

An aerial photograph of a complex highway interchange with multiple overpasses and ramps. The scene is surrounded by urban development, including residential buildings and trees with autumn foliage. A large, white, stylized logo 'orrb' is superimposed over the center of the image, with the letters 'o' and 'b' being circular and the 'rr' being more angular.

# orrb

*Sustainable road materials reuse and repurposing of  
waste streams in pavement innovation*

Melissa Lyons, International Public Works Conference, August 2019

**Why Aussies should be concerned about the country's recycling crisis**

Plastics could be turned into roads as governments ban waste exports

Old tyres wheeled out for resurfacing motorways

China's ban on foreign waste leaves Australian recycling industry eyeing opportunities

'It is ultimately just asphalt': Recycled glass, plastic laid in road trial

**China Has Had Enough of Your Garbage**

Scott Morrison to push premiers to improve 'appalling' record on plastic recycling

**Glass, asphalt plants open in Victoria**

Morrison's war on waste welcomed

War on waste hits the road with truck tyres and jam jars

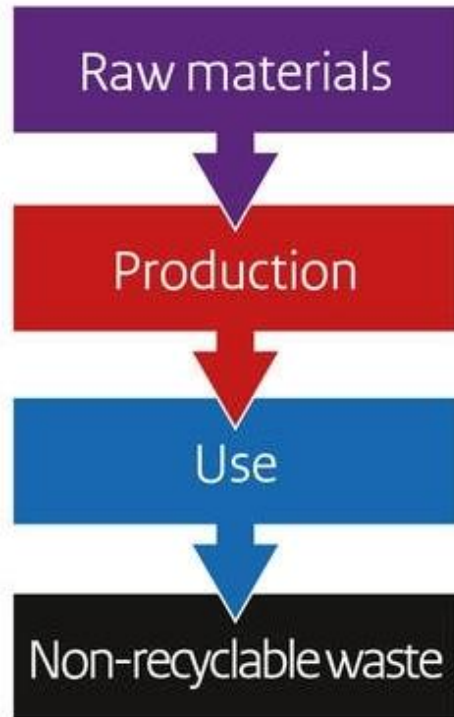
**A year after China shut the door, how will Australia deal with its recycling?**



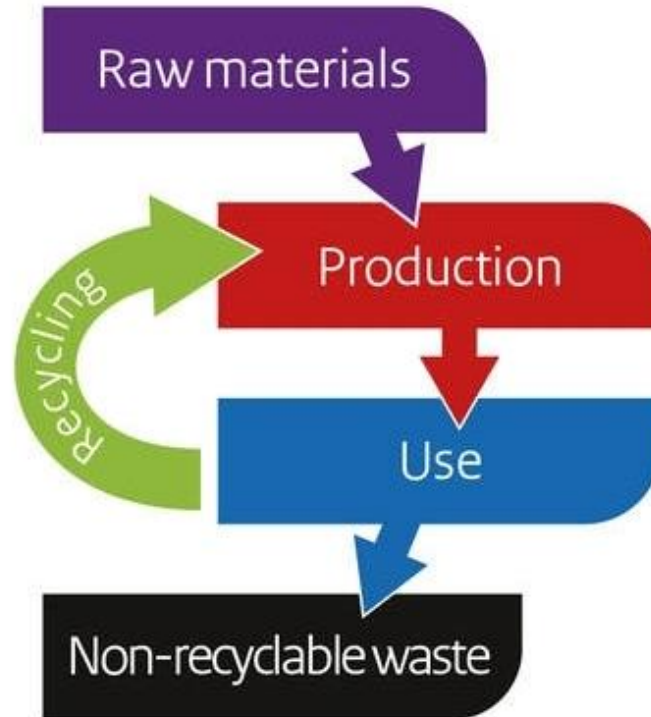
# Circular vs Linear Economy

Reduce, Reuse, Recycle

Linear economy



Reuse economy



Circular economy



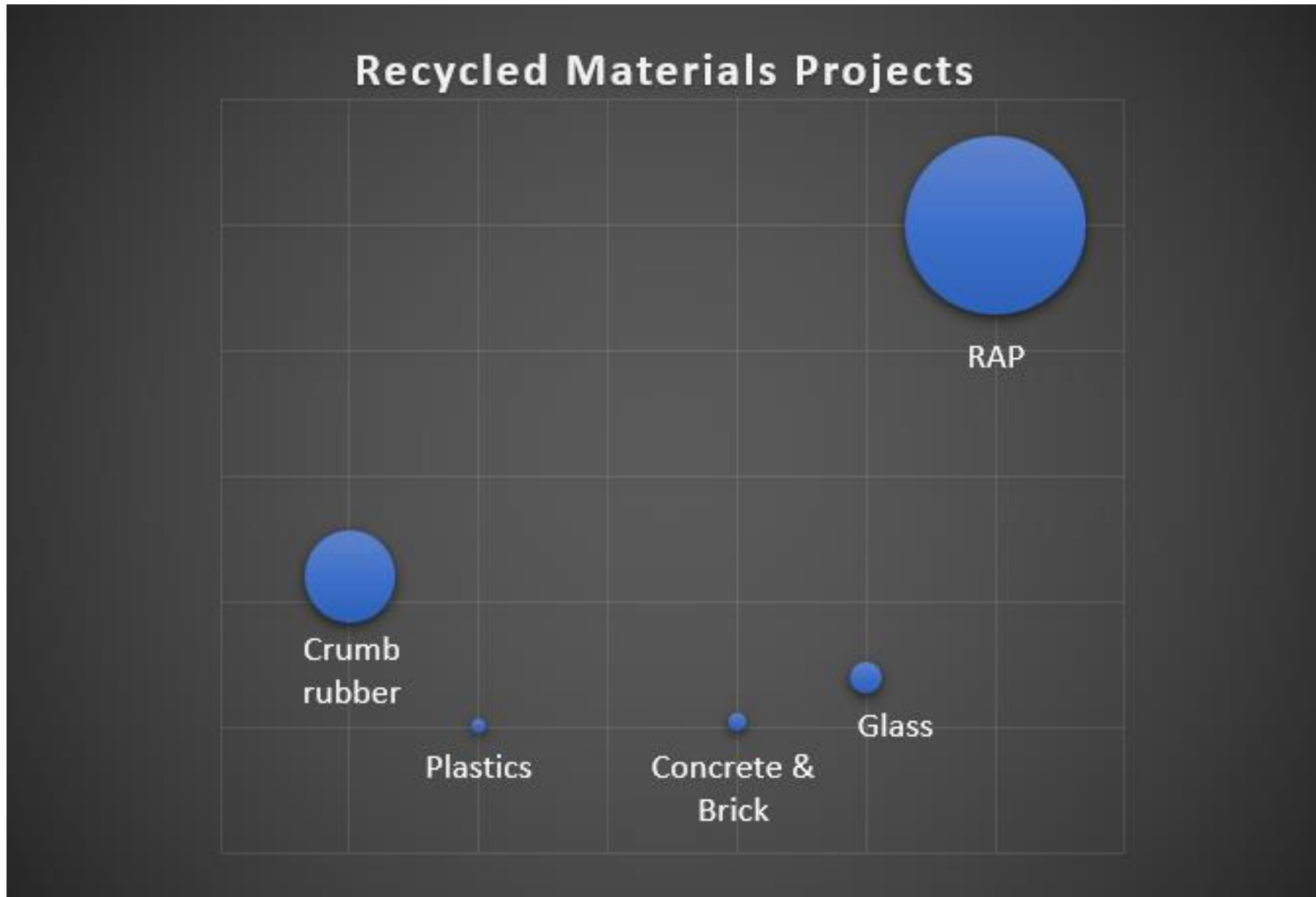
# Outline

1. Recycled materials priorities and position
2. Current recycled/sustainable materials in pavements projects
3. Future thoughts



# Priority Materials

# Research Priorities – Recycled Materials

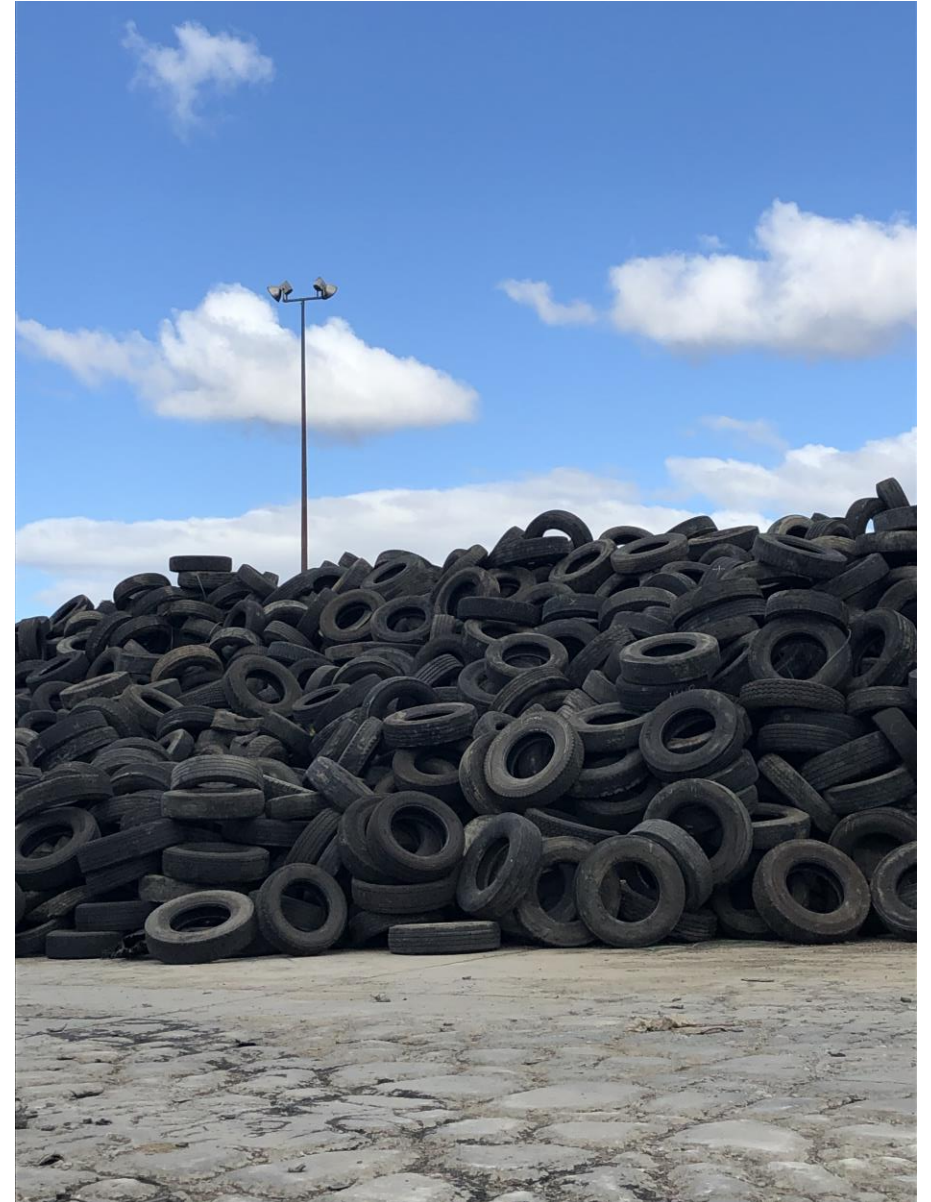


- Asphalt 100% re-usable and recyclable
- Well established technology and practices
- Dense graded asphalt in low stress conditions and in our unbound and bound granular pavements
- Benefits:
  - Reduced demand for virgin bitumen and aggregates
  - Keep its value
- Challenges:
  - Specification limits & amount of profiling's
  - Introduction of foreign materials



# Crumb Rubber

- Well established in sprayed sealing and increase use in asphalt
- Benefits
  - Performance
  - Source
  - RAP
- Challenges
  - Costs
  - OH&S
  - Specifications (asphalt)





Source: [www.abc.com.au](http://www.abc.com.au)

- Aggregate and sand replacement
- Benefits
  - Reduced demand for virgin aggregates
  - Reliable source
- Challenges:
  - Limited to sub-base and base
  - Stripping
  - Road user costs

# Plastics

- Not a priority material...yet
- Many plastic products out there being paved
- Benefits not well understood
- Challenges
  - RAP
  - Asset management
  - Reliable, consistent, clean and local source
  - Microplastics
  - Performance enhancer or filler?
  - Specifications



# Other road sector applications



# Current Projects

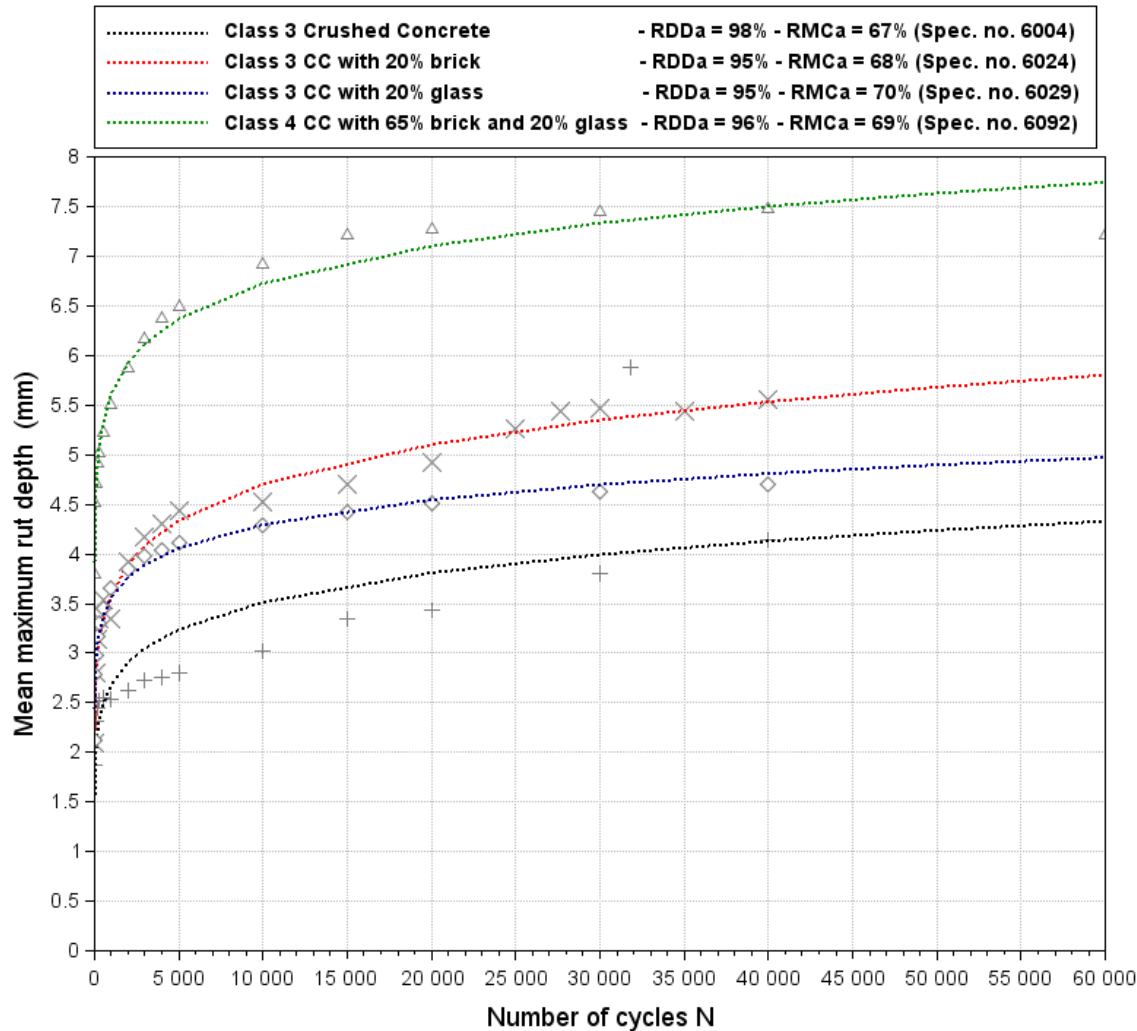
# Wheel Tracking Analysis of Fit for Purpose Materials



- DoT VIC is aiming to develop specification for unbound recycled base materials for lightly trafficked roads.
- Crushed concrete, crushed brick and crushed glass.
- Objective to assess deformation under XL wheel tracking testing in the laboratory.
- Compare crushed concrete and rock (control) with different proportions of crushed brick and crushed glass.

# Wheel Tracking Analysis of Fit for Purpose Materials

## Rut Depth Comparisson



- Samples tracked to minimum 40,000 cycles.
- Increased rut depth seen with greater recycled material content.
- Still well within acceptable range.



# Use of RAP containing CRM binder



# Use of RAP containing CRM binder

- Plant trial with 10% CRM-RAP
- Paving of new mix at yard
- Next steps
  - Viscosity characterisation of RAP binder, extraction method
  - Use of target viscosity blending to design new mixes
  - Lab mix designs containing 10% and 20% CRM-RAP
  - Performance testing of lab mixes



# Development of a Lightly Trafficked CRM Asphalt Specification

17



- DoT (VicRoads) Specification for wearing course of lightly trafficked roads
- Increasing the use of crumb rubber in asphalt
- Targeted at local government
- Bridging gap, harmonisation
- Move towards performance based specification

# Aggregates for Skid Resistance



- Department of State Growth
- Objectives
  - Investigate the sustainability and feasibility of DSG's continued use of higher PSV aggregates.
  - Assess DSG's approach to the use of higher PSV aggregates.
- Findings
  - High PSV resources meet current demand and an increase in demand
  - Local high PSV quarries are not being utilised to their full potential

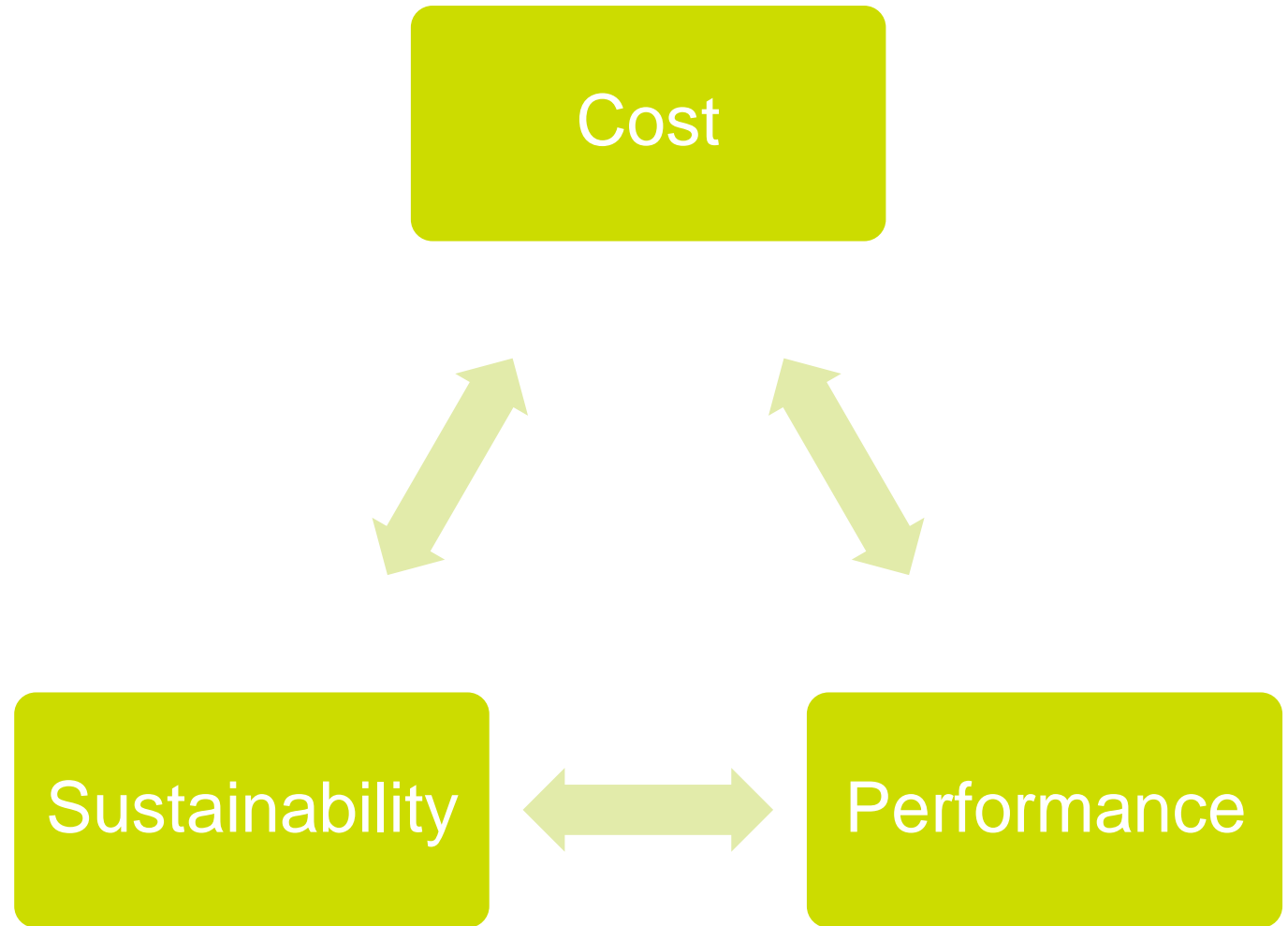
- P34 Development of Performance Based Evaluation Protocol for Non-Standard Granular Pavement Materials
  - Objective: develop a standard laboratory evaluation protocol for determining the suitability of non-standard granular materials for specific pavement applications.
  - i.e. fit for purpose materials
- P106 Assessing the environmental benefits of the NACoE research program
  - Objective: provide economic analysis of selected NaCOE projects that have been identified as having high potential to contribute to environmental savings

Where to from  
here?

# Barriers to the use of recycled materials

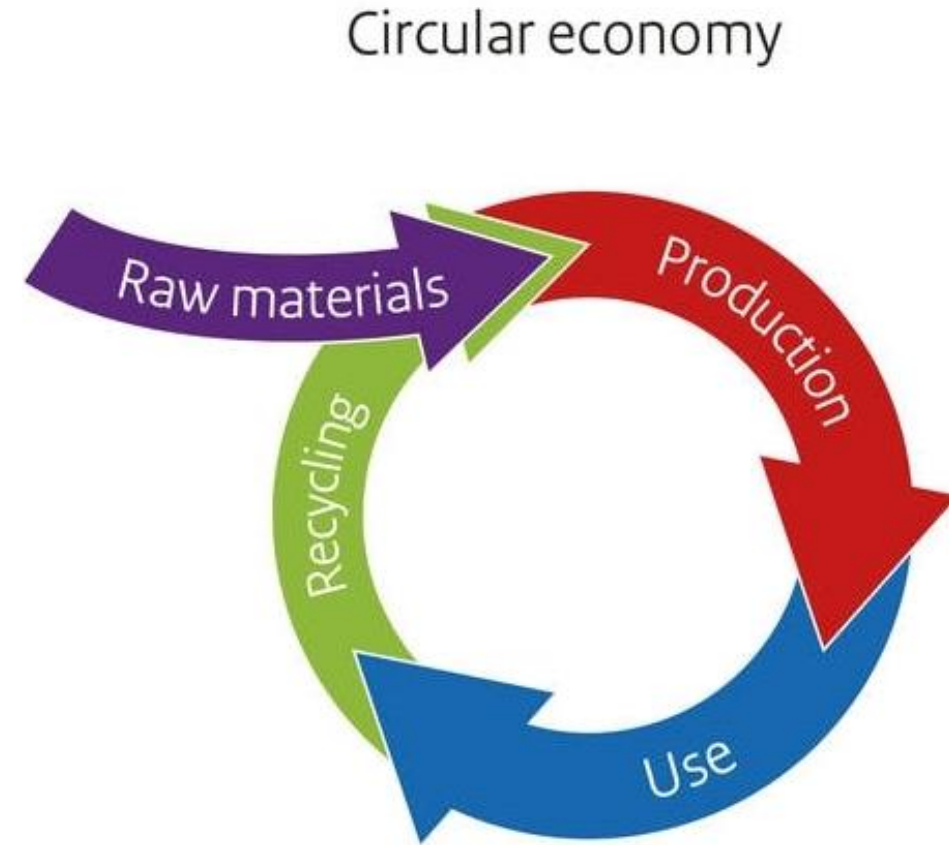
- Recycled Materials as RAP
- Asset management practices and data collection and management
- OH&S and Environmental impact
- Risk – performance and liability
- Knowledge sharing

= Confidence and means for specification development and modification



# Considerations for inclusion of recycled materials

- Full supply chain approach
- Maximum value out of products
- Will the inclusion contribute to a circular economy?
- Find the right product for the right applications – not one size fits all
- Local, reliable resources



# Long Term

## Where are we going?

- Resources to support development of technical specifications
- Performance based specifications
- Projects with longevity
- Whole-of-life approach - Performance, economic and environmental evaluation
- Perpetual products that are fit for purpose
- Continued collaboration:



**TyreStewardship**  
AUSTRALIA





# Best Practice Guides Workshop

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We are working with local government to ensure these four guides will shape Australia's transport future

**ARRB.COM.AU**



Thank You

The image features a solid blue background with a pattern of small white dots. On the right side, several curved lines of dots sweep across the frame, creating a sense of motion. In the top left corner, the word "arto" is written in a white, lowercase, rounded sans-serif font. Below the logo, a large, light blue, rounded rectangular shape contains the text "SHAPING OUR TRANSPORT FUTURE" in a blue, uppercase, sans-serif font.

arto

SHAPING  
OUR  
TRANSPORT  
FUTURE