

USED TYRES SUPPLY CHAIN AND FATE ANALYSIS

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Client

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Report Disclaimer

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Glossary of terms / abbreviations

Term / abbreviations	Description
BBEC	Brock Baker Environmental Consulting
Bitumen crumb rubber asphalt (BCRA)	An asphalt product which uses crumb rubber as a binder, typically for high traffic roads.
Casings	The rigid, inner of a tyre upon which a tread is placed. Typically, tyres good enough for re-tread or resale as seconds are referred to as casings.
Civil engineering	Engineering discipline that deals with the built environment, including works like roads, bridges, canals, dams, and buildings.
Crumb rubber	A highly-refined rubber product, typically less than 1mm in diameter, made from recycled tyres.
Domestic recovery / recycling	Activities that occur to recover or recycle used tyres within Australia.
End-of-life tyres (EOLT)	A tyre that is deemed no longer capable of performing the function for which it was originally made. Often referred to as used tyres or waste tyres.
Energy recovery	The use of used tyres in a thermal process to recover energy for electricity generation or industrial process.
Equivalent passenger units (EPUs)	A standard measure, based on the typical weight of a standard passenger tyre (9.5 kgs).
In-use	Tyres that are in demand for the purpose for which they were originally made.
Material flow analysis (MFA)	Material flow analysis (MFA) is a mass balanced based analytical method to quantify flows and stocks of materials or substances for a well-defined system and time period. MFA is also referred to as substance flow analysis (SFA). MFA is an important tool in establishing a circular economy.
Non-participant tonnages managed	Is the remainder of the total 2018-19 used tyre arisings minus TSA participant reported tonnages managed.
Non-TSA used tyres	Are the total used tyre arisings (in 2018-19) minus TSA used tyre s tonnages managed (i.e. non-TSA used tyres are the remainder).
Off-the-road (OTR) tyre	Tyres for mining sites and heavy industry applications.
REC	Randell Environmental Consulting
Recovery	Broadly refers to used tyre that are collected and either reused, recycled or recovered for embodied energy (energy recovery) either in Australia or overseas.
Recycling	Process to recover constituent materials from used tyres and use those materials to manufacture other products either in Australia or overseas.
Refurbishment	Refers to worn tyres that are not discarded by the owner, rather the worn tyre is sent for a renewal so the owner can continue to use the tyre.
Resource recovery	Refers to used tyre that are collected and either reused recycled or recovered for embodied energy (energy recovery) either in Australia or overseas.
Re-treading	The preparation of used tyres for reuse by replacing the outer tread.
Reuse	The use of tyres for the purpose for which they were originally made, including use of re-tread tyres and second-hand tyres.
Rubber granule	A refined rubber product, typically 2mm – 15mm, made from recycled tyres.

Term / abbreviations	Description
Stockpile	The following definition of a used tyre stockpile was adopted for the report: <ol style="list-style-type: none"> 1. More than 40 tonnes (5,000 EPU) in storage onsite 2. More than 12 months storage 3. Untreated, unprocessed to product specification.
tpa	Tonnes per annum
TSA	Tyre Stewardship Australia
TSA participant tonnages managed	Are the reported tonnages of used tyres managed by TSA participants, reported annually.
TSA used tyres	The tonnages of managed used tyres that are reported by TSA members participants as part of annual reporting and includes tonnages for any kind of processing of used tyres excluding transport (i.e. shredding, pyrolysis, etc). TSA used tyres tonnages do not include double counting (i.e. only processes that result in a recycled and or exported used tyre are counted).
Tyre Derived Fuel (TDF)	Shredded tyres prepared to a specification for use in energy recovery.
Tyre Stewardship Australia (TSA)	The not-for-profit company established to deliver the National Tyre Product Stewardship Scheme.
Tyre wear dispersal	The dispersal of rubber from in-use tyres to the open environment (land, waterways, etc.) due to wear of the tyre tread.
Tyre-derived aggregate (TDA)	Shredded tyres prepared to a specification for use as aggregate in civil engineering applications.
Tyre-derived products (TDPs)	Any product produced from rubber, steel, textiles or other material recovery from the recovery of used tyres.
Used tyre fates	What happens to Australian used tyres when they reach the end of their useful life (either in Australian or overseas) including re-use, recycling, energy recovery, and disposal fates.
Used tyres	A tyre that is deemed no longer capable of performing the function for which it was originally made.
Waste tyres	A used tyre that is discarded, typically when the tyre is being replaced.

Summary

In 2019, Tyre Stewardship Australia (TSA) engaged Randell Environmental Consulting in association with Brock Baker Environmental Consulting (BBEC) and Envisage Works to complete this *Used tyres supply chain and fate analysis*.

This analysis follows-on from a used tyre material flow analysis that REC deliver in 2017 as a part of the [National market development strategy for used tyres](#) (the 2017 Strategy). The 2017 strategy found that:

“Data from the last three national studies on used tyre shows that around 60 – 65% of all waste tyres generated are disposed to landfill or go to other fates, such as dumping or illegal stockpiling, where little or no resource value is recovered and the quantities to each fate are unknown”. Page viii.

A primary aim of this project is to provide an improved understanding of the fate of this 60 – 65% of used tyres identified in the 2017 Strategy. By improving this used tyre fate data, the project also aims to provide estimates of the tonnages of used tyres that are currently being stockpiled.

On the 9th November 2019 Environment Ministers agreed that ‘waste tyres’ that have not been processed into a ‘value-added material’ should be banned from being exported overseas. The timing of the waste export bans was also agreed with the ban on the export of all whole waste tyres, including baled waste tyres, to come into effect by December 2021.

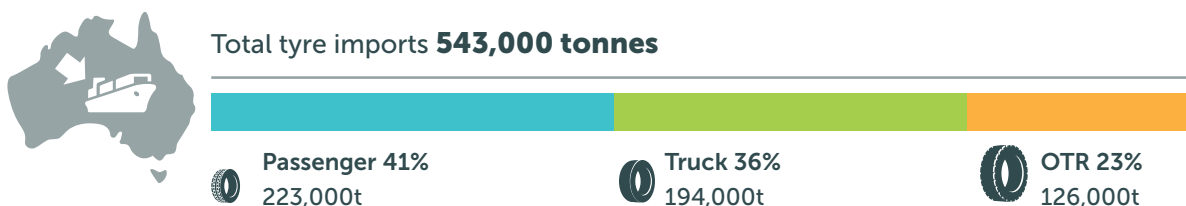
It is understood that the *National Waste Policy Action Plan* will drive the implementation of Australia’s *National Waste Policy 2018*. It includes the following two key waste management targets that directly relate to used tyres:

- An 80 per cent ‘recovery’ rate of material across all waste streams.
- Significant increases to government procurement of recycled materials.

Tyre consumption

Figure S1 details Australian consumption of tyres in 2018-19 for passenger, truck and off-the-road (OTR) tyres. A total of 543,000 tonnes of tyres were imported in 2018-19 and assumed to be consumed in 2018-19. Tyre imports are a reasonable estimate of consumption in any particular year as tyres are not typically sorted for long periods before sale. Since the closure of Bridgestone Tyres in Adelaide, in 2010, Australia has not manufactured any tyres (i.e. imports represent consumption).

Figure S1. Australian tyre consumption 2018–19, by tyre group (tonnes)



Levied versus non-levied tyre imports

Tyres that are imported by TSA members (loose or fitted¹) are subject to the National Tyre Product Stewardship Scheme (the Scheme) levy upon sale (25 cents per 9.5 kilograms). The Scheme levy funds TSA and its programs.

TSA membership is voluntary and not all loose tyre importers are currently TSA members. Until recently, no fitted tyre importers were TSA members². Currently **no** OTR tyre imports (126,000 tonnes in 2018-19) are levied upon sale.

Excluding OTR tyres, TSA membership covered 34% (140,000 tonnes) of the passenger and truck tyres imported in 2018-19. The remaining 66% (275,000 tonnes) of passenger and truck tyres were imported and sold without collection of the levy (non-levied sales).

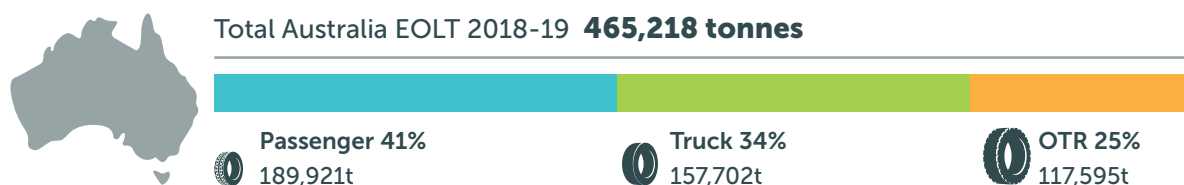
When OTR tyres are included, TSA membership covered just 26% (140,000 tonnes) of tyre imports in 2018-19. The remaining 75% (400,000 tonnes) of tyres were imported and sold without collection of the levy.

This presents a significant challenge for TSA and its members, that aim to increase used tyre recovery for all tyres consumed in Australia, while only 26% (by weight) of tyre imports are levied.

Used tyre arisings 2018-19

After use, used tyres are generated (referred to as used tyre arisings in this report). Figure S2 details Australian arisings of used tyres in 2018-19 for passenger, truck and OTR tyres. An estimated total of 466,000 tonnes of used tyre arose in 2018-19. Used tyre arisings are not the same as consumption in 2018-19 (543,000 tonnes) because the used tyre arisings relate to tyres consumed over several previous years and also don't include tyre wear losses to the environment.

Figure S2. Australian tyres reaching end-of-life in 2018–19, by tyre group (tonnes)



TSA participants vs non-participant management of used tyres 2018-19

In addition to the tyre importers that are TSA members, TSA has a range of 'participants' across the used tyre supply chain. These including retailers, fleet operators, local governments, collectors and recyclers. TSA participants report used tyre tonnages as part of annual reporting which provides TSA with important information about the management and fate of used tyres.

'TSA participant' tonnages included in this report are a summary of TSA participant reporting.

'Non-participant' tonnages included in this report are the remainder (i.e. total 2018-19 used tyre arisings minus TSA participant reported tonnages managed).

It is important to note that TSA participants manage used tyre arisings that were originally imported by TSA members and used tyres that were imported by non-TSA members (unlevied). As noted above, in 2018-19, just 140,000 tonnes of tyres were imported by TSA members and levied at sale. In the same year 227,000 tonnes of used tyres were managed by TSA participants.

1. Loose = tyres not fitted to vehicles, imported for sale. Fitted = tyres fitted to vehicles such as cars. 2. Volkswagen became a TSA member in 2019.

The 227,000 tonnes of used tyres managed by TSA participants is 49% of total used tyre arisings in 2018-19. Only 26% of total tyre imports were levied in the same year.

TSA participants managed 85% of passenger, 33% of truck and 10% of OTR used tyres arisings in 2018-19. The rates of TSA participant management of used tyres are highest where levy coverage is highest (passenger) and lowest where levy coverage is not currently in place (OTR).

Exports vs domestic management of used tyres 2018-19

Overall in 2018-19, 44% (206,000 tonnes) of used tyres were managed in Australia (domestic) vs 56% (258,000 tonnes) exported.

For passenger used tyres: 85% (161,000 tonnes) were exported and 15% (29,000) remained onshore.

For truck used tyres: 55% (87,000 tonnes) were exported and 45% (71,000) remained onshore.

For OTR used tyres: 10% (11,500 tonnes) were exported and 90% (106,000) remained onshore.

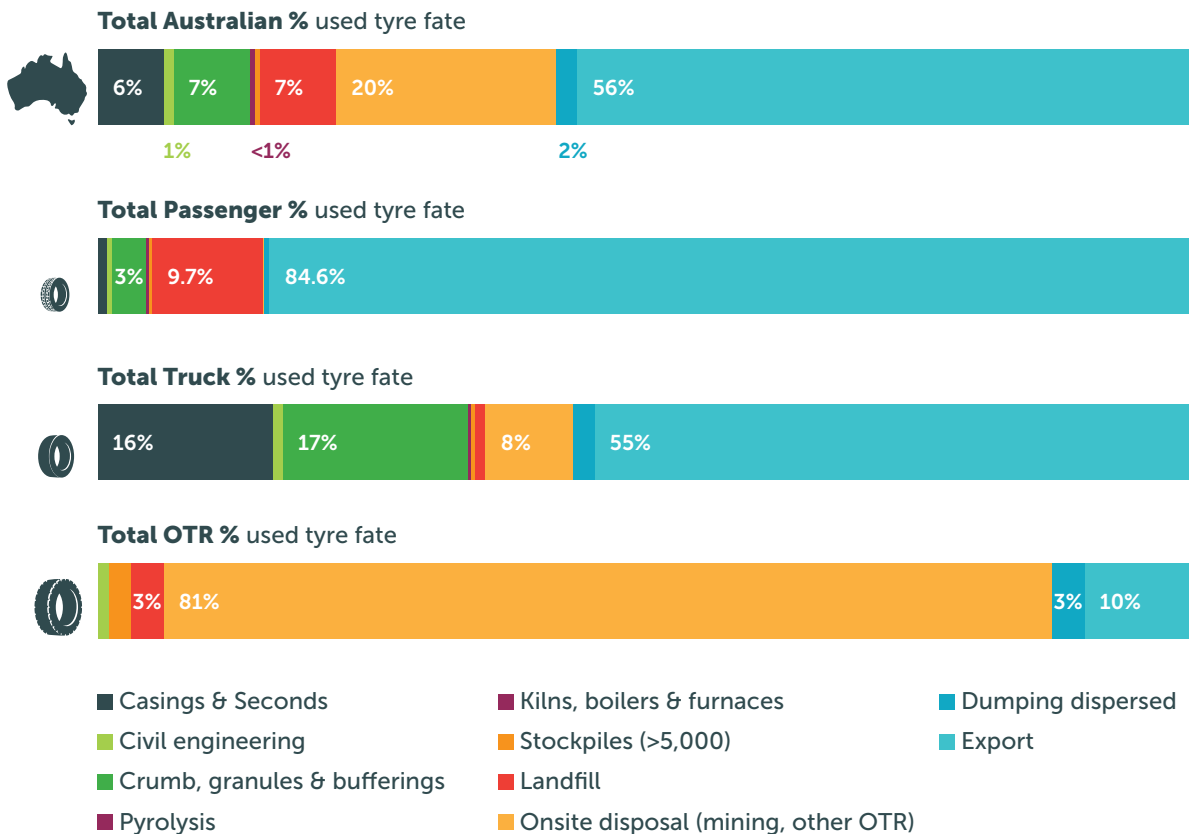
For domestic used tyres, 29% (59,000 tonnes) were managed by TSA participants and an estimated 71% (147,000 tonnes) were managed by non-TSA participants.

For exported used tyres, 65% (168,000 tonnes) were exported by TSA participants and an estimated 35% (91,000 tonnes) of exports were exports by non-TSA participants.

Australian used tyre fate analysis 2018-19

Figure S3 details the fate of Australian used tyres in 2018-19. It is important to note that all of the fate data, except for 'export' data, presents domestic (on-shore) used tyre management. Each of the domestic fates are discussed below, followed by discussion of the export fate data.

Figure S3. Fate of Australian used tyre (TSA and non-TSA) by tyre group in 2018-19 (tonnes)



Domestic fate analysis 2018-19

Casing and seconds tonnages refers to used tyres that are re-treaded for reuse. A total of 6% (26,400 tonnes) of used tyres were re-treaded for resale in Australia in 2018-19. Almost all re-treads were truck tyres that are the most suited to re-treading. A total of 16% (24,900 tonnes) of truck used tyres were re-treaded and most (80%) of the re-treading was by non-TSA participants.

Civil engineering refers to the use of used tyres in the construction of retaining walls or permeable pavements, for example. An estimated total of 1% (3,100 tonnes) of used tyres were used in civil engineering in 2018-19, mostly (80%) by non-participants.

Used tyre crumb, granules and buffing refers to the highly processed rubber products that are made from used tyres for a wide range of uses from improving the performance of asphalt in road construction to tile adhesives. A total of 7% (32,900 tonnes) of used tyres were recycled into crumb, granules and buffings in Australia in 2018-19. Most was made from truck tyres that contain higher amounts of the more valuable natural rubber than passenger tyres. A total of 17% (27,000 tonnes) of truck used tyres were made into crumb, granules and buffings and all reprocessing was by TSA participants.

Pyrolysis refers to the heating of tyres in the absence of oxygen to decompose and separate various organic components to generate end products including char, oil, syngas and steel. A total of <1% (1,300 tonnes) of used tyres were recovered by pyrolysis in Australia in 2018-19 and all recovery was by TSA participants.

No used tyres were sent to **cement kilns, industrial boilers or furnaces for energy recovery (TDF)** in Australia in 2018-19. Significant tonnages of used tyre were **exported** as a TDF in 2018-19, as discussed in below under 'Exports fate analysis'.

For the purposes of the report a stockpile is defined as:

- More than 40 tonnes (5,000 EPU) in storage onsite
- More than 12 months storage
- Untreated, unprocessed to product specification.

Stockpiles refer to large, typically illegal, unmanaged piles of used tyres as opposed to dispersed dumping of tyres in small quantities, or onsite disposal of OTR used tyres at mine sites or similar. An estimated total of around 1% (5,600 tonnes) of used tyres were disposed into stockpiles in Australia in 2018-19.

The estimate of 2018-19 stockpiling is based on extensive industry consultation. Stakeholders noted that whilst stockpiling has been a major issue for used passenger tyres in the past, stockpiling had largely ceased in 2018-19.

Stockpiling is understood to have ceased due to:

- firstly, increases in EPA regulation of stockpiling
- secondly, and in response to tighter regulation, an increase in the amount of baling and export of passenger tyres.

The reduction in used passenger tyre stockpiling is supported by TSA participant reporting. Of the estimated 190,000 tonnes of used passenger tyre arising in 2018-19, TSA participants reported managing 162,000 tonnes. This leaves some 30,000 tonnes not accounted for in TSA participant reporting. Industry consistently stated that baling and exporting of tonnages collected by non-TSA participants was common practice in 2018-19. It is therefore reasonable to assume that these baled exports account for the majority of non-TSA participant tonnages (estimated at 23,000 tonnes).

Nationally, this leaves around 5,000 tonnes (625,000 used passenger tyres units) unaccounted for and these are assumed to be either stockpiled, sent to landfill or dumped (dispersed).

For the purposes of this report, **landfill** refers to used tyres sent to a legal landfilling site that is permitted by state environmental regulators. A total of 7% (34,900 tonnes) of used tyres were sent to landfill in Australia in 2018-19. Most were passenger and truck tyres and approximately half were landfilled in Queensland where there was no landfill levy in place in 2018-19. Queensland has now introduced a landfill levy and tonnages of used tyres going to landfill should fall in future years.

Onsite disposal (mining, other OTR) refers to the onsite disposal of used OTR tyres (only) within a mining void or onsite on farms or similar. Stakeholder consultation found that onsite disposal was the main fate for OTR tyres in Australia, particularly for the mining sector. An estimated total of 81% (94,900 tonnes) of used OTR tyres were disposed onsite in Australia in 2018-19. This accounts for 20% of the Australian used tyre arisings in 2018-19 which is by far the largest non-recovery pathway for used tyres (by weight).

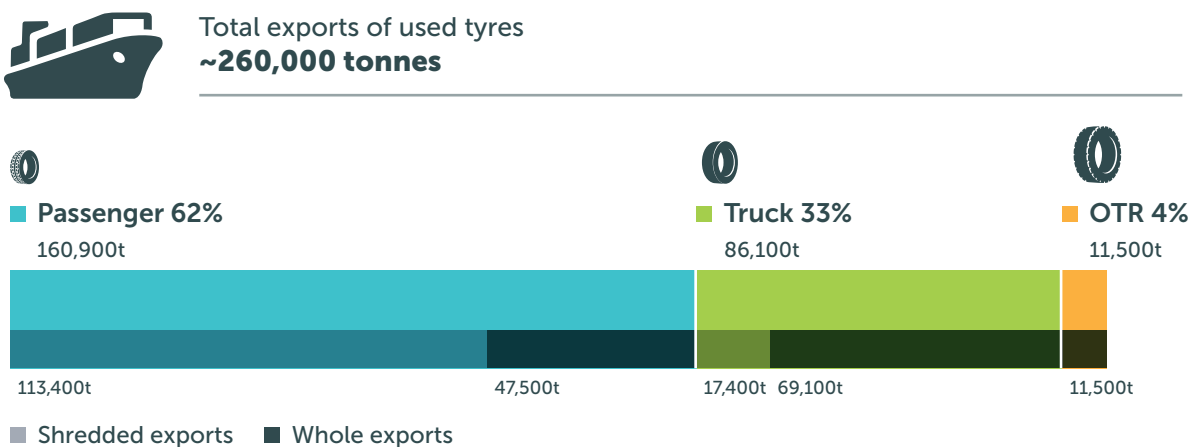
Dispersed dumping includes small incidental dumps, of several tyres, across Australia including road-side dumping, dumping in gullies on public or private land, etc. The mapping and drive-time analysis of all Australian landfills and transfer stations, presented in Section 10, shows that 97% of Australians live within a 30-minute drive of a landfill or transfer station. The remaining 3% of the population are assumed to have no used tyre drop-off service in their area (due to being very remote) and are not likely to drive more than 30 mins to access a disposal point, and therefore the used tyres are likely to be dumped in diffuse/small dumping events. Based on the method outlined above, an estimated total of 2% (7,400 tonnes) of non-TSA participant used tyres were illegally dumped across Australia in 2018-19.

Export fate analysis 2018-19

As detailed in Figure S4, Australia exported around 260,000 tonnes of used tyres in 2018-19. These exports consisted of 62% passenger, 33% truck and 4% used OTR tyres.

Figure S4 also details the amount of used tyres that were shredded before export and used tyres exported whole (as bales or casings). This split is important as it provides insight into the fate of the exported used tyre and identifies the tonnage that will be subject to the export ban in December 2021 (all whole used tyres). Around 128,000 tonnes of whole used tyres were exported in 2018-19 that will be impacted by the 2021 export ban.

Figure S4. Australian used tyre exports in 2018-19 (tonnes)



An estimated 131,000 tonnes of used tyres were exported as shredded tyres in 2018-19. Shredded used tyres are also referred to as **Tyre Derived Fuel (or TDF)** because most shredded tyres are used as a fuel supplement in cement kilns, boilers or furnaces. The bulk, if not all, of the shredded used passenger tyre exports in 2018-19 would have been used as TDF. Shredded truck tyres may have been exported for further processing into crumb rubber, off-shore.

An estimated 48,000 tonnes of passenger tyres were exported whole in 2018-19. Most, if not all, whole passenger tyre exports would be baled and are understood to be processed in pyrolysis plants or shredded to produce TDF offshore. A small amount of whole passenger tyres may be exported loose and sold into second-hand markets offshore.

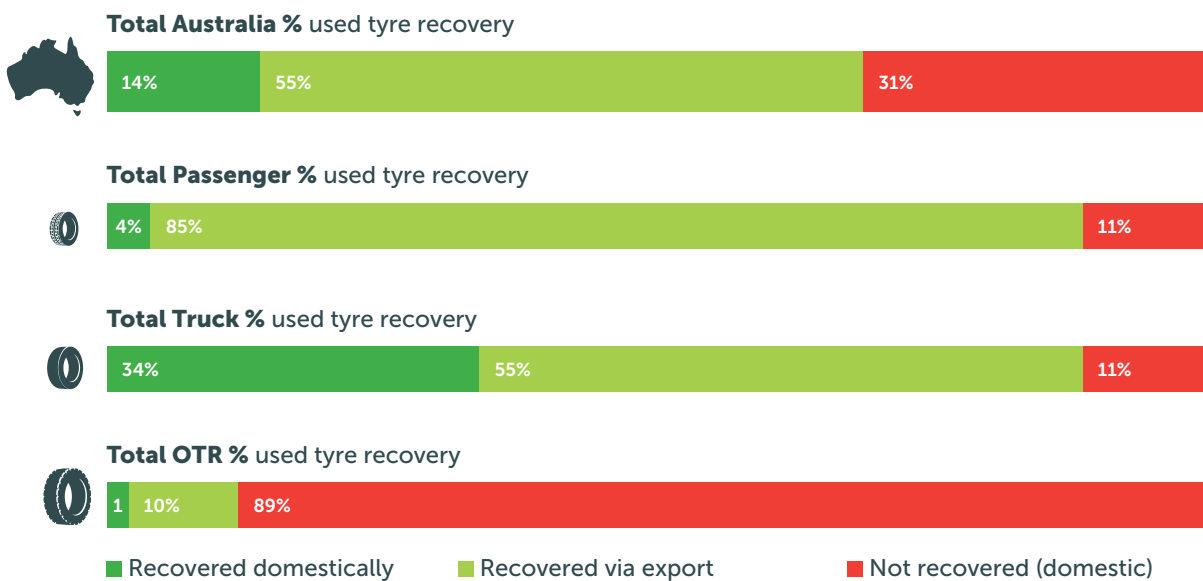
An estimated 69,000 tonnes of whole truck tyres were exported whole in 2018-19. Whole truck tyre exports are likely to be re-treaded or processed into crumb rubber, offshore.

An estimated 12,000 tonnes of used OTR tyres were exported 'whole' in 2018-19. These OTR exports are understood to mostly be sectioned into several pieces to enable handling and recycled offshore.

Used tyre recovery rate 2018-19

Figure S5 details the 2018-19 used tyre recovery rates in total and by tyre group.

Figure S5. Australian used tyre recovery rates (%) total and by tyre group 2018-19



In 2018-19, 14% of used tyre arisings were recovered domestically and another 55% were recovered via exporting shredded or whole used tyres to offshore markets, bringing the total recovery rate to 69% of arisings.

For passenger used tyres, 4% were recovered domestically and 85% were recovered via exporting mostly shredded tyres (TDF) and some whole used tyres to offshore markets. Therefore, the total recovery rate in 2018-19 was 89% of arisings for passenger tyres. For passenger tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. However, additional onshore processing of the currently exported whole passenger tyres (around 50,000 tonnes) may be required to meet the 2022 export ban on whole tyres.

For used truck tyres, 34% were recovered domestically and 55% were recovered via exporting mostly casings to offshore markets, bringing the total recovery rate to 89% of 2018-19 arisings. For truck used tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 70,000 tonnes) of additional onshore processing of truck tyres by 2022.

For used OTR tyres it is estimated that just 1% of OTR were recovered domestically and 10% were recovered via exporting OTRs to offshore markets. The total recovery rate for used OTR tyres was just 11% of 2018-19 arisings. For OTR used tyres the *National Waste Policy Action Plan* recovery rate of 80% has not been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 80,000 tonnes) of additional onshore OTR processing by 2022.

Used tyre financials

The financials analysis, below, is based on industry consultation undertaken in **August 2019**.

Important! Since August 2019, there have been major used tyre market fluctuations due to several factors impacting global trade at the beginning of 2020. These factors include the proposed ban on the export of whole tyres from Australia, restrictions in India on pyrolysis processes and major trade disruptions due to corona virus. The global response to the corona virus has reportedly impacted the cost and availability of shipping containers for used tyre exports.

At the time of publication (March 2020) industry commented that prices were outside the cost ranges included below. **The financials below are subject to major change and may not reflect current market financials.** The analysis below should not be used as the basis for future scenario and business case planning.

Table S1 provides a summary of the revenue from used **tyre collections** which has historically been the main source of revenue for the used tyre recovery industry. The collections revenues provided below shows the collection cost ranges as indicated by industry (i.e. the costs to the tyre disposer). The analysis does not include assessment of the operational costs associated with collection such as staff, fuel, and truck maintenance.

Table S1. Summary of used tyres collections revenue (gross) per used tyre and per tonne (August 2019)

		Collections revenue (gross)			
		Lower		Upper	
		\$/unit	\$/tonne	\$/unit	\$/tonne
Passenger	Metro	\$1	\$125	\$3	\$375
	Regional	\$1	\$125	\$3	\$375
	Rural	\$2	\$250	\$6	\$750
Truck	Metro	\$5	\$125	\$10	\$250
	Regional	\$8	\$200	\$10	\$250
	Rural	\$14	\$350	\$20	\$500
OTR	Metro	–	\$165	–	\$400
	Regional	–	\$400	–	\$600
	Rural	–	\$400	–	\$600

Many industry stakeholders raised concerns about falling collection revenues due to the ability of 'new' baling companies to set-up operations very quickly and cheaply to export baled used tyres at a profit.

Historically collection costs of \$3 to \$5 per passenger tyre in metro areas were common, in August 2019 collections of passenger tyres were costed at \$1 to \$3 in metro areas.

Industry also commented that the collection revenue for truck used tyres has also been reducing due to strong export markets for truck casings and a 'cash economy' operating that is facilitating very cheap collection of truck tyres by under-paying drivers and not have the appropriate insurances in place.

The financial profit or loss for used **tyre processing** is another key financial consideration. The profits or losses vary significantly depending on the process used and the fate of the used tyres.

Table S2 provides analysis of the profit or loss for different used tyre fates. Negative values present a processing financial loss and positive values a processing profit.

The financials listed in Table S2 provide the ranges as indicated by industry. Profit or loss information was provided with varying levels of detail and the notes for each fate need to be considered to best interrupt the information presented.

Table S2. Summary of processing profit or loss by fate and tyre group, dollars per tonne (August 2019)

Fate			Profit or loss		Notes
			Lower \$/tonne	Upper \$/tonne	
Recycling (onshore)	Shredded tyre (TDF)	Passenger	-\$70	-\$100	There is currently no TDF use onshore.
		Truck	-\$100	-\$100	
		OTR	-\$180	-\$180	
	Granule (2-15mm)			-\$500	Processed granule sells for around \$600 per tonne.
	Buffings (<2mm)			-\$500	Buffings sells for around \$700 per tonne.
Crumb rubber (powder)		-\$400	-\$600	Processed crumb sells for around \$400 - \$650 per tonne.	
Recycling (export)	Shredded tyre (TDF)		-\$80	-\$100	Costs include shredding and transport to port.
Energy recovery (export)	Whole baled used tyres exports		\$30	-\$20	Costs include baling and transport to port. Baled exports market has been volatile. Exporters may make \$20/tonne loss or may profit \$30/tonne.
Disposal	Landfill		-\$600	-\$1,900	Landfilling at licenced landfills is very costly. Most jurisdictions have banned the landfilling of whole tyres.

Of note is the processing loss for exporting TDF (up to \$100 per tonne) compared to the potential profit for exporting baled tyres. In August 2019, exporting baled tyres may have cost \$20 per tonne or balers may have profited up to \$30 per tonne.

Competitive markets will find the most cost-effective option that is permitted. In August 2019, for passenger tyres baling and export was permitted and may have been the most cost-effective option.

The implementation of the export ban for whole used tyres (including baled) in 2021 will change the current processing financials. Once the export ban comes into effect, processing costs could increase by \$130 per tonne (moving from baling to onshore TDF production) or around \$1 per passenger tyre. If tyre collectors do not adjust their collection fees accordingly, there could be an increased risk of stockpiling or more widespread diffuse dumping of individual truckloads of tyres.

Procurers of waste tyre services may have to adjust pricing. As noted above, industry reports low tyre collection (disposal) fees are 'the norm' and do not provide sufficient revenue to support the additional processing costs for onshore recycling or TDF production.

Legacy used tyre stockpiles

A total of 15 legacy stockpiles were identified that are spread across Australia containing around 15,000 tonnes or around two million EPU.

Another 10 legacy stockpiles were identified that have recently been cleaned-up. Around 29,000 tonnes or 3.6 million EPUs are estimated to have been recently cleaned-up at an average cost of around \$500 per tonne or \$4 per EPU.

Recommendations

This report presents a significant amount of information and data that should prove useful in supporting TSA to deliver the Scheme. Below are recommendations that can be drawn from the data and the project findings:

1. Increase the proportion of levied tyre sales.

With the TSA levy being paid on only 25% (140,000 tonnes) of tyre imports and 75% (400,000 tonnes) of tyres being imported and sold without payment of the levy, there is significant opportunity to improve levy coverage and increase funding to support used tyre recovery.

2. Market the successes of TSA to date using the data presented.

In 2018-19, 49% of all used tyre arisings were managed by TSA participants, while only 25% of tyre imports were levied in the same year. TSA participants managed 85% of passenger used tyre arisings in 2018-19.

3. Investigate export end markets and foreign policy plans.

Australia exported 260,000 tonnes of used tyres in 2018-19. Australia depends on international off-take markets for TDF. In preparing for the 2021 export ban on whole used tyres, TSA need to be confident of off-shore markets for shredded used tyres as this greatly impacts the level of investment required in Australia.

4. Complete a targeted study of OTR used tyres.

Not enough is known about OTR management for the mining and agriculture sectors. Very large tonnages are assumed not recovered. Simply improving knowledge and data on OTR management and fate could identify higher recovery rates and improved positioning of TSA. Currently OTR disposal tonnages are dragging the overall recovery rate down significantly and the current (and long standing) assumed fate of onsite disposal has never been well tested and validated.

5. Start to plan for 80% recovery rate and no whole tyre exports for all tyre groups.

To meet these new requirements/targets the project identified the need to:

- process an additional 50,000 tonnes of passenger tyres, onshore
- process an additional 80,000 tonnes of truck used tyres, onshore
- process additional 80,000 tonnes of OTR used tyres currently disposed onsite.

Infrastructure planning will be key to ensure there is enough capacity of a range of recovery options that stimulate a competitive recovery market and prevent stockpiling from occurring. The 2017 Strategy provides a detailed roadmap to achieve this level of local reprocessing and end-market development.

6. Continue to analyse the costs of used tyre recovery.

More analysis of the business case for the range of used tyre recovery options is needed. This would enable TSA and other stakeholders to monitor market conditions and better understand where market risks are currently and those that may develop in future.

Introduction

In 2019, Tyre Stewardship Australia (TSA) engaged Randell Environmental Consulting in association with Brock Baker Environmental Consulting (BBEC) and Envisage Works to complete this *Used tyres supply chain and fate analysis*.

This analysis follows-on from a used tyre material flow analysis that REC delivered in 2017 as a part of the [National market development strategy for used tyres](#) (the 2017 Strategy).

The 2017 strategy found that:

“Data from the last three national studies on used tyres shows that around 60 – 65% of all waste tyres generated are disposed to landfill or go to other fates, such as dumping or illegal stockpiling, where little or no resource value is recovered and the quantities to each fate are unknown”. Page viii.

The 2017 Strategy also states that:

“Landfill / unknown’ fates are referred to collectively because data does not allow the quantities of landfilled used tyres to be reported separately from other used tyre fates where no resource value is recovered and for which the quantities to each are unknown. OTR tyres that are not recovered are an exception and are understood to be landfilled on-site into the mine.” Page viii.

A primary aim of this project is to provide an improved understanding of the fate of this 60–65% of used tyres identified in the 2017 Strategy. By improving this used tyre fate data, the project also aims to provide estimates of the amount of used tyres that are currently being stockpiled.

Project scope

2.1

The scope of this project is summarised in the points below:

1. Provide an up-to-date and concise summary of Australian and state and territory policy frameworks for used tyres.
2. Undertake a supply chain assessment (using MFA) to identify and assess used tyre ‘pathways’ and fates.
3. Complete analysis of used tyre financials for the significant pathways and fates identified in the MFA.
4. Analyse the risks of stockpiling associated with used tyre pathways.
5. Compile an estimate of the amount of used tyres in historical (legacy) stockpiles in Australia.
6. Recommend actions to improve the outcomes and the recovery rate for Australian used tyres and to reduce the likelihood of stockpiling.

Report structure

The main body of the report focuses on the national picture, with a focus on the 2018-19 reporting year.

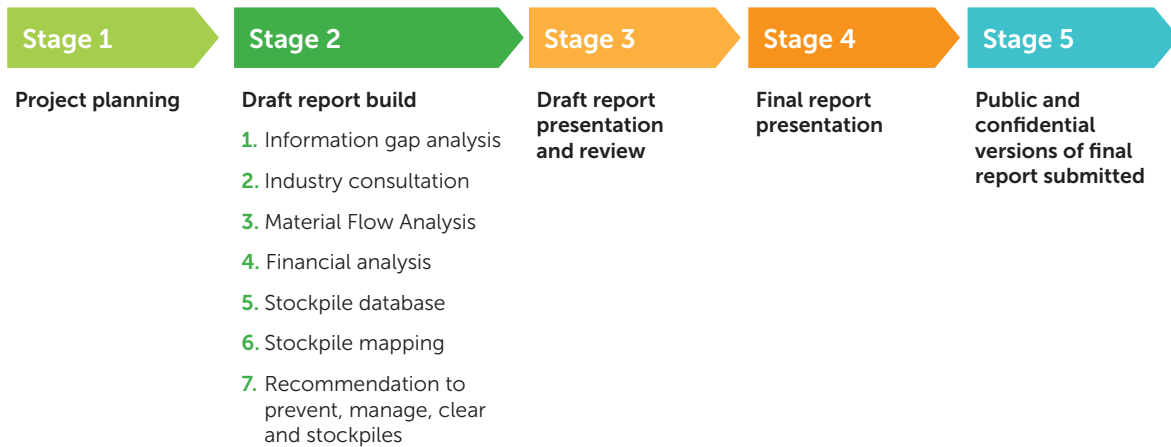
This report is structured as follows:

- **Section 3** details the project method. It discusses how the MFA, supply chain assessment and fate analysis were completed and the key assumptions and data sources used. Appendix A summarises the data sources and key assumptions made for each step in the supply chain analysis. Section 3 also includes discussion of the key project definitions, including the definition used for used tyre stockpiles.
- **Section 4** includes a summary the current Australian national policy framework for used tyres. Appendix B includes a more detailed summary for each jurisdiction. Each jurisdictional summary includes the policy framework and the jurisdictions key data, as derived from the project MFA and supply chain analysis.
- **Section 5** includes the tyre supply chain analysis. This section provides analysis of the Australian tyre supply chain, based on MFA, including tyre consumption (imports) and used tyre arisings. All data are presented in tonnes. The analysis reports the 2018-19 year and provides historical and projected trends.
- **Section 6** includes the analysis of the fate of Australian used tyres (i.e. what happens to Australian used tyres when they reach the end of their useful life, either in Australian or overseas). The section starts with analysis of the amount of used tyres that are managed in Australia (domestic fates) vs the amount of used tyres that are exported to other countries (export fates). More detailed analysis is then provided of the domestic and export fates.
- **Section 7** includes the analysis of the Australian used tyre recovery rate in 2018-19 (i.e. what percentage of 2018-19 used tyre arisings were recovered by reuse, recycling or energy recovery).
- **Section 8** includes a concise analysis of used tyres financials including discussion of used tyre collection revenue and used tyre processing profits or losses.
- **Section 9** includes a summary of information about historical (legacy) Australian used tyre stockpiles and clean-up costs.
- **Section 10** includes mapping of Australia's TSA accredited retailers, used tyre collection and recovery infrastructure, mining sites, and export ports.
- **Section 11 and 12** include conclusions and recommendations.

Method

The project has been delivered over five stages as summarised below.

Figure 1. Project delivery stages summary



Stage 2 involved significant consultation with a range of stakeholders across industry and government. The list of stakeholders who provided valuable input to the project delivery is included in the Acknowledgements section.

Key to the project method is the materials flow analysis (MFA) that is detailed below.

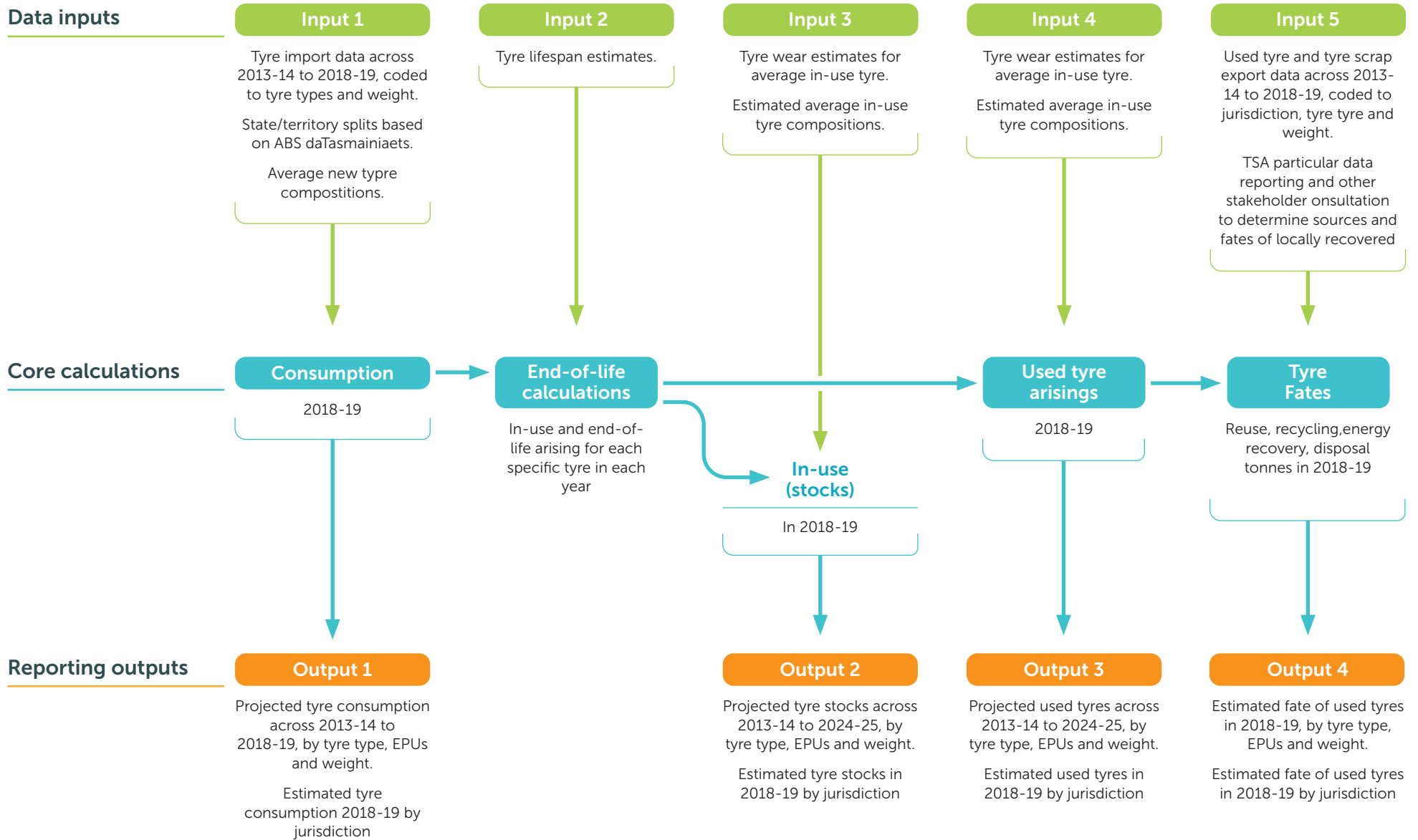
Used tyre material-flow-analysis

The project analysis is founded upon a comprehensive MFA for used tyres. Figure 2 provides an overview of the MFA development method including the main data inputs, calculations, and MFA outputs.

The MFA development method can be summarised as follows:

- The current and projected sales of tyres (passenger, truck and OTR) into the Australian market were estimated based primarily on a collation of tyre import data and market outlook data for future tyre sales.
- For passenger, truck and OTR tyres the ‘in-use’ and ‘end-of-life’ arisings were calculated for each year (current and future) by application of an average lifespan for each tyre type.
- The in-use and end-of-life tyre quantities for each tyre type were estimated. Importantly, this stage of the MFA estimated the tonnages of tyre rubber that is dispersed to the open environment due to the wear of the tyre tread during use.
- For each tyre type the fate of used tyre arisings was estimated. This was based on reported used tyre fate data from TSA participants for 2018-19 and consultation with the non- participants used tyre recovery industry and a state environment regulators. Section 3.2 discusses the method for used tyre supply chain analysis (including for TSA participant and non-participant tonnages).

Figure 2. Overview of the MFA development method



Used tyre supply chain and fate analysis

The used tyre supply chain analysis builds upon the MFA that is outlined above. Figure 3 provides an overview of the used tyre supply chain and fate analysis completed for the project. The supply chain was analysed in three key phases discussed below.

1. Tyre consumption

- **Import** including original equipment fitted (tyres on vehicles) and loose tyre imports (including new and second-hand).
- **Tyre use phase** as estimated by the average tyre lifespan. Disposal of tyre wear to the environment occurs in this phase that results in a loss of weight in each tyre due to wear. For example, a standard passenger tyre weight is estimated to fall from 9.5 kgs to 8kgs.

2. Used tyre arisings

- **Used tyre removal** from vehicles at the end of life by tyre retailers, commercial removal (i.e. motor mechanics, onsite service providers for mining and agriculture, or truck and bus fleet servicing onsite).
- **Used tyre collections** from tyre retailers, waste transfer stations, or onsite pick-up for commercial removals (removed onsite, including backloading where new tyres are delivered and old tyres collected as part of replacement fees).

Note: as illustrated in Figure 3, not all used tyre that are removed are collected by a third party or taken to a waste transfer station. Some used tyres are directly disposed (legally and illegally).

Used tyre fate (local and export)

- including 'whole' and 'shredded' tonnages to re-use, recycling, energy recovery, and disposal fates.

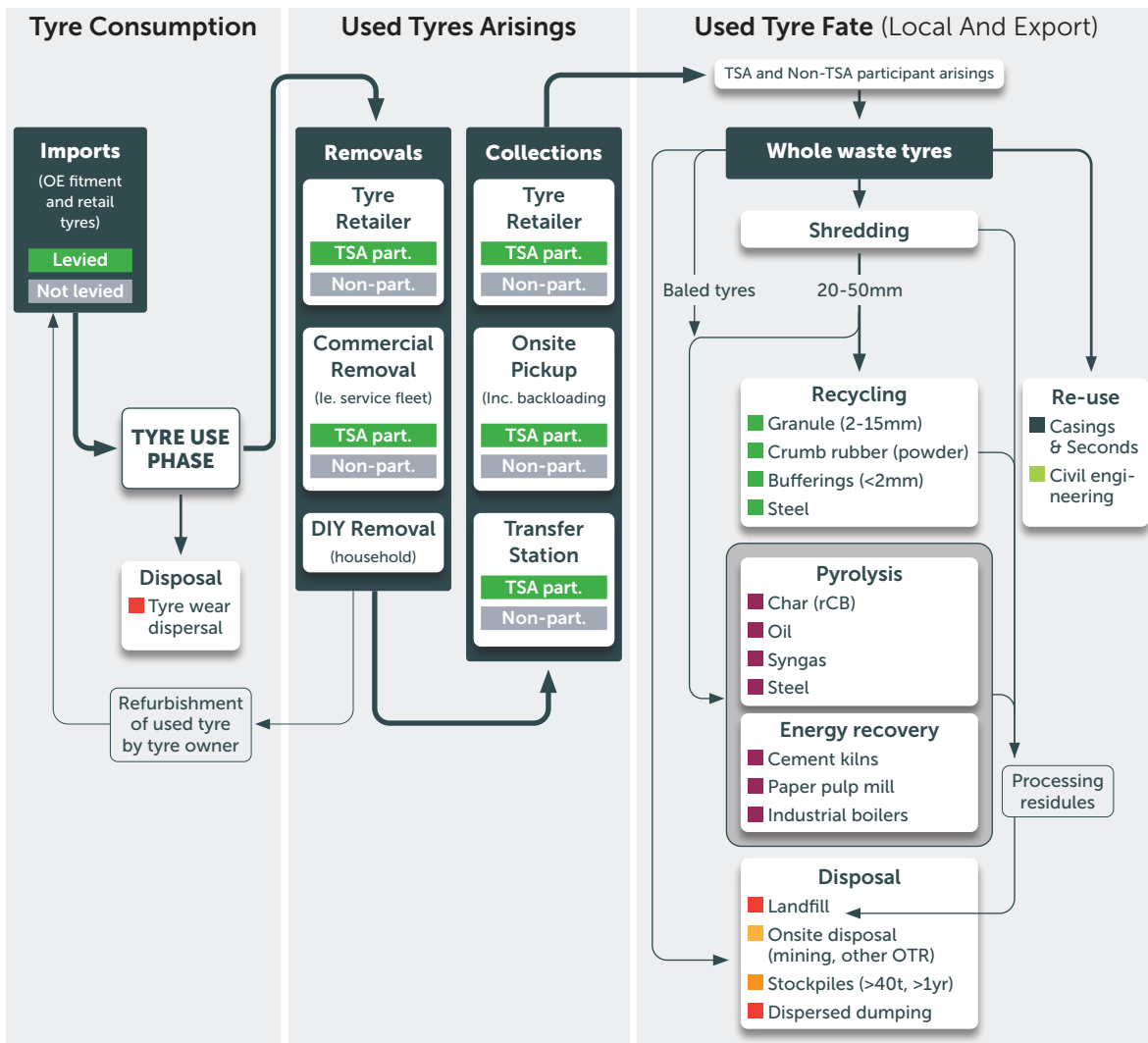
TSA has a range of 'participants' across the used tyre supply chain. These including retailers, fleet operators, local governments, collectors and recyclers. TSA participants report used tyre tonnages as part of annual reporting which provides TSA with important information about the management and fate of used tyres.

To enable a better understanding of the tonnages of tyres being managed by TSA participants and non-TSA participants, used tyre arisings were split into 'TSA participants' and 'non-participants' used tyre tonnages.

'TSA participant' tonnages included in this report are a summary of TSA participant reporting.

'Non-TSA participant' tonnages included in this report are the remainder (i.e. total 2018-19 used tyre arisings minus TSA participant reported tonnages managed).

Figure 3. Overview of supply chain and fate analysis (TSA participant and non-participant flows)



Used tyre fates

The used tyre 'fates' analysis represents what happens to Australian used tyres when they reach the end of their useful life (either in Australian or overseas³). Tonnages of used tyre re-use, recycling, energy recovery, and disposal fates are analysed. Each of these fate categories is discussed below.

Re-use

Re-use includes re-treading of discarded worn tyres to enable the tyre to be re-used. Re-treading of truck tyres is still occurring locally and globally. Passenger and OTR tyres are not re-treaded in Australia in significant quantities, if at all.

Figure 3, illustrates another pathway for used tyres 'refurbishment' by the tyre owner. This pathway differs from the 're-treading' of a used tyre that has been removed and discarded by the tyre owner (e.g. a worn truck tyre removed by a retailer and then collected by for re-treading).

Refurbishment refers to worn tyres that are not discarded by the owner, rather the worn tyre is sent for a renewal so the owner can continue to use the tyre. This is common in the aviation industry, where large aircraft tyres are refurbished once the aircraft has completed a set number of take-offs and landings. Large aircraft tyres are typically refurbished up to seven times before reaching end-of-life.

Re-use also includes the use of used tyres in the construction of retaining walls or permeable pavements, for example.

3. Due to a lack of data on the fate of used tyres that are exported, the fate analysis of used tyres that are exported is currently limited to tonnages exported whole or as shredded tyres.

Recycling

Used tyre recycling processing can produce a range of products, depending on the extent of processing (shredding and further size reduction / refinement). Products include rubber granule, buffings, and crumb (powder) as well as recovered steel.

Energy recovery (tyre derived fuel)

Shredded used tyres (commonly referred to as tyre derived fuel or TDF) is used directly as an energy supplement in cement kilns, paper pulp mills or industrial boilers. The only recovery that occurs is the recovery of embodied energy, no materials (such as steel) are recovered.

Pyrolysis

Pyrolysis kilns heat used tyres to generate by-products that include syngas (fuel), char, oil, and steel. Pyrolysis kilns are not actually a fate category. Pyrolysis is presented as a standalone category because it enables a combination of energy recovery and recycling fates.

Disposal

Disposal of used tyres includes the following:

- Landfilling of whole and /or shredded used tyres and the landfill of residuals from recycling or energy recovery processes.
- Onsite disposal of typically whole OTR used tyres onsite either at a mining site or other onsite disposal sites.
- Stockpiling of used tyres in stockpiles of greater than 40 tonnes (5,000 equivalent passenger units, EPU) for a period of a year or more. See Section 3.3 for further discussion.
- Dispersed dumping that includes small incidental dumps of several tyres across Australia including road-side dumping, dumping in gullies on public or private land, etc.

Appendix A includes a summary of the information, data sources and key assumptions made for each step in the supply chain analysis illustrated in Figure 3.

Definition of a used tyre stockpile

A used tyre 'stockpile' of significance needs to be clearly defined to be able provide effective analysis of stockpiles.

To do this the lower threshold to apply to the definition of a stockpile (versus what is diffuse illegal dumping or temporary storage/ accumulation) needed to be agreed.

Following discussions with TSA, it was agreed that the stockpiles definition should be based on a combination of:

- REC 2017, *Hazardous waste stockpiles in Australia* completed for the Department of Environment and Energy, discussed below
- EPA Victoria's threshold for requiring a licence for the storage of used tyres of 40 tonnes or 5,000 EPU.

Hazardous waste stockpiles in Australia, 2017 report extracts

- **EOLT licence required to stockpile**

EOLT stockpiling is licensed in all Australian jurisdictions apart from Qld and Tasmania. However, the thresholds of storage that are regulated vary significantly from about 1 tonne in WA up to 40 tonnes in Vic. Both SA and NSW regulate storage of used tyre stockpiles of 5 tonnes.

- **EOLT tracking (transport and receipt)**

EOLT collection, transport and receipt is tracked in NSW, Qld, SA and WA only. ACT, Tasmania, NT and Vic do not track EOLTs. Vic is the only large and populous state in Australia that do not track used tyre and this has likely contributed to the significant stockpiling issue for used tyre in Vic.

- **EOLT stockpile quantity limit set for all sites**

ACT set a tonnage limit of 25 for used tyre storage, Vic sets a limit on the volume of used tyre that can be stockpiled, NSW and SA set the limit within the site license. Recent regulation of used tyre storage in Victoria via the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007, requires used tyre storages >40 tonnes to be licensed. EPA has also developed a standard licence (LL-WM1.6) for sites receiving used tyre which reads "the maximum size of a pile of tyres stored outdoors does not exceed 20m long, by 6m wide, by 3m high"

Whilst these changes should help prevent some used tyre stockpiles in Vic, it is worth noting that the threshold for licensing, at 40 tonnes, is eight times higher than comparable jurisdictions (NSW and SA).

REC 2017, page 46, defines stockpiles as:

- More than 12 months storage
- Untreated, unprocessed to product specification
- Requires active management to protect human health or the environment from impact
- Hazardous waste 'clearance' requirement typically apply.

The following definition of a used tyre stockpile has been adopted for this report:

- More than 40 tonnes (5,000 EPU) in storage onsite
- More than 12 months storage
- Untreated, unprocessed to product specification.

Notes on data presentations

3.4

- Assurances were provided to the stakeholders consulted for the project regarding the confidentiality of their responses. The report does not include any company-specific data.
- As was the case for the 2017 Strategy, industry reported data for used tyre exports is higher than what is reported in ABS export data. Data collated from industry consultation suggests significant underreporting or mis-reporting of used tyre exports (that is to say the tonnages reported by TSA participants as exported are higher than the total tonnage exports in ABS export data). It is beyond the scope of this project to analyse why ABS reported exports are lower than TSA participant reported exports.
- Throughout the MFA and this report most values in the text, tables and figures have been rounded. For this reason, minor discrepancies may occur between stated totals and the apparent summation of the determinate values. Percentage values have been calculated using the determinate values prior to rounding.
- Data is generally presented to three significant figures.

- This project brings together two key datasets. The MFA, that provides estimates of used tyre arisings nationally and by jurisdiction, and the TSA participant reported data on the amount of used tyres recovered in each jurisdiction. Combining the two datasets can produce misleading data especially at the more detailed state and territory level. For example, if the estimated used tyre arisings in 2018-19 are less than the reported used tyre reprocessing in 2018-19 by TSA participants, it can result in negative values for other fates (estimated by taking tonnages of arisings minus the tonnages of recovery). Where this occurred, it was likely a result of or clearing of stockpiles from previous years used tyre arisings or other data uncertainties. Minor amendments to jurisdictional splits were made to correct any negative values generated in the analysis.

National policy framework for used tyres

4.0

Policy and regulation related to waste management, including management of used tyres, is mostly devolved down to state and territory governments. However, National waste policy requirements for used tyres are also significant and are discussed below.

Refer to Appendix B for a summary of each jurisdictions policy framework and summary of Tasmania, as derived from the project MFA and supply chain analysis.

Council of Australian Governments (COAG) waste export bans

4.1

On the 9th November 2019 Environment Ministers agreed that waste tyres that have not been processed into a 'value-added material' should be banned from being exported overseas.

The timing of the waste export bans was also agreed with the ban on the export of all whole tyres including baled tyres to come into effect by December 2021.

Ministers noted that the timeline will be further tested with industry and local government, while also developing an implementation plan that will be released in 2020.

It was also noted that resourcing, from Commonwealth, states and territories, and industry will be required to effectively implement the ban. At this stage it is unclear if any funding will be made available to the used tyre recovery industry to enable them to transition to processes that will generate a 'value-added material'.

National Waste Policy 2018

4.2

The 2018 *National Waste Policy* provides the national waste management policy direction until 2030.

The policy includes five principles for waste management with the aim of supporting a circular economy, included below.

1. Avoid waste:

- Prioritise waste avoidance, encourage efficient use, reuse and repair
- Design products so waste is minimised, they are made to last and we can more easily recover materials.

2. Improve resource recovery:

- Improve material collection systems and processes for recycling
- Improve the quality of recycled material we produce.

3. Increase use of recycled material and build demand and markets for recycled products.

4. Better manage material flows to benefit human health, the environment and the economy.

5. Improve information to support innovation, guide investment and enable informed consumer decisions.

COAG National Waste Policy Action Plan

4.2.1

On the 9th November 2019 Environment ministers agreed to a new *National Waste Policy Action Plan* that will drive the implementation of Australia's National Waste Policy 2018.

It includes the following two key waste management targets that directly relate to used tyres:

An 80 per cent 'recovery' rate of material across all waste streams.

Significant increases to government procurement of recycled materials.

Ministers committed to identifying any significant procurement opportunities such as major road projects that could use significant amounts of recycled material, which could include crumbed rubber from used tyres. The Commonwealth agreed to a leading role in implementing the action plan and will report progress at the next meeting of ministers.

Product Stewardship Act 2011

4.3

Product stewardship is an approach which recognises that all participants in the product supply chain have a responsibility to ensure that the product can be appropriately managed at end of life.

In 2011 the *Product Stewardship Act* was introduced. The management of used tyre in Australia has been a priority under the Product Stewardship Act which culminated in the development of a voluntary, industry-led scheme administered by Tyre Stewardship Australia (See Section 4.4).

The Act is required to be reviewed every five years. In 2017, the Federal Government announced it will undertake a formal review of the Product Stewardship Act. The review is likely to focus on the impacts of co-regulatory and voluntary stewardship schemes and the ability to which they can affect positive change in the market. The review is expected to be finalised in the last quarter of 2019.

The [Review of the Product Stewardship Act 2011, Consultation paper March 2018](#) noted that an independent review of TSA and the Tyre Stewardship Scheme, conducted by Marsden Jacob in 2017, included recommendations that TSA seek accreditation of the Tyre Stewardship Scheme under the voluntary product stewardship accreditation scheme.

In May 2017, the TSA Board released a statement that the Board will consider making an application for accreditation when the Government next opens a call for accreditation of voluntary product stewardship arrangements.

Tyre Stewardship Australia

4.4

TSA was launched in 2014 as a not-for-profit company established to deliver the National Tyre Product Stewardship Scheme (the Scheme).

The Scheme, which is a voluntary stewardship scheme, aims to:

- reduce in the number of tyres not going to an environmentally sound use
- enhance the Australian recycling industry
- develop sustainable markets for recycled tyre products
- improve conditions for tyre collectors and recyclers
- increase consumer awareness of the impacts of end-of-life tyre disposal.

Tyres that are imported by TSA members (loose or fitted) are subject to the National Tyre Product Stewardship Scheme (the Scheme) levy upon sale (25 cents per 9.5 kilograms). The Scheme levy funds TSA and its programs.

TSA has a range of 'participants' across the used tyre supply chain. These including retailers, fleet operators, local governments, collectors and recyclers. TSA participants report used tyre tonnages as part of annual reporting which provides TSA with important information about the management and fate of used tyres.

The Scheme is an accreditation program which seeks to promote those tyre collectors and recyclers in the industry that have committed to responsible end of life management of tyres.

This is achieved through:

- accreditation and promotion of participants in the Scheme
- a detailed audit and compliance program to ensure best practice is being achieved
- an industry development program aimed at improving the capability and capacity of the tyre recycling sector
- investment in research and development to identify new and expanded markets for tyre derived products in Australia.

Tyre Stewardship Scheme

4.4.1

TSA is different to most product stewardship schemes for tyres around the world and to schemes for other products (paint, mattresses, oil and alike) in Australia. TSA does not charge an 'eco-fee' that encompasses the management of tyres throughout the end of life supply chain. The structure of TSA acknowledges the existing collection systems already in place in Australia and builds upon those to create an efficient and cost-effective Scheme for industry and consumers.

The management of tyres in Australia is undertaken through a market-based arrangement between the disposer of the aggregated tyres (retailers, councils and alike) and tyre collectors and recyclers.

Procurers of used tyre disposal services and service providers make commercial arrangements and TSA does not influence these arrangements directly. However, TSA does accredit operators within the supply chain to ensure that market participants meet environmental and safety standards as stipulated in the Scheme.

TSA Best Practice Guides

4.4.2

TSA has released several Best Practice Guides which set out the requirements for participants in the Scheme. Of relevance to the tyre recycling industry are:

Best Practice Guideline for Fire and Emergency Preparedness.

This guideline provides industry with information on how to manage the risk and compliance requirements to ensure appropriate planning and management for tyre-related fires. This includes contingency planning, on-site fire management systems and protocols for training and servicing of plant and equipment.

Collector and Recycler Audit Handbook.

Sets out the processes that apply to TSA Collector and/or Recycler accreditation and annual compliance audits, assessment of accreditation and compliance, and steps to resolve non-compliance. It ensures transparency in relation to the scope of TSA audits and explains what Collectors and Recyclers are required to do before, during and after an audit in order to meet Scheme requirements and maintain accreditation.

Stockpile Management Guideline.

The guideline has been developed with consideration to existing State and Territory legislation regarding tyre stockpiles and storage.

Independent Guide on Thermal Processing Technologies.

This industry guide focused on increasing knowledge and identifying potential issues prior to approval, funding or the building of a plant in Australia.

The implementation of the guidelines as part of the TSA audit and compliance function is likely to assist all participants in meeting their regulatory requirements.

National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998

4.5

The *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998* (Controlled Waste NEPM) provides a framework for managing the movement of controlled wastes between states and territories. The NEPM relates only to interstate and not intrastate movement.

Used tyres are listed as a controlled waste under Schedule A (List 1) of the Controlled Waste NEPM, therefore states and territories are required to have systems in place that track the interstate movement of used tyre. However, the degree to which states and territories are set up to track the movement of used tyres differs.

Basel Convention

4.6

The *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* (the "Basel Convention") regulates the movement of hazardous wastes across international boundaries. Australia was a foundation signatory to it in 1992, when it came into force.

The Basel Convention puts an onus on exporting countries to ensure that hazardous wastes are managed in an environmentally sound manner in the country of import. These obligations are placed on countries that are party to the Convention. One hundred and fifty-one countries have ratified the Basel Convention as at December 2002.

The obligations are to:

- minimise generation of hazardous waste
- ensure adequate disposal facilities are available
- control and reduce international movements of hazardous waste
- ensure environmentally sound management of wastes
- prevent and punish illegal traffic.

Signatories are required to implement systems that ensure the notice, consent and tracking of hazardous waste across national boundaries, including annual reporting requirements.

Article 1 of the Basel Convention (page 97) includes the following:

“Scope of the Convention

1. *The following wastes that are subject to transboundary movement shall be “hazardous wastes” for the purposes of this Convention:*
 - (a) *Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III; and*
 - (b) *Wastes that are not covered under paragraph (a) but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.”*

Waste tyres are not listed in Annex I, however, waste tyres are regulated as a hazardous or controlled waste in all jurisdictions in Australia, except for Victoria⁵. Therefore, consistent with Article 1 (b) above, Australia reports waste tyre generation within Basel reporting as part of a subtotal of ‘additional waste categories’ that are not included in Annex I.

It is also worth noting that Annex IX LIST B (page 140) includes the following:

“Wastes contained in the Annex will not be wastes covered by Article 1, paragraph 1 (a), of this Convention unless they contain Annex I material to an extent causing them to exhibit an Annex III characteristic
... B3140 Waste pneumatic tyres, excluding those destined for Annex IVA operations”

This statement excludes waste tyres from Basel transboundary movement requirements, including export permits, unless the waste tyres are being exported to be disposed (i.e. not exported for recycling).

Hazardous Waste (Regulation of Exports and Imports) Act 1989

4.7

The Australian Government Department of the Environment and Energy implements its Basel Convention responsibilities through the [Hazardous Waste \(Regulation of Exports and Imports\) Act 1989](#) (the “Hazardous Waste Act”), which regulates (via a permitting system) movement of hazardous wastes in and out of Australia.

The object of the Hazardous Waste Act is to:

“... regulate the export, import and transit of hazardous waste to ensure that exported, imported or transited waste is managed in an environmentally sound manner so that human beings and the environment, both within and outside Australia, are protected from the harmful effects of the waste.”

The Department assesses hazardous waste import and export permit applications. As discussed above waste tyres being exported for recycling are excluded from the Basel Convention reporting requirements (under Annex IX LIST B) and therefore Hazardous Waste Act requirements for import and export permits.

5. See further discussion within each jurisdiction’s chapter in Appendix B.

OECD Decision Regulations

4.8

To support its member countries in meeting the obligations of the Basel Convention (through the harmonised OECD Decision C (2001)107), the Organisation for Economic Cooperation and Development (OECD) has published a *Guidance Manual for the Control of Transboundary Movements of Recoverable Wastes*. The guideline lists waste tyres under the “green control procedure”, which requires that the material must be:

“destined for recovery operating within a recovery facility which will recover them in an environmentally sound manner according to national laws, regulations and practices”.

Australian Customs Regulations

4.9

A significant number of used tyres are exported from Australia each year. The *Customs Act 1901* provides a legislative framework for the exportation of goods from Australia, including the prohibition and setting of requirements and conditions. The Act requires that goods being exported from the country be reported to the Department of Immigration and Border Protection.

The *Export Control Manual* sets out the requirements for the export of goods from Australia. Specifically, the manual outlines reporting requirements, including the process for obtaining an Export Declaration Number (EDN) and the numbering conventions which apply to shipments under the Australian Harmonised Export Commodity Classification (AHECC).

Tyre supply chain analysis

This section provides analysis of the Australian tyre supply chain, based on MFA, including tyre consumption (imports) and used tyre arisings. All data are presented in tonnes. The analysis reports the 2018-19 year and provides historical and projected trends.

Australian tyre consumption (imports)

Figure 4 details Australian consumption of tyres in 2018-19 for passenger, truck and OTR tyres. A total of 543,000 tonnes of tyres were imported in 2018-19 and assumed to be consumed in 2018-19. Tyre imports are a reasonable estimate of consumption in any particular year as tyres are not typically sorted for long periods before sale. Since the closure of Bridgestone Tyres in Adelaide, in 2010, Australia has not manufactured any tyres (i.e. imports represent consumption).

Figure 4. Australian tyre consumption 2018–19, by tyre group (tonnes)

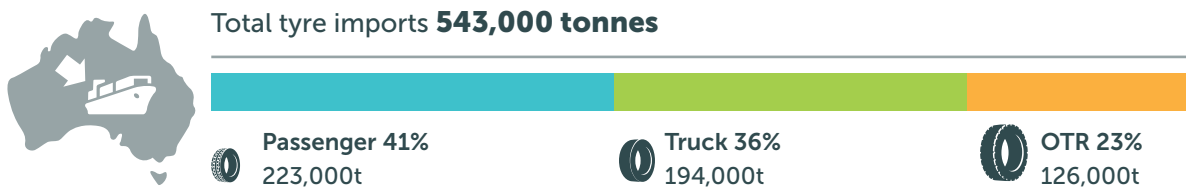


Figure 5 details Australian tyre consumption estimates in 2018-19 in each jurisdiction by passenger, truck and OTR tyres. Jurisdictional proportions of tyre consumption for passenger and truck are estimated based on passenger vehicle and truck registrations in each jurisdiction. OTR tyres consumption is prorated based on business activity across the agriculture, mining, manufacturing, construction and wholesale trades industry divisions in each jurisdiction.

Figure 5. Australian tyres consumption 2018–19, by jurisdiction and tyre group (tonnes)

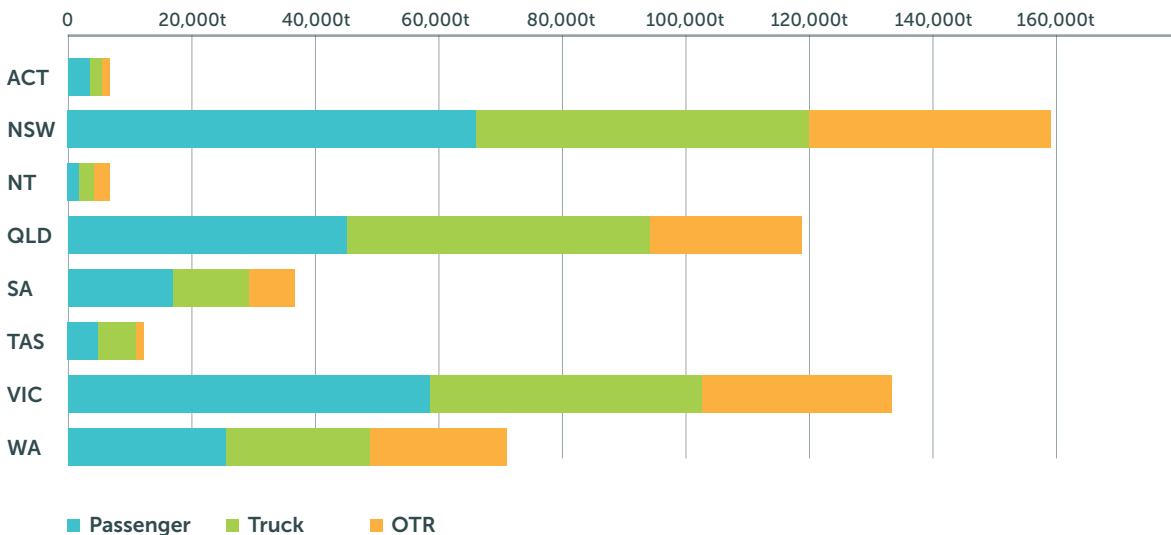
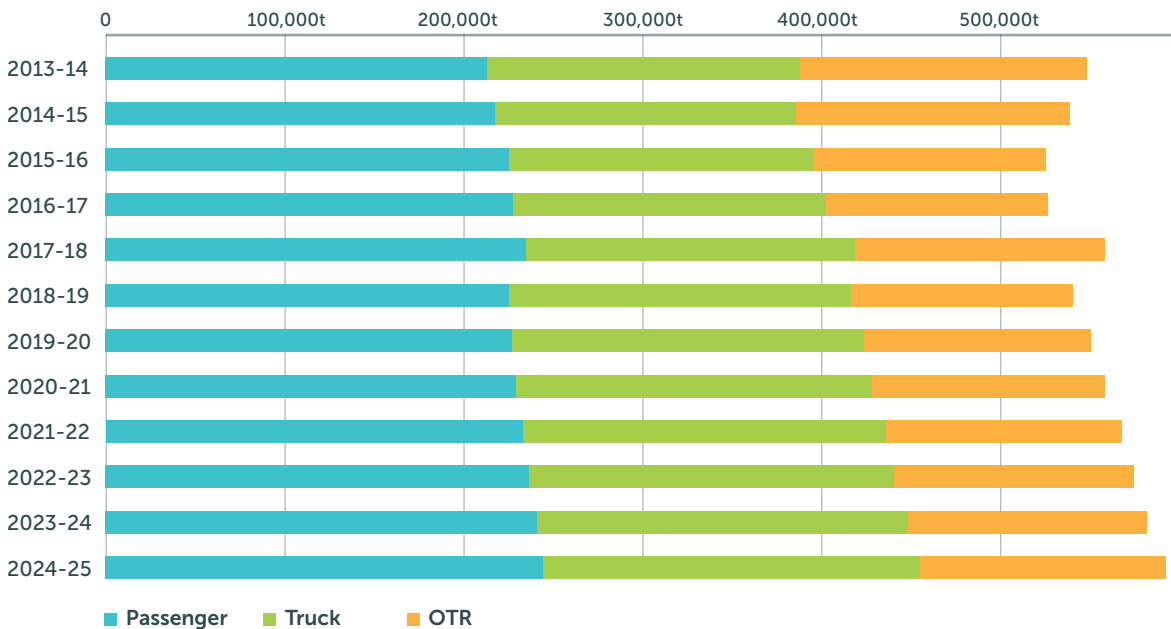


Figure 6 details actual Australian tyre consumption from 2013-14 till 2018-19 and includes projected (estimated) tyre consumption till 2024-25. Tyre consumption is projected to increase at a rate of 1.5% per annum till 2025 based on *IbisWorld Tyre Retailing in Australia*. Projected tyre consumption increases of 1.5% per annum is also consistent with *ABS projected population growth* to 2025 of between 1.4% and 1.8% per annum.

Figure 6. Australian tyres consumption 2013–14 to 2024–25, by tyre group (tonnes)



Levied versus non-levied tyre imports

5.2

As discussed in Section 4.4, tyres that are imported by TSA members (loose or fitted⁶) are subject to the Scheme levy upon sale (25 cents per 9.5 kilograms). The Scheme levy funds TSA and its programs. TSA membership is voluntary and not all loose tyre importers are currently TSA members. Until recently, no fitted tyre importers were TSA members⁷. Currently no OTR tyre imports are levied upon sale.

Figure 7 details the tonnages of tyre imports that were imported by TSA members (and levied) and the tonnages of 'not levied' tyre imports in 2018-19.

Figure 7 (a) details Australian passenger and truck tyre imports (only) and figure (b) details passenger, truck and OTR imports.

Excluding OTR tyres, TSA membership covered 34% (140,000 tonnes) of the passenger and truck tyres imported in 2018-19. The remaining 66% (275,000 tonnes) of passenger and truck tyres were imported and sold without collection of the levy.

When OTR tyres are included, TSA membership covered just 26% (140,000 tonnes) of tyre imports in 2018-19. The remaining 75% (400,000 tonnes) of tyres were imported and sold without collection of the levy.

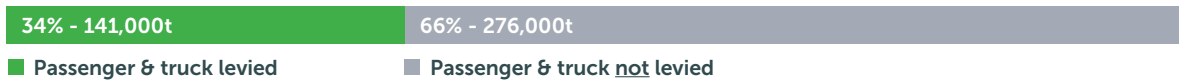
This presents a significant challenge for TSA and its participants, that aim to increase used tyre recovery for all tyres consumed in Australia, while only 26% (by weight) of tyre imports are levied.

1. Loose = tyres not fitted to vehicles, imported for sale. Fitted = tyres fitted to vehicles such as cars.

2. Volkswagen became a TSA member in 2019.

Figure 7. (A) Australian passenger and truck tyres and (B) passenger, truck and OTR levied vs not levied, 2018-19 (tonnes)

A. Passenger and truck tyre imports 2018-19



B. Passenger, truck tyre and OTR imports 2018-19



Australian used tyre arisings

After use, used tyres are generated (referred to as used tyre arisings). Figure 8 details Australian arisings of used tyres in 2018-19 for passenger, truck and OTR tyres. An estimated total of 466,000 tonnes of used tyres arose in 2018-19. Used tyre arisings are not the same as consumption in 2018-19 (543,000 tonnes) because the used tyre arisings relate to tyres consumed over several previous years and also don't include tyre wear losses to the environment.

Figure 8. Australian tyres reaching end-of-life in 2018–19, by tyre group (tonnes)

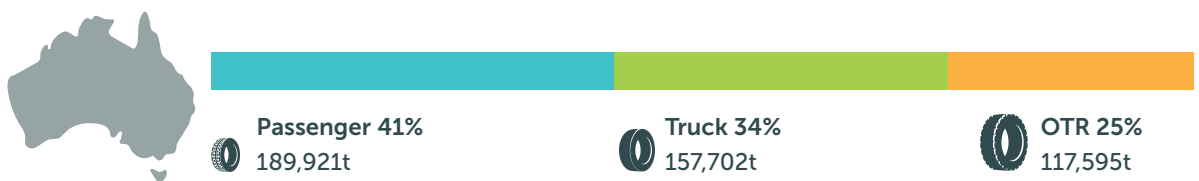


Figure 9 details Australian arisings of used tyres in 2018-19 in each jurisdiction for passenger, truck and OTR tyres. Jurisdictional proportions of used tyre arisings link to the jurisdictional estimates of tyre consumption detailed in Section 5.1.

Figure 9. Australian tyres reaching end-of-life in 2018–19, by jurisdiction and tyre group (tonnes)

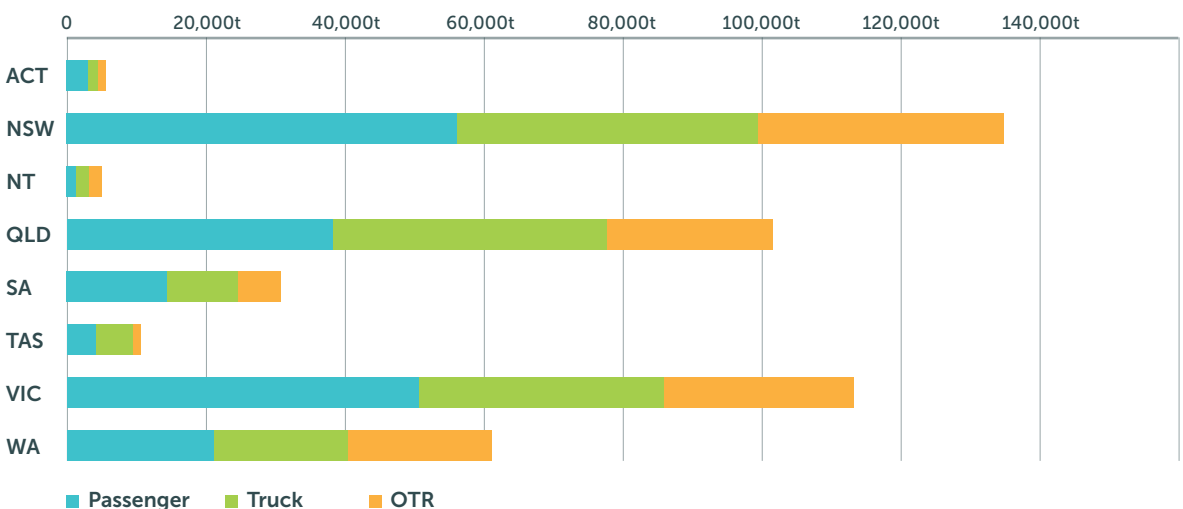
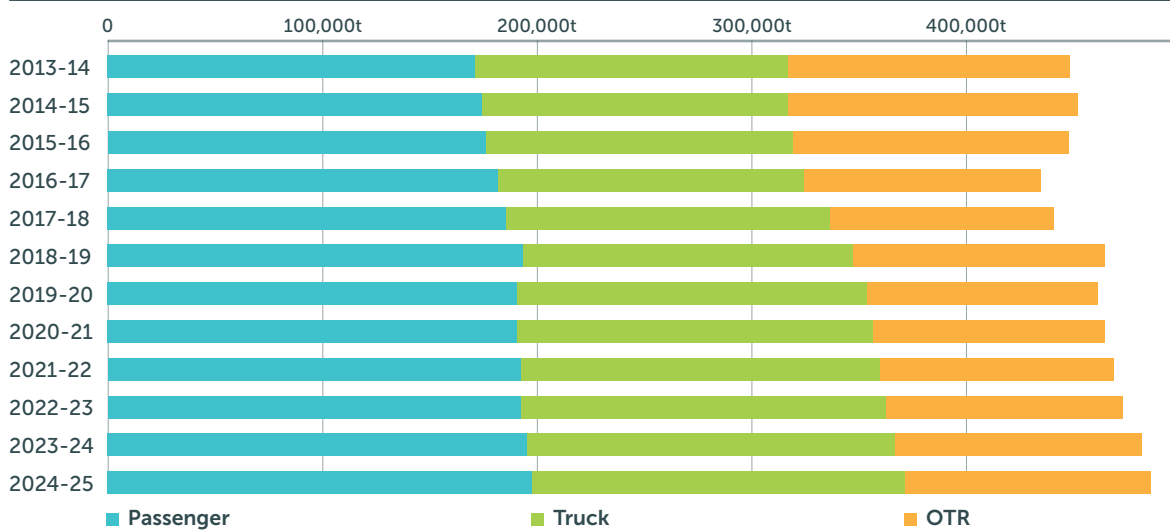


Figure 10 details estimated Australian used tyre arisings from 2013-14 till 2024-25. Used tyre arisings are projected to increase over time, driven by increases in tyre consumption, and are expected to reach around 490,000 tonnes by 2025.

Figure 10. Australian tyres reaching end-of-life 2013–14 to 2024–25, by tyre group (tonnes)



A participants vs non-participant management of used tyres (2018-19)

5.3.1

In addition to the tyre importers that are TSA members, TSA has a range of ‘participants’ across the used tyre supply chain. These including retailers, fleet operators, local governments, collectors and recyclers. TSA participants report used tyre tonnages as part of annual reporting which provides TSA with important information about the management and fate of used tyres.

‘TSA participant’ tonnages included in this report are a summary of TSA participant reporting.

‘Non-participant’ tonnages included in this report are the remainder (i.e. total 2018-19 used tyre arisings minus TSA participant reported tonnages managed).

Figure 11 details the tonnages of used tyre arisings that were managed by TSA participants vs used tyres managed by non-participants in 2018-19.

It is important to note that TSA participants manage used tyre arisings that were originally imported by TSA members *and* used tyres that were imported by non-TSA members (unlevied). In 2018-19, just 140,000 tonnes of tyres were imported by TSA members and levied at sale. In the same year 227,000 tonnes of used tyres were managed by TSA participants.

The 227,000 tonnes of used tyres managed by TSA participants is 49% of total used tyre arisings in 2018-19. Only 26% of total tyre imports were levied in the same year.

TSA participants managed 85% of passenger, 33% of truck and 10% of OTR used tyres arisings in 2018-19. The rates of TSA participant management of used tyres are highest where levy coverage is highest (passenger) and lowest where levy coverage is not currently in place (OTR).

Figure 11. Used tyre arisings management by TSA participants vs non-participants, 2018–19 (tonnes)

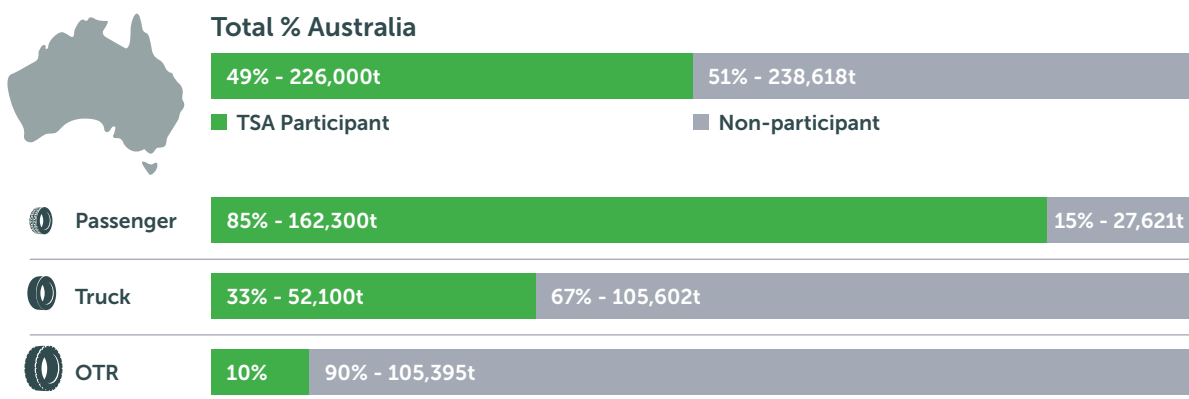
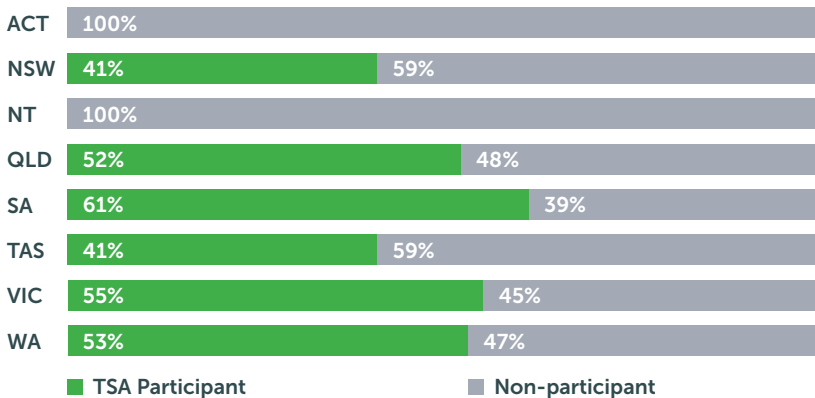


Figure 12 and Figure 13 detail the tonnages of TSA participants vs non-participants used tyre management by jurisdiction and by tyre group. Analysis of these figures is provided in text boxes within the charts.

Figure 12. Used tyre arisings - TSA participant vs non-participant by jurisdiction 2018–19 (tonnes)

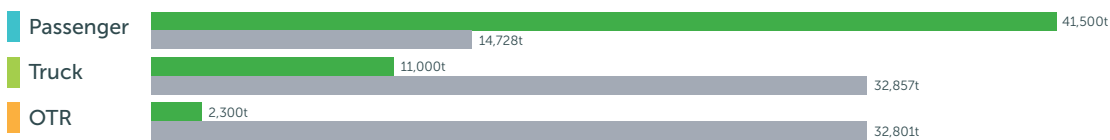


In 2018-19 the leading TSA participant management rate was achieved in SA followed by Vic, WA and Qld.

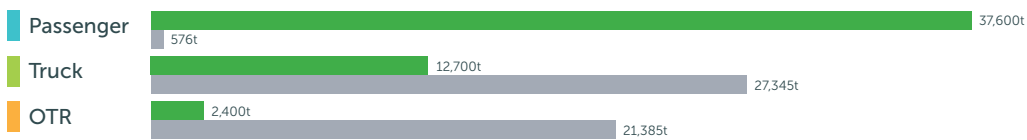
NSW TSA management rates appear surprisingly low for a populous and developed state. NT and ACT have no TSA participants operating currently.

Figure 13. Used tyre arisings TSA participant vs non-participant by jurisdiction and tyre group 2018–19 (tonnes)

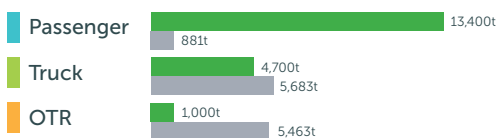
New South Wales & ACT



Queensland

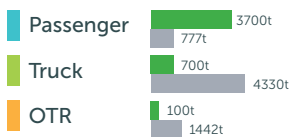


South Australia



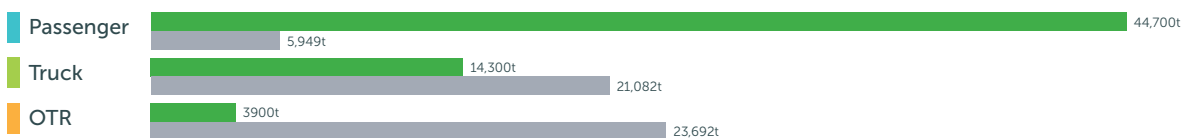
OTR and truck tyres dominated the non-participant tonnages around Australia in 2018-19.

Tasmania

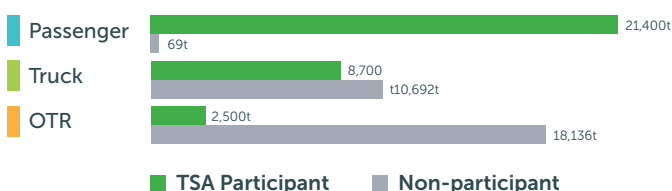


In all jurisdictions, apart from NSW, used passenger tyres are almost entirely managed by TSA participants.

Victoria



Western Australia



Fate of Australian used tyres

This section provides analysis of the fate of Australian used tyres (i.e. what happens to Australian used tyres when they reach the end of their useful life, either in Australia or overseas). The section starts with analysis of the amount of used tyres that are managed in Australia (domestic fates) vs the amount of used tyres that are exported to other countries (export fates). More detailed analysis is then provided of the domestic and export fates.

Domestic versus export fates

6.1

Figure 14 details the tonnages of used tyre managed domestically vs exported. The following points are illustrated in Figure 14.

- Overall in 2018-19, 44% (206,000 tonnes) of used tyres were managed in Australia (domestic) vs 56% (258,000 tonnes) exported.
- For passenger used tyres:** 85% (161,000 tonnes) were exported and 15% (29,000) remained onshore.
- For truck used tyres:** 55% (87,000 tonnes) were exported and 45% (71,000) remained onshore.
- For OTR used tyres:** 10% (11,500 tonnes) were exported and 90% (106,000) remained onshore.
- For domestic used tyres:** 29% (59,000 tonnes) were managed by TSA participants and an estimated 71% (147,000 tonnes) were managed by non-TSA participants.
- For exported used tyres:** 65% (168,000 tonnes) were exported by TSA participants and an estimated 35% (91,000 tonnes) of exports were exports by non-TSA participants.

Figure 14. Domestic and export used tyre fate (TSA participant vs non-participants) total and by tyre group 2018–19 (tonnes)

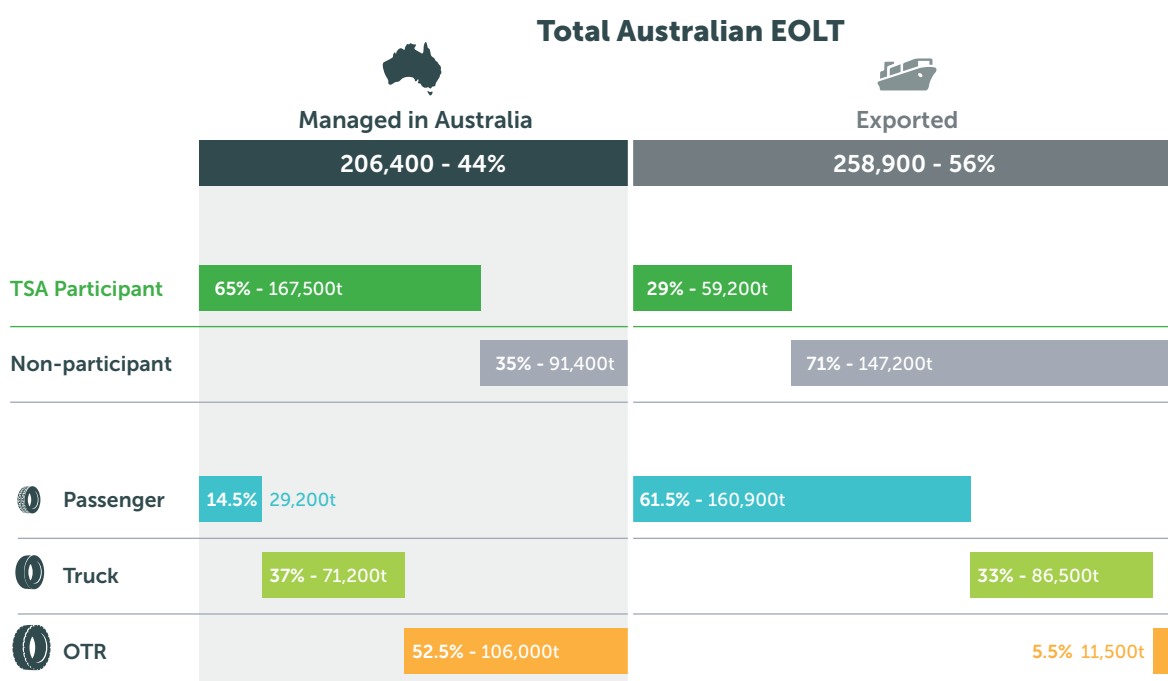
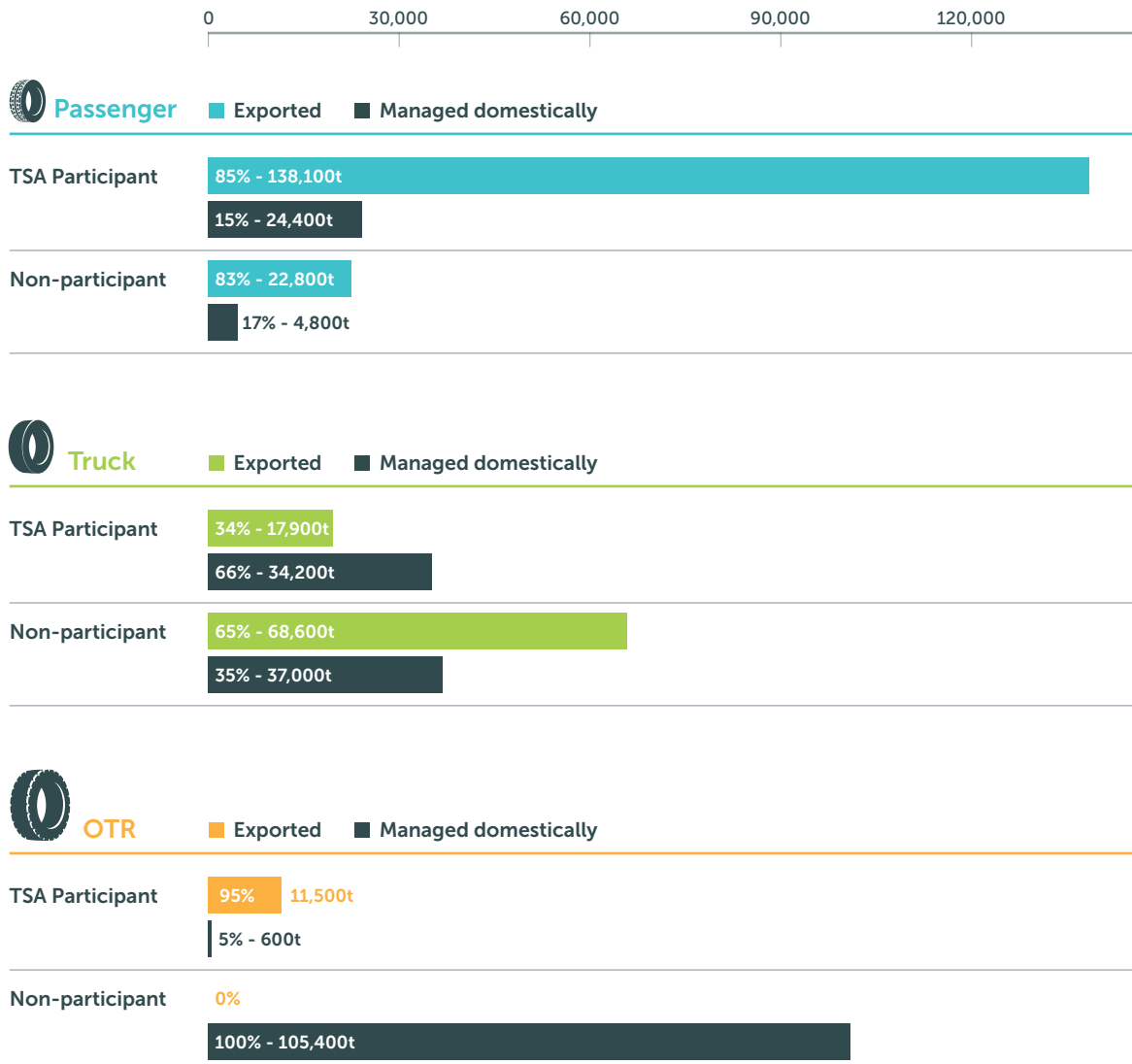


Figure 15 details the tonnages of passenger, truck and OTR used tyres being exported or managed domestically by TSA participants and non-participants. Analysis of this figure is provided in text boxes within the chart.

Figure 15. TSA participant and non-participant export and domestic fate by tyre group 2018–19 (tonnes)



TSA participants reported:

- 85% of passenger used tyres were exported, 15% remained onshore
- 34% of truck used tyres were exported, 66% remained onshore
- 95% of used OTR tyres were exported, 5% remained onshore.

For non-participant used tyres:

- 83% of passenger were estimated exported, 17% remaining onshore
- 65% of truck were estimated exported, 35% remaining onshore
- 0% of OTR were estimated exported, 100% remaining onshore

Note: the tonnages of non-participant exports have higher uncertainty. Estimates are based on industry consultation. Extensive consultation suggests the majority of non-participant passenger used tyres are baled whole and exported and the majority of non-participant used truck tyres are exported whole for re-treading or to be processed into crumbed rubber overseas. The uncertainty regarding the amount of non-participant exports is more significant for truck tyres, than passenger tyres, because significant tonnages (68,600) of truck tyres are estimated to be exported by non-participants. Whereas, most passenger exports (140,000 tonnes) are those reported by TSA participants, with only 22,800 tonnes being non-participant exports.

Australian used tyre fate analysis 2018-19

Figure 16 and Table 1 detail the fate of Australian used tyres in 2018-19. Table 1 also includes the fate tonnages split by TSA participants and non-participant. Section 6.3 includes analysis of domestic fates and Section 6.4 includes analysis of the fate of exported used tyres.

Figure 16. Fate of Australian used tyre (TSA participants and non-participants) by tyre group in 2018-19 (tonnes)

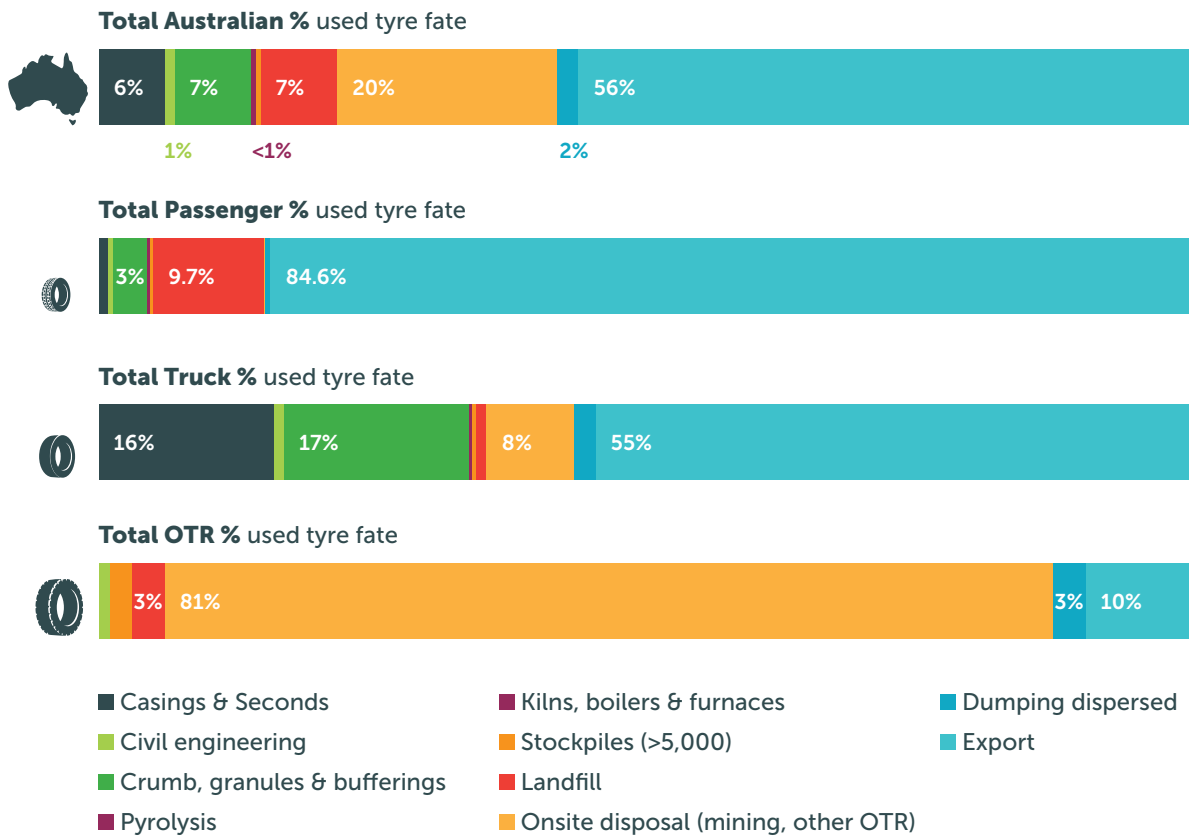


Table 1. Fate of Australian used tyre by tyre group (TSA participants and non-participants) 2018-19 (tonnes)

	Passenger	Truck	OTR	TSA partic.	Non-partic	Total
Casings & seconds	1,500	24,900	0	20%	80%	26,400
Civil engineering	900	1,100	1,100	19%	81%	3,100
Crumb, granules and buffings	5,800	27,000	100	100%	0%	32,900
Pyrolysis	400	400	500	100%	0%	1,300
Kilns/boilers/furnaces	0	0	0	0%	0%	0
Stockpiles (>40 t, 5,000 EPU)	1,100	2,400	2,100	9%	91%	5,600
Landfill	18,500	12,200	4,200	53%	47%	34,900
Onsite disposal (mining, other OTR)	0	0	94,900	0%	100%	94,900
Dispersed dumping	1,000	3,200	3,200	0%	100%	7,400
Export	160,900	86,500	11,500	65%	35%	258,900
Total	190,100	157,700	117,600	49%	51%	465,400

Domestic fate analysis 2018-19

6.3

This section provides analysis of the fate of used tyres that remained in Australia in 2018-19. Each of the domestic fates that are included in Figure 16 and Table 1 are discussed below.

Casings and seconds (used tyre re-treading)

6.3.1

Casing and seconds tonnages refers to used tyres that are re-treaded for reuse. A total of 6% (26,400 tonnes) of used tyres were re-treaded for resale in Australia in 2018-19. Almost all re-treads were truck tyres that are the most suited to re-treading. A total of 16% (24,900 tonnes) of truck used tyres were re-treaded and most (80%) of the re-treading was by non-TSA participants.

Civil Engineering

6.3.2

Civil engineering refers to the use of used tyres in the construction of retaining walls or permeable pavements, for example. An estimated total of 1% (3,100 tonnes) of used tyres were used in civil engineering in 2018-19, mostly (80%) by non-participants.

Crumb, granules and buffings

6.3.3

Used tyre crumb, granules and buffing refers to the highly processed rubber products that are made from used tyres for a wide range of uses from improving the performance of asphalt in road construction to tile adhesives. A total of 7% (32,900 tonnes) of used tyres were recycled into crumb, granules and buffings in Australia in 2018-19. Most was made from truck tyres that contain higher amounts of the more valuable natural rubber than passenger tyres. A total of 17% (27,000 tonnes) of truck used tyres were made into crumb, granules and buffings and all reprocessing was by TSA participants.

Pyrolysis

6.3.4

TSA 2018 [Guide to Tyre pyrolysis and gasification technologies](#), page 7, explains: "Pyrolysis and gasification refer to two similar thermal/heating processes. Pyrolysis refers to the heating of tyres in the absence of any reactive gases such as air or oxygen. Gasification involves heating the tyres with the presence of low levels of oxygen. Both heating processes are used to decompose and separate various organic components... After the pre-treated tyres are heated, end products include char, oil, syngas and steel."

A total of <1% (1,300 tonnes) of used tyres were recovered by pyrolysis in Australia in 2018-19 and all recovery was by TSA participants.

Kilns/boilers/furnaces

6.3.5

No used tyres were sent to cement kilns, industrial boilers or furnaces for energy recovery (TDF) in Australia in 2018-19. Significant tonnages of used tyre were exported as a TDF in 2018-19, as discussed in Section 6.4.

Stockpiles (>40 t, 5,000 EPU)

6.3.6

For the purposes of the report a **stockpile is defined as:**

- More than 40 tonnes (5,000 EPUs) in storage onsite
- More than 12 months storage
- Untreated, unprocessed to product specification.

Stockpiles refer to large, typically illegal, unmanaged piles of used tyres as opposed to dispersed dumping of tyres in small quantities, as discussed in 6.3.9, or onsite disposal of OTR used tyres at mine sites or similar, see 6.3.8. An estimated total of around 1% (5,600 tonnes) of used tyres were disposed into stockpiles in Australia in 2018-19. There are historical stockpiles of used tyres in Australia, which are discussed in Section 9.

The estimate of 2018-19 stockpiling is based on extensive industry consultation. Stakeholders noted that whilst stockpiling has been a major issue for used passenger tyres in the past, stockpiling had largely ceased in 2018-19.

Stockpiling is understood to have ceased due to:

- firstly, increases in EPA regulation of stockpiling
- secondly, and in response to tighter regulation, an increase in the amount of baling and export of passenger tyres.

The reduction in used passenger tyre stockpiling is supported by TSA participant reporting. Of the estimated 190,000 tonnes of used passenger tyre arising in 2018-19, TSA participants reported managing 162,000 tonnes. This leaves some 30,000 tonnes not accounted for in TSA participant reporting. Industry consistently stated that baling and exporting of tonnages collected by non-TSA participants was common practice in 2018-19. It is therefore reasonable to assume that these baled exports account for the majority of non-TSA participant tonnages (estimated at 23,000 tonnes). Nationally, this leaves around 5,000 tonnes (625,000 used passenger tyres units) unaccounted for and these are assumed to be either stockpiled, sent to landfill or dumped (dispersed).

Landfill

6.3.7

For the purposes of this report, landfill refers to used tyres sent to a legal landfilling site that is permitted by state environmental regulators. A total of 7% (34,900 tonnes) of used tyres were sent to landfill in Australia in 2018-19. Most were passenger and truck tyres and approximately half were landfilled in Queensland where there was no landfill levy in place in 2018-19. Queensland has now introduced a landfill levy and tonnages of used tyres going to landfill should fall in future years.

Onsite disposal (mining, other OTR)

6.3.8

Onsite disposal (mining, other OTR) refers to the onsite disposal of used OTR tyres (only) within a mining void or onsite on farms or similar. Stakeholder consultation found that onsite disposal was the main fate for OTR tyres in Australia, particularly for the mining sector. An estimated total of 81% (94,900 tonnes) of used OTR tyres were disposed onsite in Australia in 2018-19. This accounts for 20% of the Australian used tyre arisings in 2018-19 which is by far the largest non-recovery pathway for used tyres (by weight).

Dispersed dumping

6.3.9

Dispersed dumping includes small incidental dumps, of several tyres, across Australia including road-side dumping, dumping in gullies on public or private land, etc. The mapping and drive-time analysis of all Australian landfills and transfer stations, presented in Section 10, shows that 97% of Australians live within a 30-minute drive of a landfill or transfer station. The remaining 3% of the population are assumed to have no used tyre drop-off service in their area (due to being very remote) and are not likely to drive more than 30 mins to access a disposal point, and therefore the used tyres are likely to be dumped in diffuse/small dumping events. Based on the method outlined above, an estimated total of 2% (7,400 tonnes) of non-TSA participant used tyres were illegally dumped across Australia in 2018-19.

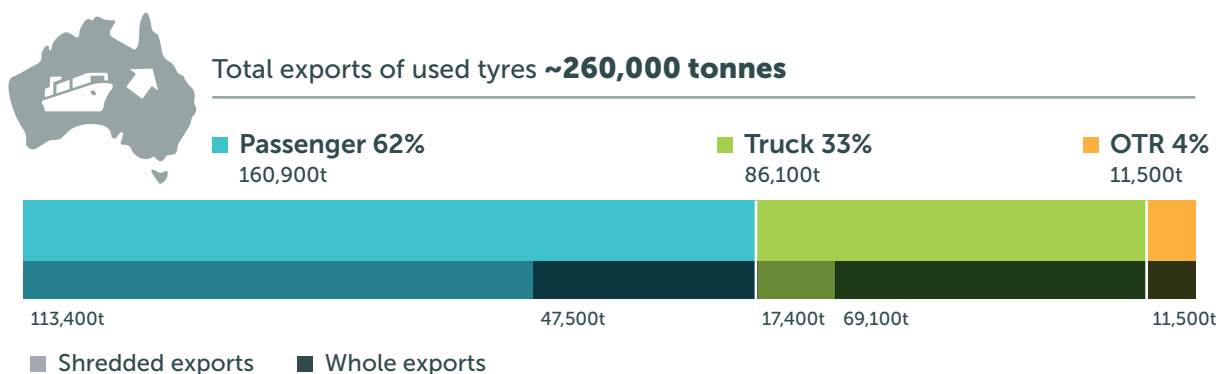
Export fate analysis 2018-19

6.4

As detailed in Figure 16, Australia exported around 260,000 tonnes of used tyres in 2018-19. These exports consisted of 62% passenger, 33% truck and 4% used OTR tyres.

Figure 16 also details the amount of used tyres that were shredded before export and used tyres exported whole (as bales or casings). This split is important as it provides insight into the fate of the exported used tyre and identifies the tonnage that will be subject to the export ban in December 2021 (all whole used tyres). Around 128,000 tonnes of whole used tyres were exported in 2018-19 that will be impacted by the 2021 export ban.

Figure 17. Australian used tyre exports in 2018-19 (tonnes)



An estimated 131,000 tonnes of used tyres were exported as shredded tyres in 2018-19. Shredded used tyres are also referred to as **Tyre Derived Fuel (or TDF)** because most shredded tyres are used as a fuel supplement in cement kilns, boilers or furnaces. The bulk, if not all, of the shredded used passenger tyre exports in 2018-19 would have been used as TDF. Shredded truck tyres may have been exported for further processing into crumb rubber, off-shore.

An estimated 48,000 tonnes of passenger tyres were exported whole in 2018-19. Most, if not all, whole passenger tyre exports would be baled and are understood to be processed in pyrolysis plants or shredded to produce TDF offshore. A small amount of whole passenger tyres may be exported loose and sold into second-hand markets offshore.

An estimated 69,000 tonnes of whole truck tyres were exported whole in 2018-19. Whole truck tyre exports are likely to be re-treaded or processed into crumb rubber, offshore.

An estimated 12,000 tonnes of used OTR tyres were exported 'whole' in 2018-19. These OTR exports are understood to mostly be sectioned into several pieces to enable handling and recycled offshore.

Australian used tyre recovery rate 2018-19

This section provides analysis of the used tyre recovery rate in 2018-19, as presented in Figure 18 and Table 2. In 2018-19, 14% of used tyre arisings were recovered domestically and another 55% were recovered via exporting shredded or whole used tyres to offshore markets, bringing the total recovery rate to 69% of arisings.

For passenger used tyres, 4% were recovered domestically and 85% were recovered via exporting mostly shredded tyres (TDF) and some whole used tyres to offshore markets. Therefore, the total recovery rate in 2018-19 was 89% of arisings for passenger tyres. For passenger tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. However, additional onshore processing of the currently exported whole passenger tyres (around 50,000 tonnes) may be required to meet the 2022 export ban on whole tyres.

For used truck tyres, 34% were recovered domestically and 55% were recovered via exporting mostly casings to offshore markets, bringing the total recovery rate to 89% of 2018-19 arisings. For truck used tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 70,000 tonnes) of additional onshore processing of truck tyres by 2022.

For used OTR tyres it is estimated that just 1% of OTR were recovered domestically and 10% were recovered via exporting OTRs to offshore markets. The total recovery rate for used OTR tyres was just 11% of 2018-19 arisings. For OTR used tyres the *National Waste Policy Action Plan* recovery rate of 80% has not been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 80,000 tonnes) of additional onshore OTR processing by 2022.

Figure 18. Australian used tyre recovery rates (%) total and by tyre group 2018-19

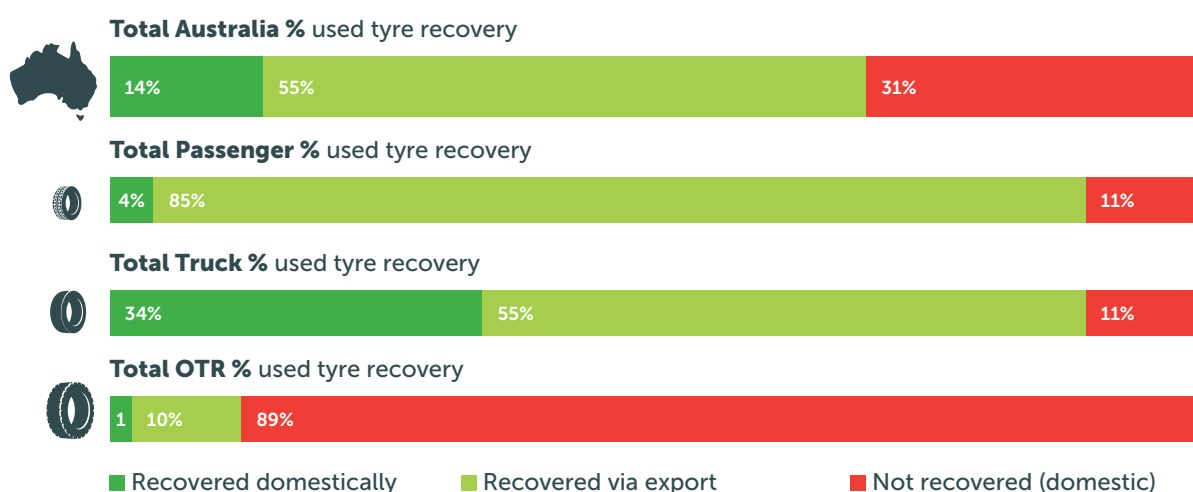


Table 2. Australian used tyre recovery rates (%) total and by tyre group 2018-19

	Passenger	Truck	OTR	Total
Recovery rate (domestic only)	4%	34%	1%	14%
Recovery rate (domestic & export)	89%	89%	11%	69%

Used tyre financial analysis

The financials analysis, below, is based on industry consultation undertaken in August 2019.

Important! Since August 2019, there have been major used tyre market fluctuations due to several factors impacting global trade at the beginning of 2020. These factors include the proposed ban on the export of whole tyres from Australia, restrictions in India on pyrolysis processes and major trade disruptions due to corona virus. The global response to the corona virus has reportedly impacted the cost and availability of shipping containers for used tyre exports.

At the time of publication (March 2020) industry commented that prices were outside the cost ranges included below. **The financials below are subject to major change and may not reflect current market financials.** The analysis below should not be used as the basis for future scenario and business case planning.

Table 3 provides a summary of the revenue from used tyre collections which has historically been the main source of revenue for the used tyre recovery industry. The collections revenues provided below shows the collection cost ranges as indicated by industry (i.e. the costs to the tyre disposer). The analysis does not include assessment of the operational costs associated with collection such as staff, fuel, and truck maintenance.

Table 3. Summary of used tyres collections revenue (gross) per used tyre and per tonne

		Collections revenue				Comments
		Lower		Upper		
		\$/unit	\$/tonne	\$/unit	\$/tonne	
Passenger	Metro	\$1	\$125	\$3	\$375	Many consultees complained about constant under-cutting and that collections at \$1 per EPU are unsustainable.
	Regional	\$1	\$125	\$3	\$375	
	Rural	\$2	\$250	\$6	\$750	
Truck	Metro	\$5	\$125	\$10	\$250	Consultees commented on difficulty in getting truck used tyres that are often 'cherry-picked' from a site before they arrive to collect, leaving lower value passenger used tyres only. Also raised concerns that cheap Chinese truck tyres are not suitable to re-treading and could undermine the re-tread market long-term.
	Regional	\$8	\$200	\$10	\$250	
	Rural	\$14	\$350	\$20	\$500	
OTR	Metro		\$165		\$400	It is difficult to put a unit price on OTR collections due to OTR weights varying from around 100 kgs to 3,000 kgs. Prices of \$165-\$600 per tonnes were provided.
	Regional		\$400		\$600	
	Rural		\$400		\$600	

Many industry stakeholders raised concerns about falling collection revenues due to the ability of 'new' baling companies to set-up operations very quickly and cheaply to export baled used tyres at a profit.

Historically collection costs of \$3 to \$5 per passenger tyre in metro areas were common, in August 2019 collections of passenger tyres were costed at \$1 to \$3 in metro areas.

Industry also commented that the collection revenue for truck used tyres has also been reducing due to strong export markets for truck casings and a 'cash economy' operating that is facilitating very cheap collection of truck tyres by under-paying drivers and not have the appropriate insurances in place.

The financial profit or loss for used **tyre processing** is another key financial consideration. The profits or losses vary significantly depending on the process used and the fate of the used tyres.

Table 4 provides analysis of the profit or loss for different used tyre fates. Negative values present a processing financial loss and positive values a processing profit.

The financials listed in Table 4 provide the ranges as indicated by industry. Profit or loss information was provided with varying levels of detail and the notes for each fate need to be considered to best interrupt the information presented.

Table 4. Summary of processing profit or loss by fate and tyre group, dollars per tonne (August 2019)

Fate			Profit or loss		Notes
			Lower \$/tonne	Upper \$/tonne	
Recycling (onshore)	Shredded tyre (TDF)	Passenger	-\$70	-\$100	There is currently no TDF use onshore.
		Truck	-\$100	-\$100	
		OTR	-\$180	-\$180	
	Granule (2-15mm)			-\$500	Processed granule sells for around \$600 per tonne.
	Buffings (<2mm)			-\$500	Buffings sells for around \$700 per tonne.
	Crumb rubber (powder)		-\$400	-\$600	Processed crumb sells for around \$400 - \$650 per tonne.
Recycling (export)	Shredded tyre (TDF)		-\$80	-\$100	Costs include shredding and transport to port.
Energy recovery (export)	Whole baled used tyres exports		\$30	-\$20	Costs include baling and transport to port. Baled exports market has been volatile. Exporters may make \$20/tonne loss or may profit \$30/tonne.
Disposal	Landfill		-\$600	-\$1,900	Landfilling at licenced landfills is very costly. Most jurisdictions have banned the landfilling of whole tyres.

Of note is the processing loss for exporting TDF (up to \$100 per tonne) compared to the potential profit for exporting baled tyres. In August 2019, exporting baled tyres may have cost \$20 per tonne or balers may have profited up to \$30 per tonne.

Competitive markets will find the most cost-effective option that is permitted. In August 2019, for passenger tyres baling and export was permitted and may have been the most cost-effective option.

The implementation of the export ban for whole used tyres (including baled) in 2021 will change the current processing financials. Once the export ban comes into effect, processing costs could increase by \$130 per tonne (moving from baling to onshore TDF production) or around \$1 per passenger tyre. If tyre collectors do not adjust their collection fees accordingly, there could be an increased risk of stockpiling or more widespread diffuse dumping of individual truckloads of tyres.

Procurers of waste tyre services may have to adjust pricing. As noted above, industry reports low tyre collection (disposal) fees are 'the norm' and do not provide sufficient revenue to support the additional processing costs for onshore recycling or TDF production.

Legacy Australian used tyre stockpiles

This section provides a summary of information about legacy Australian used tyre stockpiles. The information was compiled through industry and government consultation. It may not be complete and will require maintenance to be kept up-to-date.

As discussed in Section 6.3.6, stockpiles refer to large, typically illegal, unmanaged piles of used tyres as opposed to dispersed dumping of tyres in small quantities, or onsite disposal of OTR used tyres at mine sites or similar.

In 2018-19, an estimated total of around 5,600 tonnes (or 700,000 EPU) of used tyres were disposed into stockpiles in Australia. The 2018-19 estimate of stockpiling is not specific to any stockpile (i.e. it is an estimate of the national tonnage of used tyres stockpiled around the country in 2018-19).

A total of 15 legacy stockpiles were identified that are spread across Australia containing around 15,000 tonnes or around two million EPUs.

Another 10 legacy stockpiles were identified that have recently been cleaned-up. Around 29,000 tonnes or 3.6 million EPUs are estimated to have been recently cleaned-up at an average cost of around \$500 per tonne or \$4 per EPU.

It's worth comparing the tonnages used tyres in stockpiles to the tonnages of used OTR tyres that are estimated to be disposed onsite each year. In 2018-19 around 95,000 tonnes of OTRs were estimated to have been disposed onsite. This is around six times the estimated total legacy stockpile in Australia in 2018-19 (15,000 tonnes), discussed above.

Mapping

This section provides mapping of retailers, used tyre collection and recovery infrastructure, mining sites, and export ports. Figure 19 illustrates a significant amount of information including:

- the location of current and recently cleaned-up stockpiles
- the location of used tyre collectors both TSA accredited and not
- the location of operating mines in Australia, many of which will disposal of used tyres onsite
- the number of TSA retailers in each area (see green shading) that provide a key used tyre collection pathway
- shipping ports, that can also be important to enable exporting of used tyres

Figure 19. Used tyre collectors, operating mine sites, shipping ports, and TSA accredited retailers

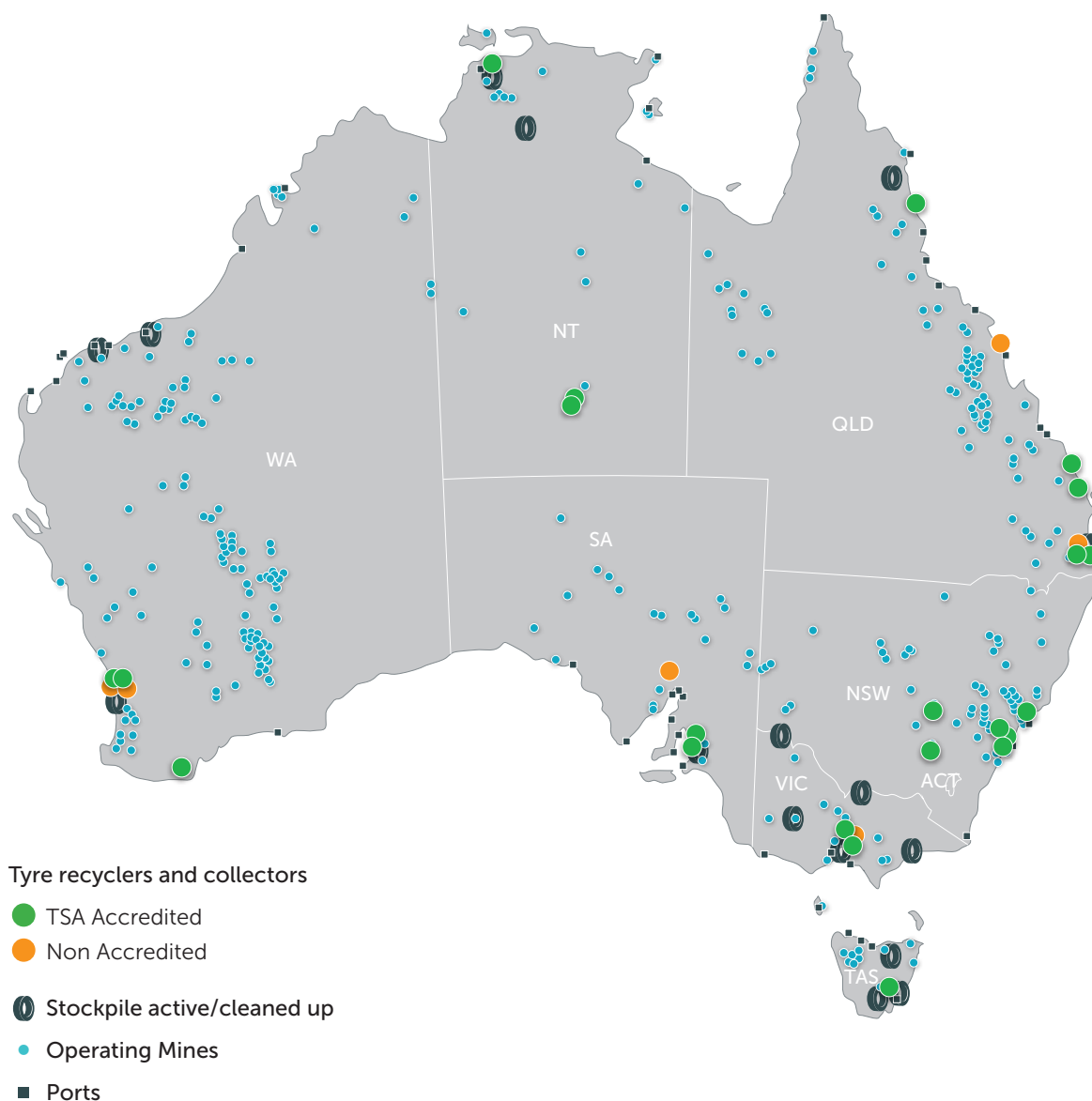
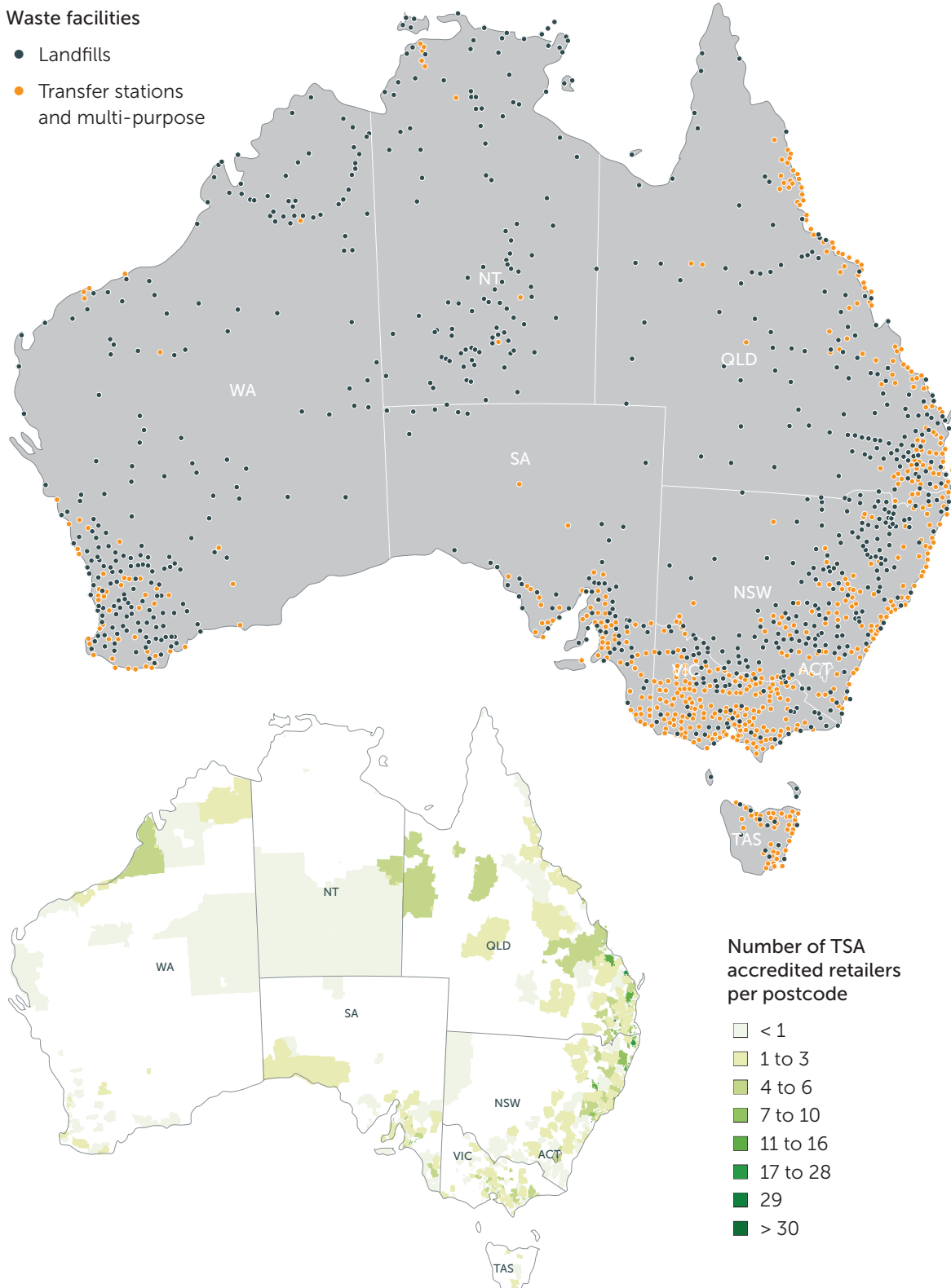


Figure 20 illustrates the location of transfer stations, TSA accredited retailers and landfills in Australia. Drive-time analysis, for all the facilities mapped below, found 97% of Australians live within 30 mins drive time of a landfill or transfer station.

The remaining 3% of the population are assumed to have no used tyre drop-off service in their area (due to being very remote) and are not likely to drive more than 30 mins to access a drop-off point, and therefore the used tyres are likely to be dumped in diffuse small dumping events.

Figure 20. Collection and recovery infrastructure



Conclusions

On the 9th November 2019 Environment Ministers agreed that waste tyres that have not been processed into a 'value-added material' should be banned from being exported overseas. The timing of the waste export bans was also agreed with the ban on the export of all whole tyres including baled tyres to come into effect by December 2021.

Ministers also agreed to a new *National Waste Policy Action Plan* that will drive the implementation of Australia's National Waste Policy 2018. It includes the following two key waste management targets that directly relate to used tyres:

- An 80 per cent 'recovery' rate of material across all waste streams.
- Significant increases to government procurement of recycled materials.

Levied versus non-levied tyre imports

Excluding OTR tyres, TSA membership covered 34% (140,000 tonnes) of the passenger and truck tyres imported in 2018-19. The remaining 66% (275,000 tonnes) of passenger and truck tyres were imported and sold without collection of the levy (non-levied sales).

When OTR tyres are included, TSA membership covered just 26% (140,000 tonnes) of tyre imports in 2018-19. The remaining 75% (400,000 tonnes) of tyres were imported and sold without collection of the levy.

This presents a significant challenge for TSA and its participants, that aim to increase used tyre recovery for all tyres consumed in Australia, while only 26% (by weight) of tyre imports are levied.

TSA participants vs non-participant management of used tyres 2018-19

In addition to the tyre importers that are TSA members, TSA has a range of 'participants' across the used tyre supply chain. These including retailers, fleet operators, local governments, collectors and recyclers. TSA participants report used tyre tonnages as part of annual reporting which provides TSA with important information about the management and fate of used tyres.

TSA participants manage used tyre arisings that were originally imported by TSA members *and* used tyres that were imported by non-TSA members (unlevied). As noted above, in 2018-19, just 140,000 tonnes of tyres were imported by TSA members and levied at sale. In the same year 227,000 tonnes of used tyres were managed by TSA participants.

The 227,000 tonnes of used tyres managed by TSA participants is 49% of total used tyre arisings in 2018-19. Only 26% of total tyre imports were levied in the same year.

TSA participants managed 85% of passenger, 33% of truck and 10% of OTR used tyres arisings in 2018-19. The rates of TSA participant management of used tyres are highest where levy coverage is highest (passenger) and lowest where levy coverage is not currently in place (OTR).

Exports vs domestic management of used tyres 2018-19

- Overall in 2018-19, 44% (206,000 tonnes) of used tyres were managed in Australia (domestic) vs 56% (258,000 tonnes) exported.
- For passenger used tyres: 85% (161,000 tonnes) were exported and 15% (29,000) remained onshore.
- For truck used tyres: 55% (87,000 tonnes) were exported and 45% (71,000) remained onshore.
- For OTR used tyres: 10% (11,500 tonnes) were exported and 90% (106,000) remained onshore.
- For domestic used tyres, 29% (59,000 tonnes) were managed by TSA participants and an estimated 71% (147,000 tonnes) were managed by non-TSA participants.
- For exported used tyres, 65% (168,000 tonnes) were exported by TSA participants and an estimated 35% (91,000 tonnes) of exports were exports by non-TSA participants.

Domestic fate analysis 2018-19

Casing and seconds tonnages refers to used tyres that are re-treaded for reuse. A total of 6% (26,400 tonnes) of used tyres were re-treaded for resale in Australia in 2018-19. Almost all re-treads were truck tyres that are the most suited to re-treading. A total of 16% (24,900 tonnes) of truck used tyres were re-treaded and most (80%) of the re-treading was by non-TSA participants.

Civil engineering refers to the use of used tyres in the construction of retaining walls or permeable pavements, for example. An estimated total of 1% (3,100 tonnes) of used tyres were used in civil engineering in 2018-19, mostly (80%) by non-participants.

Used tyre crumb, granules and buffing refers to the highly processed rubber products that are made from used tyres for a wide range of uses from improving the performance of asphalt in road construction to tile adhesives. A total of 7% (32,900 tonnes) of used tyres were recycled into crumb, granules and buffings in Australia in 2018-19. Most was made from truck tyres that contain higher amounts of the more valuable natural rubber than passenger tyres. A total of 17% (27,000 tonnes) of truck used tyres were made into crumb, granules and buffings and all reprocessing was by TSA participants.

Pyrolysis refers to the heating of tyres in the absence of oxygen to decompose and separate various organic components to generate end products including char, oil, syngas and steel. A total of <1% (1,300 tonnes) of used tyres were recovered by pyrolysis in Australia in 2018-19 and all recovery was by TSA participants.

No used tyres were sent to **cement kilns, industrial boilers or furnaces for energy recovery (TDF)** in Australia in 2018-19. Significant tonnages of used tyre were exported as a TDF in 2018-19, as discussed in below under 'Exports fate analysis'.

For the purposes of the report a stockpile is defined as:

- **More than 40 tonnes (5,000 EPU) in storage onsite**
- **More than 12 months storage**
- **Untreated, unprocessed to product specification.**

Stockpiles refer to large, typically illegal, unmanaged piles of used tyres as opposed to dispersed dumping of tyres in small quantities, or onsite disposal of OTR used tyres at mine sites or similar. An estimated total of around 1% (5,600 tonnes) of used tyres were disposed into stockpiles in Australia in 2018-19.

The estimate of 2018-19 stockpiling is based on extensive industry consultation. Stakeholders noted that whilst stockpiling has been a major issue for used passenger tyres in the past, stockpiling had largely ceased in 2018-19.

Stockpiling is understood to have ceased due to:

- firstly, increases in EPA regulation of stockpiling
- secondly, and in response to tighter regulation, an increase in the amount of baling and export of passenger tyres.

The reduction in used passenger tyre stockpiling is supported by TSA participant reporting.

Of the estimated 190,000 tonnes of used passenger tyre arising in 2018-19, TSA participants reported managing 162,000 tonnes. This leaves some 30,000 tonnes not accounted for in TSA participant reporting. Industry consistently stated that baling and exporting of tonnages collected by non-TSA participants was common practice in 2018-19. It is therefore reasonable to assume that these baled exports account for the majority of non-TSA participant tonnages (estimated at 23,000 tonnes). Nationally, this leaves around 5,000 tonnes (625,000 used passenger tyres units) unaccounted for and these are assumed to be either stockpiled, sent to landfill or dumped (dispersed).

For the purposes of this report, **landfill** refers to used tyres sent to a legal landfilling site that is permitted by state environmental regulators. A total of 7% (34,900 tonnes) of used tyres were sent to landfill in Australia in 2018-19. Most were passenger and truck tyres and approximately half were landfilled in Queensland where there was no landfill levy in place in 2018-19. Queensland has now introduced a landfill levy and tonnages of used tyres going to landfill should fall in future years.

Onsite disposal (mining, other OTR) refers to the onsite disposal of used OTR tyres (only) within a mining void or onsite on farms or similar. Stakeholder consultation found that onsite disposal was the main fate for OTR tyres in Australia, particularly for the mining sector. An estimated total of 81% (94,900 tonnes) of used OTR tyres were disposed onsite in Australia in 2018-19. This accounts for 20% of the Australian used tyre arisings in 2018-19 which is by far the largest non-recovery pathway for used tyres (by weight).

Dispersed dumping includes small incidental dumps, of several tyres, across Australia including road-side dumping, dumping in gullies on public or private land, etc. The mapping and drive-time analysis of all Australian landfills and transfer stations, presented in Section 10, shows that 97% of Australians live within a 30-minute drive of a landfill or transfer station. The remaining 3% of the population are assumed to have no used tyre drop-off service in their area (due to being very remote) and are not likely to drive more than 30 mins to access a disposal point, and therefore the used tyres are likely to be dumped in diffuse/small dumping events. Based on the method outlined above, an estimated total of 2% (7,400 tonnes) of non-TSA participant used tyres were illegally dumped across Australia in 2018-19.

Export fate analysis 2018-19

Australia exported around 260,000 tonnes of used tyres in 2018-19. These exports consisted of 62% passenger, 33% truck and 4% used OTR tyres.

An estimated 131,000 tonnes of used tyres were exported as shredded tyres in 2018-19. Shredded used tyres are also referred to as **Tyre Derived Fuel (or TDF)** because most shredded tyres are used as a fuel supplement in cement kilns, boilers or furnaces. The bulk, if not all, of the shredded used passenger tyre exports in 2018-19 would have been used as TDF. Shredded truck tyres may have been exported for further processing into crumb rubber, off-shore.

An estimated 48,000 tonnes of passenger tyres were exported whole in 2018-19. Most, if not all, whole passenger tyre exports would be baled and are understood to be processed in pyrolysis plants or shredded to produce TDF offshore. A small amount of whole passenger tyres may be exported loose and sold into second-hand markets offshore.

An estimated 69,000 tonnes of whole truck tyres were exported whole in 2018-19. Whole truck tyre exports are likely to be re-treaded or processed into crumb rubber, offshore.

An estimated 12,000 tonnes of used OTR tyres were exported 'whole' in 2018-19. These OTR exports are understood to mostly be sectioned into several pieces to enable handling and recycled offshore.

In total around 128,000 tonnes of whole used tyres were exported in 2018-19 that will be impacted by the 2021 export ban.

Used tyre recovery rate 2018-19

In 2018-19, 14% of used tyre arisings were recovered domestically and another 55% were recovered via exporting shredded or whole used tyres to offshore markets, bringing the total recovery rate to 69% of arisings.

For passenger used tyres, 4% were recovered domestically and 85% were recovered via exporting mostly shredded tyres (TDF) and some whole used tyres to offshore markets. Therefore, the total recovery rate in 2018-19 was 89% of arisings for passenger tyres. For passenger tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. However, additional onshore processing of the currently exported whole passenger tyres (around 50,000 tonnes) may be required to meet the 2022 export ban on whole tyres.

For used truck tyres, 34% were recovered domestically and 55% were recovered via exporting mostly casings to offshore markets, bringing the total recovery rate to 89% of 2018-19 arisings. For truck used tyres the *National Waste Policy Action Plan* recovery rate of 80% has been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 70,000 tonnes) of additional onshore processing of truck tyres by 2022.

For used OTR tyres it is estimated that just 1% of OTR were recovered domestically and 10% were recovered via exporting OTRs to offshore markets. The total recovery rate for used OTR tyres was just 11% of 2018-19 arisings. For OTR used tyres the *National Waste Policy Action Plan* recovery rate of 80% has not been met. To meet the 80% recovery rate under the 2022 export ban may require a significant amount (around 80,000 tonnes) of additional onshore OTR processing by 2022.

Used tyre financials

Important! Since August 2019, there have been major used tyre market fluctuations due to several factors impacting global trade at the beginning of 2020. These factors include the proposed ban on the export of whole tyres from Australia, restrictions in India on pyrolysis processes and major trade disruptions due to corona virus. The global response to the corona virus has reportedly impacted the cost and availability of shipping containers for used tyre exports.

At the time of publication (March 2020) industry commented that prices were outside the cost ranges included below. The financials below are subject to major change and may not reflect current market financials. The analysis below should not be used as the basis for future scenario and business case planning.

Many industry stakeholders raised concerns about falling collection revenues due to the ability of 'new' baling companies to set-up operations very quickly and cheaply to export baled used tyres at a profit. Historically collection costs of \$3 to \$5 per passenger tyre in metro areas were common, in August 2019 collections of passenger tyres were costed at \$1 to \$3 in metro areas.

Industry also commented that the collection revenue for truck used tyres has also been reducing due to strong export markets for truck casings and a 'cash economy' operating that is facilitating very cheap collection of truck tyres by under-paying drivers and not have the appropriate insurances in place.

Reported processing losses for exporting TDF (up to \$100 per tonne for shredding and transport to port) compared to the potential profit for exporting baled tyres is significant. In August 2019, exporting baled tyres may returned a profit of up to \$30 per tonne (at the port).

Competitive markets will find the most cost-effective option that is permitted. In August 2019, for passenger tyres baling and export was permitted and may have been the most cost-effective option.

The implementation of the export ban for whole used tyres (including baled) in 2021 will change the current processing financials. Once the export ban comes into effect, processing costs could increase by \$130 per tonne (moving from baling to onshore TDF production) or around \$1 per passenger tyre. If tyre collectors do not adjust their collection fees accordingly, there could be an increased risk of stockpiling or more widespread diffuse dumping of individual truckloads of tyres.

Procurers of waste tyre services may have to adjust pricing. As noted above, industry reports low tyre collection (disposal) fees are 'the norm' and do not provide sufficient revenue to support the additional processing costs for onshore recycling or TDF production.

Legacy used tyre stockpiles

A total of 15 legacy stockpiles were identified that are spread across Australia containing around 15,000 tonnes or around two million EPUs.

Another 10 legacy stockpiles were identified that have recently been cleaned-up. Around 29,000 tonnes or 3.6 million EPUs are estimated to have been recently cleaned-up at an average cost of around \$500 per tonne or \$4 per EPU.

Recommendations

This report presents a significant amount of information and data that should prove useful in supporting TSA to deliver the Scheme. Below are recommendations that can be drawn from the data and the project findings:

1. Increase the proportion of levied tyre sales.

With the TSA levy being paid on only 25% (140,000 tonnes) of tyre imports and 75% (400,000 tonnes) of tyres being imported and sold without payment of the levy, there is significant opportunity to improve levy coverage and increase funding to support used tyre recovery.

2. Market the successes of TSA to date using the data presented.

In 2018-19, 49% of all used tyre arisings were managed by TSA participants, while only 25% of tyre imports were levied in the same year. TSA participants managed 85% of passenger used tyre arisings in 2018-19.

3. Investigate export end markets and foreign policy plans.

Australia exported 260,000 tonnes of used tyres in 2018-19. Australia depends on international off-take markets for TDF. In preparing for the 2021 export ban on whole used tyres, TSA need to be confident of off-shore markets for shredded used tyres as this greatly impacts the level of investment required in Australia.

4. Complete a targeted study of OTR used tyres.

Not enough is known about OTR management for the mining and agriculture sectors. Very large tonnages are assumed not recovered. Simply improving knowledge and data on OTR management and fate could identify higher recovery rates and improved positioning of TSA. Currently OTR disposal tonnages are dragging the overall recovery rate down significantly and the current (and long standing) assumed fate of onsite disposal has never been well tested and validated.

5. Start to plan for 80% recovery rate and no whole tyre exports for all tyre groups.

To meet these new requirements/targets the project identified the need to:

- process an additional 50,000 tonnes of passenger tyres, onshore
- process an additional 80,000 tonnes of truck used tyres, onshore
- process additional 80,000 tonnes of OTR used tyres currently disposed onsite.

Infrastructure planning will be key to ensure there is enough capacity of a range of recovery options that stimulate a competitive recovery market and prevent stockpiling from occurring. The 2017 Strategy provides a detailed roadmap to achieve this level of local reprocessing and end-market development.

6. Continue to analyse the costs of used tyre recovery.

More analysis of the business case for the range of used tyre recovery options is needed. This would enable TSA and other stakeholders to monitor market conditions and better understand where market risks are currently and those that may develop in future.

Supply chain analysis summary of information and data sources and key assumptions

Table A. Data sources and key assumptions

Supply chain	Data sources and key assumptions	
	TSA participants	Non-participants
Imports	TSA participant reporting of imports.	Assume non-participant imports are the remainder (i.e. total imports less TSA participant reporting). Imports of loose and fitted tyres are all included.
Total used tyre arisings	TSA participant reporting of used tyre total processing tonnages (regardless of process type) is assumed to be the tonnages of participant collections. The total TSA participant collections will include some used tyres that were not levied on import.	Total non-participant used tyre arisings tonnages are assumed to be the remainder of the MFA estimated used tyre arisings for 2018-19 (i.e. total used tyre arisings minus tonnages collected and managed by TSA participants).
Used tyre removals	No data was available to support analysis of the amounts of used tyre removals by retailers, commercial removals (i.e. service/fleet) or DIY removal.	
Used tyre collection	<p>TSA participant reporting of used tyre total processing tonnages (regardless of process type) is assumed to represent the tonnages of TSA collections.</p> <p>Analysis of participant collections data was used to provide an estimate of the TSA participant collections from tyre retailers, on-site pick-ups and from waste facilities (i.e. transfer stations).</p>	<p>No data available to determine the tonnages of non-participant collections from tyre retailers, on-site pick-ups and from waste facilities (i.e. transfer stations).</p> <p>Important to note that many OTR tyres are not collected at all (i.e. they are disposed onsite).</p>
Used tyre fates	TSA participant reporting of management of passenger, truck and OTR used tyres, by jurisdiction.	See table below for detail of assumed fates for non-participant tonnages.

Table B: Non-participant used tyres assumed fate proportions (%) by jurisdiction

		NT	Tas	SA	WA	VIC	QLD	NSW	ACT	Assumptions		
SHREDDED USED TYRES												
Domestic	Granulating / crumbing	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA participant fate data	
		Truck	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA participant fate data	
		OTR	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA fate data	
	Pyrolysis	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA fate data	
		Truck	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA fate data	
		OTR	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all shredding recovery via TSA site, i.e. in TSA fate data	
	Landfill	Passenger	10%	1%	1%	1%	1%	15%	10%	10%	10%	Industry consult 2019, shredded pass. used tyres going to landfill in more remote areas where collection costs are high in Qld, NSW, Vic. Mostly in Qld, this will likely reduce in future with introduction of landfill levies.
		Truck	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consultation suggests no shredded truck tyres to landfill due to rubber resource value
		OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consultation suggests no shredded OTR tyres shredded and landfilled due collection costs being too high, if landfilled, sent directly (not via shredding).
Exported	Shredded tyres exported with fate unknown	Passenger	10%	10%	10%	10%	10%	10%	10%	40%	10%	TSA annual report supporting data identifies some shredding of used tyres for export, by non-participant recyclers.
		Truck	5%	5%	5%	5%	5%	5%	5%	5%	5%	TSA annual report supporting data identifies some shredding of used tyres for export, by non-participant recyclers.
		OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

		Tyre type	NSW	QLD	VIC	WA	SA	Tas	NT	ACT	Assumptions
WHOLE USED TYRES											
Casings <i>(Tyres good enough for re-tread or resale as seconds are referred to as casings)</i>	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, pass. used tyre re-treading is no longer viable in Australia
	Truck	20%	20%	20%	20%	20%	20%	20%	20%	20%	Industry consult 2019, 320,000 re-treads per annum at around 55 kgs each, which equates to 17,600 tonnes. Onshore truck re-treading is becoming less viable due to cheap Chinese truck tyre imports.
	OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, truck tyres generally go to crumb or re-treading if recovered
Civil engineering (whole) <i>(includes tyres cut in half. Excludes tyres shredded to create a tyre derived aggregate)</i>	Passenger	1%	1%	1%	1%	1%	1%	1%	1%	1%	Industry consult 2019, there are several projects around the country, but tonnages of used tyre utilised are still very small, ass. 1% or less.
	Truck	1%	1%	1%	1%	1%	1%	1%	1%	1%	Industry consult 2019, truck tyres generally go to crumb or re-treading if recovered
	OTR	1%	1%	1%	1%	1%	1%	1%	1%	1%	Industry consult 2019, ass. OTR generally not used for this application
Pyrolysis	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all pyrolysis recovery via TSA site, i.e. in TSA fate data
	Truck	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all pyrolysis recovery via TSA site, i.e. in TSA fate data
	OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all pyrolysis recovery via TSA site, i.e. in TSA fate data
Kilns/boilers/furnaces	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all fuel substitution via TSA site, i.e. in TSA fate data
	Truck	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all fuel substitution via TSA site, i.e. in TSA fate data
	OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	Industry consult 2019, ass. insignificant flow, ass. all fuel substitution via TSA site, i.e. in TSA fate data
Dumping dispersed <i>(includes incidental dumping and site use applications such as farms, motor racing as barriers etc. Excludes use in civil engineering)</i>	Passenger	3%	3%	3%	3%	3%	3%	3%	3%	3%	Mapping of all Australian landfills and transfer stations shows that 97% of Australians live within 30 mins drive time of a landfill or transfer station. The remaining 3% of the population are assumed to have no used tyre collection service in their area (due to being very remote) and are not likely to drive more than 30 mins to access a disposal point, and therefore the used tyres are likely to be dumped in diffuse small dumping events.
	Truck	3%	3%	3%	3%	3%	3%	3%	3%	3%	
	OTR	3%	3%	3%	3%	3%	3%	3%	3%	3%	
	Passenger	3%	3%	3%	3%	3%	3%	3%	3%	3%	
	Truck	3%	3%	3%	3%	3%	3%	3%	3%	3%	
	OTR	3%	3%	3%	3%	3%	3%	3%	3%	3%	

		NT	Tas	SA	WA	VIC	QLD	NSW	WA	VIC	QLD	NSW	NT	ACT	Assumptions	
Domestic	Stockpiles (>5,000) <i>(significant stockpiles of 5,000 EPU's or more that have been in a static stockpile for more than 12 months)</i>	Passenger	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	10%	2%	Industry consult 2019, ass. insignificant flow, consultees agreed that major stockpiling is no longer occurring due to: <ul style="list-style-type: none"> • firstly, increases in EPA regulation of stockpiling • secondly, and in response to tighter regulation, an increase in the amount of baling and export of passenger tyres. In NT a higher rate of stockpiling is assumed due to the lack of service providers in the territory. 	
		Truck	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%		
		OTR	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Domestic	Onsite disposal <i>(mining, other OTR)</i>	Passenger	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	Assumes only OTRs are disposed to onsite mining pits. 4x4 used tyres from the site would also be disposed in onsite, assumed to be insignificant amount	
		Truck	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	Assumes only OTRs are disposed to onsite mining pits.	
		OTR	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	Industry consult 2019, almost all mining used tyres are still being disposed onsite in the mine void.
Exported	Landfill	Passenger	4%	3%	3%	3%	4%	4%	3%	3%	3%	4%	5%	4%	The remain proportion of whole used tyres (i.e. once all other fates are allocated using the proportion documented in this worksheet) are assumed to be sent to landfills across the country.	
		Truck	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	1%	9%		
		OTR	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	
Exported	Whole tyres exported with fate unknown	Passenger	70%	80%	80%	80%	65%	70%	80%	80%	80%	80%	40%	70%	Industry consult 2019, consultees consistently stated that majority flow of passenger used tyre in non-TSA collections are currently being baled and exported.	
		Truck	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	Industry consult 2019, consultees consistently stated that significant amounts of truck used tyres are being exported whole for reuse or crumbing.
		OTR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	Assume that no OTR are being exported whole, due to size and shipping costs.

State and Territory summaries

Victoria 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~ 6,600,000	227,416 km ²	133,000 tonnes	192,000 tonnes	113,400 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in Victoria are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	Sets licensing requirements for premises that store more than 40 tonnes or 5,000 waste tyres
Transportation	No	None
Waste tracking	No	None
Recycling	No	None, only required for tyre storage as outlined above
Disposal	Yes	Used tyres cannot be landfilled whole, however they can be landfilled when shredded into pieces no greater than 250 mm in any direction
Landfill levy	Yes	Used tyres attract the landfill levy in Victoria, which in 2018-19 was \$64.30/tonne in metropolitan areas and \$56.36/tonne in regional areas
Reuse	No	Reuse options for used tyres are limited under the Environment Protection Act with several "unacceptable" reuse options documented
Fire safety	Yes	Guidelines for the safe storage of tyres indoor and outdoor have been published by the Metropolitan Fire Brigade (MFB) and Country Fire Authority (CFA)
Energy recovery	Yes	Energy from Waste Guideline (Publication 1559) provides high-level guidance on the siting, design, construction and operation of energy from waste facilities, including those accepting used tyres

Used tyre fate estimates

Table 5 and Figure 21 detail the estimated Victorian used tyre fates. In 2018-19, Victoria generated some 113,400 tonnes of used tyres. Around 59% (67,000 tonnes) were exported, while around 26% (29,000 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse and materials recycling accounted for around 16% (17,000 tonnes).

1. REC has provided state-by-state breakdowns of the regulatory framework for used tyres. The analysis provides a tick for regulation that enables used tyre markets for recycling and recovery to function more effectively.

Table 5. Victoria used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	5,400	0	5,400	4.8%
Civil engineering	100	200	200	500	0.4%
Crumb, granules and buffings	0	11,400	0	11,400	10.1%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	100	400	500	1,000	0.9%
Landfill	2,200	2,100	900	5,200	4.6%
Onsite disposal (mining, other OTR)	0	0	21,300	21,300	18.8%
Dumping dispersed	200	600	700	1,500	1.3%
Export	48,100	15,100	3,900	67,100	59.2%
Total	50,700	35,200	27,500	113,400	

Figure 21. Victoria used tyre fates 2018–19 (tonnes)

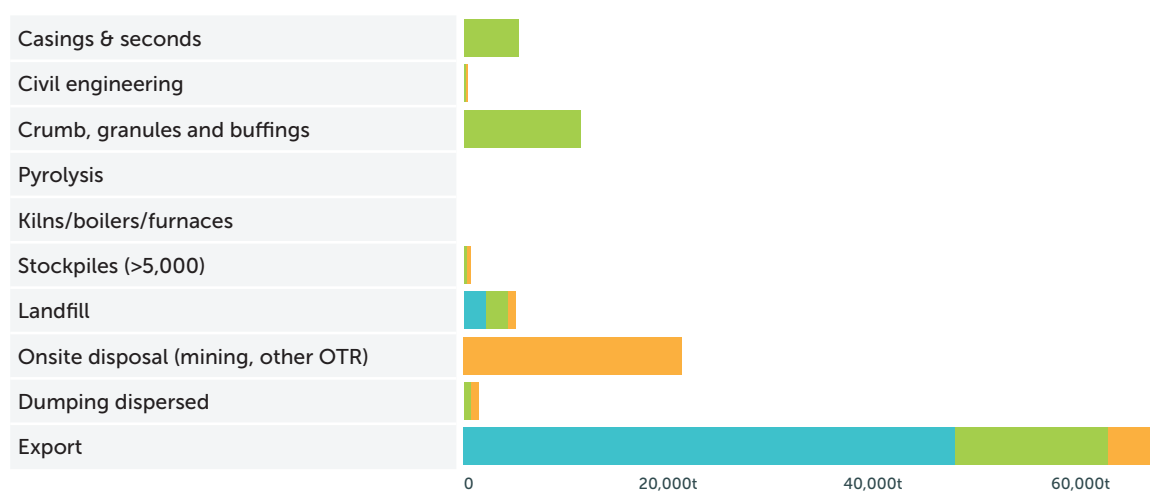


Table 6 and Figure 22 detail the estimated Victorian used tyre recovery rates. In 2018-19, domestic recovery accounted for 15% (around 17,000 tonnes), recovery via export accounted for 59% while the remaining 26% were not recovered. Overall, the Victorian recovery rate was 74% in 2018-19.

Table 6. Victoria used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	100	17,000	200	17,300
Recovered via export	48,100	15,100	3,900	67,100
Not recovered (domestic)	2,500	3,100	23,400	29,000
Total	50,700	35,200	27,500	113,400

Figure 22. Victoria used tyre recovery rate 2018–19 (tonnes)



Queensland 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~5,200,000	1,730,648 km ²	119,000 tonnes	159,000 tonnes	102,000 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in Queensland are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	The Environmental Protection (Regulated Waste) Amendment Regulation 2018 commenced in February 2019. Sites that store greater than 4 tonnes or 500 EPU's must obtain an environmental authority
Transportation	Yes	Used tyres are a regulated waste under Schedule 7, Part 1 of the Environmental Protection Regulation 2008. Transportation of tyres as a regulated waste requires an approval for ERA 57 – Regulated waste transport.
Waste tracking	Yes	Used tyres are listed as a trackable waste in Schedule 2E of the Environmental Protection Regulation 2008. Registered regulated waste transporters must submit tracking documentation within 7 days.
Recycling	Yes	Used tyres are a regulated waste and tyre recyclers must obtain an ERA 59 – Tyre recycling approval (where 1,000 EPU's or more are received per annum)
Disposal	Yes	Used tyres may be landfilled whole or shredded only at landfills licensed to accept tyres
Landfill levy	No	In 2018-19 no levy was in place. In 2019-20 a new levy will be in place. Levy for Category 2 regulated waste is \$105 per tonne.
Reuse	No	Reuse options for used tyres are limited under the Environment Protection Act with several "unacceptable" reuse options documented
Fire safety	Yes	Fire and Rescue Service Act 1990 (Requisition 1) 2011 requires any person who stores more than 500 tyres to take steps to minimise the risk of fire, including pile size and separation distances.
Energy recovery	No	None

Used tyre fate estimates

Table 7 and Figure 23 detail the estimated Qld used tyre fates. In 2018-19, Qld generated more than 102,000 tonnes of used tyres of which around 28% or 29,000 tonnes ended up in landfill or onsite disposal. Qld sent around 6.7% (7,000 tonnes) for re-tread and recycled around 10% (10,000 tonnes) of used tyres into rubber crumb and granules. A further 51% (52,000 tonnes) was recovered via export into energy recovery markets.

Table 7. Queensland used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	6,800	0	6,800	6.7%
Civil engineering	500	300	200	1,000	1.0%
Crumb, granules and buffings	5,300	4,700	100	10,100	9.9%
Pyrolysis	400	400	500	1,300	1.3%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	0	500	400	900	0.9%
Landfill	5,100	3,400	900	9,400	9.2%
Onsite disposal (mining, other OTR)	0	0	19,200	19,200	18.8%
Dumping dispersed	100	800	600	1,500	1.5%
Export	26,800	23,200	1,800	51,800	50.8%
Total	38,200	40,100	23,700	102,000	

Figure 23. Queensland used tyre fates 2018–19 (tonnes)

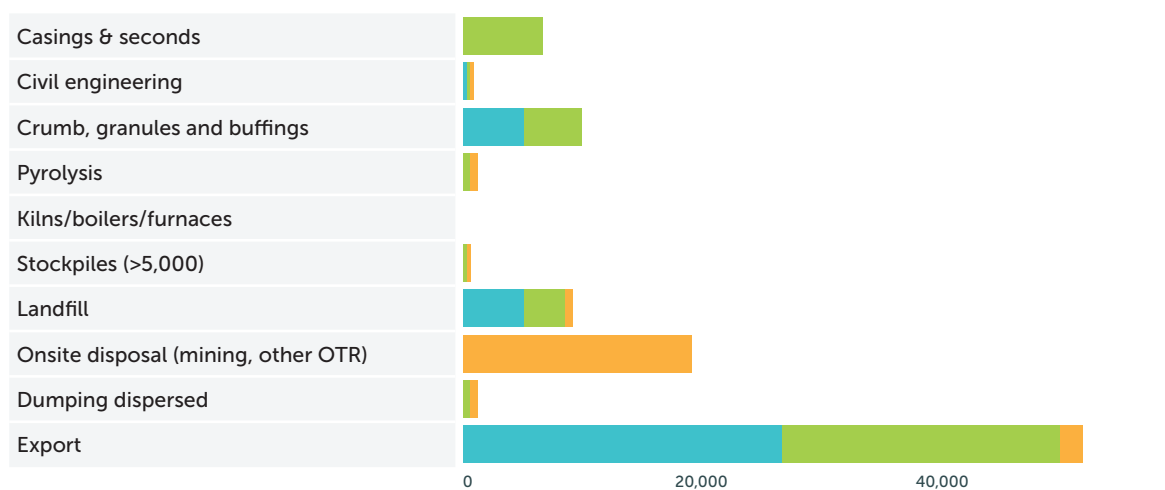


Table 8 and Figure 24 detail the estimated Qld used tyre recovery rates. In 2018-19, domestic recovery accounted for 19% (around 19,000 tonnes), recovery via export accounted for 51% while the remaining 30% were not recovered. Overall, the recovery rate in Qld was 70% in 2018-19.

Table 8. Queensland used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	6,200	12,200	800	19,200
Recovered via export	26,800	23,200	1,800	51,800
Not recovered (domestic)	5,200	4,700	21,100	31,000
Total	38,200	40,100	23,700	102,000

Figure 24. Queensland used tyre recovery rate 2018–19 (tonnes)



Western Australia 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~ 62,700,000	2,529,875 km ²	71,000 tonnes	94,000 tonnes	61,400 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in WA are summarised in the table below.

Area	Enabling Regulation ¹	Details
Tyre storage	Yes	Part 6 of the WA Environment Protection Regulations 1987 stipulate that sites storing more than 100 tyres must be licensed.
Transportation	Yes	Waste tyres are a controlled waste under the Environmental Protection (Controlled Waste) Regulations 2004 and as such permitting and tracking is required when used tyres are transported from commercial premises.
Waste tracking	Yes	Paper based, records must be kept for 3 years.
Recycling	Yes	The WA Environment Protection Regulations 1987 set requirements for the storage, handling, transportation and disposal of used tyres in WA. The Environment Protection Act 1986 and the Waste Avoidance and Resource Recovery Act 2007 contain provision relevant for tyre recycling.
Disposal	Yes	Disposal of used tyres is restricted within the Tyre Landfill Exclusion Zone.
Landfill levy	Yes	Used tyres disposed to landfill are subject to the inert landfill levy rate which is currently \$50/tonne
Reuse	No	No reuse options listed
Fire safety	No	None
Energy recovery	Yes	EPA WA has undertaken analysis of the environmental and human health impacts of waste to energy technologies to inform policy and regulatory decision making. The WA Waste Authority Waste to energy position statement aims to provide guidance for potential proponents and complements the Waste to energy advice under Section 16e

Used tyre fate estimates

Table 9 and Figure 25 detail the estimated WA used tyre fates. In 2018-19, WA generated more than 61,400 tonnes of used tyres of which around 31% (19,000 tonnes) went to landfill or onsite disposal. WA sent around 4% (2,500 tonnes) for re-tread and there was no used tyre materials recycling reported. Exports for recovery accounted for around 63% (38,000 tonnes).

Table 9. Western Australia used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	2,400	0	2,400	3.9%
Civil engineering	0	100	200	300	0.5%
Crumb, granules and buffings	0	0	0	0	0.0%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	0	200	400	600	1.0%
Landfill	800	1,100	700	2,600	4.2%
Onsite disposal (mining, other OTR)	0	0	16,300	16,300	26.5%
Dumping dispersed	0	300	500	800	1.3%
Export	20,600	15,300	2,500	38,400	62.5%
Total	21,400	19,400	20,600	61,400	

Figure 25. Western Australia used tyre fates 2018–19 (tonnes)

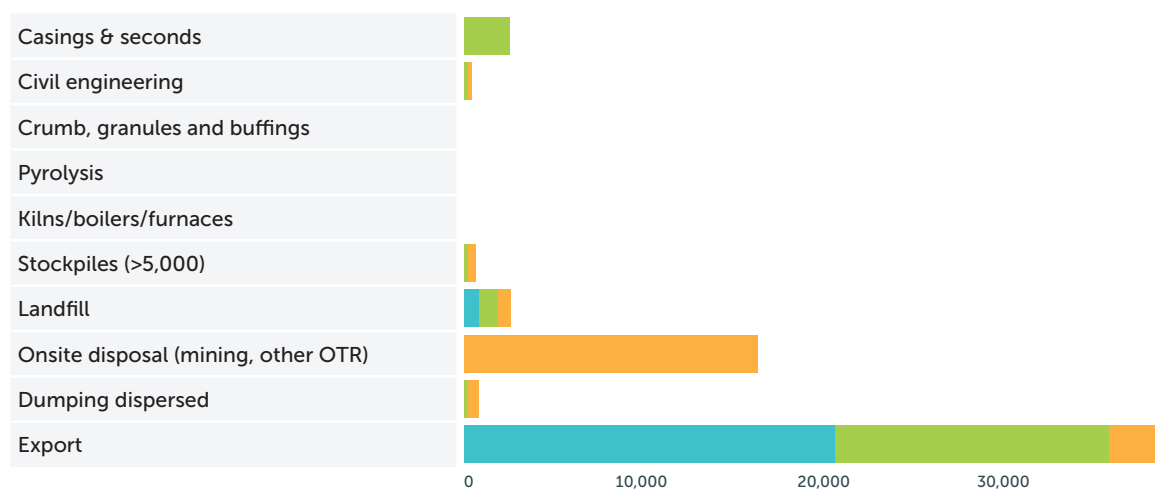
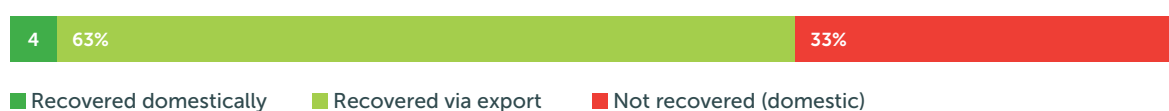


Table 10 and Figure 26 detail the estimated WA used tyre recovery rates. In 2018-19, domestic recovery accounted for 4% (around 2,700 tonnes), recovery via export accounted for 63% while the remaining 33% were not recovered. Overall, the recovery rate in WA was 67% in 2018-19.

Table 10. Western Australia used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	0	2,500	200	2,700
Recovered via export	20,600	15,300	2,500	38,400
Not recovered (domestic)	800	1,600	17,900	20,300
Total	21,400	19,400	20,600	61,400

Figure 26. Western Australia used tyre recovery rate 2018–19 (tonnes)



New South Wales 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~8,100,000	800,642 km ²	158,000 tonnes	222,000 tonnes	135,100 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in NSW are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	Protection of the Environment Operations (Waste) Regulations 2014 set licensing requirements for all operators who store more than 5 tonnes or 500 waste tyres at any time.
Transportation	Yes	Section 143 of the Protection of the Environment Operations Act 1997 (POEO Act) requires waste tyres be transported only to a place that can lawfully accept them.
Waste tracking	Yes	Those involved in the waste tyre value chain are required to register and report through the WasteLocate system. This system allows the tracking of used tyre consignments from the retailer to the point of recycling, storage or disposal.
Recycling	Yes	Protection of the Environment Operations (Waste) Regulations 2014 set licensing requirements for all tyre recyclers processing more than 5,000 tonnes of waste tyres per annum.
Disposal	Yes	Whole tyres cannot be landfilled in metropolitan areas, in regional areas disposal of tyres to landfill is at the discretion of local government.
Landfill levy	Yes	Used tyres attract the landfill levy in NSW, which in 2018-19 was \$141.20/tonne in metropolitan areas and \$81.30/tonne in regional areas.
Reuse	Yes	NSW EPA allows for the lawful land application of used tyres under specific circumstances outlined in a resource recovery order and exemption.
Fire safety	Yes	NSW Fire Brigade Guidelines for Bulk Storage of Rubber Tyres set requirements for open and indoor storage of waste tyres.
Energy recovery	Yes	The NSW Energy from Waste Policy Statement sets out the considerations and criteria that apply to recovery energy from waste materials, including used tyre. Under the policy, waste tyres can be used for energy recovery at purpose-built energy recovery facilities. The Eligible Waste Fuels Guidelines also list used tyres as an eligible waste fuel in NSW when used in an approved cement kiln.

Used tyre fate estimates

Table 11 and Figure 27 detail the estimated NSW used tyre fates. In 2018-19, NSW generated some 135,000 tonnes of used tyres. Around 53% (71,000 tonnes) were exported for recovery, while around 35% (48,000 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse and materials recycling accounted for around 12% (16,000 tonnes).

Table 11. New South Wales used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	1,000	6,600	0	7,600	5.6%
Civil engineering	200	300	300	800	0.6%
Crumb, granules and buffings	500	7,500	0	8,000	5.9%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	300	700	700	1,700	1.3%
Landfill	8,100	4,300	1,300	13,700	10.1%
Onsite disposal (mining, other OTR)	0	0	29,500	29,500	21.8%
Dumping dispersed	500	1,000	1,000	2,500	1.9%
Export	45,600	23,500	2,200	71,300	52.8%
Total	56,200	43,900	35,000	135,100	

Figure 27. New South Wales used tyre fates 2018–19 (tonnes)

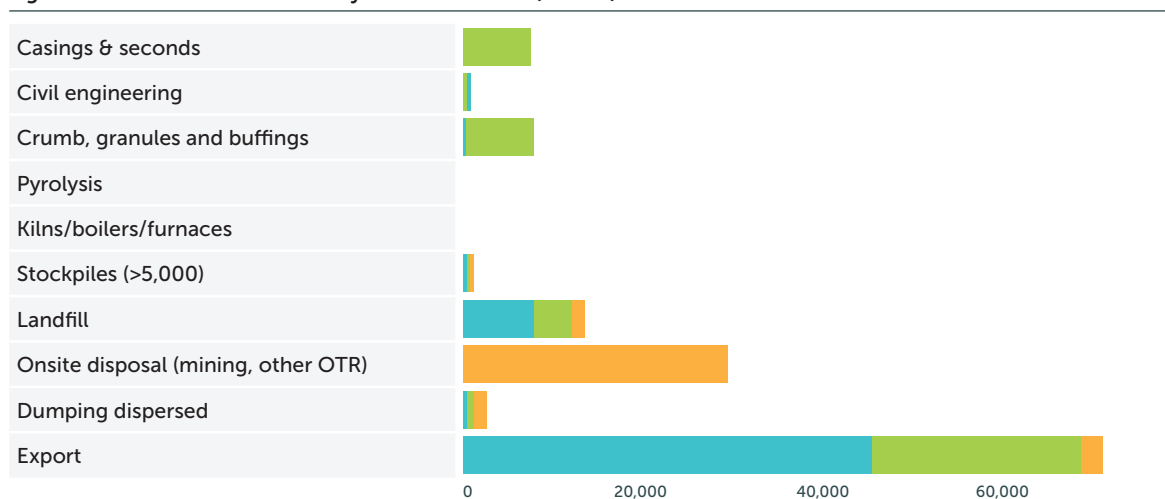
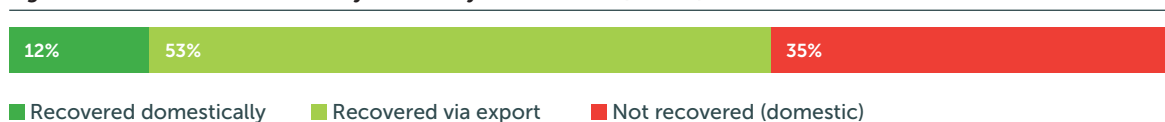


Table 12 and Figure 28 detail the estimated NSW used tyre recovery rates. In 2018-19, domestic recovery accounted for 12% (around 16,000 tonnes), recovery via export accounted for 53% while the remaining 35% were not recovered. Overall, the recovery rate in NSW was 65% in 2018-19.

Table 12. New South Wales used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	1,700	14,400	300	16,400
Recovered via export	45,600	23,500	2,200	71,300
Not recovered (domestic)	8,900	6,000	32,500	47,400
Total	56,200	43,900	35,000	135,100

Figure 28. New South Wales used tyre recovery rate 2018–19 (tonnes)



South Australia 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~1,800,000	983,482 km ²	37,000 tonnes	52,000 tonnes	31,200 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in SA are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	The Environment Protection Act 1993 requires an environmental authorisation for the reception, storage, treatment or disposal of used tyres for quantities exceeding 5 tonnes or 500 EPU's per annum.
Transportation	Yes	The Environment Protection Act 1993 requires an environmental authorisation to transport used tyres
Waste tracking	Yes	Paper based waste tracking to track where tyres are collected and where they are taken, to be completed by both the generator, transporter and disposal operator.
Recycling	Yes	The Environment Protection Act 1993 requires an environmental authorisation for the reception, storage, treatment or disposal of used tyres for quantities exceeding 5 tonnes or 500 EPU's per annum.
Disposal	Yes	Whole tyres are banned from landfill in SA under the Environment Protection (Waste to Resources) Policy 2010.
Landfill levy	Yes	The SA waste levy applies to shredded tyres sent to landfill. Current rates are \$76/tonne in metropolitan areas and \$38/tonne in regional areas.
Reuse	Yes	A development approval is required for structural reuse of tyres (such as erosion control) involving more than 5 tonnes per annum.
Fire safety	Yes	The General Guidelines for Rubber Tyre Storage developed by the SA Fire Authorities provide guidance for indoor and outdoor storage of waste tyres.
Energy recovery	Yes	SA EPA publication <i>Thermal energy from waste (EfW)</i> activities is supportive of the use of used tyres in EfW provided recycling markets are not available, as per waste hierarchy.

Used tyre fate estimates

Table 13 and Figure 29 detail the estimated SA used tyre fates. In 2018-19, SA generated some 31,000 tonnes of used tyres. Around 57% (18,000 tonnes) were exported for recovery, while around 25% (8,000 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse and materials recycling accounted for around 18% (6,000 tonnes).

Table 13. South Australia used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	500	2,200	0	2,700	8.7%
Civil engineering	0	100	100	200	0.6%
Crumb, granules and buffings	0	2,900	0	2,900	9.3%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	400	200	100	700	2.2%
Landfill	900	600	200	1,700	5.4%
Onsite disposal (mining, other OTR)	0	0	4,900	4,900	15.7%
Dumping dispersed	0	200	200	400	1.3%
Export	12,500	4,200	1,000	17,700	56.7%
Total	14,300	10,400	6,500	31,200	

Figure 29. South Australia used tyre fates 2018–19 (tonnes)

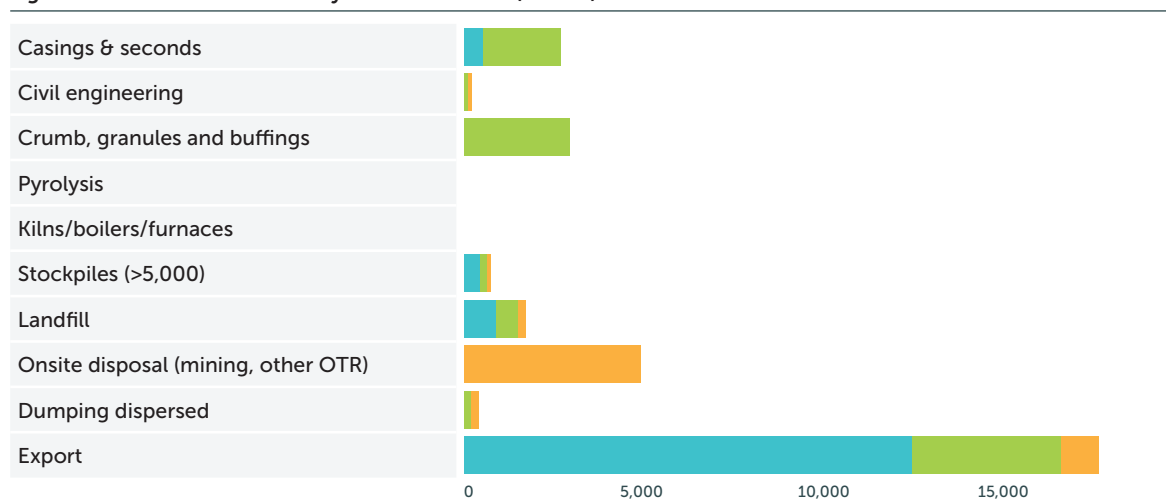


Table 14 and Figure 30 detail the estimated SA used tyre recovery rates. In 2018-19, domestic recovery accounted for 18% (around 6,000 tonnes), recovery via export accounted for 57% while the remaining 25% were not recovered. Overall, the recovery rate in SA was 75% in 2018-19.

Table 14. South Australia used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	500	5,200	100	5,800
Recovered via export	12,500	4,200	1,000	17,700
Not recovered (domestic)	1,300	1,000	5,400	7,700
Total	14,300	10,400	6,500	31,200

Figure 30. South Australia used tyre recovery rate 2018–19 (tonnes)



Tasmania 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~533,000	68,401 km ²	13,000 tonnes	18,000 tonnes	11,000 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in Victoria are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	More than 100 tonnes of used tyres storage require EPA approval and likely licensing.
Transportation	Yes	Tyres are a controlled waste under the Environmental Management and Pollution Control (Controlled Waste Tracking) Regulations 2010 and operators involved in the production, transportation and receipt of used tyres must be registered.
Waste tracking	Yes	As above
Recycling	Yes	Tyre recyclers must be licensed under the Environmental Management and Pollution Control (Waste Management) Regulations 2010.
Disposal	Yes	Whole tyres may not be landfilled in Tasmania. Shredded tyres can be accepted at secure landfills.
Landfill levy	No	Tasmania does not have a landfill levy, but will have a levy introduced 2021.
Reuse	No	No reuse options listed.
Fire safety	No	There are no specific requirements or guidance notes for fire safety, however the General Fire Regulations 2010 provide provisions for general site requirements.
Energy recovery	No	None

Used tyre fate estimates

Table 15 and Figure 31 detail the estimated Tasmania used tyre fates. In 2018-19, Tasmania generated some 11,000 tonnes of used tyres. Around 59% (6,500 tonnes) were exported for recovery, while around 28% (3,000 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse and materials recycling accounted for around 14% (1,500 tonnes).

Table 15. Tasmania used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	900	0	900	8.2%
Civil engineering	0	0	0	0	0.0%
Crumb, granules and buffings	0	600	0	600	5.5%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	0	100	0	100	0.9%
Landfill	900	500	100	1,500	13.6%
Onsite disposal (mining, other OTR)	0	0	1,300	1,300	11.8%
Dumping dispersed	0	100	0	100	0.9%
Export	3,600	2,800	100	6,500	59.1%
Total	4,500	5,000	1,500	11,000	

Figure 31. Tasmania used tyre fates 2018–19 (tonnes)

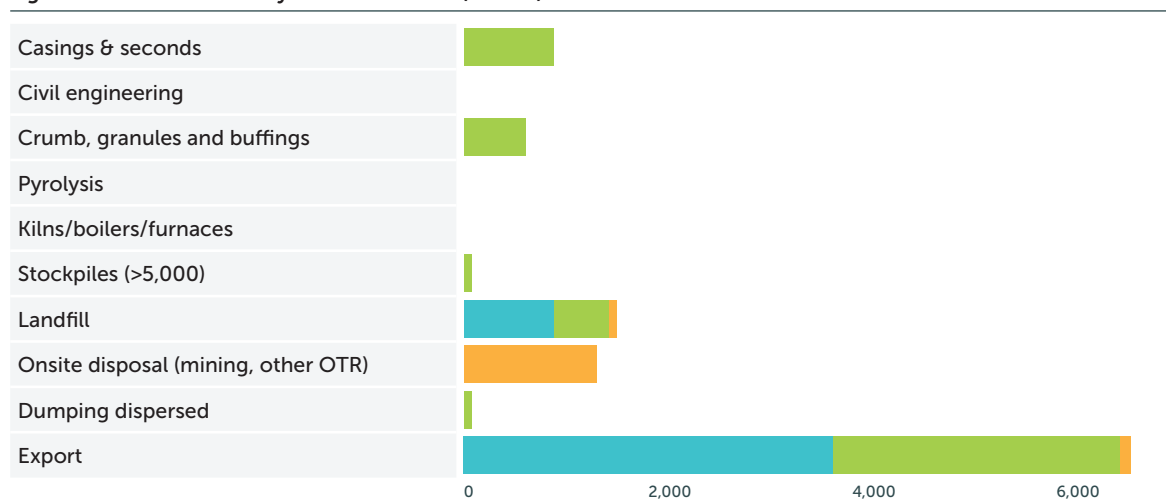
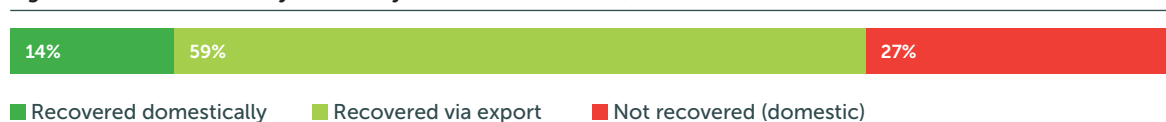


Table 16 and Figure 32 detail the estimated Tasmanian used tyre recovery rates. In 2018-19, domestic recovery accounted for 14%, recovery via export accounted for 59% while the remaining 27% were not recovered. Overall, the recovery rate in Tasmania was 73% in 2018-19.

Table 16. Tasmania used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	0	1,500	0	1,500
Recovered via export	3,600	2,800	100	6,500
Not recovered (domestic)	900	700	1,400	3,000
Total	4,500	5,000	1,500	11,000

Figure 32. Tasmania used tyre recovery rate 2018–19 (tonnes)



Northern Territory 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~252,000	1,335,742 km ²	7,000 tonnes	8,000 tonnes	4,900 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in NT are summarised in the table below.

Area	Enabling Regulation ¹	Details
Used tyre storage	Yes	Activities involving the collection, transport, storage, recycling, treating or disposing of tyres (a listed waste) require an environmental protection licence under the Waste Management and Pollution Control Act and Waste Management and Pollution Control (Administration) Regulations.
Transportation	No	As above
Waste tracking	No	None
Recycling	No	Activities involving the collection, transport, storage, recycling, treating or disposing of tyres (a listed waste) require an environmental protection licence under the Waste Management and Pollution Control Act and Waste Management and Pollution Control (Administration) Regulations.
Disposal	Yes	As above
Landfill levy	Yes	None
Reuse	No	None listed
Fire safety	Yes	None
Energy recovery	Yes	None

Used tyre fate estimates

Table 17 and Figure 33 detail the estimated NT used tyre fates. In 2018-19, NT generated some 5,000 tonnes of used tyres. Around 50% (2,400 tonnes) were exported for recovery, while around 43% (2,100 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse accounted for around 8% (400 tonnes).

1. REC has provided state-by-state breakdowns of the regulatory framework for used tyres. The analysis provides a tick for regulation that enables used tyre markets for recycling and recovery to function more effectively.

Table 17. Northern Territory used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	400	0	400	8.2%
Civil engineering	0	0	0	0	0.0%
Crumb, granules and buffings	0	0	0	0	0.0%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	100	200	0	300	6.1%
Landfill	100	0	100	200	4.1%
Onsite disposal (mining, other OTR)	0	0	1,500	1,500	30.6%
Dumping dispersed	0	100	0	100	2.0%
Export	1,000	1,400	0	2,400	49.0%
Total	1,200	2,100	1,600	4,900	

Figure 33. Northern Territory used tyre fates 2018–19 (tonnes)

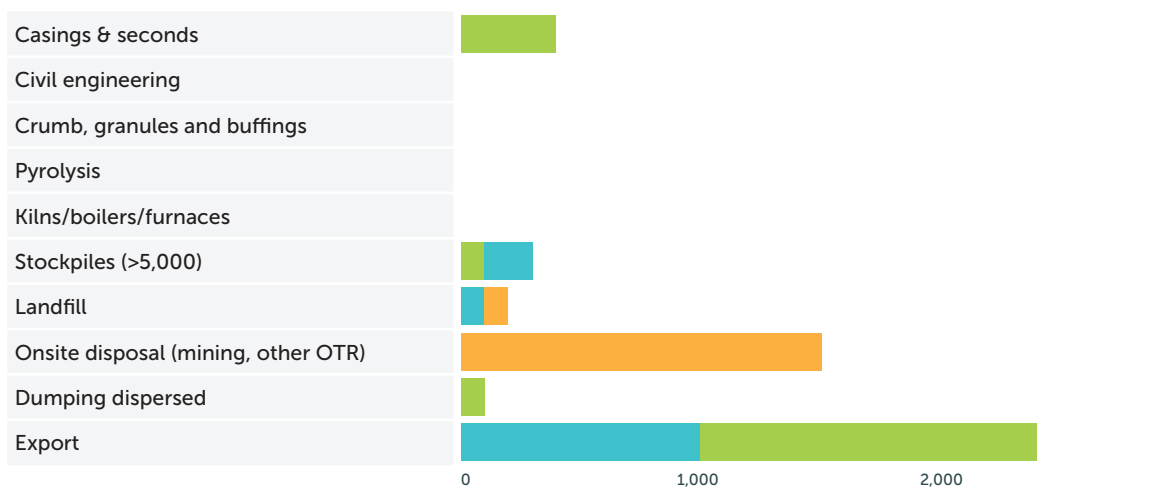
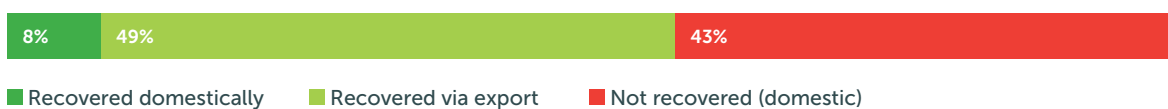


Table 18 and Figure 34 detail the estimated NT used tyre recovery rates. In 2018-19, domestic recovery accounted for 8%, recovery via export accounted for 49% while the remaining 43% were not recovered. Overall, the recovery rate in NT was 57% in 2018-19.

Table 18. Northern Territory used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	0	400	0	400
Recovered via export	1,000	1,400	0	2,400
Not recovered (domestic)	200	300	1,600	2,100
Total	1,200	2,100	1,600	4,900

Figure 34. Northern Territory used tyre recovery rate 2018–19 (tonnes)



Australian Capital Territory 2018-19 Market Overview

Population	Size	Consumption	In-use	Used tyre Generation
~429,500	2,358 km ²	7,000 tonnes	11,000 tonnes	5,500 tonnes

Policy and regulatory settings

The current policy and regulatory settings related to used tyre management in Victoria are summarised in the table below.

Area	Enabling Regulation ¹	Details
Tyre storage	Yes	Section 49.1(a) of the Environment Protection Act 1997 requires businesses involved in the storage, transport, disposal or processing of tyres to obtain an environmental authority (license). Storage is limited to 25 tonnes and areas must be clearly marked and segregated.
Transportation	Yes	As above
Waste tracking	No	None
Recycling	Yes	Section 49.1(a) of the Environment Protection Act 1997 requires businesses involved in the storage, transport, disposal or processing of tyres to obtain an environmental authority (license). Storage is limited to 25 tonnes and areas must be clearly marked and segregated.
Disposal	No	Tyres are permitted to be landfilled whole or shredded, costs are around \$300 per tonne for tyres.
Landfill levy	No	There was no landfill levy in the ACT in 2018-19. However, in 2019-2020 a levy will be introduced.
Reuse	No	None listed
Fire safety	No	None
Energy recovery	No	None

Used tyre fate estimates

Table 19 and Figure 35 detail the estimated ACT used tyre fates. In 2018-19, ACT generated some 5,500 tonnes of used tyres. Around 65% (3,600 tonnes) were exported for recovery, while around 29% (1,600 tonnes) were disposed onsite, landfilled, stockpiled or dumped (dispersed dumping). Domestic reuse accounted for around 6% (300 tonnes).

Table 19. Australian Capital Territory used tyres fate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total	%
Casings & seconds	0	300	0	300	5.5%
Civil engineering	0	0	0	0	0.0%
Crumb, granules and buffings	0	0	0	0	0.0%
Pyrolysis	0	0	0	0	0.0%
Kilns/boilers/furnaces	0	0	0	0	0.0%
Stockpiles (>5,000)	100	0	0	100	1.8%
Landfill	500	100	0	600	10.9%
Onsite disposal (mining, other OTR)	0	0	800	800	14.5%
Dumping dispersed	100	0	0	100	1.8%
Export	2,700	900	0	3,600	65.5%
Total	3,400	1,300	800	5,500	

Figure 35. Australian Capital Territory used tyre fates 2018–19 (tonnes)

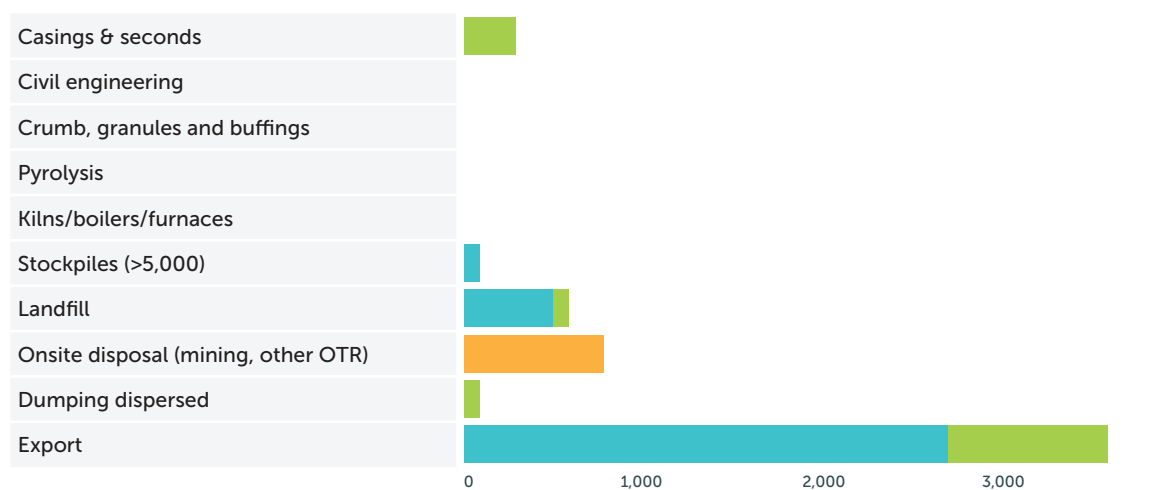


Table 20 and Figure 36 detail the estimated ACT used tyre recovery rates. In 2018-19, domestic recovery accounted for 6%, recovery via export accounted for 65% while the remaining 29% were not recovered. Overall, the recovery rate in ACT was 71% in 2018-19.

Table 20. Australian Capital Territory used tyre recovery rate 2018–19 (tonnes)

Fate	Passenger	Truck	OTR	Total
Recovered domestically	0	300	0	300
Recovered via export	2,700	900	0	3,600
Not recovered (domestic)	700	100	800	1,600
Total	3,400	1,300	800	5,500

Figure 36. Australian Capital Territory used tyre recovery rate 2018–19 (tonnes)





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