Use of Recycled Materials in Transport Applications– Australian Case Studies

Resource Efficiency & Energy Group
Transport and Environment Knowledge Hub
24 February 2020

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Types of Recycled Materials

Glass

Brisbane City Council

Reference: https://www.brisbane.qld.gov.au/clean-and-green/green-home-and-community/clean-and-green-blog/the-recycle-life-cycle-what-happens-to-our-recycling-in-brisbane?utm_source=fb_photo_organic&utm_medium=social&utm_campaign=green_nov19_asphalt
https://www.facebook.com/BrisbaneCityCouncil/posts/10156795552477709?comment_id=10156824468497709

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Reference: https://www.northernriverswaste.com.au/cp_galleries/banners/master/Waste_Education.jpg
https://www.northernriverswaste.com.au/cp_themes/default/home.asp
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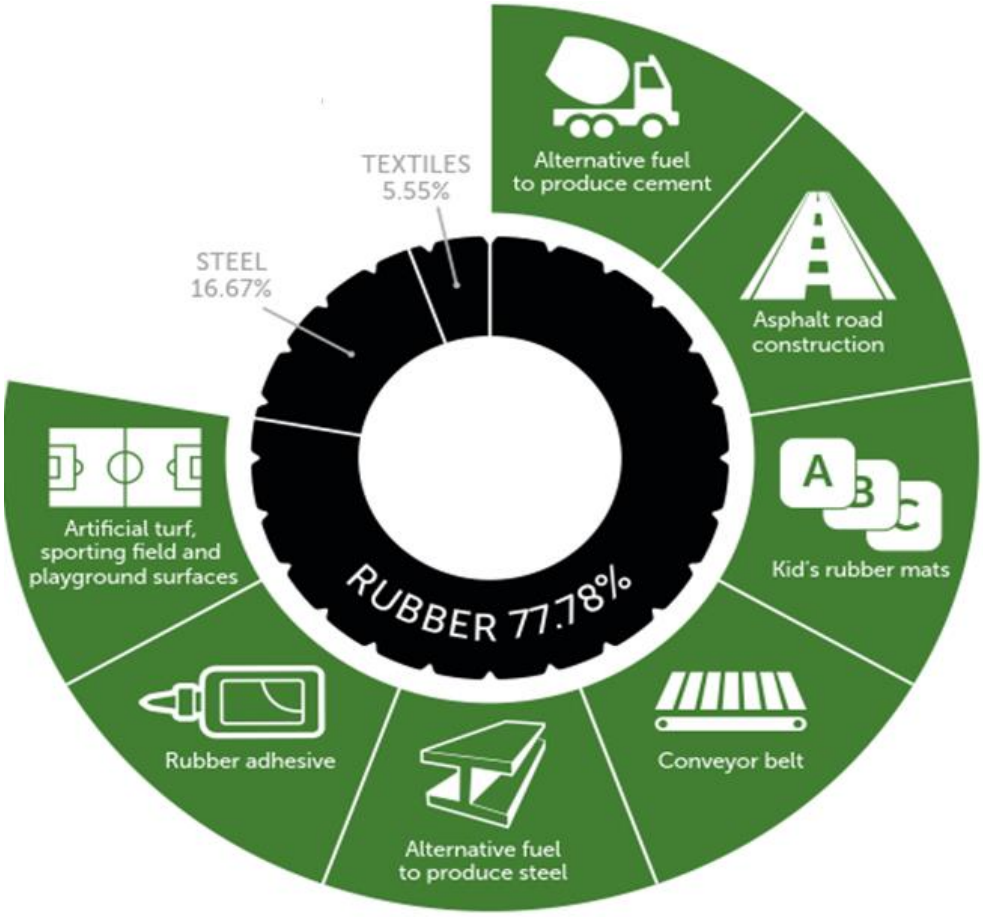
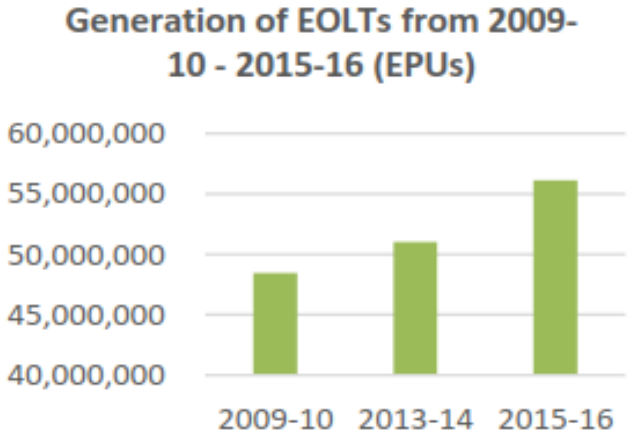
End of Life Tyres

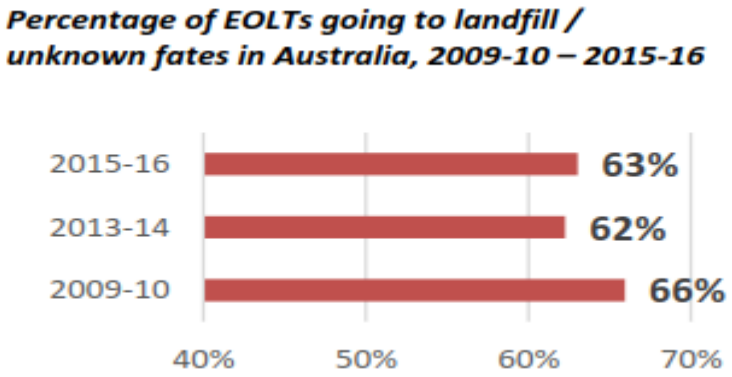


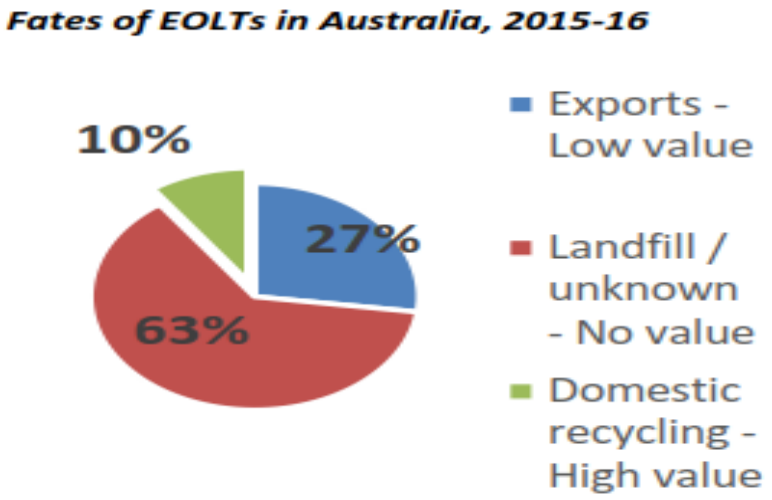
Source: TSA 2015/16 Annual Report, pg 40.

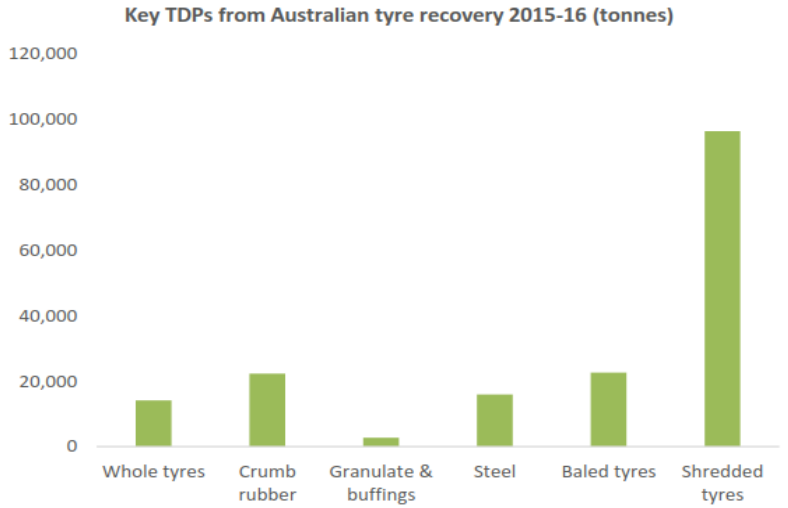
Background

National Context









Source: ACT NOWaste

Problem Statement

- End-of-life tyres (EOLT) are predominately exported, landfilled, illegally dumped or stockpiled.
- Landfilling of EOLTs represents a significant missed opportunity from the recovery and reuse of rubber and steel.
- Mismanagement of EOLTs poses serious risks to the community and environment for example through incidence of tyre fires:
  - Release of toxic smoke
  - Pollution of groundwater and surface water (from runoff)

Opportunity in Australian Capital Territory (ACT)

- To be proactive and to be a leader in resource recovery of end-of-life tyres (EOLTs).
- Small industry group (approx. 22 tyre retailers in ACT).
- A range of market opportunities for tyre derived products (TDPs).
- Legislation has been introduced to support resource recovery.

Specification for use of TDP in road surface seal and asphalt construction

Strengths / Opportunities

- Increase **industry investment in infrastructure.**
- Supports market for TDP in the ACT.
- Reduce EOLTs exported.
- Raw material recovery and contributes to GHG emissions reduction.
- Opportunities and funding for Research and Development.
- **Potential recoverable resource to replace virgin materials in the production of road products**.
- Boral Asphalt Division in the ACT has indicated they are looking to upgrade their existing Asphalt plant at Mugga Lane to accept tyre crumb.

Weaknesses / Threats

- Potential administrative hurdles for Roads ACT to **change procurement standards to allow use of TDP.**
- Security of supply of TDP for road material.
- Relatively **high capital cost of establishing a crumbing plant in the ACT.**
- Price-point has to ensure TDP is a viable alternative.
- Local market pressure from cheaper imports.
- Industries may be deterred by environmental permitting requirements.
- Concerns around health and environmental impacts of rubber crumb and asphalt plants, including emissions and odour.
- Potential **quality issues with on-site use of crumb in bitumen spray sealing works.**

Tyre Crumbing Plant

- Used to produce crumb rubber to less than 1mm in size
- Three stage grinding process to separate rubber fabric and steel

Indicative Capital Cost	O & M Cost	$ per tyre sold*
$5 million	$500k	$2.75

**Assume capital cost paid back over 3 years and based on 2015/16 number of tyres sold 875,000 EPU*

- Uses : As modified binder in bitumen spray seal and asphalt pavement construction
- Market in the ACT : Approx. 40% of EOLT's generated

Source: TSA 2015/16 Annual Report, pg 4.

Tyre Shredding Plant

- Used to produce shredded rubber to 50 - 150mm in size
- Staged process to first shred then separate rubber fabric and steel

Indicative Capital Cost	O & M Cost	$ per tyre sold*
$1 million	$100,000	60 cents

**Assume capital cost paid back over 3 years and Based on 2015/16 number of tyres sold 875,000 EPU*

- Uses : As drainage material in landfill construction, light weight fill for road construction and other building applications

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Salisbury

References: http://www.icewarm.com.au/wp-content/uploads/City-of-Salisbury.jpg
http://www.salisbury.sa.gov.au/Council/News_Media_and_Publications/Latest_News/Rubbish_goes_full_cycle_in_sustainable_road_initiative
https://www.natspec.com.au/images/PDF/Project_Report_Use_of_recycled_materials_for_roadworks.pdf
https://upload.wikimedia.org/wikipedia/en/thumb/c/c4/Burton_Springbank_waters.jpg/540px-Burton_Springbank_waters.jpg

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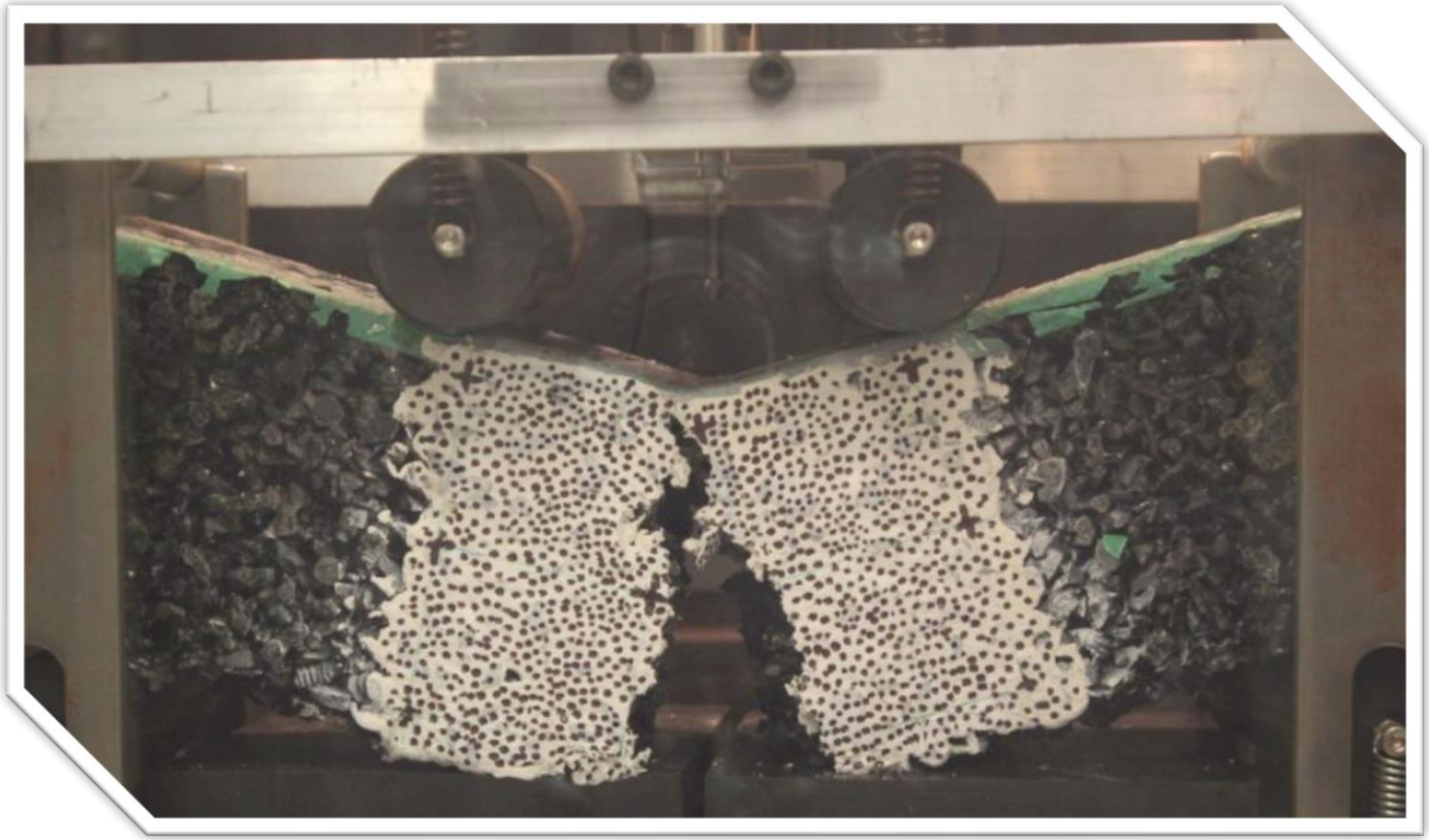
Reference: https://www.tyrestewardship.org.au/resource/case-studies/where-the-rubber-not-only-hits-but-is-in-the-roads



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References: https://pursuit.unimelb.edu.au/articles/turning-old-tyres-into-new-roads

References: https://www.tyrestewardship.org.au/latest-news/south-australian-councils-take-part-in-major-trial-using-recycled-tyre-rubber

https://www.tyrestewardship.org.au/latest-news/video-recycled-rubber-roads-in-the-news

Waste Plastics

MACREBUR
The plastic road company

Reference: https://www.macrebur.com/about-us
https://www.macrebur.com/the-product/
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https://educateinspirechange.org/wp-content/uploads/2019/07/From-LtoR-Sarah-Lakin-Contract-Manager-at-MacRebur-Dale-Ashelford-Springfield-Press-and-Events-Co-ordinator-and-Dave-Main-Springfield-North-Managing-Director.jpg

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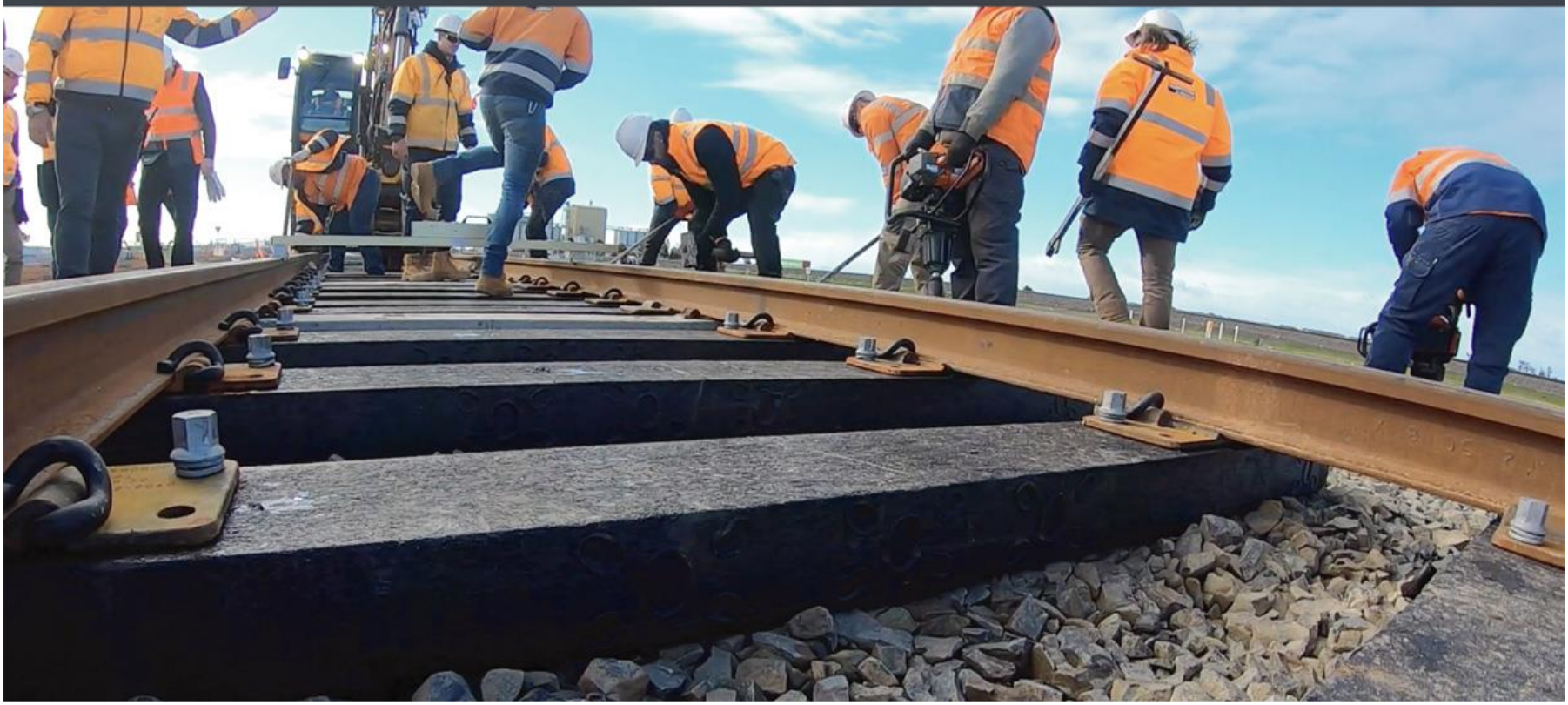

Reference: http://www.integratedrecycling.com.au/wp-content/uploads/2019/09/Duratrack-Tough-1222px.jpg
http://www.integratedrecycling.com.au/railway-sleepers/

Specifications and Standards

- TNZ's M/4 Specifications for Base course Aggregate
- Australian Asphalt Pavement Association National Model Specifications
- State specifications
  - NSW
  - QLD
  - VIC
  - WA
  - SA
- Local council specifications
  - Brisbane City Council

References: https://wastemanagementreview.com.au/millions-tyres-soon-used-australias-roads/
https://www.mainroads.wa.gov.au/BuildingRoads/TenderPrep/Specifications/Pages/specifications.aspx
https://www.brisbane.qld.gov.au/planning-and-building/planning-guidelines-and-tools/planning-guidelines/reference-specifications
https://www.aapa.asn.au/aapa-national-model-specifications/
https://www.nzta.govt.nz/assets/resources/basecourse-aggregate/docs/basecourse-aggregate.pdf

Thank you

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