake technical risk-based assessments are declining. With the current shortage in market resource capability, there is a risk of inadequate succession planning to ensure SRAs continue to be an informed client. SRA's do share information through various forums such as Austroads and leverage off other authorities, including national and international research and trials.

There is no dedicated central body coordinating the review and adoption of alternative materials. Such a body could provide numerous benefits in assisting to coordinate state-based requirements and supply chains, proactively respond to emerging challenges and share industry learnings. Resourcing of multiple functions in DoT can result in reactive responses to proposals from suppliers and MTIA, where short project timeframes can limit ability for suppliers/contractors to adequately test and assess material properties.

SRA's assessment processes and human resourcing to undertake assessments vary state to state and often there are no clear pathways within the organisation structures for proponents and/or projects to seek materials and products assessments. Stated based requirements can vary based on several factors. One is due to varying local supply sources and material properties, resulting in varying manufacture and construction methodologies that are not easily translatable across states.

- *Materials testing and quality control*

A critical factor to ensure quality and performance of recycled and renewable materials is the testing and quality control of source materials. This includes the control of input materials, ensuring adequate stockpile of quality source material, and the mix and construction methodologies.

Increasingly, due to time pressures, assessments are reliant on short term tests to inform long term performance. Some tests and technology don't currently exist to achieve this, therefore requires further research to look at methods for accelerated testing, that can be extrapolated out to represent the design life performance.

- *Consideration of long-term risk – not just a project headline*

Responsibilities and accountabilities for the long-term risks and benefits is somewhat undefined. Victoria's Big Build is driving the increase of adoption of recycled materials, with assets handed back to DoT for operation and maintenance. There is limited SRA funding to support strategic long-term trials and monitoring. Potential and perceived cost risks for management of 'unknown' performance risks ultimately results in less appetite for asset owners to adopt new materials.

Considerations need to be seen as a national issue to attract interest from other states and investment funding to undertake longer term trials and strategic monitoring programs to better inform outcomes and performance. Local Government projects can often provide suitable projects and sites for testing and trials as these are less risk than e.g. high value high risk State assets such as urban freeways. Government grants have successfully enabled such trials.

One example is development of a recycled plastics pavements mix design. The supplier initiated successful trials with Local Council. In addition, through Austroads, federal funding was granted for longer term research, testing and trials. These trials continued to reveal additional performance benefits and characteristics to strengthen the case for adoption of such materials and de-risked several initial assumptions and unknowns.

5.2.2 Major Road Projects Victoria (MRPV) and Ecologiq

Overview

Major Transport Infrastructure Authority (MTIA) oversee Victoria's Big Build, delivering major road and rail infrastructure. MRPV forms part of MTIA, responsible for planning and delivering major road projects in Victoria. Projects include major road upgrades, new roads, bridges and major freeway upgrades.

Ecologiq is a Victorian Government initiative, created in 2019 to integrate recycled content into transport projects. Ecologiq are supporting the implementation of the Recycled First Policy by working with industry to remove barriers through the high-level priorities noted below (Ecologiq 2022):

- Optimise the use of Victorian recycled and reused materials on Victorian major transport projects
- Change the approach to technical standards and specifications
- Pursue market development opportunities

MRPV's Sustainability Policy outlines sustainability objectives and principles that must be considered under government legislation and policy when planning and delivery projects. A clear action from this policy is to establish robust sustainability objectives and targets.

As noted in Section 4.4.3 above, all tenderers on Victorian major transport infrastructure projects are required to demonstrate how they will optimise the use of recycled and reused materials. The policy is recognised as key driver to contractors and suppliers' willingness to investigate, innovate and propose recycled content solutions, as it creates greater certainty materials will be accepted.

There is currently no formal documented process for seeking approval of sustainable and recycled content materials. A risk assessment approach is adopted to ensure quality and performance outcomes of the material, that is, materials can demonstrate the required mechanical and engineering properties. MRPV and the Asset Owner needs to be confident in the materials use, effective design life, durability, structural integrity, and relevant strength properties.

Questions that are considered in determining suitable alternative materials where standards are not well defined include:

- What is the product trying to achieve?
- What material is being substituted and the properties of this within the application?
- What is the proposed testing method? Is there a testing method available or does a new method need to be developed?

Temporary works for large MTIA projects can create opportunities for longer term testing and research and development opportunities. A number of these are currently being explored with the aim to better inform long term performance outcomes.

Challenges

- *Capability and Technical Leadership*

Required competency and capability to meet the challenges are present in Australia, however resourcing and ensuring capable people have availability to lead initiatives is a challenge. With the scale of projects and ambitious delivery timeframes, priorities are often focused on getting the job done. Therefore, opportunities for innovation to positively impact project sustainability outcomes, risk not being fully pursued. Research institutes have a significant role to play and with increased understanding of industry, there are further opportunities to improve application of research into practice.

- *Standards and specifications*

MTIA are driving a big focus on innovation, standards and specifications, and the owners of these need to enable change. Ecologiq are currently leading a review of interstate standards and specifications to propose nationally consistent changes relating to the allowable limits of various recycled materials. Improved frameworks for robust assessments of recycled content materials will assist where standards and specifications may not currently exist. Initiatives for information sharing are also being explored, including lessons learnt and case studies for creating successful step changes to improve confidence and empower designers, contractors and suppliers to innovate.

- *Early considerations to inform project funding*

It is recognised considerations need to be built into the early concept design and business case phase of projects to ensure there are contingencies to protect opportunities being dollar value-driven out of future detail design and delivery stages.

- *Misconceptions of recyclable materials*

There are currently many misconceptions around recycled materials such as they can be more costly, require laborious construction methodologies, require special handling and/or are less safe to install, are unable to meet design life requirements. However, these perceptions are not always applicable as substitute materials and their purpose/properties vary greatly. Such perceptions can be myth busted based on engineering and improved industry knowledge.

- *Quality of source materials and local supply chains*

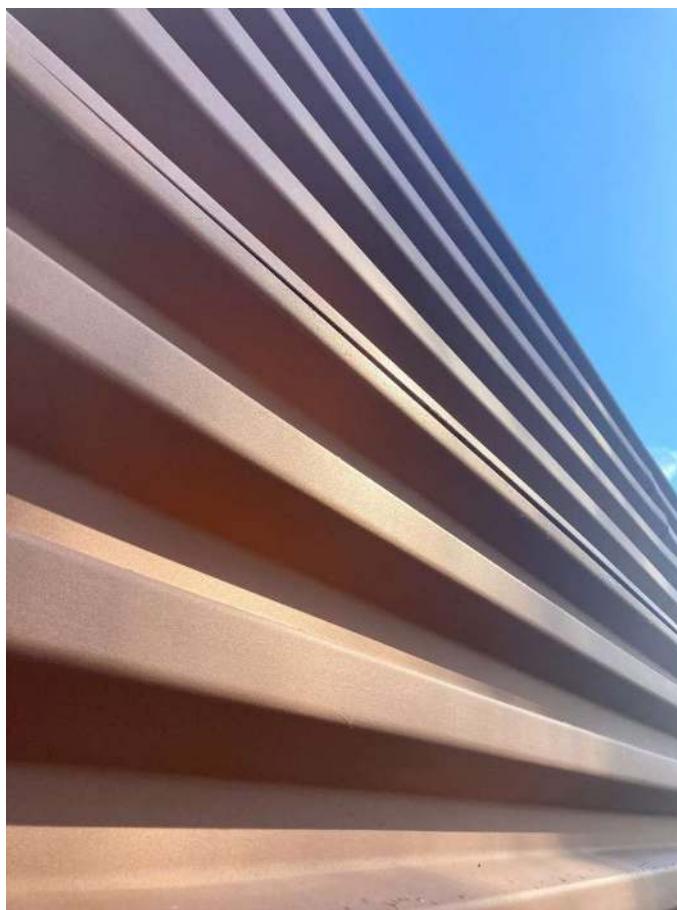
One of the biggest challenges for delivery is management of source material, variability of supply and ability to confirm/source local supply chains.

5.2.3 AusGroup

Overview of Product

Through their partnership with the PACT Group, AusGroup Alliance have developed Rotationally Moulded Panels (Figure 3) for use in infrastructure noise walls and viaduct/bridge screens. The production process involves bi-axial rotation of a mould in an oven at a temperature of 1500⁰ Celsius. These panels can be any shape or colour and they can have a pattern included in the moulding process on one or both sides of the panel. The constituent material is polyethylene powder (plastic polymer).

Figure 3: Rotationally Moulded Panels (PACT Group)



AusGroup and PACT have been producing Rotationally Moulded Plastic Panels for road infrastructure projects in Victoria and other jurisdictions since 2012, including those articulated in Table 3.

Table 3. Rationally Moulded Plastic Panels projects

Project	Delivery Authority	Year
Peninsula Link	Linking Melbourne Authority	2012
Caufield to Dandenong 9	LXRP	2017 - 2019
Monash Freeway (Toorak Rd Off Ramp)	VicRoads	2018
Groningen	Netherlands	2016
M5 Sydney	TfNSW (RMS)	2013

Since 2017, the AusGroup and PACT partnership have started to manufacture and install panels which include Post-Consumer Recycled (PCR) plastics in the product. Some benefits from the use of PCR plastics in panels used on infrastructure projects:

- Provides a home for difficult to recycle waste coming from film and soft plastics.
- Reusing millions of milk bottles collected from kerb sides.
- Panel can accommodate bespoke design possibilities coupled with good structural properties and reduced maintenance imposition.
- RMP panels have inherent anti-graffiti properties as the material itself does not lend itself to graffiti due to its moulded variable shape. In addition to this, flexible paint can be applied to the panels if required.
- Can provide noise absorptive or noise reflective properties as required on individual projects. RMP panels have better noise absorption properties than timber and corten.

To date the RMP Panels, which incorporate PCR, have been used on the Mordialloc Bypass Project in 2021 and a project in Jelco, Sydney in 2020. The panels are also being considered for inclusion in the following projects:

- Melbourne Airport Rail (viaduct screens)
- NorthEast Link (secondary packages)
- Coffs Harbour Bypass (TfNSW)
- M1 Black Hill to Tomago (TfNSW)

The PACT/AusGroup partnership developed the use of PCR panels after identifying a need to reuse the large quantities of PCR Plastics generated by Australian society. As advised by the AusGroup/PACT Alliance, this drive comes from a shared corporate value and belief in “a bold broader plan for plastics in Australia”. This broader plan involves a belief that “Australia can accelerate the creation of a local circular economy and become a global benchmark of excellence”.

Challenges

One of the main challenges the AusGroup/PACT partnership have faced was a lack in the Victorian industry before 2018, of a noise wall standard. This lack of recognised standard meant that each project had their own specific requirements and project specific noise wall standards, which has dampened the ability to transfer knowledge and experience from one project to the next. Each project and/or project owner (or delivery authority) focuses heavily on different performance or materiality aspects of the noise wall, however, product durability is a common theme. Exacerbating this issue, each delivery authority (e.g., LXRP, MRPV, NELP, etc.) have a different and often

undocumented approval process for the incorporation of RMP PCR panels on their projects. In addition, the approval of the product on one project does not transfer as an approval on another project under the same delivery authority.

In 2018 VicRoads introduced a noise wall standard section 765, however, it was developed as a “one size fits all” document which addressed all types of wall materiality including concrete, steel, timber, acrylic, etc. An unintended consequence of the introduction of this standard was the adoption of a fire standard, which is only attainable using concrete or steel. Section 765.03(g) refers to requirements from AS1530.3 in regards the ignitability of materials and the spread of flame.

To overcome these requirements, AusGroup/PACT tested their panels against a European standard (EN 1794-2) and AS1530.3 and found that the RMP panels performed better than acrylic and timber in respect to fire resistance. Experience from current installations shows that grass fires have not ignited the RMP panels. Some panels installed on the Peninsula Link project have ignited after an instance of vandalism where an accelerant was used. The affected panel was destroyed; however, the fire did not spread to adjacent panels. AusGroup/PACT also flag that due to the repeatability of the manufacturing process, replacement panels can be produced to replace any individual panels which may be damaged during a project’s operation.

Despite these mitigating measures, the current standard relevant in Victoria still effectively excludes the use of RMP PCR panels. This has meant that the possibility for RMP PCR panels to be adopted on an infrastructure project is specific to each individual project and usually depends on the following factors:

- An interested party or person on the development team, for example, and an architect, who advocates for the use of recycled products and RMP PCR panels specifically. This has been realised during the early development of several projects in Victoria and NSW such as Melbourne Airport Rail Link (MARL), Coffs Harbour Bypass and the M1 Black Hill to Tomago project, where urban architects have specified the use of the RMP PCR Panels.
- A project development team who are open to the use of RMP PCR panels. Some individuals in the industry have preconceived prejudices against the product around areas such as durability and fading.
- The use of RMP PCR Panels is taken up or ‘allowed’ early in the project development process. Experience has shown that it is very difficult to substitute the RCM PCR panels later in the procurement or delivery phase due to time constraints on the contractor, and the development of other design elements (e.g., noise wall foundations), which may deviate from the installation requirements of the RMP panels.
- The comparative cost of the alternative ‘standard’ product, for example, if a patterned concrete panel is the alternative, then RMP PCR Panels are cost competitive.
- Are sustainability outcomes valued on the part of the project owner.

This uncertainty has resulted in a variable pipeline of work and an inability to complete a ‘Go/No Process’ or business feasibility case for the product on behalf of both AusGroup and the PACT Group.

AusGroup/PACT have been involved with DoT in the development of a technical specification for plastic noise walls which is currently being considered in Victoria. As the ultimate asset owner, DoT are clearly aiming to mitigate future risks associated with the use of a largely unproven product. The new specification will detail performance requirements against durability, fire performance, design life and acoustic properties, as were considered in the original VicRoads Specification 765. This new Plastic Noise Specification also considers a manufacturing warranty, which was not a requirement under the section 765 specification.

The AusGroup/PACT partnership believe that this new specification will enable all Victorian delivery authorities to specify RMP PCR panels more easily on projects, thereby ensuring a healthy future

pipeline for manufacturing. This will enable the RMP PCR panel noise walls to become a profitable product line for both companies.

5.2.4 Downer

Overview of product

The Downer Group has developed Reconopahlt™(Figure 4), an asphalt product that contains high-recycled content derived from true waste streams, that would otherwise be bound for landfill.

Reconopahlt™ has been developed through exclusive partnerships with Close the Loop, Repurpose It and Downer's own repurposing facilities. The product is comprised of:

- Soft and scrunchable plastic bags and packaging,
- Waste glass destined for landfill or indefinite stockpiling,
- Waste toner from used printer cartridges,
- Reclaimed asphalt pavement (RAP) from end-of-life roads,
- Crumb rubber from end-of-life tyres, and
- Coarse aggregate and sands from street sweepings.

Figure 4: Reconopahlt™ Recycled Materials (Downer Group)



The Reconophalt™ mixes comply with AS2150 and state road authority specifications.

Downer estimates that 170,000 tonnes of soft plastic waste is created in Victoria every year (based on 2019 figures), with only 17,000 tonnes or 10% recovered (Sustainability Victoria, 2021).

Reconophalt™ provides a new use for soft plastic to improve recovery and reduce the amount being sent to landfill.

The asphalt mix was developed by Downer and tested for over two years. The research culminated in Downer constructing a demonstration of the product in partnership with the City of Hume. The soft plastic asphalt road was constructed on Rayfield Avenue, Craigieburn, and was aimed at testing and demonstrating performance of the product under different weather conditions. Further environmental validation of the product has been completed with the NSW Environment Protection Authority.

In an Australian-first, Downer's Reconophalt™ has been approved for use in road construction by the New South Wales Environment Protection Authority (NSW EPA) under a resource recovery order and exemption. This followed 18 months of extensive testing under a program designed in

conjunction with the NSW EPA, including the potential leaching of Bisphenol-A (BPA) and release of microplastics. Reconophalt™ has been demonstrated to bring no increased environmental risk compared to standard asphalt while providing considerable sustainability and performance benefits.

Downer's research has found that the recycled materials coupled with an innovative product mix design increases the fatigue life, improves durability and resistance to cracking. Performance testing of some Reconophalt™ has shown up to 65% improvement in fatigue life and superior deformation resistance for withstanding heavy vehicular traffic.

Reconophalt™ is now commercially available across Australia and is currently being used on MTIA projects as a VicRoads approved mix and by local governments in Victoria and councils in New South Wales and South Australia. Reconophalt™ is marketed as cost-competitive with standard asphalt.

Challenges

There were several challenges for Downer to obtain approval for use of the product, as well as making the product commercially viable. These were:

- *Lack of process within road authorities for a product of this nature to be considered.*

The introduction of a product containing recycled plastics into asphalt was an industry first that Downer launched. As such there was no existing process for approval. Within Victoria, though VicRoads had a mix approval process, the use of plastic was unique and complicated this. Downer went through extensive testing and performance requirements to demonstrate that the product was able to meet the technical requirements for use, as well as showing that the product was safe for the environment. This process was led by Downer and resulted in the product becoming a VicRoads approved mix. Critical to this was the City of Hume acting as a willing participant in a demonstration with Downer for the use of the product on a new road. Though Downer has been able to obtain approval in Victoria. There has not been approval from other state authorities for use.

The challenge with there being no process, was uncertainty. It meant that there were no review guidelines for technical personnel within the road authority to endorse, or for Downer to test against. Further, there was no documentation on how an approval could be granted. This was in terms of testing requirements, documentation, and timeframes. This uncertainty meant a level of risk was required by Downer to undertake the development of product without knowing how or when the product may be approved. It is noted that the investment in this product by Downer was driven by the ESG benefits, rather than commercially motivated. The development and adoption of Reconophalt™ came out of the passion and dedication of the "Close the Loop" organisation which was looking for a use for toner cartridges and soft plastics from supermarkets.

- *Willingness of an authority to be the first to use*

Hume City Council has an Innovation and Circle Economy Committee which was interested in adopting a trial for Reconophalt™. This was supported by Sustainability Victoria with a grant for the demonstration of a field trial road containing recycled material.

Once the trial pavement had been constructed and implemented under test conditions, Downer was able to obtain the VicRoads Asphalt mix approval. This required a significant amount of testing; they have spent over \$500K on testing in overseas laboratories which could test the leachate and micro plastic properties of the mix.

- *Testing and performance requirements*

Without a known process the testing and performance requirements were difficult to ascertain and then prove. Specific concerns related to rubbish entering the environment through reuse in the roads by the EPA required innovative testing to demonstrate compliance.

Downer went through the process of completing an Environmental Product Declaration in accordance with ISO 14025 and EN 15804 for Reconophalt™. As mentioned above, this process was time consuming and required a significant investment by Downer.

- *Inability to transfer approval between States*

The lack of a national standard and/or national approval process has meant that the approval for use of Reconophalt™ in Victoria does not translate to a more streamlined approval process in other states. This requires Downer to go through a separate approval process for each state.

This requires a significant amount of investment and process to be repeated for each state, with the challenges of obtaining approval replicated.

Opportunities

Downer was able to successfully obtain accreditation for the use of Reconophalt™ and has had increased market awareness, particularly in Victoria in recent years due to the following:

- The willingness of an authority to ‘take a chance’, in this case the City of Hume.
- Introduction of the Recycled First Policy, requiring contractors building in the Victorian transport projects to optimise their use of recycled and reused materials.
- Creation of Ecologiq in Victoria advocating for the integration of recycled and reused content across Victoria’s transport infrastructure projects.

The creation of a government lead organizations and policies has been instrumental in creating change.

5.2.5 Wagners

Overview of Product

Wagner's began investing in Earth Friendly Concrete (EFC) since 2005 (Figure 5) as a requirement to include more sustainable construction products. Initially it was driven by the carbon tax from Gillard Government. EFC is a Geopolymer Concrete which utilises no general purpose (GP) cement and requires an aluminosilicate pre-cursor. This occurs through condensation reaction of ground granulated blast furnace slag, fly ash and alkali salts which binds and hardens. GPC based concrete may be formulated to cure more rapidly, gain ultimate strength more rapidly and have higher chemical resistance in hostile conditions as compared to Type GP and or Type GP blend-based concrete.

The ingredients which make up the EFC mix include:

- EFC activator, binder and admix solution – Geopolymer,
- Ground Blast Furnace Slag and Flyash,
- Aggregate, and
- Water

The implementation of this product can reduce the carbon footprint of a project by 5-15%. Due to the omission of calcium carbonate, which is a highly carbon intensive manufactured material, as an ingredient in GPC, it significantly reduces the carbon footprint of this product.

Figure 5: Earth Friendly Concrete (Wagner)



Previous Applications

Wagner's has implemented sustainable materials in several projects as demonstrated in Table 4.

Table 4. Wagner projects and applications

Project	Application	Year
Cross River Rail	Temporary Precast Tunnel Lining Segments	2021
Alcock Bridge	Prestressed Bridge Beams	
Pinkenba Wharf	Wagner	2018
Toowoomba Wellcamp Airport	Runway Pavement	2014
Global Change Institute Building	Concrete Slabs	2012

EFC has been proved to rival traditional concrete in certain aspects of product performance i.e., structural, with 30% higher flexural tensile strength, 40% lower dry shrinkage and high fire resistance. For durability it has a high acid and sulphate resistance, high Microbial Induced Corrosion (MIC) resistance, high chloride ingress resistance (marine) and low heat of reaction.

Wagner's has received approval for EFC from Deutsches Institut für Bautechnik (DIBt) which is a technical authority in the German construction sector. The institute carries out its activities based on an agreement concluded between the Federation and the German federal states. Wagner's chose this institute as it had a stringent and pragmatic approval process which would lead to approvals in other European countries in the future. The 12-month process which incurred a cost of \$500k is aimed at products that are intended for permanent incorporation in construction works and its performance is relevant in relation to the fulfilment of the basic requirements for construction works and its intended use is not fully covered by a harmonised standard. Given that EFC does not use Portland Cement, the main ingredient in traditional concrete mixes and in all current Australian Standards for concrete, Wagner's believed this was the most appropriate approval path for the product.

Furthermore, to the DIBt Approval EFC has achieved performance recognition in the following:

- Performance compliance to AS3600 "Concrete Structures"
- Queensland Department of Main Roads released MRTS270 Precast Geopolymer Concrete Elements specification

- American ASTM sub-committee to develop specifications for alternative binders including alkali activated cementitious materials
- DIBt approval for use of EFC® under the German concrete code, DIN EN 206-1

Challenges

To date, application of EFC in Australia has been driven by an individual driving the outcome and ensuring adequate testing occurs for approval. This was the case with Aurecon for the Kyogle Bridge where the use of EFC was driven by the lead structural engineer. The challengers EFC face in the market is lack of correlation to the Australian Standards, authorities not aligning, supply chain partners, the local material and cost. The largest challenge for EFC is AS3600 Concrete Structures which specifies Portland Cement in all concrete mixes, this leaves no option for a geopolymers concrete solution. This product has only been utilised in non-structural application to date as the material type approval process is extensive and there is a lack of long-term data and durability on the product. The client often required the tests replicated for initial mix again to achieve sign-off which is not a comparable method to demonstrate the effectiveness of the product. This results in design engineers not achieving approval for mix designs and application of the product.

Furthermore, the asset owner is more likely to not accept a product that doesn't adhere to a specific standard and therefore inheriting risk. This risk is linked to perceived structural stability, maintenance and long-term performance of the asset constructed with this product. To overcome AS3600, Dr Stephen Foster led a committee to create an addendum to AS3600, titled Geopolymer Design Handbook which Wagner and other industry professionals contributed to over the 3-year process. The handbook will provide designers a guideline on creating structural designs with geopolymers concrete.

Other Challenges Include:

- **Multiple Authorities:** Other than EFC not aligning with AS3600, if the product is approved for a specific project and application there is ongoing difficulty in gaining approval at an alternative authority. In Queensland there are five water authorities alone and approval with one authority does not equate to approval at another. The method and testing of ongoing approval incur a cost of up to \$10k and 6 months per mix design.
- **Supply Chain Partner:** Wagner requires a supply chain partner in alternative states to supply the specific EFC geopolymers as an additive to their concrete mixes. Larger concrete supply companies such as Boral and Holcim are not open to engage with a third party and rather investigate a geopolymers internally.
- **Material:** In Victoria the Slag is treated with Gypsum. Gypsum is the retarding agent of cement which is mainly used for regulating the setting time of cement and is an indispensable component. The Gypsum doesn't allow the chemical reaction from the geopolymers to activate properly to achieve the right concrete properties. The Slag supply is vertically integrated with cement companies and are interested in keeping EFC out of the market.
- **Cost:** The cost of EFC has a 20% premium on standard concrete mixes. However, the properties of the concrete in marine usage remove the requirement of other concrete treatments as it can withstand the environment.

6 Discussion

The research identified several links and common themes between the experiences of government authorities and the observations of product suppliers gained through their experiences in navigating the approvals landscape of the Australian Transport Infrastructure industry. The following subsections organise these links and themes, outline opportunities for improvement and highlight potential constraints and risks that may be encountered along the path to improvement.

6.1 Common Observations and Key Themes

There were three key observations across both government and industry, these include, but not limited to:

- Importance of a centralised Industry framework (policies, processes, guidelines, standards and specifications).
- Human resources and ownership
- Standards, compliance, and risk.

Table 5 outlines these themes in detail.

Table 5. Observations and themes identified

Theme	Authorities / Asset Owners	Suppliers
A	Importance of a centralised Industry framework (policies, processes, guidelines, standards and specifications)	
Observations	<i>Without a framework, it is difficult for Authorities/Owners to define a yardstick by which to assess new products</i>	<i>Without a framework, it is difficult for Suppliers and Contractors to develop strong business cases and invest</i>
Commentary	<p>A framework confirms vision and clarifies the direction for the industry.</p> <p>Without a framework, authorities/owners have faced challenges with encouraging market response and, also with vetting and assessing new products when they are proposed by the market. A framework provides an ability to address key questions such as:</p> <ul style="list-style-type: none"> • Which parameters should the new product be assessed against? • What testing regime should the product meet? • How does the proposed product compare to similar products? <p>A significant step forward in Victoria has been the establishment of the Recycled First policy which requires bidders on future transport projects to demonstrate how they will optimise the use of recycled and reused Victorian materials.</p> <p>Related, Ecologiq has produced several reference guides which offer concise overviews of the multitude of varying industry standards and specifications that currently exist, and ultimately support the increased adoption of recycled and reused materials.</p>	<p>A framework confirms the expectations and pathway to approval.</p> <p>Without a framework, suppliers and contractors face substantial challenges with developing robust internal business cases for investment, research and development and scaled production without clarity on approval likelihood and return-on-investment (R.O.I.). There can be too much perceived risk to allow for upfront commitment, the transferability of approvals across State jurisdictions is unclear, which further clouds the clouds the business case for R.O.I. and scaling. Even if a Supplier were to obtain pre-approval in one jurisdiction, there is no clear understanding that some transferability into other jurisdictions will be entertained.</p>
B	Human Resources and Ownership	
Observations	<i>Insufficient internal human resources to champion the initiative and drive change</i>	<i>Significant positive impact of a centralised State organisation dedicated to the initiative (Ecologiq)</i>

Commentary	<p>The government project delivery bodies expressed a lack of available internal resources and capability to review and interrogate proposals for new sustainable products as a limiting factor. Most internal reviewers/approvers have competing tasks and priorities. They also expressed that there was not consistency in resources across that states.</p> <p>A significant step forward in Victoria has been the establishment of EcologiQ – a centralised organisation dedicated to supporting the implementation of the Recycled First policy and ensuring the policy requirements are effectively met.</p> <p>EcologiQ provides structured guidance and advocacy to the industry (including suppliers and contractors), effectively championing the initiative.</p>	<p>The introduction of the Recycled First Policy has clarified the State's vision and direction, and increased surety for market investment by suppliers and contractors.</p> <p>The establishment of EcologiQ in Victoria has increased visibility, communicated priority and urgency, and demonstrated the State's commitment to recycled, more sustainable materials and products.</p> <p>Furthermore, the guidance provided by EcologiQ has clarified the process for the market which encourages investment.</p>
C	Standards, Compliance and Risk	
Observations	<i>Unchartered territory with regards to the long-term performance of new products</i>	<i>Australian Standards can be prescriptive and may preclude adoption of new products</i>
Commentary	<p>Authorities/owners may find themselves in a dilemma around how to responsibly assess new products using currently available tools.</p> <p>Guidance documents within State authorities may be non-existent or in development. Austroads guidance can become the default reference point (where applicable) but may not be tailored for this purpose.</p> <p>Given the obligations of authorities/owners to prioritise the long-term performance and minimise future costs and risks associated with their asset networks, they may request product warranties, whole-of-life assessments, repeated testing regimes, etc., which can become too onerous and costly for suppliers to meet.</p> <p>The uncertainty pertaining to long-term product performance fosters risk aversion.</p>	<p>Relevant Australian Standards may not provide full or clear guidance on the adoption of new eco-friendly products. Moreover, some clauses within certain Standards may preclude the adoption of novel products.</p> <p>Suppliers are left with uncertainty around how to demonstrate the quality and compliance of their product.</p> <p>In some instances, the challenge presented by the rigidity in Australian standards may encourage suppliers and industry organisations / individuals to seek alternative pathways to achieving Industry acceptance (e.g., all product suppliers interviewed by the project group shared experiences in leading initiatives to revise specifications or draft alternatives).</p>

	<p>Consulting engineers may find themselves in the middle of this situation. Authorities/owners may want to see endorsement/certification of new products by a consulting engineer as part of a supplier's application for approval.</p> <p>Accordingly, product suppliers will seek out certification from consulting engineers that their product meets the requirements of the relevant Australian Standards. However, the relevant Australian Standards may not cater for such comparisons, which creates a risk for consulting engineers. For example, AS3600 specifies the use of Portland cement, so a consulting engineer adopt the stance that they would potentially be placing their registration, insurance, and reputation at risk by endorsing a concrete product that does not include Portland cement.</p>
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6.2 Opportunities for Improvement

Based on the recurring themes and commonalities identified through the industry interviews, the project team have identified several opportunities for improvement that may yield specific benefits for the industry (Table 6). Some of these opportunities correlate to a specific theme, whereas others stand alone as general observations and concepts.

Table 6. Opportunities for improvements

Theme	Opportunity	Outcomes
A	Develop clear, centralised and transferable frameworks	<ul style="list-style-type: none"> - Key industry references and guidance documents (other than Australian Standards) available for authorities to reference, enabling better and more efficient assessment and increased uptake - Increased clarity and surety for suppliers enabling greater investment, research and development, and scaled production - Key step toward interstate transferability and, eventually, national alignment.
B	Establish centralised state resources dedicated to the initiative	<ul style="list-style-type: none"> - Increased visibility, focus, priority, knowledge sharing, promotion, direction. - Through structured guidance, clarify the process for the market which encourages investment. - Accountability - Support for client assessment
C	Clarify the expectations, needs and allocations of risk between authorities/owners, suppliers, contractors, and consultants	<ul style="list-style-type: none"> - Decreased risk aversion, increased collaboration. - Lowered barriers to achieving greater uptake of suitable products
Further Opportunities	<p>Stronger commercialize incentives through project KPIs.</p> <p>Standardise the evaluation criteria to apply beyond Victorian Big Build projects.</p>	<ul style="list-style-type: none"> - Further encourage the adoption of eco-friendly, more sustainable products - Broaden the reach of the State's policy beyond the Big Build

6.3 Potential Constraints and Risks

When considering how the opportunities for improvement might be pursued to achieve benefits for the industry, the project group have identified several potential risks and constraints for consideration (Table 7).

Table 7. Constraints and risks

No.	Risks / Constraints
1	The feedback received suggests that there may be some awareness and even apprehension amongst professionals in the industry regarding the potential for perceived professional contradictions and possibly even reputational damage associated with individuals who were invested in and/or participatory in the production of Australian Standards which lack clear and direct allowances for innovative, eco-friendly products.
2	The feedback received suggests that there may be a (perceived) conflict of interest or difference in motivations between: <ol style="list-style-type: none"> Authorities/owner and consultants responsible for the certification and approval of new products and materials, who have professional obligations to prioritise the long-term (future) performance, durability and safety of assets and products, and reduce risk and cost, and Product supply companies seeking product pre-approval to sell their product as a “superior” option in the market, thereby achieving market entry and/or advantage.
3	The feedback received suggests that the State jurisdictions in Australia can be quite parochial which may make interstate coordination and transferability and national alignment more difficult to achieve.

7 Recommendations for Industry

Based on the broad findings of our research and the common links and themes summarised in Section 6 above, the project team propose that the following recommendations be considered by the Transport Infrastructure industry.

7.1 Recommendations to achieve Optimum Long-term Benefits

The following recommendations represent optimum outcomes for the industry that may take some time to develop and implement.

- Develop and implement a nationally consistent and harmonised framework for the assessment of sustainable, eco-friendly products.
- Building a nationally consistent assessment framework will increase clarity and surety for suppliers enabling greater investment, research and development, and scaled production. A national framework will also drive increased interstate transferability.

7.2 Recommendations for Immediate Consideration

It is acknowledged that implementation of the optimum long-term recommendations put forward in Section 7.1 above will be inherently complex and is therefore likely to require longer timeframes for development. Therefore, notwithstanding those optimum long-term recommendations, the project team propose the following interim recommendations which could yield valuable benefits for the industry in the short-term.

1. Develop clear, centralised, and transferable frameworks
 - Build upon the current Austroads Guide to Pavement Technology Framework - The Austroads Guide to Pavement Technology Framework could be adapted and used by the wider Infrastructure Industry to create a common and understood process for the approval

and adoption of sustainable products. This could be a beneficial and readily achievable goal in the short-term as other frameworks are developed.

- Develop clear state-based frameworks that cater for transferability - As the industry works toward a nationally consistent framework, establishing frameworks in each state will yield tangible benefits in the near term, such as increased visibility, priority, knowledge sharing, direction, and accountability in each region. Structured guidance within the frameworks (including a clear policy) will clarify the process for the market and thereby encourage investment.
- 2. Establish centralised state resources dedicated to the initiative
 - Establish state-based centralised champion organisations, similar to Ecologiq in Victoria - In parallel with developing state-based frameworks, it is envisioned that establishing champion organisations in each state – similar to Ecologiq – will yield tangible benefits in the near and long term. Dedicated leadership and advocacy in each state goes hand-in-hand with policy and framework development.
- 3. Clarify the expectations, needs and allocations of risk between authorities/owners, suppliers, contractors, and consultants
 - Establish an Industry working group to delve into the topic of Australian Standards and risk allocation - It is acknowledged that the topics of Standards, compliance and risk are complex and interrelated, and will likely take some time to unpack and improve. At this juncture it is envisioned that the best step forward is to establish a working group comprised of a broad but selective group of industry organisations and representatives. This working group would be tasked with mapping out a way forward to achieve improvements in this space, and that through the collaborative and inclusive nature of the group the actions and outcomes would be widely endorsed by the industry.
 - Continued Government Grants to support investment and trials - Several Government grants are available for use by industry and research institutes to support research, development, and trials of new materials and products. Grants can effectively assist to fund testing and trials for suppliers to address Asset Owner material and performance requirements and improve confidence in products where there is currently a lack of information. Extending and simplifying the grants and levies available will assist with future product development and may assist in accelerating different markets/solutions for recycled and renewable materials.

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