F I N A L R E P O R T

Market Failure in End-of-life Tyre Disposal

Prepared for

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URS

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Acronyms

ABS	Australian Bureau of Statistics
ATIG	Australian Tyre Importers Group
ATMA	Australian Tyre Manufacturers Association
COAG	Council of Australian Governments
DEH	Department of the Environment and Heritage
EoL	End-of-life
EPA	Environmental Protection Agency
EPU	Equivalent Passenger Unit
IWRP	Industry Waste Reduction Plan
JWGT	Joint Working Group on Tyres
OEM	Original Equipment Manufacturer
OTR	Off The Road
PRO	Producer Responsibility Organisation
R&D	Research and Development
RIS	Regulatory Impact Statement
TC	Transformation Category
TDF	Tyre Derived Fuel
TDP	Tyre Derived Product
URS	URS Australia Pty Ltd

Definitions relating to the End-of-Life Tyre Market

AFR	Means alternative fuels and raw materials that can be used as a source of fuel in energy generation (waste products such as end-of-life tyres, demolition timbers, waste oil, carbon anode dust, aluminium spent cell liners, solvent based fuels can be used as AFR in cement kilns) (Geocycle – Environmental Solutions for Industry 2001, p.3).
Buffings	Rubber removed from tyre cases (both from the tread only and tread and tyre shoulder) to prepare them for retreading or during finishing of the tyres after the retreads are applied (Atech Group 2001, Pt.1, p.65).
Casing	A whole tyre.
Collector	Any person who collectors and transports used, rejected or unwanted motor vehicle tyres in any part of Australia (NSW EPA 1998, p.4). A collector or transporter engages in the activity of collection and/or transportation.
Dealer	A person or company that sells tyres to consumers for use on motor vehicles.
Disposal	The permanent disposal of end-of-life tyres. Disposal options for end-of-life tyres include a sanitary landfill (that receives other solid waste) and a tyre monofil (MWH New Zealand Ltd 2004, p.19).
End use market	Refers to the end markets that use Tyre Derived Products as inputs; the market that end market producers operate in (See 'End market producer').
End market producer	Means a producer of products that use Tyre Derived Products as inputs; essentially the demanders and users of Tyre Derived Products, e.g. flooring specialists, road surfacing companies, and retaining wall producers.
End-of-life Tyre	A used tyre that cannot or is not reused for its originally intended purpose and is not retreaded. Such tyres may have a further use as a raw material for other processes or be destined for final disposal. [Note: End-of-life tyres are called "scrap tires" in the United States.] (MWH New Zealand Ltd 2004, p.4).
EPU	An equivalent passenger unit, the weight of tyre equal to an average passenger tyre, 9.5kg (NSW EPA 1998, p.4).
Motor vehicle	Means any motor car, motor carriage, motor cycle or other vehicle propelled upon any public street wholly or partly by any volatile spirit, steam, gas, oil, or electricity, or by any means other than human or animal power, and includes a trailer, but does not mean or include any vehicle used on a railway or tram way (other than a light rail vehicle).] [Note: This includes any sedan, utility van, panel van, van, truck, articulated vehicle, trailer, caravan, bus, agricultural vehicle, agricultural trailer or mining vehicle and includes such vehicles when not used on public streets.] (NSW EPA 1998, p.4).

Processor	Any person who is not a retreader or a recycler, who processes used, rejected or unwanted tyres. [Note: This includes any person who shreds, cuts or de-walls tyres for disposal.] (NSW EPA 1998, p.4).
Producer	Refers to the originators of new tyres, essentially the manufacturers and importers of new tyres (loose and fitted tyres) that begin the flow of tyres into a market.
Product stewardship	"Product Stewardship is an approach that recognises that manufacturers, importers, governments and consumers have a shared responsibility for the environmental impacts of a product throughout its full life cycle" (EPHC 2004a, p.2).
Recycler	See 'Transformer'.
Retreader	Any person who processes used, rejected or unwanted tyres for sale as a motor vehicle tyre (NSW EPA 1998, p.4).
Shredding	Shredding of tyres involves cutting and tearing the end-of-life tyre mechanically with shredders using a series of various sized rotating knives (Monitor Tire Disposal Transformation 2005, p.1).
Transformer	Any person who processes used, rejected or unwanted tyres into a saleable product that is not a motor vehicle tyre (NSW EPA 1998, p.4).
Transporter	See 'Collector'.
TDP	Refers to the point at which tyre waste becomes a 'product'. Means a saleable product manufactured directly from used, rejected or unwanted tyres that is used as a raw material for another manufacturing process. According to the Tyres Roundtable, an end-of-life tyre must undergo "substantial transformation" before it is classified a tyre-derived products. [Note: This refers to whole tyres, cut tyres, chip, granulate, buffing, crumb, steel and textile that are used for energy recovery (See 'TDF'), material recovery and civil engineering end use markets.] (refer to Appendix C for these TC categories).
Tyre category	Means the six common categories of tyres including Off The Road (OTR) tyres, truck and bus tyres, light and medium commercial tyres, specialty tyres, passenger tyres and motor cycle tyres.
Tyre landfill	A sanitary landfill, or portion of a landfill, that receives only end-of-life tyres. The landfill has an appropriate liner, cover, leachate collection system and monitoring system (MWH New Zealand Ltd 2004, p.19).

Used tyre	A used, rejected or unwanted motor vehicle tyre, that can be reused for its originally intended purpose, retreaded, transformed, recycled, or that may be destined for final disposal. [Note: Used tyres are divided into two sub-categories depending on their appropriateness for reuse or recycling: (1) Waste tyres or (2) end-of-life tyres] (MWH New Zealand Ltd 2004, p.4).
Used tyre operator	Means any person, who buys, sells, exchanges, stores, transports, imports, exports, reuses, retreads, recycles, processes, bales, consigns for transport, accepts, disposes of to landfill, or otherwise disposes of used, rejected or unwanted tyres (NSW EPA 1998, p.4).
Used tyre transaction	Means the buying, selling, exchanging, storing, transporting, importing, exporting, reusing, retreading, recycling, processing, baling, consigning for transport, accepting, disposing of to landfill, or otherwise disposing of used, rejected or unwanted motor vehicle tyres in Australia (NSW EPA 1998, p.4).

Market Failures

Market failures are characteristics of goods and markets that can lead to economically inefficient allocation of resources, compared with the theoretical ideal. Dealing with market failure is an important rationale for government intervention and regulation.

The main sources of market failure are:

- External costs and benefits;
- Public and collective goods;
- Information failures; and
- Monopoly and restricted competition.

The purpose of this study was to determine the nature and extent of market failures relating to the management of end-of-use tyres in Australia.

Key Findings

1. The precise nature of any tyre industry wide market failure.

Market Failure	Applicable to End-of-Life Tyres	Extent/Quantification
External costs		
• Environmental	Yes	Marginal
• Health	Yes	Marginal
• Fire risk	Yes	Significant but tighter regulation has reduced in recent years in urban areas
• Illegal disposal	Yes	> $35 to $70 million over 10 years
Public and collective goods	Yes	Up to $280 million over 10 years
Information failures	Yes	
Monopoly and restricted competition	No	Not Applicable
TOTAL		**> $315 to $350 million over 10 years**

2. The precise nature of any supply chain specific market failures associated with the three major supply chains.

The three supply chains for the entry of new tyres into the Australian market are (1) original equipment tyres, (on domestically produced and imported vehicles) (2) domestically manufactured tyres and (3) imported loose tyres (section 5.1).

Market failures identified in Finding 1 are identical across tyre supply chains but can differ among categories of tyre (section 5.3). The external costs of illegal disposal are greater for smaller tyres such as passenger car tyres, than for large tyres such as heavy truck tyres. Estimates suggest only 1 percent of truck tyres are illegally dumped or stockpiled, whereas rates for passenger tyres are highest with 16 percent illegally dumped followed closely by light truck tyres at 12 percent. Passenger tyres are shown to contribute 67 percent of the total number of EPUs illegally dumped even though they account for 49 percent of total tyres entering the market (excluding OTR tyres). Therefore, as a proportion of passenger tyres to total tyres within each of the three supply chains, passenger tyres contribute the most to external costs of illegal disposal (sections 4.1.1 and 5.3).

3. The extent to which:

   – any market failure applies to a particular tyres supplier;

   – there is any variation of any market failure between suppliers;

   – any market failures vary between the management of tyres produced for original equipment manufacturers, such as vehicles (whether imported or domestically manufactured) and tyres provided for after market use.

The major sources of market failure stem from illegal disposal and storage, lack of public and collective goods relating to end-of-life tyres and poor information. Most of these are not specific to particular tyre suppliers or supply chains (sections 4 and 5).

The supply of information to consumers about disposal practices and options is inconsistent and haphazard across Australia. Many suppliers do not provide information sufficient for them to make informed choices about disposal practices (section 4.3). This is a symptom of the information market failure and should not be considered a supplier specific issue.

Location of tyre suppliers may influence illegal dumping. Illegal dumping and storage may be relatively more prevalent as a proportion of tyre turnover in more remote areas as a result of high transport costs and lack of treatment facilities, coupled with state-wide regulation of legal disposal. However, it also occurs in major cities where the bulk of used tyres are located. While there may be business drivers for individual businesses to engage in illegal dumping and storage, these are not specific to particular types of tyre supplier.

As vehicle dealers tend to use specialist tyre suppliers and fitters, there is no significant difference between the management of tyres produced for original equipment manufacturers (whether imported or domestically manufactured) and tyres provided for after market use.

4. Assess all stages and aspects of the life cycle of the suppliers' tyres, including volumes and current treatment of the tyres at end-of-life by suppliers of tyres:

– volume of tyres (on a percentage basis) supplied to the market by each of the three supply chains, and to the extent possible, the volume of tyres (on a percentage basis) presenting in the waste stream from each of the three supply chains;

Supply Chain 1: 5,357,000 tyres (7,431,000 EPUs); Supply Chain 2: 4,110,000 tyres (5,720,000 EPUs); Supply Chain 3: 11,102,000 tyres (22,434,000 EPUs).

The volume of tyres presenting into the waste stream for each of the three supply chain is generally equal in proportion to those entering the market. Changes in the national vehicle fleet drive the proportion of tyre categories entering the waste stream (section 5).

– The current treatment of the tyres at end-of-life by suppliers of tyres.

Current treatment for all end-of-life tyres is estimated as: Legal Landfill 64%; Illegal Dumping 14%; Tyre-Derived Products 23%.

5. The volume of tyres (on a percentage basis) supplied to the market by each of the three supply chains, and to the extent possible, the volume of tyres (on a percentage basis) presenting in the waste stream from each of the three supply chains.

The volume of tyres supplied to the market by each of the supply chains is summarised in Table 5.8. There is no way of distinguishing used tyres originating from the three supply chains once they enter the waste stream – only categories of tyre (e.g. passenger) can be differentiated.

6. The current treatment of the tyres at End-of-life by suppliers of tyres.

Current end of life tyres treatment is as follows: Legal Landfill 64%; Illegal Dumping 14%; Tyre-Derived Products 23%. There is no way of distinguishing used tyres originating from individual suppliers of new tyres– only categories of tyre (e.g. passenger) can be differentiated.

7. The impact on return/disposal practices of End-of-life tyres by the extent to which they are covered under any warranty, particularly new vehicle warranty.

Few if any new vehicle warranties cover tyres unless they are defective. Replacement of original tyres at the end of their lives is usually undertaken by specialist tyre suppliers with arrangements with service departments of car dealers, although some dealers do it themselves.

New tyres are covered by limited warrantees. Tyre manufacturers/distributors have arrangements for recovery of some defective tyres under tyre warranties, for their own quality control purposes. The rest are disposed of with other end-of-life tyres by the tyre dealers.

8. The impact on return/disposal practices of any preferred service provider contracts, particularly between vehicle manufacturers and tyre retailers.

Many operators of heavy earth-moving/mining equipment and heavy trucks have service contracts with specialist tyre firms. In this part of the used tyre market, refurbishment and retreading is common, so that this may be reflected in contract arrangements. Such arrangements may also apply to service departments of manufacturers and dealers in such equipment. However, for passenger and light truck tyres, service provider contracts do not generally specify return/disposal practices (Appendix D).

9. The impact on return/disposal practices of any contractual arrangements, particularly between vehicle manufacturers and tyre recyclers or between tyre retailers and tyre recyclers, or between vehicle manufacturers, tyre retailers and tyre recyclers.

This study could not find any evidence of direct contractual arrangements between vehicle manufacturers and tyre recyclers. Vehicle manufacturers would have arrangements to deal with tyre manufacturers/importers to manage defective tyres supplied as original equipment, as they would for any other component suppliers. Some service departments of vehicle dealers have arrangements with tyre suppliers (in the form of tyre retails) to deal with end-of-life tyres.

Tyre retailers' disposal practices are not aligned with any downstream end uses except in the case of truck/bus tyre retreading where this occurs. This study is not aware of any tyre retailers' disposal practices being influenced by the needs of reprocessors for particular types or qualities of tyres (sections 3, 4.3, 4.4).

10. The location of end-of-life tyres by supplier, including whether they are recycled, disposed of to landfill, are exported or illegally dumped.

Information is not available to determine the location of end-of-life tyres by individual supplier, for commercial confidentiality reasons. Data on exports of used tyres by port of export are available from the Australian Bureau of Statistics. No information is available on illegal dumping by individual suppliers unless they have been prosecuted.

1.1 Context of this Study

The tyre industry and the Australian Government Department of the Environment and Heritage (DEH), on behalf of the EPHC, have been negotiating the development of national product stewardship arrangements for end-of-life tyres. The negotiations have focused on the establishment of a Tyres Product Stewardship Agreement, under which a national industry-run tyres product stewardship scheme will operate. The scheme would be supported by government regulation to ensure that participants in the voluntary scheme are not competitively disadvantaged in the market place. The regulations would ensure that any tyre industry companies that are not participants in the voluntary scheme would have to achieve equivalent outcomes to those included in the agreement. The new regulations would be established as sector specific Schedules under a proposed new National Environmental Protection (Product Stewardship) Measure.

Two economic modelling studies were conducted to facilitate negotiations, and the development of the proposed arrangements to date. These studies have identified the consequences of the market failure aspects of end-of-life tyres management, including inefficient allocation of resources because of imperfect information and externalities. However, questions remain over certain aspects of the identified market failure. The purpose of this study is to examine in more detail the identified market failure aspects, as well as investigating any market failure within and between the three major supply chains for tyres entering the Australian market, which are, (a) tyres imported by consignment (tyre importers); (b) tyres imported on vehicles (vehicle importers); and (c) domestically manufactured tyres (tyre manufacturers).

This study will provide input into the Regulation Impact Statement being developed for the proposed tyres product stewardship agreement.

1.2 Requirements of this Study

The Terms of Reference for this study are included in Appendix A and are summarised below.

This study is an analysis of market failures applying to the management of End-of-life tyres in Australia, with particular emphasis on investigating any environmental and human health externalities and differences in impacts of the different supply chains for entry of tyres into use in Australia. The study is required to focus on:

1. "The precise nature of any tyre industry wide market failure;
2. The precise nature of any supply chain specific market failures associated with the three major supply chains, which are:
   - tyres imported by consignment (tyre importers);
   - tyres imported on vehicles (vehicle importers); and
   - domestically manufactured tyres (tyre manufacturers).

3. The extent to which any market failure applies to a particular tyres supplier, and the extent to which there is any variation of any market failure between suppliers. This work should investigate the extent to which any market failures vary between the management of tyres produced for original equipment manufacturers, such as vehicles (whether imported or domestically manufactured) and tyres provided for after market use, i.e. replacing tyres that entered the market on original equipment."

4. The study is to "assess all stages and aspects of the life cycle of the suppliers' tyres", including volumes and "current treatment of the tyres at end-of-life by suppliers of tyres".

In addition the study is to assess "all stages and aspects of the life cycle of the tyre" including:

- "The volume of tyres (on a percentage basis) supplied to the market by each of the three supply chains, and to the extent possible, the volume of tyres (on a percentage basis) presenting in the waste stream from each of the three supply chains; and
- "The current treatment of the tyres at End-of-life by suppliers of tyres."

The study is to assess all stages and aspects of the tyre life cycle including:

- "The impact on return/disposal practices of End-of-life tyres by the extent to which they are covered under any warranty, particularly new vehicle warranty;
- "The impact on return/disposal practices of any preferred service provider contracts, particularly between vehicle manufacturers and tyre retailers;
- "The impact on return/disposal practices of any contractual arrangements, particularly between vehicle manufacturers and tyre recyclers or between tyre retailers and tyre recyclers, or between vehicle manufacturers, tyre retailers and tyre recyclers; and if possible
- "The location of End-of-life tyres by supplier, including whether they are recycled, disposed of to landfill, are exported or illegally dumped."

1.3 Structure of the Report

The main body of this report is presented in five main sections. This Introduction as part of Section 1 has provided the context of the study and an overview of the study requirements. Section 2 provides an overview of the theoretical economic concepts of market failure as a context and foundation for the analysis of the specific market failures within the end-of-life tyre market. The overview describes the characteristics of market failures within the categories of externalities, undeveloped markets and institutions, monopoly and non-competitive behaviour, information failures and public goods. Generic examples of each market failure are provided.

Section 3 provides a brief description of the market arrangements for end-of-life tyres in Australia followed by Section 4 which examines the market failure in End-of-life Tyre Markets of whether this market displays any of the characteristics of the market failures described in Section 2. The section is sub

divided into each of the market failures (externalities, public goods, information failures and monopoly, competition and market structure) and the end-of-life tyre market is assessed to examine whether the market demonstrates evidence of each of the market failures. Where evidence exists this has been presented and where it has been possible quantified. The section ends with a discussion on the implications of market failure for resource recovery.

Section 5 provides a description of the total new tyre market and its three major supply chains (tyres imported by consignment (tyre importers), tyres imported on vehicles (vehicle importers); and domestically manufactured tyres (tyre manufacturers)). It analyses whether or not there is any difference between the various supply chains in regard to disposal arrangements. The section specifically examines the disposal arrangements for the vehicle importers supply chain and concludes by discussing whether or not the market failures as identified in Section 4 apply to a different extent to any of the tyre supply chains, and if so, to what extent.

References for the study are included in Section 6 followed by the report Appendices.

2.1 What is 'Market Failure'?

The term 'market failure' comes from the theoretical economic literature[1]. This section explains the concepts of market failure. These concepts are then applied to Australia's end-of-life tyre markets in Section 4.

Generally, markets work very well for most goods and services to allocate resources in the most economically efficient manner to ensure that the community obtains the greatest benefit from their use. However, there may be circumstances where this is not the case, where markets, left to themselves, cannot deliver outcomes that are as efficient as the theoretical ideal. In these circumstances, markets are considered to "fail" in their role of efficiently allocating resources. Actions that effectively address the sources of market failure may enhance economic efficiency if the benefits of intervention exceed the costs. Dealing with market failure is an important rationale for government intervention and regulation.

In their quest to minimise regulatory burdens on business and the community, Australian governments have agreed that they should only regulate when it is necessary (ORR, 1998). The Council of Australian Governments (COAG) recent agreement on regulation reaffirmed commitment to this fundamental principle (COAG 2006). For business regulation, this means ensuring that if regulation is proposed to address areas of market failure, the regulation will be effective and economically efficient. This study should be seen in this context.

The term 'market failure' is a theoretical concept. It should not be construed in its literal plain English sense to infer that market forces are not at work or are not being permitted to work. Rather, the term is a short-hand way of indicating that market forces are not able to work perfectly to deliver socially optimal results. The term does not have a pejorative connotation. The concept provides a framework for understanding whether a market, left to itself, can be expected to overcome a problem that has been identified, or whether some intervention may be required. It is therefore fundamental to avoiding unnecessary or poorly targeted regulation.

Black, in his *Oxford Dictionary of Economics*, explained the term as follows:

> "A brief label for the view that the market does not provide a panacea for all economic problems.... [A]n unregulated market may fail to produce an ideal state of affairs" (Black, 1997, p. 290).

Several factors have been identified in the economics literature that can impede the operation of markets to produce socially optimal outcomes and where government intervention is used to improve market performance. These are:

[1] A useful text on this subject is Ian Wills, *Economics and the Environment: A signalling and incentives approach*'2nd Edition, Allen and Unwin, Crows Nest 2006.h

- ***Externalities, where private costs and benefits are not aligned with social costs and benefits.*** An unregulated market reflects private costs and benefits. Where the private incentive to produce a good is less than the net social benefit, it will be under-provided by the market relative to the social optimum. Conversely, where the private incentives are to produce more than is optimal, it will be over-provided, relative to the social optimum. An external cost arises when social costs are greater than private costs. Environmental pollution is a classic example of an external cost that may not be taken fully into account in private decision making. Such effects are sometimes known as 'spillovers' or 'off-site impacts'. Environmental and health regulations are examples of government attempts to overcome such externalities. Market–based instruments such as levies and subsidies are now also being used to try to internalise social costs into private decision-making.

- ***Public goods, where it is not feasible to exclude anyone from consuming goods and services***. This form of market failure can arise where consumption by one individual does not diminish the amount available to others (non-rivalry in consumption) or because the transactions costs of exclusion are prohibitive. Defence, social institutions such as law and order and information are classic examples of public goods that are non-rivalrous in consumption. Charging for general urban road use is an example of the latter, where pricing has been infeasible.

  Technology is changing the boundaries of public goods. Information now spreads across the globe instantly, so that it is difficult to prevent others from acquiring it. The feasibility of pricing some goods and services that have been considered public goods in the past is also changing. This is affecting approaches to charging for household waste management, a service that has been considered a public good.

  Collective goods are a sub-set of public goods, where the goods and services are provided for the mutual benefit of a group, such as an industry. For example, industry associations often collect and distribute statistics and develop training programs for the benefit of their members.

  Industry associations develop over time. Some environmental and natural resource goods and services have not been traded traditionally. For example, until relatively recently, wastes, with the exception of certain recyclables, were not considered to be 'market' goods. Where waste products have not traditionally been traded and have been considered 'non-market' goods, industry institutions will not generally be well developed. Thus, industries dealing in waste products, such as end-of-life tyres, often do not have the institutional infrastructure to provide collective goods. .It takes time and experience for industries to mature enough to develop the collective goods that enable them to work efficiently.

  When goods and services cannot be efficiently priced and are available to everyone in a society, taxation is typically used to pay for it. For collective goods and services, levies or membership dues support their provision. For example, levies on primary production support agricultural industry marketing and research activities.

  A critical issue here is that unless a mechanism like this is available to ensure that everyone who benefits, pays, individuals may have an incentive not to pay. This is known as the "free-rider problem". For example, the number of subscribers who pay to support public radio stations is a small

proportion of the population that can listen to the services. With collective business services, competitive pressures can erode voluntary financial support to the extent that they become unviable, even though individuals may wish to 'do the right thing'. Overcoming the free-rider problem is another rationale for government intervention in markets to enable them to perform better.

- ***Information failures.*** Information is the lifeblood of markets. Market participants need to understand the products on offer, the needs of consumers, the conditions of trade, supplies, demand, prices and costs, and to be able to identify potential participants in the market. All of these require information. Markets cannot operate optimally where consumers or producers do not have adequate information to make informed decisions or to undertake transactions. However, information is also costly. Achieving the optimum information level involves a trade-off between the benefits and costs of information. Information is likely to be limited in newly developing areas with new products, markets and operators.

  Governments often intervene in markets to overcome information failures. Regulation is often used in areas of high risk and where information is too technical to be widely understood, such as health and safety. Information issues can also be tackled directly through provision of information and transparent processes.

- ***Monopoly and non-competitive behaviour*** can lead to over-charging and restriction of supply of goods and services relative to the social optimum. However, when economies of scale and scope are available, the most efficient outcome may be a monopoly or oligopoly (a small number of firms).

  'Natural monopolies' occur when economies of scale and scope are such that the only efficient market structure is a monopoly. Utilities like electricity, water or household garbage collection and waste management have traditionally been considered to be natural monopolies. Almost by definition, such situations are likely to arise in the developmental stages of a market as firms develop new and innovative products and processes.

  Governments typically intervene in markets where competition may be restricted through competition policy, specific regulation or public ownership. In recent years, this field of government intervention has been subject to significant reform with improved understanding of the nature of such markets and of the strengths and weaknesses of types of government intervention itself.

The relevance of these various sources of market failure to the markets for used tyres will be discussed in Section 4.

Market arrangements for dealing with end-of-life tyres cover the three supply chains by which new tyres enter the market, the removal, collection, transport and storage of used tyres, and their re-use, processing or disposal.[2] This section provides an overview of these market arrangements and examines the applicability of the various concepts of market failure to them.

3.1 Overview of End-of-life Tyre Markets and Disposal Arrangements

The Australian used tyre industry, which handles end-of-life tyres, is composed of a large number of firms engaged in several different markets including retailing and refitting, collection, transport, storage, reprocessing and disposal. Some markets, such as tyre retailing and reprocessing are relatively concentrated, with a small number of large firms accounting for a major portion of the business, and a large number of small firms accounting for the rest. A few large companies such as Beaurepaires and Bob Jane dominate tyre retailing and refitting in Australia. The used tyre collection industry is highly competitive, with some large operators and a large number of small individual operators (estimated about 70 operators nationally) (URS 2005, p. 33).

The number of used tyre processors is currently relatively small. They encompass a wide range of activities, from retreading, shredding and chipping through to the manufacture of tyre-derived products. Major players include Sims Tyrecycle and smaller individual operators (URS 2005, p. 34). The transformation industry consists of a small number of firms. Sims Tyrecycle is the largest, followed by others including AEM Regenerative Rubber, Chip Tyre and Affordable Rubber. The disposal sector includes a large number of waste management facilities around Australia, and firms engaged in energy recovery and export.

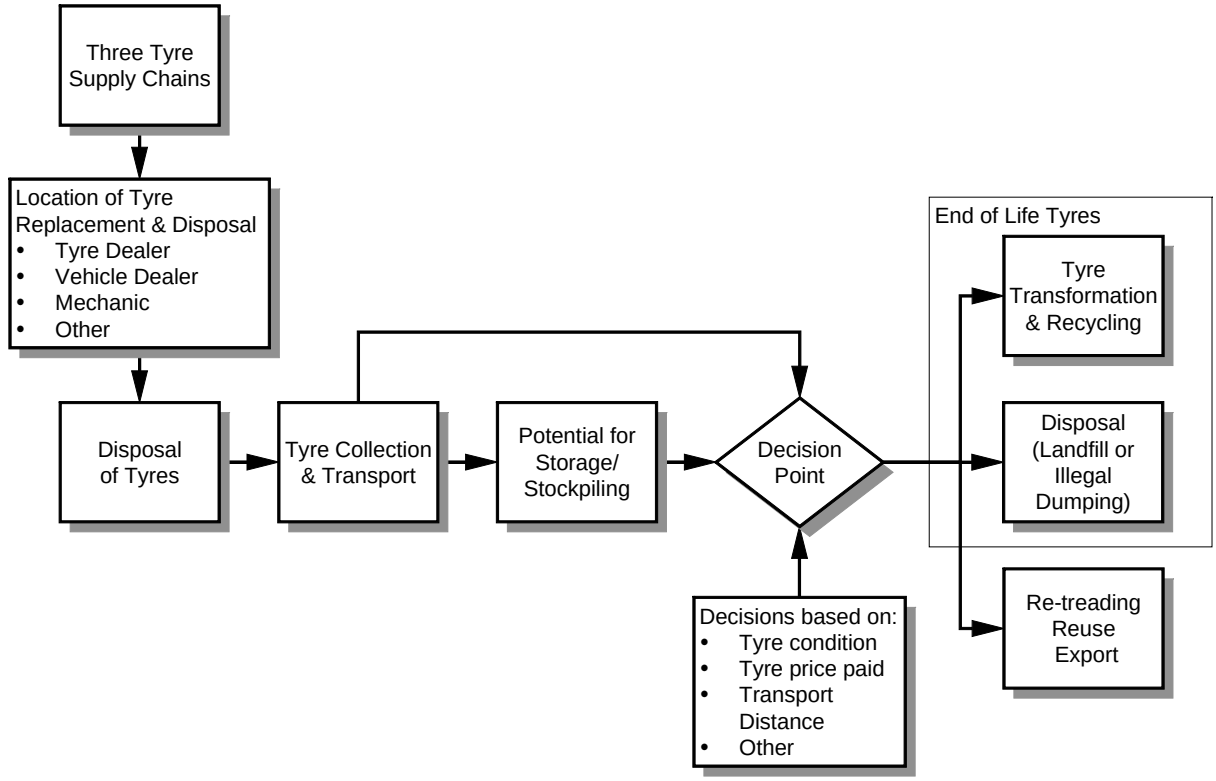
Figure 3.1 provides an indicative flow chart of tyre collection, transport and end use/disposal.

3.2 Tyre Removal

Tyres are removed from vehicles when they are worn, however some tyres are only partially worn and are removed to obtain matching sets or upgrade tyre specifications for vehicles. The removal and replacement of tyres is a specialised activity, generally undertaken at tyre dealers or vehicle dealers during servicing. For larger tyres (such as truck, bus and off the road tyre suppliers generally have specialist tyre maintenance contracts in place with some repairs and maintenance carried out from mobile service units. On mine sites, earthmoving tyre suppliers will often provide a complete tyre maintenance service. When tyres are replaced 95 percent of all used tyres are left at the tyre dealer (ACIL Consulting 2000, p.19) and are generally stockpiled for collection by the tyre collection industry.

[2] A full description of the end-of-life tyre market and disposal arrangements can be read in URS' previous report *Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme* (2005).

Figure 3-1: Tyre Collection, Transport and End use/Disposal Flow Chart



Source: Industry Sources and URS Analysis

3.3 Tyre Collection and Transport

Most collection is undertaken by small operators. While some tyre reprocessors are vertically integrated and collect, transport, and reprocess, they mostly rely on individual collectors for much of their supply of used tyres (ARRB Transport Research 2004, p.33).

The tyre collection and transportation industry is highly competitive with comparatively low barriers to entry. The basic requirements are a vehicle and a license to carry tyres. This results in a large number of collectors operating with low margins, and inevitably, considerable turnover as individuals enter and leave the industry. This process can create considerable uncertainty with the supply chains to processors, especially in respect to dislocation and interruption of collection and transport. This can be a particular problem in regional markets where there are few operators. Marginal operators are forced to take a fairly short term view of the used tyre market and its opportunities.

The collection phase is a key link in the end-of-life tyres supply chain. Collection and transport operators determine the destination of used tyres as a function of their own business operations. They make decisions on where tyres will be transported based on their expected profit outcomes from moving tyres to landfill, retreading, export, or to transformation industries – the four main destinations for used tyres.

The tyre collector is paid a fee to remove tyres from tyre or vehicle dealers, who in turn charges their customers. As a minimum this fee covers the cost of collection, transport and landfilling, with the tyre or vehicle dealers covering their costs of tyre handling. As a general rule this fee is $2.50 per EPU in the metropolitan areas (URS 2005, page 35, section 4.1.3). If a better return can be made from other uses such as retreading or transformation to tyre-derived products, then these routes will be followed. The cost of collection and transport is influenced by the volume and distance transported. The fee structure for tyre collections is shown in Table 3–1 below alongside the average disposal fee charged at the retailer:

Table 3-1: Approximate Disposal Fees

	Disposal Fee @ Retailer $/EPU	Passenger $/EPU	$/tonne
Metropolitan	2.50	1.10	~125
Regional	3.50	2.40	~275
Rural	5.00	4.00	~438

Source: URS Analysis and ARRB Transport Research 2004, p.33

3.4 Tyre Disposal and Stockpiles

Current estimates suggest some 63 percent of all end-of-life tyres were legally disposed of in an Australian landfill, which is equivalent to nearly 23 million EPUs, or about 70 percent of EPUs. Landfills charge a disposal fee per tyre, per tonne of whole or shredded tyres. Current estimates suggest that this is only 21 percent of EPUs or 23 percent of tyre numbers are reprocessed. Rates of legal and illegal disposal and reprocessing vary significantly across the tyre categories. For example, it is estimated that 16 percent of passenger tyres EPUs are illegally dumped against only 1 percent of truck tyres. This reflects the relative profitability of reprocessing heavy truck tyres compared with smaller passenger tyres.

There is currently a move towards prohibiting land filling of whole tyres. South Australia, Tasmania, Victoria, Western Australia and the Sydney metropolitan area have already banned this practice.

Due to these regulatory requirements, and the national trend toward shredding, disposers of waste tyres must either pre-shred prior to disposal (paying a shredded tyre landfill fee) or alternatively they can dispose of whole tyres but must pay a higher landfill charge to cover handling, coarse shredding, and landfilling. Landfill disposal fees vary from facility to facility. They can be as low as $65 per tonne for shredded tyres ($0.50-0.60 per EPU) and up to $150 per tonne for whole tyres requiring shredding ($1.20 per EPU) (URS 2005). Recent information has highlighted disposal costs as low as $20 per tonne at landfills in NSW outside the greater Sydney region (ATRA 2006). Hence shredding and its related costs are becoming a more important consideration in determining the direction of end-of-life tyres.

Table 3–2 overleaf provides a breakdown of current estimates of the direction of end-of-life tyres to disposal and stockpiling (illegal or legal) or to reprocessing into tyre derived product. This data provides a breakdown against six tyre classifications and is summarised in terms of numbers of tyres (Table 3-2).

Table 3-2: Current Disposal of End-of-life Tyres ('000s)

	Total Tyres	Motor cycles	Passenger	Light trucks	Truck and bus	Specialty tyres	OTR
Legal Landfill – Current	12,461	681	8,209	2,660	828	26	57
Illegal Dumping – Current	2,664	63	2,115	473	13	0	0
Tyre-Derived Products – Current	4,456	71	3,320	828	209	17	12
Totals	**19,581**	**815**	**13,643**	**3,961**	**1,050**	**43**	**69**
Legal Landfill – Current	64%	84%	60%	67%	79%	61%	83%
Illegal Dumping – Current	14%	8%	16%	12%	1%	0%	0%
Tyre-Derived Products – Current	23%	9%	24%	21%	20%	39%	17%
Totals	**~100%**	**~100%**	**~100%**	**~100%**	**~100%**	**~100%**	**~100%**

Source: URS Analysis. [Note: percentages may not add to 100 because of rounding]

Note for Table 3–2: Data is totalled down the columns

Table 3-3 below shows the share of each tyre category that is disposed illegally, legally or reprocessed represented in EPUs.

Table 3-3: Current Disposal of End-of-life Tyres ('000s EPUs)

	Motor cycles	Passenger	Light trucks	Truck and bus	Specialty tyres	OTR	Total EPUs
Legal Landfill – Current	340	8,209	5,319	4,140	132	5,703	**23,843**
Illegal Dumping – Current	32	2,115	947	63	0	0	**3,156**
Tyre-Derived Products – Current	35	3,320	1,655	1,045	83	1,197	**7,335**
Legal Landfill – Current	1%	34%	22%	17%	1%	24%	**~100%**
Illegal Dumping – Current	1%	67%	30%	2%	0%	0%	**~100%**
Tyre-Derived Products – Current	0%	45%	23%	14%	1%	16%	**~100%**

Source: URS Analysis. [Note: percentages may not add to 100 because of rounding]

Note for Table 3–3: Data is totalled along the rows from left to right

3.4.1 Illegal Disposal and Stockpiling

In 2005 an estimated 3.2 million EPUs (Table 3-3) were illegally disposed or stockpiled. This represents some 14 percent of all end-of-life tyres entering the waste stream. There exists some uncertainty regarding the number, and proportion, of tyres that are either illegally disposed or stockpiled. At present numbers are uncertain and probably vary between states and between urban and rural and regional areas. The numbers presented in Table 3-3 were the most consistent currently available. Numbers that are illegally disposed are usually expressed as annual rates, the size of stockpiles are generally expressed as aggregate numbers.

Illegal storage and disposal generally refers to the dumping of tyres at sites that have failed to obtain the required approvals or licenses or sites where deliberate illegal dumping has occurred. The incentive for illegal dumping is lower disposal costs for the collector. Higher landfill disposal charges can encourage this practice (Atech Group 2001, Pt.1, p.10). Recently, some NSW rural councils have developed approaches aimed at reducing or eliminating the need to landfill tyres. Tyre retailers in these areas are finding it difficult to dispose of tyres legally (NSW DEC 2004). Currently in NSW there are 10 licences issued for Used Tyre Processing or Disposal (NSW DEC 2006a). Sustainability Victoria has recently cracked down on an increase in illegal dumping in the North West and Central Regions of Victoria, stating that despite the general public paying fees to have their tyres disposed of appropriately that these tyres were being illegally dumped or stockpiled (EPA VIC). Disposal of tyres illegally carries heavy fines in various jurisdictions around Australia and prosecutions are undertaken (NSW DEC 2006b).

Historic stockpiles include illegally dumped tyres, industry stockpiles, and dedicated tyre landfill cells from which tyres can potentially be extracted in the future for recycling (as in Victoria) (ARRB Transport Research 2004, p.45). The number of used tyres currently in stockpiles around Australia has been estimated at 20 million EPU (ARRB Transport Research 2004, p.9) although this figure is unreliable as there is no accurate record keeping of tyre disposal practices.

3.5 Tyre Transformation

A small number of tyre transformers process end-of-life tyres into various products (refer to Appendix C). They include SIMS Tyrecycle (VIC, NSW, QLD, SA), AEM Regenerative Rubber (NSW), Chip Tyre (QLD) and Affordable Rubber (QLD), and Reclaim Industries (WA). The process of transformation requires machinery that gradually reduces the tyres into smaller and refined or purified particles (shredding, chopping, granulating and grinding). The largest industry operator, SIMS Tyrecycle, collects and disposes of approximately 66,500 tonnes of tyres per year, estimated at 28 percent of the annual flow of end-of-life tyres) as well as buffings. It is understood that not all of these tyres are processed into tyre derived product. Some tyres are processed to produce rubber crumb (TC5). About 10,000 tonnes of rubber crumb were produced from used tyres in 2005, representing 56 percent of all rubber crumb produced in Australia.

There are generally three broad classifications of end use markets utilising tyre-derived products in Australia. These include: civil engineering; energy (fuel source – AFR); and material recovery (rubber, steel and fabric). A wide range of products is produced from used tyres including civil engineering

materials (retaining walls), equestrian surfaces; soft fall surfacing and sub-flooring; matting; rubberised asphalt and spray seals for road application; fillers in adhesives; and input for elastomers (Appendix C). The previous URS report *Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme* (2005) analysed current markets and their growth potential as summarised in Table 3-4.

Table 3-4: Current and Potential Size of Tyre Derived End Use Markets

End Use	Tyre-Derived Products Input	Current Used Tyre Inputs	Potential Used Tyre Inputs[3]
Civil Engineering			
Retaining Walls, Foundations, Pavings & Erosion Control	TC1	1,400 tonnes 174,000 EPU	40,000 tonnes 5 million EPU
Stemming	TC4 Granulate	0 tonnes (trials only)	55,000 tonnes 9.4 million EPU
Landfill Engineering	TC3, TC4 Granulate	0 tonnes (trials only)	Unknown
Energy			
Tyre Derived Fuel	TC1, TC2, TC3	9,740 tonnes 1.2 million EPU	110,000[4] tonnes 13.8 million EPU
Blasting Material	TC4 Buffing	0 tonnes (trials only)	74,000 tonnes 12.6 million EPU
Rubber & Material Recovery			
Road Surfacing	TC5	915 tonnes 160,125 EPU	90,000 tonnes 15.8 million EPU
Flooring & Mats	TC4, TC5	10,850 tonnes 2.12 million EPU	15,850 tonnes 3.21 million EPU
Moulded Products	TC4 Buffing, TC5	10,000 tonnes 2.2 million EPU	13,000 tonnes 4.3 million EPU
Adhesives	TC5	6,000 tonnes 1.1 million EPU	10,000 tonnes 1.8 million EPU
Steel		Unknown	Unknown
Textile		0 tonnes	Unknown

Source: Industry Sources and URS Analysis (URS 2005)

The difference between the current usage volumes and suggested potential demands of used tyres is striking. Indicative gross margin analysis suggested that for TC4, 5 and 6 products, current prices exceed collection and transformation costs for tyres sourced from urban areas. Returns for other TC products and for tyres sourced from regional and rural areas is less favourable. Positive returns are not the sole

[3] Note: Potential inputs of used tyres is based on stakeholder feedback and estimates for growth

[4] Cement Industry Federation letter to DEH 6 June 2006

indicator of potential demand for TC product. They still need to be competitive with the cost of virgin materials, as well as being profitable in their own right.

Market failure can arise from several sources, as outlined in Section 2.1. The questions for this study are how these concepts apply to the Australian end-of-life tyre markets; and whether and to what extent the various forms of market failure distort resource allocation in these markets.

Market failure can arise from any or all of the following:

- Externalities;
- Public and collective goods;
- Information failures; and
- Monopoly and restricted competition.

The applicability of each of these to Australian end-of-life tyre markets is examined in turn.

4.1 Externalities

Externalities can arise in any sector of the end-of-life tyre markets, including stockpiling and disposal by both legal and illegal methods. Disposal externalities such as fire, environmental and health risk are often cited, but they can also result from transport and reprocessing.

4.1.1 Disposal Externalities

Emissions from Decomposition

Tyres are largely inert in landfill and in the landscape. They do not break down readily as they have been engineered to maintain their integrity in use. This is especially so in landfills where their formulation renders them largely chemically inert.

Nevertheless, there is some evidence that landfilling and stockpiling of used tyres can contribute to leaching of inorganic and organic chemicals (UK Environment Agency Report 1998, Section 4.5). They can also contribute to the release of landfill gas and leachates with the potential to create toxicity on the natural environment (Hird, Griffiths and Smith, p.37). Data are currently limited on the toxicity of tyre leachate to terrestrial organisms.

Preliminary studies indicate that leachate from tyres may, under certain circumstances, be toxic to aquatic organisms. Leachate from tyre pieces and crumbs appears to be more toxic than leachate from whole tyres, but only whole tyres are likely to be used in the aquatic environment for purposes such as bumpers on piers and artificial reefs (EPA 2001).

No estimates of the extent of chemical leaching and gas emissions from the decomposition of tyres are available for Australia. It is not possible to quantify the externalities involved. However, they do not

appear to be a significant source of emissions relative to decomposition of other materials in landfills and in aquatic environments. This does not appear to be a significant source of environmental external cost.

Pest breeding

Bulk locations of waste tyres (in stockpiles and landfills) can act as breeding sites for mosquitoes and other vermin (Atech Report 2001, Part 1, p.17). According to the South Australian EPA, mosquitoes are attracted to the rainwater that builds up in the wells of the tyres, and the warm, dark environment. A single tyre can nurture hundreds of larvae. These pests can create health risks for humans and animals in the vicinity of stockpiles (Liu, Mead and Stacer 1998).

Diseases associated with mosquitoes in Australia include dengue fever and Ross River virus. (SA EPA 2003, p.1). One U.S. study showed that in the study area, 80 percent of the children suffering from mosquito-vectored disease lived within 100 yards of a tyre dump (Liu, Mead and Stacer 1998).

Whether tyres account for more than a marginal increase in mosquito breeding and in the risks of mosquito-borne disease in Australia is not clear. It is however a more avoidable risk than natural mosquito breeding sites. While breeding of mosquitoes and other pests constitutes an external cost, it is not possible to quantify it.

Legal landfill management

Although tyres do not degrade readily, whole tyres are difficult to manage in landfills. Intact tyres can collect land fill gas (produced by decomposing waste) and create potential fire hazards (see below). Over time, tyres can also "float" to the surface, where they can damage cover layers. While this imposes costs on landfill operators, that is not an external cost. The cost of preventing and dealing with this phenomenon should be incorporated in landfill charges and operating procedures; alternatively it may be internalised to disposers by requiring pre-treatment such as shredding.

There are however, a number of old landfill sites where such provisions have not been made. The costs were not borne by those disposing of the tyres in this way, so the costs of ongoing management can be considered a legacy external cost as the resource misallocation has already occurred. Landfill operators should be able to quantify these legacy costs, as they are market-based costs. However, information is not available to enable quantification for this study.

Illegal Dumping

Illegal disposal generally refers to the dumping or stockpiling of tyres at unlicensed sites or at sites that have failed to obtain the required approvals or licenses for disposal or processing. Current estimates suggest about 3.2 million EPUs were illegally disposed in Australia (9 percent of EPUs), or some 14 percent of all end-of-life tyres entering the waste stream per annum (see Table 3-2). Estimates suggest that passenger tyres make up about two-thirds of the total number of EPUs illegally dumped, and light truck tyres some 30 percent (Table 3-3). Heavy truck tyres represent only two percent of dumped EPUs.

This relatively low share reflects the higher profitability of reprocessing truck tyres.

Tyres disposed of illegally carry zero immediate cost to the transporter, collector or disposer, although they are exposed to the risk of substantial fines or other penalties for illegal actions. This zero disposal charge in comparison to the costs of legal landfill is a chief motivator for illegal disposal. Tyres are typically disposed illegally in remote locations, which mean that these tyres can be expensive to remove. In addition, if tyres are covered with soil or are underground, then extraction costs are also high (URS 2005).

Illegal disposal can also have adverse effects in the landscape. Dumping in gullies can block creeks and rivers and change water flows (NSW DEC 2004 and Atech Report 2001, Part 1, p.18). They are also an eyesore (Atech Report 2001, Part 1, p.17).

Tyres are sometimes dumped in gullies by landholders attempting to deal with soil erosion. However unless specifically engineered for the task this application is not effective as tyres can become mobile during floods, damage neighbouring properties, harbour vermin and weeds and pose a fire risk. In South Australia erosion control programs using waste tyres must be licensed (SA EPA). Tasmania allows for certain agricultural and civil uses as defined under its guidelines (DPI TAS).

This practice indicates the importance of maintaining perspective in considering private and social costs and benefits. If the tyres used in this manner work as a control measure, this should not be considered illegal dumping but reuse, akin to other civil engineering uses such as artificial reefs. If the erosion control is successful, eventually vegetation will be re-established but the tyres will remain, with all of their costs. If tyres are not generally effective in controlling erosion, then the practice imposes net costs from the start. Improved information would enable landholders to make better informed decisions about the use of end-of-life tyres in the landscape.

The costs to local authorities and landowners of cleaning up illegal tyre dumps can be quite substantial. Illegal dumping imposes external costs because those responsible for dumping cannot be identified and the current landowner or society at large is liable for both the usual costs of disposal as well as the incremental clean up costs (Atech Report 2001, Appendix 2). Costs of cleanup vary depending on the location of the dump, the difficultly in removal and the legal landfilling costs.

Earlier estimates based on quotes to clean up a large tyre dump greater than 100,000 tyres) were up to $1.65 per tyre (Atech Report 2001, Appendix 2). In this report it was stated that cleanup costs for smaller dumps would be higher. At the Gold Coast in 2000 a number of illegal tyre dumps in bushland cost more than $10,000 for removal, shredding and correct disposal (QLD 2000). Current examples from California state that 3,000 illegally dumped EPUs cost authorities between $US2.25 – $3 per tyre to cleanup (CIWMB 2006b). Examples from England and Wales cite costs of over £2.0M of tax payer's money per annum to cleanup illegally disposed (fly tipped) tyres (DEFRA 2004) £330,000 to clean up 10,000 tyres (North Lincolnshire Council 2006).

A number of published papers and reports list expected environmental impacts but these have not been well quantified for the Australian context. A base line measure of impact may be provided by using estimates of cleanup costs to remove illegally dumped tyres. The annual cost is estimated to be over $4

million (or some $35 million over 10 years) (URS 2005). This excludes the cost of cleanup of Australia's large illegal stockpiled of used tyres, which is likely to double the cleanup cost from $35 million to $70 million over ten years. These costs are purely market-based costs. They do not include any of the non-market (external) costs cited above, such as pest breeding, blocking of waterways or fire.

4.1.2 Fire Risk

Tyres are flammable. When in a concentrated mass they pose a fire risk. Underground tyre fires can be very difficult and costly to control. Stockpiling, landfilling and bulk storage of used tyres all have the potential to lead to fires, even underground. Such fires are particularly difficult to control. There have been a number of fires involving tyres at landfills in Australia and around the world.

Tyre fires have serious environmental and health impacts because:

- They can be difficult to control and extinguish;
- Uncontrolled pyrolysis of tyres produces a complex mixture of chemical residues and particles, some of which are toxic to humans, fauna and flora and some of which may inhibit the biota on which landfill processes depend; and
- The vapours and fallout pollute the atmosphere.

A tyre fire at Bindoon, WA in 1990 is estimated to have cost the WA EPA $600,000 to clean-up a contaminated watercourse. Recreational activities and businesses in neighbouring properties were also adversely affected by air pollution (NSW DEC 2004). A similar tyre fire in 1992 in Salisbury, QLD is reported to have cost the fire brigade $750,000 and a fire at a retail tyre outlet in Sydney in 2002 caused the hospitalisation of people from surrounding areas due to respiratory concerns. The runoff of water used in fighting tyre fires also has the potential to pollute waters (NSW DEC 2004) as water on tyre fires often increases the production of pyrolytic oil and provides a mode of transportation to carry the oils off-site and speed up contamination of soils and water (CIWMB 1996).

Underground tyre fires are particularly problematic as they can be so difficult to control. A UK Environment Agency Report (1998, Section 4.2 & 4.7) indicated that a tyre fire in a tip containing 10 million buried tyres burned for more than 10 years underground. Tyre fires in landfills threaten the on-going operation of the facility and can release pollutants into the soil and groundwater.

In addition, tyre fires have the potential to impact on human and animal health as a result of the air quality and pollution created from the toxic smoke created. Many chemicals carried in the smoke, some of which are mutagens and carcinogens, have been identified in the emissions from both the controlled and uncontrolled burning of rubber tires (CIWMB 1996). The smoke contains many tiny particles (smaller than 10 μm) small enough to the inhaled into the deep lung (CIWMB 2002). The major carcinogens of concern are polycyclic aromatic hydrocarbons (PAH's) as well as heavy metals contamination of zinc and lead (CIWMB 1998). These can cause acute health effects including eye, nose and throat irritation and exacerbate asthma and repertory conditions and the potential to exacerbate pre-existing heart conditions,

confirming that the most significant public health risks appear to be people with asthma, heart and lung diseases (CIWMB 2002).

Australian authorities have imposed stricter fire controls on tyre storage facilities in recent years. This has led to fewer fires in recent times. The costs of these fire control measures can be considered a means of internalising what would otherwise have been external costs. Information is not available to estimate the value of remaining fire risks from tyre disposal and storage, particularly as the greatest risks are probably posed by illegal tyre dumps.

Transport

Transport costs are a significant factor in determining the fate of used tyres in Australia. Whether an end-of-life tyre is reprocessed – or even collected – will depend upon its location and the costs of transporting it to a facility such as a transformer or a legal landfill. If low back-loading freight rates are available, transport of used tyres can become financially more attractive, even from relatively remote locations.

Transport gives rise to external costs through emission of pollutants and greenhouse gases into the atmosphere and wear and tear on roads. Such external costs are not unique to used tyres, however, as they apply to all types of cargo. Such external costs should be included in any evaluation of the benefits and costs of transporting used tyres.

Reprocessing Waste and Emissions

Manufacturing activities generate waste and can also generate emissions to the environment. While all manufacturing facilities, including tyre transformers, have to meet environmental standards, the environmental costs of any waste products must also be considered in any evaluation of external benefits and costs. When tyres are used for energy and burnt, for example, the character of the waste residues will change and particulate matter and substances such as sulphur may be mobilised. The extent of any external costs will depend upon the extent of emissions and treatment of residues from the reprocessing activities.

No information is available to quantify the external costs of reprocessing tyres in Australia.

4.2 Public and Collective Goods

Public and collective goods cannot be provided at the socially optimal level without intervention in the market. If an individual cannot appropriate the benefits, such a good is unlikely to be provided adequately in the absence of government or collective action among those who benefit. Research is an area that is often under-provided because of the inability of the researcher to appropriate the benefits of the research. This appears to apply to the waste tyre industry as well.

Collective goods are typically provided by industries for their members. They include such services as the development of standards, collection of statistics and generic marketing and information, as well as the

building of market institutions. New industries, with immature markets, lack both the industry institutions and the services that they can provide. The transactions costs of developing such arrangements can be significant in the short term. Lack of industry standards is one factor that appears to be retarding end-of-life tyre industry development and expansion (see Section 4.4 below).

Socially Suboptimal Investment in R&D

It could be argued that insufficient funding of beneficial applied research is hindering product development and the development of a viable End-of-life tyre industry. It is difficult to protect the intellectual property involved in many innovative applications for waste tyres. Such firms feel that they are unable to capture the benefits from an investment. Given the high risks in undertaking and implementing research and their small size, individuals and firms in the tyres industry are not encouraged to embark on R&D investment unless the potential rewards are correspondingly high. This is despite such developments potentially benefiting and making society better off (Atech Report 2001, Part 2, p.4).

For example, a company developed the technology to create rubberised trays for mining trucks using tyre-derived products. It decided not to launch the product, despite the time and money invested, as it was concerned that its idea would be copied by competitors. Similarly, uses had been found for the fibre recovered from tyres but its application was closely guarded (Confidential Industry Source).

The lack of industry players willing to invest in R&D for tyre-derived products was highlighted in a number of URS industry discussions in the 2005 report. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) indicated that firms in the tyre industry were reluctant to assist funding research of advanced transformation technologies for used tyres into a higher grade of rubber crumb (TC5) for use in road surfaces and a range of other products (Personal Communication[7] 2005). This was despite the potential benefits to transformers, end market producers and end users.

The majority of the research undertaken in the use of rubber modified asphalt has been undertaken not by the industry but by state government road authorities (URS Report 2005, p.73). Public provision of research services is a common remedy to perceived inadequacy of private R&D.

While Australia can benefit from other countries' R&D for uses of end-of-life tyres, some local research will be required for applications that are sensitive to Australian conditions, such as roads.

While it seems likely that there is some market failure in the provision of research services, it is difficult to estimate its extent. Furthermore, identifying the probable existence of the market failure does not indicate what, if anything, should be done about it. Many, areas of research would claim to be under-provided and compete for limited public research funds. Determining what, if any, public resources are devoted to research into used tyre technology or market applications requires assessment of likely benefits and costs relative to alternative areas of research. Areas of research where the industry as a whole would benefit might be amenable to collective industry action when the industry is mature enough to support provision of collective services.

Collective Goods

Markets for waste tyres are relatively undeveloped in Australia. This applies to varying extents through all stages of the waste tyre industry, from collection to reprocessing, reuse and disposal. This is also reflected in the poor information available about tyre-derived products (see below). This issue was analysed in the previous URS report (URS 2005).

Australia's used tyre industries have not yet developed the industry institutions and arrangements that can provide the collective goods that many other industries enjoy. There appears to be little cooperation between transformers and end market producers to connect with each other and work together as a consolidated industry. Small operators in particular, are not connected to each other as the transactions costs of dealing with each other are too high.

A number of participants in the industry told URS of this situation during the 2005 Report consultations. One major area where transformers do not currently cooperate, but where they thought it would be beneficial to all players, is in the generic marketing and advertising of tyre-derived products to potential users and the broader population. Individual producers would not be able to appropriate the benefits of such generic services, so in the absence of collective action they will be underprovided. Collection of industry statistics, development of quality standards, generic marketing and industry research have all been identified as issues that might be improved by the collective action of those involved in the end-of-life tyre industries.

Quality standards are another example of under-developed collective services for the end-of-life tyre industries. The quality of supply of tyre-derived products across the industry suffers as a result of the lack or poor enforcement of collective industry quality standards. While some transformers produce quality controlled products for their individual markets, industry research has indicated both lack of standards for many products and inconsistent conformity to those standards that do exist. This means that size, shape and purity of tyre-derived products are not uniform across the industry, creating uncertainty for end market producers as to the type and quality of inputs they will receive from a transformer.

Tyre-derived products can vary between transformers or between batches produced. This is an issue for producers using these tyre-derived products as inputs into other products, e.g. rubber flooring. Industry research has indicated that end market producers and end users can have difficulty finding quality, standardised products that are fit for their purpose. URS discussions with Allied Rubber in 2005 indicated that the lack of uniformity across the industry, combined with the perception that tyre-derived substitutes for natural rubber are of a poorer quality, were the principal reasons behind Allied Rubber deciding not to used recycled tyre inputs in their rubber products (Personal Communication[5] 2005).

The reasons for this include:

- Larger transformers have been able to set up more stable supply arrangements with tyre collectors while smaller transformers have difficulty securing supplies; and
- Some transformers require tyres of particular quality, e.g. they cannot use tyres that are too dirty or damaged. The market is not currently set up to encourage transformation and recycling and many

smaller collectors lack facilities for sorting to meet quality standards. As a result, a proportion of waste tyres that are fit for transformation are not removed from the waste stream and are disposed of in landfill.

Industry institutions are likely to develop as the industry matures, as they have in other industries, and indeed, there is evidence of their germination already. Collective action is easier the smaller the number of firms. Conversely, it can be more difficult in sectors that are highly competitive with large numbers of small operators. Ultimately, the industry players have to be convinced of the benefits of collective action. If they do not see the benefits of such services, the industry institutions will not develop quickly. In such industries, it is not uncommon for those companies with longer time horizons and greater financial strength to bear a disproportionate share of the costs of developing new industry associations and their collective services.

The value of the market failure involved in the industries' inability to provide collective goods is linked to the information failures outlined below.

4.3 Information

Poorly informed markets do not operate efficiently. Currently, statistics relating to the used tyre markets are poor. Entry to the industry will be limited if potential players are not aware of the opportunities available. Poor information to consumers of new tyres and potential users of tyre-derived products could also be impeding the development of these markets.

Poor Statistics

Studies, such as the ATEC 2001 report 'A National Approach to Waste Tyres', concluded that statistics on manufacturing and imports of new tyres as well as used tyre disposal, reuse and recycling, are poor. The number of new tyres entering the market can be estimated from production and import statistics, and verified via the number of vehicle registrations. However, it is more difficult to estimate the size and composition of the used tyre waste stream. For the waste tyre industry, the lack of monitoring of used tyres means that collectors, transporters, transformers, end market producers and waste management authorities and regulators do not have good information about the supply of used tyres as inputs, or to enable monitoring of compliance with environmental and waste management regulations.

URS consultations with councils and other government departments for the 2005 report revealed significant gaps in data, and reliance on estimation rather than quality statistics. For example, the number of stockpiled and illegally disposed tyres across Australia is an estimate only, which is not backed by high quality national data[5]. South Australia has a docketing system to track whole used tyres in place, NSW planned to implement a used tyre tracking scheme under the 1998 Tyre Industry Waste Reduction Plan, and Queensland and the Northern Territory proposed tracking schemes for 2001 (NSW EPA 1998, p.10). However, the NSW Department of Environment and Conservation indicated that the proposed tracking

[5] Discussions with various Environmental Protection Agencies (URS 2005)

scheme had not been implemented, and there is no indication that the other states' schemes have been effective in collecting the data for the industry to use (Personal Communication[6] 2005). In addition, four jurisdictions (VIC, WA, ACT, and NT) had no tracking schemes in place in 2001(Atech Report 2001, Part 1, p.13-14) although a tracking system has been introduced in WA.

However, information is costly. While poor information may be a market failure, it is also necessary to ask whether the benefits of better information justify the costs of collecting it and making it available. Related questions are who should collect the information and pay for it?

If the information is largely to ensure compliance with public policy, then governments would be expected to resource information collection and analysis. However, if the major beneficiaries of better information are likely to be companies involved in the tyre markets, then private provision could be appropriate. In other industries, individual firms and industry associations collect and analyse market information. Provision of information to the industry is an example of a collective good that could be provided by industry participants, acting together.

Consumer Information

Better information for consumers of new tyres about disposal and recycling could influence their decisions about purchase. However, lack of information on end-of-life issues does not constitute a market failure if such information would not change purchase or disposal behaviour. Merely establishing that information is poor does not identify market failure – the essential element of market failure is that the poor information distorts resource allocation decisions.

Would better information about disposal practices change consumers' decisions about which dealer they used? Across the tyre industry, there are currently no consistent arrangements for informing consumers about disposal arrangements and costs. Many consumers are not made aware that the cost they pay for a replacement tyre encompasses the cost of collection, and then transportation of their used tyres on to a number of different destinations including: (1) landfilling; (2) illegal disposal; (3) stockpiling; or (4) transformation into a range of tyre-derived products and end market products. Consumers of new tyres are not necessarily made aware of the $2-2.50 per EPU fee charged by tyre dealers at point of sale when tyres are replaced.

The $2.50 fee per passenger tyre is greater than the suggested levy necessary to fund the proposed product stewardship Scheme, aimed at realising a greater proportion of the resource value embedded in tyres (URS 2005). The $2.50 is far greater than actual disposal costs of $1 to $1.50 and is a measure of the extent of the combined effects of undeveloped markets and poor information. Poor information to consumers about disposal costs reduces competitive pressure and effective consumer choice about tyre disposal.

URS' discussions with car dealers, car servicers and tyre dealers have indicated that this fee is sometimes disclosed as an "environmental levy" or "scrap tyre fee", and it is sometimes not disclosed at all. It is understood by players in the industry that the purpose of these fees is to cover the costs of collection, and encompasses the fee that is paid to tyre collectors. When this fee is not disclosed, consumers have no

understanding of what they are paying for or why. Even if a fee is displayed on an invoice, it appears that consumers are not made aware that this "environmental levy" is related to the cost of used tyre collection. As this fee may be higher than the cost to actually collect and transform/dispose of a tyre (URS 2005, p.ES-3), consumers are not able to make informed decisions on the end use of their used tyres.

Users of Tyre-Derived Products

Poor information about the characteristics, quality and availability of tyre-derived products will impede end user acceptance. Potential users of products that contain recycled tyres may not receive adequate or sufficient information that either: (1) informs them that these products exist; or that (2) the products are of a quality suitable for use. Potential users or end market producers may believe that transformed products offer poor value. They also need a reason to change their sources of supply (Atech Report 2001, Part 2, p.4).

Examples of poor information impeding the use of tyre-derived products have been reported in the road surfacing industry, where polymers and substitutes for rubber crumb are still favoured in states such as Queensland, Western Australia and South Australia (Personal Communication[4] and Personal Communication[1] 2005). Two road contractors using rubber crumb in seals, indicated that rubber crumb is cheaper than polymer substitutes. However, the Queensland Department of Main Roads believed that polymers are cheaper, principally because they have seen no evidence to the contrary (Personal Communication[1] and Personal Communication[4] 2005). There appears to be a lack of information in the market about the advantages that tyre transformed products can provide, partly due to a lack of quality standards and research and development. Road authorities are unlikely to commit to a new product if it is untested and may not be as durable as a product made from virgin materials.

The lack of industry specifications on the shape, size and quality of tyre-derived products could be impeding their acceptance and use. Without specifications on standards and uniformity, potential users are unlikely to specify products containing recycled tyres. Inconsistent product quality is also more likely in the absence of industry standards. However, not all quality issues are related to market failures related to information and lack of collective industry services. Inconsistent quality in manufactured products is due to company-specific operations, not market failure.

In summary, it seems likely that lack of quality standards and poor information to potential users about the benefits of tyre-derived products may be impeding the development of the market and could be considered a market failure. It is allied to the immaturity of the markets themselves.

4.4 Monopoly, Competition and Market Structure

Australian tyre markets are relatively competitive (Section 3.1). Retailing of new tyres is the most concentrated sector, with a few large retailers accounting for a high proportion of sales, and a large number of small firms accounting for the rest. Collection, transport and disposal are highly competitive, with a large number of small operators spread around the country, although there may be limited competition in these sectors at the local level. Among recyclers and transformers there are a few large

firms, but this part of the industry is quite diverse, with a number of small companies also producing a variety of products. Barriers to entry to any of these sectors of the end-of-life tyre industry are low, relative to, for example, the petro-chemical manufacturing industry generally.

The organisation of the industry is influenced by the need to secure reliable supplies of end-of-life tyre inputs for processing. URS was informed during the previous study that efforts by some operators to develop long-term continuous collection services on a small scale had been frustrated by pre-existing arrangements for large batch collections of stockpiled tyres. The need to secure reliable supplies has led to pressure for vertical integration and alliances with collectors. This puts competitive pressure on those that are not vertically integrated or have not secured supplies, and encourages them to make similar arrangements.

Such industry arrangements and the economies of scale and scope available to larger firms can lead to significant differences in costs and prices throughout the industry. During previous industry consultations, some smaller companies were not able to compete with larger players on conditions of supply, prices of inputs or prices for their products. Given the immature nature of the industry and the differences in scale and costs between large and small operators, differences in costs and prices could be expected and would not, in themselves be evidence of anti-competitive conduct or market failure.

It does not appear that lack of competition constitutes a source of market failure in relation to end-of-life tyre markets.

4.5 Quantifying Market Failure in End-of-life Tyre Markets

Volumes of waste to landfill or illegal disposal are either symptomatic of market failure or simply the result of a lack of profitable opportunity to use that waste. Discussions above suggest areas of market failure.

Gross margin analysis results (URS 2005) suggest there are further profitable uses of end-of-life tyres in excess to current levels of reprocessing. These results show that greater volumes could be reprocessed profitably, with a net value of $70 million generated from additional levels of resource recovery over the next ten years. This value is net of any level of investment in mechanisms that may be necessary to facilitate that level of recovery, and the reductions in landfill costs, but the results showed a positive net present value overall.

The URS (2005) study showed that profitable options for increased levels of reprocessing exist, especially in urban areas. Market failure or time lags in investment in industry expansion are a cause of this suggested loss in urban areas at least. Lower levels of resource recovery from rural and regional areas may also be affected by the same market failures, but are predominately a result of higher collection costs – options are less viable financially.

All current uses of end-of-life tyres do not appear to be economically efficient. URS (2005) analysis suggested a levy cost of less than $1.00 per EPU would be sufficient to encourage reprocessing with positive net values. The potential saving to consumers of passenger tyres alone is a NPV of $155 million

over ten years with the annual costs of $19.5 million in the first year. Accounting for all tyres, with the exception OTRs, the NPV increases to $280 million over ten years with the annual costs of $35.5 million in the first year. This provides an indication of the costs to consumers of current market distortions caused primarily by poor information, immature market institutions and inability of the industry to provide collective goods.

The table below summarises the extent of market failures associated with end-of-life tyres, quantifying impacts where that is possible.

Table 4-1: Market Failures

Market Failure	Applicable to End-of-Life Tyres	Extent/Quantification
External costs		
• Environmental	Yes	Marginal
• Health	Yes	Marginal
• Fire risk	Yes	Significant but tighter regulation has reduced in recent years in urban areas
• Illegal disposal	Yes	> $35 to $70 million over 10 years
Public and collective goods	Yes	Up to $280 million over 10 years
Information failures	Yes	
Monopoly and restricted competition	No	Not Applicable
TOTAL		**> $315 to $350 million over 10 years**

Source: URS Analysis, assuming that product stewardship scheme eliminates these costs over the 10 year life of the scheme.

It should be noted that whilst Environmental external costs are marginal, Health, Fire Risk and Illegal disposal external costs also contain a portion of environmental external costs in their respective impacts. An example would be the environmental impact of toxic smoke and leachate from tyre fires.

The estimates of the costs of lack of collective goods and information failures are based on the analysis conducted for the development of the products stewardship scheme. They assume that both issues are eliminated over the ten year period of the scheme. If mitigation measures are not introduced, the current costs of $35.5 million per annum would continue from the public and collective goods and information failures.

This section of the report presents quantifiable data for the total tyre market (new tyres supplied into the markets) and the three major supply chains, being tyres imported by consignment (tyre importers), tyres imported on vehicles (vehicle importers); and domestically manufactured tyres (tyre manufacturers). The section goes on to discuss the nature of the disposal arrangements of tyres from new vehicle dealers representing vehicle manufactures that are members of the Federal Chamber of Automotive Industries (FCAI). The section then concludes by discussing whether or not the market failures as identified in Section 4 apply to a different extent to any of the tyre supply chains and if so to what extent.

FCAI represent the following vehicle manufactures and importers: Alfa Romeo, Audi, Bentley, BMW, Chrysler-Jeep, Citroen, Daihatsu, Ferrari, Fiat, Ford, GM Holden Ltd, Honda, Hyundai, Jaguar, Kia, Land Rover, Lexus, Maserati, Mazda, Mercedes-Benz, Mini, Mitsubishi, Nissan, Peugeot, Proton, Porsche, Renault, Rolls-Royce, Saab, Smart, SsangYong, Subaru, Suzuki, Toyota, Volkswagen, Volvo. These brands manufacture and import predominately passenger vehicles[6] and SUVs[7].

A number of these brands manufacture vehicles in Australia as well as import, such as Ford, GM Holden Ltd, Mitsubishi and Toyota, however, the majority of the brands import all vehicles.

FCAI also represents the following motor cycle manufactures Aprilia, BMW Motorcycles, BRP Australia Pty Ltd, Ducati, Harley Davidson, Honda MPE, Kawasaki, Paul Feeney Group, Polaris, Suzuki and Yamaha. It is understood that FCAI do not represent truck and bus manufactures.

By their very nature vehicles entering the market in Australia include OEM tyres. All imported vehicles are fitted with tyres at the point and country of manufacture. The majority of domestic manufactured vehicles are fitted with domestic tyres, however, some domestic vehicles are fitted with imported loose tyres, particularly high performance tyres.

5.1 Overview of the Tyre Supply Chains

5.1.1 Current Tyres in Use

There are an estimated 74.3 million tyres (approximately 130 million EPUs) currently in use (estimates derived from the ABS Motor Vehicle Census 2005 (ABS 2005) as well as updating of data gained from an earlier consultative process (URS 2005)) (Table 5-1). In terms of total tyres in use, passenger vehicle tyres account for 74 percent of all tyres, while light commercial tyres make up 16 percent of the total market in tyres. The remainder of the tyre market consists of truck and bus, motorcycle, specialty and off the road tyres. On a weight basis these proportions change, with passenger tyres contributing 42 percent, truck and bus 24 percent, and off the road 14 percent of the total 1.235 million tonnes in use.

6 Passenger vehicles include cars (small, medium and large), people movers, and sports cars

7 Sports Utility Vehicles (compact, medium, large and luxury). Examples would be Range Rover and Toyota Landcruiser

Table 5-1: Current Tyre in Use (000s)

Vehicle Type	Registered Vehicles	Tyre Numbers	EPU
Motorcycles (excl dirt & quad bikes)	422	844	422
Passenger Vehicles[8]	10,937	54,686	54,686
Light Commercial	2,030	12,182	24,363
Trucks & Buses[9]	531	6,206	31,030
Speciality Tyres	Not applicable	208	1,041
Off The Road Tyres	Not applicable	184	18,456
Total	**13,920**	**74,310**	**129,998**

Source: ABS & URS Analysis

5.1.2 New Tyres Entering the Australian Market

The Australian manufacturers produce a range of tyres with approximately 85 percent for the passenger vehicle market and the remaining 15 percent for light and heavy truck and bus market. Tyre manufacturers within Australia do not produce motor cycle tyres or off the road tyres. Significant quantities of tyres enter the market as imports both as loose tyres and as OEM tyres fitted to vehicles. The total number of new tyre entering the Australian market is shown in Table 5-2 below.

Table 5-2: Total Tyres Entering the Market (Loose and OEM) (000s)

Vehicle Type	Tyre Numbers	EPU
Motorcycles (incl dirt & quad bikes)	815	408
Passenger vehicles	14,268	14,268
Light truck	4,213	8,427
Truck & bus	1,161	5,804
Specialty	43	213
Off the road vehicles	69	6,465
Total	**20,569**	**35,585**

Source: ABS & URS Analysis

This table presents an increase from the totals in the 2005 URS study, partly reflecting an increase in vehicle numbers, partly due to the inclusion of all motorcycles (on road, dirt bikes and quad bikes) and

[8] Includes Campervans

[9] Includes rigid trucks, articulated trucks, non-freight carrying trucks and buses

partly due to a level of uncertainty in drawing together this data. In regard to motorcycle data, new information from the past two years indicates that only one third of total motorcycles are registered for road use.

Data total shown in Table 5-2 are made up of:

- Tyres manufactured in Australia with deductions for loose tyres fitted as OEM to vehicles manufactured in Australia;
- Imported loose tyres with deductions for imported loose tyres fitted as OEM to domestic vehicles
- Tyres fitted as OEM to vehicles manufactured in Australia; and
- Tyres fitted as OEM to imported vehicles.

Domestic Tyre Production

Information confirmed by ATMA indicates that domestic tyre production approximates between 7 to 7.5 million tyres (or 10 million EPUs) per annum (Personal Communication[8]). Domestic tyre production is focused towards manufacturing passenger vehicles tyres. It is understood that approximately 30 percent of these tyres are OEM with the remaining being loose replacement tyres as shown in Table 5-3. Some vehicles manufactured in Australia are exported and data from 2001-02 indicated that this proportion was approximately 30 percent.

Table 5-3: Domestic Loose Tyres Excluding Domestic OEM (000s)

Vehicle Type	Tyre Numbers	EPU
Motorcycles (incl dirt & quad bikes)	0	0
Passenger Vehicles	3,025	3,025
Truck & Bus[10]	1,085	2,695
Specialty	0	0
Off the road vehicles	0	0
Total	**4,110**	**5,720**

Source: ABS & URS Analysis

Loose Tyre Imports

Table 5-4 provides an overview of loose imported tyres net of exported tyres.

[10] Including Light trucks

Table 5-4: Loose Tyre Imports (000s)

Vehicle Type	Tyre Numbers	EPU
Motorcycles (incl dirt & quad bike tyres)	577	288
Passenger Vehicles	7,313	7,313
Truck & Bus[11]	3,100	8,154
Specialty	43	214
Off the road vehicles	69	6,465
Total	**11,102**	**22,434**

Source: ABS & URS Analysis

The harmonised tariff item statistical classification ABS import data does not differentiate between light commercial vehicle and truck/bus tyres, therefore the EPU equivalent numbers have been derived based on the proportion of registered vehicles.

New Vehicle Sales and OEM Tyres

The total number of OEM tyres has been calculated from the total new vehicle sales data representing both imported and locally manufactured vehicles (data provided by VFacts). Of all new vehicle sales passenger vehicles accounted for 77 percent of all tyres, while light commercial tyres make up 17 percent of the total market in tyres, in similar proportions to current tyres in use. As a proportion of the total of new vehicle sales, imported new vehicles represented 72 percent of the market or 78 percent of incoming OEM tyres. Table 5-5 details new vehicle sales and corresponding tyres with Table 5-6 segregating this data into local and imported vehicles.

Table 5-5: New Vehicle Sales & Corresponding Tyres (000s)

Vehicle Type	Quantity	Tyre Numbers	EPU
Motorcycles (incl dirt & quad bikes)	96	238	119
Passenger vehicles (including SUVs)	786	3,930	3,930
Light commercial vehicles	166	854	1,709
Trucks (all type)	29	329	1,645
Buses	1	5	29
Total	**1078**	**5,356**	**7,432**

Source: VFacts & URS Analysis

[11] Including Light trucks

Table 5-6: Locally Made & Imported New Vehicle Sales & Corresponding Tyres (000s)

Vehicle Type	Quantity		Tyre Numbers		EPU	
	Local	Import	Local	Import	Local	Import
Motorcycles (incl dirt & quad bikes)	-	96	-	238	-	119
Passenger vehicles (including SUVs)	232	554	1,159	2,771	1,159	2,771
Light commercial vehicles	40	126	206	648	413	1,296
Trucks (all type)	-	29	-	329	-	1,645
Buses	-	1	-	5	-	29
Total motor vehicles	**272**	**806**	**1,365**	**3,991**	**1,572**	**5,860**

Source: VFacts & URS Analysis

Differences between Volumes of New and EoL Tyres

There is very little difference when comparing the volume of tyres (on a percentage basis) supplied to the market to those presenting in the waste stream as shown in Table 5–7. Applying this to each of the three supply chains would produce a similar result.

Table 5-7: Differences between Volumes of New and EoL Tyres (EPUs)

Vehicle Type	Tyre Supplied to Market (EPU %)	Tyre Presented to Waste Stream (UEPU %)
Motorcycles (incl dirt & quad bikes)	1	1
Passenger vehicles	40	40
Light truck	24	23
Truck & bus	16	15
Specialty	1	1
Off the road vehicles	18	20
Total	**100**	**100**

Source: ABS & URS Analysis

5.1.3 The Three Specific Supply Chains

From the data presented above it can be seen that loose imported tyres denote the greatest quantity and percentage of new tyres entering the Australian market. A total of 11.1 Million tyres (22.4 Million EPU) representing 54 percent of the total tyre market (63 percent on an EPU basis). Locally produced loose tyres, not including locally produced OEM tyres, accounted for 4.1 Million tyres (5.7 Million EPU)

representing 20 percent of the total tyre market (16 percent on an EPU basis) reflecting the predominance of passenger tyre manufacturing in Australia. OEM tyres on imported vehicles account for 19 percent of total tyres (or 17 percent on an EPU basis). This percentage increases when domestic vehicle manufacturing is added to make up a total of 26 percent and 21 percent respectively of OEM tyres.

The supply chains are summarised in Table 5-8 below and Figure 5-1 on the following page.

Table 5-8: Tyre Supply Chains (000s)

Supply Chain Tyre Categories	Tyres #	EPU #	Tyres (%)	EPU (%)
Supply Chain 1: Imported OEM tyres	3,992	5,860	19	17
Domestic OEM tyres	1,365	1,571	7	4
Supply Chain 2: Local loose tyres	4,110	5,720	20	16
Supply Chain 3: Imported loose tyres	11,102	22,434	54	63
Total	**20,569**	**35,585**		

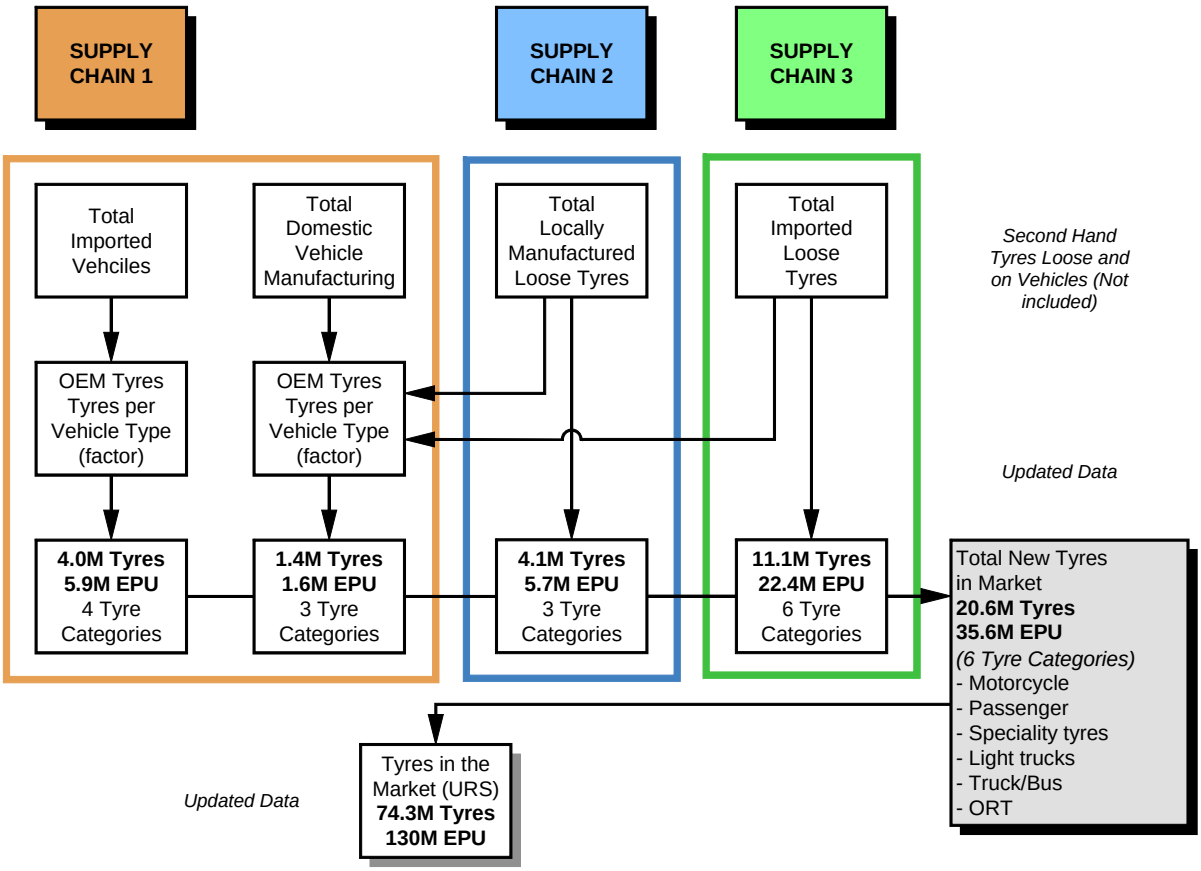
Source: URS Analysis

It is interesting to note which of the six tyre categories (Motorcycle; Passenger; Speciality tyres; Light trucks; Truck/Bus; and ORT) are represented in each of the supply chains:

- Supply chain 1, imported OEM tyres included four categories (Motorcycle, Passenger, Light trucks and Truck/Bus) and domestic OEM tyres included three categories (Passenger, Light trucks and Truck/Bus);
- Supply chain 2, local loose tyres included three categories (Passenger, Light trucks and Truck/Bus); and
- Supply chain 3, imported loose included all six categories.

A review of the data from 2003-04 reveals a similar proportional split between the tyre supply chains. In the OEM market there has been a steady decline in sales of locally made vehicles from 31 percent to 28 percent in 2004-05 although the actual sale numbers have remained relatively constant.

Figure 5-1: Tyre Supply Chains

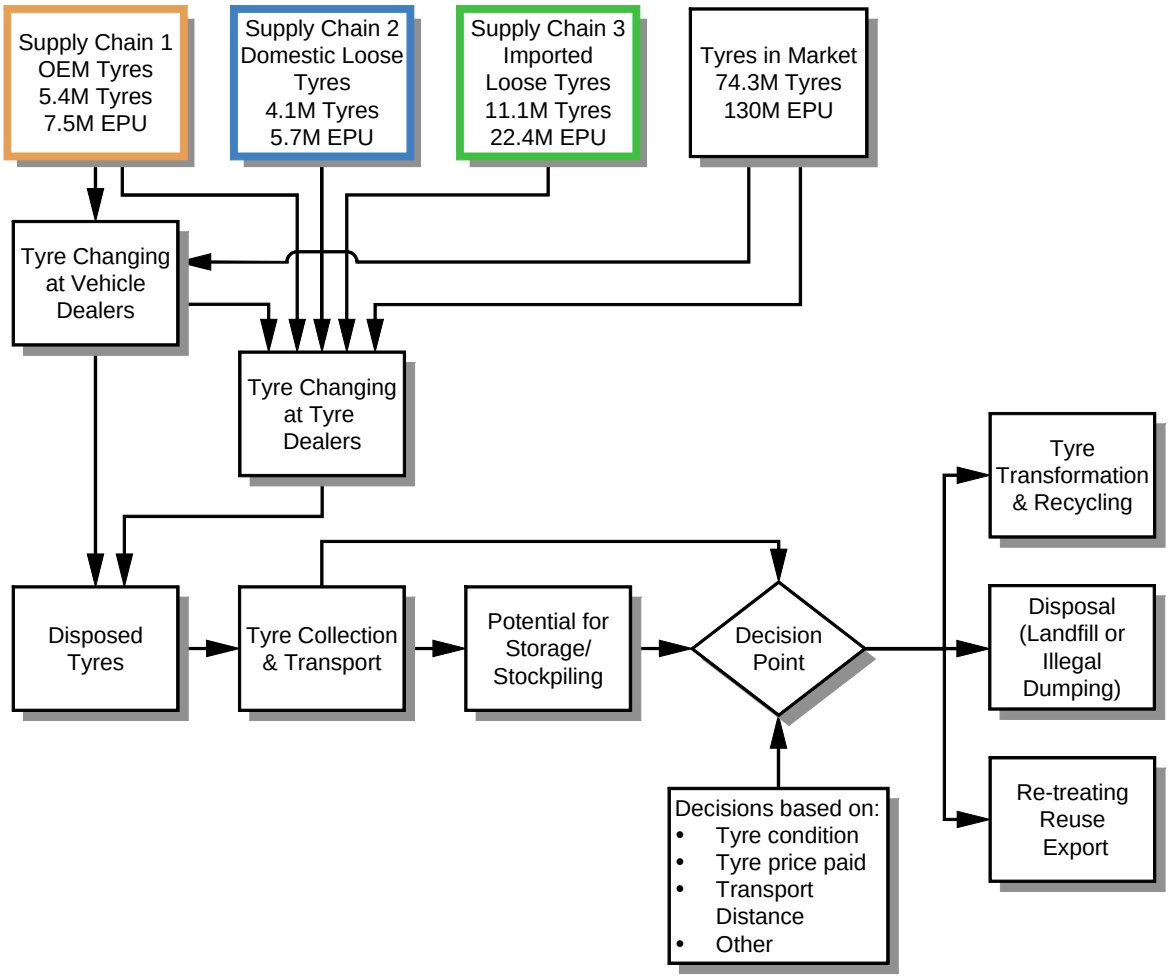


Source: URS Analysis

5.2 Disposal Arrangements of Tyres from Vehicle Dealers

The section describes the nature of disposal arrangements of tyres from new vehicle dealers representing vehicle manufactures that are members of the Federal Chamber of Automotive Industries (FCAI). These new vehicle dealers are generally well branded franchised operations with commercial ties to one or more vehicle manufacturer. Disposal arrangements include OEM tyres as well as loose tyres, as replacements for OEM tyres. A consultation process revealed that there are common trends in the way tyres are dealt with at new vehicle dealerships despite many vehicle dealers being individually owned businesses. In summary the majority of vehicle dealers send cars to specialised tyre dealers for tyre servicing with these costs transferred to the customer along with a vehicle dealer margin. The general arrangements are shown in Figure 5-2.

Figure 5-2: Tyre Collection, Transport and End use/Disposal Flow Chart for Tyre Supply Chains



Source: Industry Sources and URS Analysis

Most of the vehicle manufacturers contacted had "overall environmental policies" but none were specific to end-of-life tyres. Most vehicle dealers work with tyre dealers who take responsibility for all tyre related activities including used tyres disposal. In a number of cases vehicle dealers service tyres in-house and have some form of relationship with a tyre dealer network for tyre supply and in some instances collection of used tyres, or have used tyres collected by tyre collectors. This was confirmed by Sims TyreCycle (Personal Communication[9]) stating that there is a growth in the market for collections from vehicle dealers servicing tyres.

Whether vehicle dealers serviced tyres in-house or out-sourced tyre servicing a used tyre disposal fee averaging $2 per EPU was incurred. The specific amount varied depending on state and region. This was again confirmed by Sims TyreCycle (Personal Communication[9]) that disposal fees for tyre collections are similar for vehicle dealers servicing tyres as with tyre dealers. In summary both car dealers and tyre

dealers contracted by vehicle dealers make no distinction between OEM tyres and replacement tyres on vehicles being servicing with the same disposal arrangements apply to all of them.

In general it was noted that tyres are covered under the tyre manufacturers warranty not the new vehicle warranty and that tyre servicing was generally included under leasing arrangements. Details of the consultation process are included in Appendix D.

5.3 Market Failures as Applied to the Tyre Supply Chains

Section 4 concluded that market failure may occur in the Australian used tyres markets in relation to:

- Externalities, where private costs and benefits are not aligned with social costs and benefits:
- Undeveloped markets and institutions;
- Information failures, and
- Public and collective goods.

The impacts of market failure appear to be the same across the three supply chains for the entry of new tyres into the Australian market. However, there are some differences in the various tyre categories on the basis of external costs arising from illegal disposal and the proportion of the various tyre categories in the three tyre supply chains. Estimates in Section 3 (Table 3-2) suggest only 1 percent of truck tyres are illegally dumped or stockpiled, whereas rates for passenger tyres are highest with 16 percent of them illegally dumped followed closely by light truck tyres at 12 percent. Section 3 (Table 3-3) also provides information on the share that each tyre category contributes to the total number of EPUs illegally dumped. Passenger tyres are shown to contribute 67 percent of the total number of EPUs illegally dumped whereby they account for 49 percent of total tyres entering the market (excluding OTR tyres). In terms of this externality, passenger tyres contribute the greatest share.

Examining the proportion of passenger tyres to total tyres in each of the three tyre supply chains provides an assessment of the likely contribution of passenger tyres to illegal dumping for each supply chain. For all three supply chains the percentage of passenger tyres to total tyres (excluding OTRs) is 70 percent of all tyres entering the market and 49 percent on an EPU basis. Supply chain 1 has a higher percentage of passenger tyres (73 percent and 53 percent respectively), supply chain 2 has a similar profile (73 percent and 53 percent respectively) with supply chain 3 having the lowest percentage of passenger tyres (66 percent and 46 percent respectively). This is presented in as shown in Table 5-9 and Figure 5-3 below.

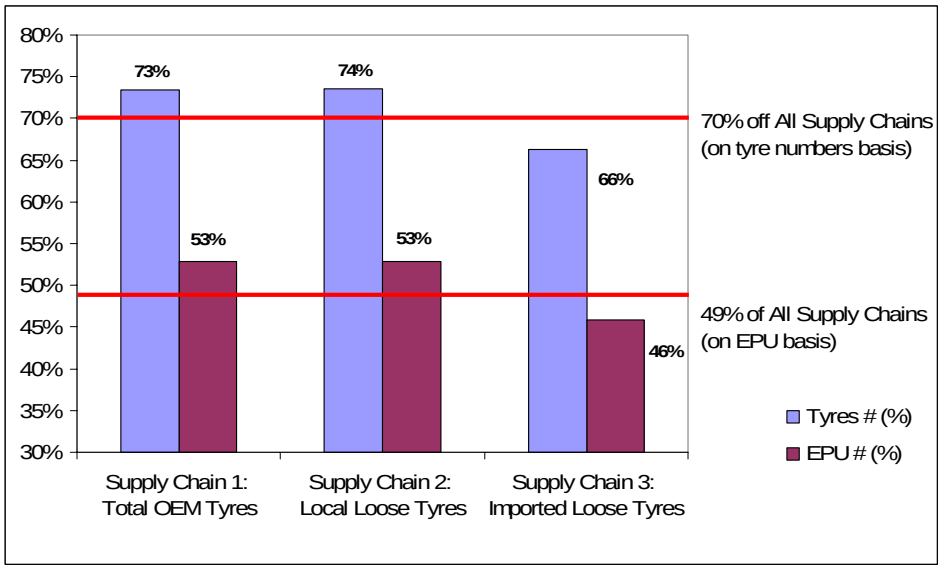
Table 5-9: Passenger Tyres as Percentage of all New Tyres for the Three Supply Chains

Supply Chains	Total Tyres # (000s)	Total EPU # (000s)	Passenger Tyres/EPUs As % of Supply Chains	
			Tyres #	EPU #
Supply Chain 1: OEM tyres	5,357	7,431	73	53
Supply Chain 2: Local loose tyres	4,110	5,720	74	53
Supply Chain 3: Imported loose tyres NOTE #	11,033	15,969	66	46
Total for All Three Supply Chains NOTE #	**20,500**	**29,120**	**70**	**49**
Supply Chain 3: Imported OTR	**69**	**6,465**	**-**	**-**
Total with ORT Tyres	**20,569**	**35,585**	**-**	**-**

Source: URS Analysis:

 # Note: excludes OTR tyres

Figure 5-3: Passenger Tyres as Percentage of all New Tyres for the Three Supply Chains



In terms of actual passenger tyre numbers supply chain 1 consists of 3,931,000 passenger tyres, supply chain 2, 3,025,000 and supply chain 3 with the largest quantity of passenger tyres – 7,313,000 as presented in Tables 5-3, 5-4 and 5-5.

Of the total number of tyres supplied to the market, tyres on new vehicles represent between 20 and 29 percent of end-of-life tyres (Table 5-9) with the remaining tyres being those on the existing vehicle fleet. New passenger vehicle tyres (OEM tyres on vehicle manufacturers represented by FCAI) represent 28 percent of the number finally disposed of and consequently contribute 28 percent to the share of that externality on the basis of the share of all tyres disposed.

Table 5-10: New Vehicle OEM Tyres –Share of all Disposed Tyres (000s)

Tyre Category	Total Tyres Disposed *	Share of OEM Tyres as a Percent of All Tyres Disposed		Share of Loose Tyres as a Percent of All Tyres Disposed	
		%	No.	%	No.
Motorcycles (incl dirt & quad bike tyres)	815	29	236	71	579
Passenger Vehicles	13,643	28	3,820	72	9,823
Light Commercial Vehicles	3,961	20	792	80	3,169
Truck & Bus	1,050	29	305	71	746

Source: URS Analysis

* Tyre numbers from Table 3-2, columns 3 (motor cycles), 4 (passenger), 5 (light truck) and 6 (truck and bus only.

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URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of the Department of the Environment and Heritage and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 28 April 2006.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between 15 May and 8 September 2006 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Appendix A
Terms of Reference for this Study

TERMS OF REFERENCE FOR A STUDY INTO THE MARKET FAILURE ASPECTS OF WASTE TYRE MANAGEMENT

1. OBJECTIVE

The objective of the study is to identify and analyse the extent of any market failures applying to the management of end-of-life tyres in Australia (i.e. whether there has been a failure of the market to efficiently allocate the resource value contained in end-of-life tyres). In particular, investigating any market failures within and between the three major supply chains for tyres entering the Australian market, which are:

a) tyres imported by consignment (tyre importers);

b) tyres imported on vehicles (vehicle importers); and

c) domestically manufactured tyres (tyre manufacturers).

2. BACKGROUND

In 2004, approximately 18 million tyres entered the Australian market and there were approximately 72 million tyres in use in Australia. Approximately 18 million of these presented in the waste stream as end-of-life tyres, representing 30 million Equivalent Passenger Units (EPU), or approximately 270 thousand tonnes. In addition, it is estimated there are 20 million EPU in existing stockpiles across Australia. Of the approximate 30 million EPU, approximately 17% went to an end market with the remaining tyres being disposed of to landfill, illegally dumped or exported.

Illegal dumping of end-of-life tyres predominantly occurs in bushland, significantly reducing the amenity and community use of those areas. In Australia, some illegal tyre dumps have caught fire generating black smoke and noxious gases (such as polycyclic aromatic hydrocarbons, benzene, styrene, phenols and butadiene), and consequential environmental and human health risks. The collection of water in end-of-life tyres can provide breeding grounds for mosquitoes and the associated human health risks.

Many of the issues identified above arise due to the identified failure of the market to efficiently allocate the resource value contained in end-of-life tyres. To address this market failure, the Environment Protection and Heritage Council (EPHC) is proposing a short term intervention in the market that aims to create a market pull for tyre derived products, by providing a direct financial incentive to tyre recyclers, and an indirect incentive to further develop existing, and create new markets for tyre derived products.

The short term market intervention is also proposed on the basis that sustainable markets for end-of-life tyre derived products will largely address the inefficient economic, environmental and social outcomes of existing practices and that tyres are part of a national market and any solution must also be national in scope.

Appendix A
Terms of Reference for this Study

3. CONTEXT

The tyre industry and the Australian Government Department of the Environment and Heritage (DEH), on behalf of the EPHC, have been negotiating the development of national product stewardship arrangements for end-of-life tyres. The negotiations have focused on the establishment of a Tyres Product Stewardship Agreement, under which a national voluntary tyres product stewardship scheme will operate. The voluntary scheme would be supported by government regulation to ensure that participants in the voluntary scheme are not competitively disadvantaged in the market place. The regulations would ensure that any tyre industry companies that are not participants in the voluntary scheme would have to achieve equivalent outcomes to those included in the agreement. The new regulations would be established as sector specific Schedules under a new National Environmental Protection (Product Stewardship) Measure.

Two economic modelling studies were conducted to facilitate negotiations, and the development of the proposed arrangements to date. These studies have identified the market failure aspects of end-of-life tyres management, including inefficient allocation of resources because of imperfect information and externalities. However, questions remain over certain aspects of the identified market failure. The purpose of this study is to examine in more detail the identified market failure aspects, as well as investigating any market failure within and between the three major supply chains for tyres entering the Australian market, which are, a) tyres imported by consignment (tyre importers); b) tyres imported on vehicles (vehicle importers); and c) domestically manufactured tyres (tyre manufacturers).

This study also relates to, and will feed into, the Regulation Impact Statement being developed for the proposed tyres product stewardship agreement.

4. PROJECT SCOPE

Drawing on the significant body of work already completed (see *Available Source Material* below), the consultant will undertake the necessary research into, and analysis of, any market failures applying to the management of end-of-life tyres in Australia, in particular investigating any environmental and human health externalities. This work should focus on:

1. The precise nature of any tyre industry wide market failure;
2. The precise nature of any supply chain specific market failures associated with the three major supply chains, which are:
    a) tyres imported by consignment (tyre importers);
    b) tyres imported on vehicles (vehicle importers); and
    c) domestically manufactured tyres (tyre manufacturers); and

3. The extent to which any market failure applies to a particular tyres supplier, and the extent to which there is any variation of any market failure between suppliers. This work should investigate the extent to which any market failures vary between the management of tyres produced for original equipment manufacturers, such as vehicles (whether imported or domestically manufactured) and tyres provided for after market use, i.e. replacing tyres that entered the market on original equipment.

In identifying and analysing the precise nature of any supply chain specific market failures, the consultant must assess all stages and aspects of the life cycle of the suppliers' tyres. This assessment must include, but does not need to be limited to the following:

- The volume of tyres (on a percentage basis) supplied to the market by each of the three supply chains, and to the extent possible, the volume of tyres (on a percentage basis) presenting in the waste stream from each of the three supply chains; and
- The current treatment of the tyres at end-of-life by suppliers of tyres.

The assessment of all stages and aspects of the life cycle of the tyre must include, but does not need to be limited to the following:

- The impact on return/disposal practices of end-of-life tyres by the extent to which they are covered under any warranty, particularly new vehicle warranty;
- The impact on return/disposal practices of any preferred service provider contracts, particularly between vehicle manufacturers and tyre retailers;
- The impact on return/disposal practices of any contractual arrangements, particularly between vehicle manufacturers and tyre recyclers or between tyre retailers and tyre recyclers, or between vehicle manufacturers, tyre retailers and tyre recyclers; and if possible
- The location of end-of-life tyres by supplier, including whether they are recycled, disposed of to landfill, are exported or illegally dumped.

Appendix B
Legislation that Impacts the End-of-Life Tyre Industry

Item	Jurisdiction	Regulatory Requirement
Landfill disposal	ACT	Allowed
	NSW	Allowed outside SMA/ERA. Whole tyres may not be disposed within the SMA/ERA; license to dispose/process >5,000 tonnes pa; tyres banned from burning at landfills (NSW EPA 1997)
	NT	Allowed; EPA approval required for tyre disposal operating on a commercial or fee for service basis (NT Waste Management and Pollution Control Act 2003)
	QLD	Allowed, whole tyre limit 10,000 EPU pa per new facility (QLD EPA EcoAccess 2004a, p.1)
	SA	Shredded only ≤ 250mm (exception is large earthmoving tyres in remote areas with no shredding facility); Waste Levy applies to all tyres disposed of at landfills (SA EPA Guidelines 2003)
	TAS	Shredded only to approved sites
	VIC	Shredded only
	WA	In Tyre Landfill Exclusion Zone (TLEZ) as defined in the Used Tyre Regulations: shredded only and need approval; other conditions on separation of piles of waste tyres
Recycle / reuse options	ACT	Approval required
	NSW	Allowed on case by case basis in consultation with local council and EPA; license needed if recycle/process >5,000 tonnes pa of rubber product/tyres (NSW EPA 1997)
	NT	Allowed but license required to recycle, treat or dispose tyres on a commercial or fee for service basis (NT Waste Management and Pollution Control Act 2003)
	QLD	Allowed but needs licence if >500 tyres
	SA	Approval required if >5 tonnes/year
	TAS	Allowed at present; approval may be required for large or atypical projects
	VIC	Approved on case by case basis
	WA	Permitted if <100 tyres, else needs approval
Mine sites	ACT	-
	NSW	No disposal on site
	NT	Allowed to be buried on site in an environmentally suitable manner – e.g. within wasterock piles
	QLD	May be buried on site subject to guidelines and becomes notifiable activity

Appendix B
Legislation that Impacts the End-of-Life Tyre Industry

Item	Jurisdiction	Regulatory Requirement
	SA	Subject to general conditions
	TAS	-
	VIC	-
	WA	On site disposal allowed outside TLEZ subject to approval
Transport	National	Transport of waste tyres interstate subject to National Environment Protection (Movement of Controlled Waste between States and Territories) Measure, and requires EPA approval in the state or territory of destination (EPHC 2004b)
	ACT	-
	NSW	Licensed for loads > 2 tonnes
	NT	License required to collect and transport tyres on a commercial or fee for service basis (NT Waste Management and Pollution Control Act 2003)
	QLD	Licensed if >250kg/load (QLD EPA EcoAccess 2004b)
	SA	Licensed
	TAS	Only by approved transporter if tyres are to be disposed
	VIC	-
	WA	Tyres may only be transported to licensed storage site or approved disposal site
Storage	ACT	-
	NSW	Licensed if > 50 tonnes but must comply with NSW Fire Brigades Storage Guidelines and (upcoming) EPA Environmental Guidelines for Used Tyre Storage
	NT	License required to store tyres on a commercial or fee for service basis (NT Waste Management and Pollution Control Act 2003)
	QLD	Considered storage it tyres held ≤ 3 years; licensed if >500 tyres/year (whole or equivalent); must comply with Fire Services requirements (QLD EPA EcoAccess 2004b)
	SA	If more than 500 waste tyres per annum need to be licensed by EPA and comply with Metropolitan Fire Service Guidelines
	TAS	Requires an environmental assessment if >100 tonnes/year. Governed by waste mgt regulations
	VIC	Draft guidelines on stacks: <5,000 tyres each
	WA	Licensed if >100 tyres/year, or >500 for a tyre fitting business
Receival Facility	ACT	-
	NSW	Licensed if processing >5,000 tonnes/year

Appendix B
Legislation that Impacts the End-of-Life Tyre Industry

Item	Jurisdiction	Regulatory Requirement
	NT	Will license in future under the Waste Management and Pollution Control Act
	QLD	Licensed if >500 tyres/year
	SA	Licensed
	TAS	Require an environmental assessment if >100 tonnes/year
	VIC	Covered by general environmental protection regulation
	WA	-
Reporting	ACT	-
	NSW	Reporting under licence conditions; tracking scheme under IWRP
	NT	Will be required under licences issued under the Waste Management and Pollution Control Act
	QLD	Tracking scheme proposed for 2001
	SA	Tracking scheme for whole tyres using docket system
	TAS	Tracking scheme proposed for mid 2001 using docket system
	VIC	-
	WA	[WA operate a tracking sysytem for waste tyres as part of its Controlled Wastes regulations. The system tracks tyre loads of 20 or more tyres and all transporters have to be licensed and the pick-up and destination of the tyres recorded]
Tyre Industry Plans	ACT	-
	NSW	Tyre Industry Waste Reduction Plan (IWRP)
	NT	None at present
	QLD	Waste Tyre Strategy
	SA	Extended Producer Responsibility Waste Policy (SA EPA cited in ARRB Transport Research 2004, p.23)
	TAS	Scrap Tyre Management System – voluntary levy by retailer
	VIC	-
	WA	Waste Tyre Strategy

Source: Atech Group 2001, Pt.1, p.13-14, URS 2005, p.15-17, and other sources as specified within table

Appendix C
Classifications for Tyre Derived Products

Transformation Categories (TC)	Type	Sizes (mm)	Common Industry Sizes (mm)	Mesh (USA)	Mesh (Europe)	Typical Use
TC1	Whole Tyres			N/A	N/A	Energy/Civil
TC2	Cut Tyres	(300 mm+)	300 mm +	N/A	N/A	Energy/Civil
TC3	Tyre Chip	(30 mm – 299 mm)	30 mm 40 mm 50 mm	N/A N/A N/A	N/A N/A N/A	Energy/Civil Energy/Civil Energy/Civil
TC4	Granulate	(1 mm – 29 mm)	8-15 mm 5-7 mm 1-4 mm	N/A 3-4 mesh 5-18 mesh	N/A 3-4 mesh 5-16 mesh	Civil/Equestrian Limited Market Soft Surfacing
	Buffing		5 mm 2.5 mm 1.2 mm	4 mesh 12 mesh 16 mesh	4 mesh 10 mesh 14 mesh	Sub Floors Soft Surfacing/Matting Soft Surfacing/Matting
TC5	Crumb (Powder)	(0 micron* – 0.9 mm)	630 micron 425 micron 250 micron 180 micron 100 micron 40 micron	30 mesh 40 mesh 60 mesh 80 mesh 140 mesh 400 mesh	28 mesh 35 mesh 60 mesh 80mesh 150 mesh 400 mesh	Roads/Adhesives General Rubber Mixing General Rubber Mixing General Rubber Mixing Elastomers Elastomers
Steel	Steel					
Textile	Textile					

* 1 mm is equal to 1,000 micron
Source: Industry Discussions 2005

Appendix D
Vehicle Manufactures & Dealers Consultation

Introduction

A meeting was held with FCAI on 10 May 2006 to discuss the acquisition of data and it was agreed that a representative sample of vehicles manufactures would be targeted including Ford, GM Holden, Toyota, BMW, Nissan, Mazda and Mercedes Benz. Subaru were later added to the list. The FACI provided contact details for a number of manufacturers, company representatives and dealers for URS to contact. In addition a number of companies were contacted independently. Phone interviews and emailed information was gathered from the 22 May to the 20 June 2006 with some manufacturers/dealers providing comprehensive information and others limited information. GM Holden declined to participate in the process.

The main objective of the interview process was to determine the environmental policies of each manufacturer in relation to tyres, their methods of tyre management and the procedures and costs relating to their disposal. The questions and results from this process are provided below.

Questionnaire

The following questions were developed for use in the telephone interviews and email

- Does your organisation/dealership have an environmental policy on used tyres? If yes please provide details.
- How many new vehicles are sold and serviced annually through your dealerships?
- Are tyres covered under new car warranties?
- Defective tyres on new vehicles. What happens to these and are they returned to the tyre company or to the original country the vehicle was manufactured?
- What services do you offer in regard to tyre servicing as part of general vehicle servicing? Do you send the vehicles to a tyre dealer or is it done in-house? Are there any specific arrangements with tyre dealers?
- If you send your vehicles to a tyre dealer, is the cost of this a direct transfer to the customers account?
- If you manage tyres in-house do you pay a tyre collector to pick up the used tyres?
- What is the collection cost per used tyre and does this vary in each state? Is this cost transferred to the customer?
- Is there a specific tyre collector(s) you recommend your dealers go through?

- Do you service vehicles that are under leasing arrangements and if so are tyres covered in such arrangements?

Ford Dealer Interviews

A random sample of Ford dealerships were contacted to participate in the survey. Of the various dealers interviewed the number of cars sold ranged from 20 to 300 per month and those serviced ranged from 600 to 5,000 per month.

Ford has an overall environmental policy for all new vehicles sold, but nothing specific in relation to end-of-life tyres. All dealers stated that tyres are covered under Ford's new car warranty and any faulty tyres returned to the tyre manufacturer via the tyre manufacturer's Australian distributors.

There is a mix of onsite/offsite arrangements for tyre servicing depending on dealer preference. Those that service tyres onsite using their own Ford-trained staff had arrangements with tyre collectors to regularly pick up tyre stockpiles with these costs passed to customers. Dealers that used third party tyre dealers transferred the entire cost of the tyre service and disposal to the customer. The environmental costs for removal of tyres from onsite Ford-approved tyre changing service centres ranged from $1.50 to $2 per passenger tyre, and from $2.50 upwards for a light truck.

Mazda

Mazda Australia has an over arching company wide environmental policy which includes an approved Mazda tyre program allowing vehicle dealers to dispose of used tyres through their partnership with Beaurepaires. In 2005 over 66,000 new Mazdas were sold and approximately 170,000 vehicles serviced by the dealer network.

Tyres are not covered under Mazda new car warranties with the respective tyre supplier providing this warranty. A similar arrangement applies for replacement tyres in that the local branches of the tyre supplier cover this warranty.

Some dealers service tyres in-house under the scope of an approved Mazda tyre program and in partnership with Beaurepaires. Other Mazda dealers sublet this work to tyre dealers, separately invoicing the Mazda vehicle owner for this service.

Mazda does not have an in-house program for used tyre disposal as this is undertaken by Beaurepaires as part of their partnership program. Beaurepaires will pick-up used tyre from the vehicle dealership and the Mazda tyre program recommends the prices listed below. It is likely that these costs are transferred to the Mazda owner/tyre purchaser.

	Disposal Cost	RRP
Car, Station Wagon & Utility	$1.59	$2.73
Light Truck, Truck & 4WD	$2.73	$5.45

Source: Mazda

In terms of leasing arrangements, some Mazda dealers provide a fully maintained service arrangement in conjunction with a finance company and tyres are a part of this. Fleet business is only a small percentage of Mazda sales.

Honda

Honda Australia sold over 48,000 new Honda cars in 2005. It does not have a specific environmental policy on used tyres. Tyres are not covered under new car warranties, but covered under the tyre suppliers warranty and if there is a defective tyre on a new car these are sent directly back to the tyre supplier in Australia.

In or out-sourcing of tyre servicing at Honda dealerships is up to the discretion of the franchisee and is managed solely within the dealership. Some chose to carry out the practice in house others use tyre dealers. No further details were provided.

Subaru

Subaru Australia sold over 40,000 new Subaru cars in 2005. Their operations are covered by an environmental policy which does not contain any specific matters relating to used tyres. No details were provided on the number of annually services under warranty as some warranties can extend up to 10 years, with between 50-60 percent of new cars being serviced at the original dealership.

Tyres are not covered under new car warranties, but under a tyre manufacturer's warranty. A single faulty tyre is replaced by the vehicle dealer with notification to the manufacturer. If there is a series of multiple defects then the tyres are sent back to the tyre supplier.

Only 5-10 percent of Subaru dealers service tyres in-house with the majority contracting this service out to local tyre dealers. This arrangement is vehicle dealer specific and run solely out of each individual business. Vehicle dealers are required to adhere to Subaru's environmental policy relating to wastes generated within service workshops and preferred service provider are listed to assist individual dealers in managing these wastes. One example is the Transpacific Group (ERS). It is noted that on the Transpacific Group's web site(http://www.transpacific.com.au/TIG/services/index.asp) there is a comprehensive list of automotive waste that are catered for including Tyre Recovery & Collection.

Off-site tyre service costs are transferred directly to the customer. However, used tyre collector's costs are not directly linked to the customer and are covered in an overarching $8-12.50 'environmental levy' currently in place for the whole vehicle (which would include the levy on oil under the Product

Stewardship for Oil Scheme). The quantum of this levy varies from state-to-state and costs specific to tyres are not itemised.

Subaru does service cars under leasing arrangements with tyres are covered in about 50-60 percent of leasing arrangements and the tyre servicing arrangements depend on the leasing arrangements.

Mercedes-Benz

The majority of Mercedes-Benz dealers are individual franchisees and the arrangements for tyre servicing is vehicle dealer specific. However, none of those contacted carried out their own tyre servicing.

Of the Mercedes-Benz dealers interviewed an average of 30 to 45 cars are serviced daily. Tyres are not covered under new car warranties, but covered under the individual tyre manufacturer's warranties. It was noted that an extended tyre warranty can be purchased by a new car owner is required.

Vehicle dealers used tyre dealers to provide tyre servicing and all tyre dealer costs were passed on to the car owner with an additional margin included. Generally the tyre dealer's "environmental levy" of $2 per tyre or $6.00 per car, although itemised on some the tyre dealer's invoices, was generally not itemised on the customer's invoice.

If cars are leased then it is the responsibility of the leasing companies organise tyre servicing if this is included in the leasing arrangements.

BMW

Of the BMW dealers contacted none carried out tyre servicing in-house and all used local tyre dealers. Defective tyres under warranty were either sent back to BMW in Melbourne or to a local tyre dealer such as Bob Jane or Bridgestone. It was noted that an "environmental levy" is charge by tyre dealers for used tyre disposal and averaged $2 per tyre.

Toyota

Toyota has a partnership with Beaurepaires to carry out tyre servicing through local Beaurepaires dealerships. Some Toyota dealerships undertake tyre servicing in-house.

The Toyota dealer network buys all their tyres from Beaurepaires and an "environmental levy" or a collection fee is included in their national price of their tyres, in other words Beaureapires factor the tyre collection and disposal costs into their "new tyre" pricing.

Appendix D
Vehicle Manufactures & Dealers Consultation

Nissan

It was reported that Nissan Australia does not have an overarching environmental policy for used tyres. It sells around 60-65,000 new Nissan vehicles per year and the dealer network services approx. 200 - 220,000 Nissan vehicles per annum. Tyre servicing is done through local tyre dealers and not at the vehicle dealer servicing the vehicle and the cost of this is a direct transfer to the customer. Tyres are covered under warrantee but through the tyre manufacturers and handled through their own agents. Leased vehicles are serviced by the vehicle dealer, however, tyres handled in the same way as vehicles being serviced.