



SUSTAINABLE
strategic solutions

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Investigation into the Environmental, Social and Economic Impacts of a Potential Banning of Used Tyres to Landfill and of Mandatory Recycling of Used Tyres

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Limitations

This is an external report commissioned by the Department of Environment and Conservation on behalf of the Waste Management Board of WA. The findings and recommendations contained in the report do not necessarily represent the views of the Waste Management Board.

All care has been exercised in undertaking the preparation of this report. Neither the Board nor the Department of Environment and Conservation accept liability for any loss or damage incurred as a result of any use of the information contained in the report.

Sustainable Strategic Solutions (S3) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the Department of Environment and Conservation WA. 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 Request for Quotation.

The methodology adopted and sources of information used by S3 are outlined in this report. S3 has made no independent verification of this information beyond the agreed scope of works and S3 assumes no responsibility for any inaccuracies or omissions. No indications were found during the investigation that information contained in this report as provided to S3 was false.

The report is based on the research undertaken, data provided by stakeholders and information reviewed at the time of preparation. S3 disclaims responsibility for any changes that may have occurred after this time.

LIMITATIONS	2
EXECUTIVE SUMMARY	4
1. INTRODUCTION.....	6
<i>THE REQUIRED TASKS</i>	6
<i>DELIVERABLES</i>	7
<i>PROJECT APPROACH</i>	8
2. POTENTIAL IMPACTS OF A TOTAL BAN ON ALL USED TYRE DISPOSAL TO LANDFILL/MANDATORY RECYCLING	10
<i>IMPACTS OF A LANDFILL BAN IN OTHER JURISDICTIONS</i>	10
<i>MANDATORY RECYCLING IN OTHER JURISDICTIONS</i>	12
<i>IMPACT ON RECYCLERS</i>	13
<i>TYRE DERIVED FUEL</i>	16
<i>OVERSIZED TYRES</i>	19
<i>IMPACTS ON LANDFILL OPERATORS</i>	19
<i>IMPACT ON COLLECTORS</i>	21
<i>IMPACTS OF STOCKPILING</i>	21
<i>REGIONAL IMPACTS</i>	22
<i>SUMMARY</i>	23
3. POTENTIAL IMPACTS OF A BAN ON THE DISPOSAL OF PARTICULAR TYPES OF TYRES TO LANDFILL/ MANDATORY RECYCLING OF PARTICULAR TYPES OF TYRES	25
<i>IMPACTS OF A BAN ON THE DISPOSAL OF PASSENGER TYRES TO LANDFILL/MANDATORY RECYCLING OF PASSENGER TYRES</i>	25
<i>IMPACTS OF A BAN ON THE DISPOSAL OF TRUCK TYRES TO LANDFILL/MANDATORY RECYCLING OF TRUCK TYRES</i>	27
<i>Impacts on retailers</i>	30
<i>Impacts on recyclers</i>	32
<i>Impact on landfill operators</i>	33
<i>IMPACTS OF A BAN ON THE DISPOSAL OF OVERSIZE TYRES TO LANDFILL/MANDATORY RECYCLING OF OVERSIZE TYRES</i>	35
<i>SUMMARY</i>	36
4. POTENTIAL IMPACTS OF A BAN ON THE DISPOSAL OF PARTICULAR FORMS OF TYRES TO LANDFILL/IMPOSING A REQUIREMENT FOR PRE-TREATMENT.....	38
<i>IMPACTS OF A BAN ON WHOLE TYRES TO LANDFILL/A REQUIREMENT TO SHRED TYRES PRIOR TO LANDFILLING</i>	38
<i>IMPACTS OF A REQUIREMENT TO BALE TYRES PRIOR TO LANDFILLING</i>	42
<i>SUMMARY</i>	45
5. ANALYSIS OF THE SUPPORT FRAMEWORK OR MECHANISMS REQUIRED	46
<i>DIVERSION OF TRUCK TYRES FROM LANDFILL</i>	46
<i>REQUIREMENT FOR BALING AND MONOFILLING</i>	48
REFERENCES.....	50
APPENDIX A: STAKEHOLDERS CONTACTED DURING THE PREPARATION OF THIS REPORT.....	52

Executive Summary

The Used Tyre Strategy for Western Australia recognises that the low cost of landfill disposal in Western Australia is a barrier to the development of other options for the management of used tyres. This study examined the potential environmental, social and economic impacts of either banning the disposal of tyres to landfill or requiring that they be recycled, or requiring some form of pre-treatment prior to landfilling

There is currently no infrastructure for recycling passenger tyres in WA. The large capital investment required for a relatively low return, due to the high percentage of fibre and lower volumes of rubber compared with other tyres, makes it unlikely a recycling facility will be developed in the short to medium term, unless as a component of another business, for example to process earthmoving tyres. There is potential for passenger tyres to be used as fuel by Cockburn Cement, with minimal or no pre-processing required, however the development of this option in WA would be likely to prevent the development of other options for passenger tyres.

Until options are developed for passenger tyres a ban on landfill disposal or a requirement to recycle them is unlikely to achieve recycling or recovery and may result in considerable impacts to the community and local government through the development of stockpiles.

WA does have a facility for recycling truck tyres that is currently processing almost all of the truck tyres generated in the metropolitan region. It has been suggested that the low landfill prices in WA compared with the prices in other States make it difficult for this business to compete and might result in closure of the facility. The study found that collection and landfill charges for used tyres are lower in WA than elsewhere in Australia, however they are increasing towards the lower end of the range.

Banning truck tyres from the metropolitan area to landfill would allow a higher gate price to be charged by the recycler, however it would not be significantly higher than the cheapest landfill prices and would be lower than most. A ban could be achieved through alteration of licence conditions for landfills receiving tyres from the metropolitan region and would provide certainty that landfill prices would not fall again making landfill disposal more attractive than recycling for these tyres. As landfill operators have instituted a voluntary policy of not accepting truck tyres there should be little or no impact on their operations.

Extending the ban to country and regional landfills is not recommended at this time even though capacity for recycling exists, due to the potential impacts on rural and remote communities of higher costs for goods and services due to tyre transport costs being passed on. The national product stewardship scheme proposes to subsidise collection and transport of tyres from rural and remote areas, which should alleviate this problem. There are also likely to be high costs in enforcing a ban on landfilling of truck tyres outside the landfills already receiving tyres from the metropolitan area.

The current lack of infrastructure for recycling oversize and off-the-road tyres means a ban on landfill disposal or a mandatory requirement to recycle these tyres is likely to lead to stockpiling and/or illegal dumping. The barriers to the establishment of recycling facilities are the large capital investment required rather than availability of used tyres.

Several jurisdictions, notably in the European Union, have used a ban on the disposal of whole tyres to landfill through a requirement for shredding as an interim step to banning all disposal of tyres to landfill. This policy appears to result in higher recycling and recovery rates only where there is a clear policy that a total ban is the next step. In Australia where most States have had at least a partial ban on the disposal of whole tyres to landfill for some time, there is no indication that the policy has diverted tyres from landfill, although it has increased the cost of disposing of tyres to landfill and improved landfill management through better compaction.

There is growing evidence that the disposal of shredded tyres in landfill is potentially more environmentally problematic than the disposal of whole tyres. The landfilling of shredded tyres also represents the loss of the resources embodied in the tyres as soil contamination makes later recovery likely to be very uneconomic.

The storage of compressed, baled tyres in monofill overcomes all of these problems, allowing the prospect of future recovery and use of the resource while providing a safe and economical interim solution. One of the two monofills currently receiving tyres from the metropolitan region only receives baled tyres, the other has recently refused to accept loose tyres from the metropolitan region. It is recommended that a requirement to bale tyres prior to monofilling be instituted at any landfill receiving tyres from the metropolitan region, with a sufficient transition period to allow purchase of balers. Tyres too large to be baled should be stacked within one area of the monofill.

Extending the requirement for baling and monofilling to other landfills should not be considered at this time due to the impacts of higher costs on rural and regional communities and the lack of infrastructure, however regional councils could be encouraged to move towards the new standard through assistance in establishing stockpile facilities and obtaining access to balers.

1. Introduction

The Western Australian Waste Management Board has recently approved a Used Tyre Strategy for Western Australia¹. The Strategy included the possibility of bans on the inappropriate disposal of tyres to landfill, perhaps to be implemented progressively as recycling infrastructure and market demand are established.

Existing practices and regulations for the management of used tyres in Western Australia act as a barrier to reuse, recycling, and energy recovery, because disposal options are comparatively cheap and do not reflect the real cost of used tyre disposal.

The current dilemma appears to be that:

- disposal to landfill is cheaper than recycling and as not all tyres are accepted for recycling, used tyres have to be sorted prior to delivery, adding to the costs; and
- there is insufficient existing capacity of tyre recyclers to recycle passenger tyres (in the short term).

It has been suggested that WA's only tyre recycler may relocate to another State due to the difficulties in competing with cheap landfill disposal of used tyres. An assessment of the social, environment and economic impacts of using a regulatory approach to divert tyres from landfill and increase the flow of tyres to recycling was required to assist the Department and the Board in making decisions regarding either a ban on tyres to landfill or mandatory recycling.

The study involved widespread consultation with stakeholders including local government, the tyre recycling industry, collectors and transporters and landfill operators as well as with the major generators of used tyres. Internet research and literature reviews were used to gain an understanding of the impacts of similar actions in other jurisdictions.

Sustainable Strategic Solutions (S3) is pleased to submit this report to the Department.

The required tasks

The aim of this project was to ascertain the potential environmental, social and economic impacts of either a ban on landfilling of tyres or mandatory recycling on the following sectors in WA:

- Local government (including Regional Councils)
- Tyre recycling industry
- Community (metropolitan and country)

¹ Used Tyre Strategy for Western Australia (Draft), Department of Environment WA, November 2005.

- State government
- Manufacturing or retail sectors
- Mining sector
- Landfill operators
- Waste collectors/transporters.

The review was to target all types of used tyres and consider two potential regulatory approaches:

- banning used tyres from inappropriate disposal in landfill; and
- making recycling of used tyres mandatory.

For each approach, the following issues were to be addressed:

- applicability across the State i.e. state-wide; metropolitan only; metropolitan and regional centres;
- analysis of the effect of banning each style and component of tyres (passenger, truck, OTR, etc.) from landfill eg: loose tyres; shredded tyres; baled tyres, etc.;
- quantity of used tyres (in EPU, tonnages and types) expected to be diverted from landfill and feasibility of recovering the material;
- the identification of economic and financial liability on each sector;
- current recycling industry capacity to cope with anticipated increase in feed stock and contamination;
- existing and/or potential market development required to support;
- necessary support framework or mechanisms required to facilitate implementation e.g. legislation/regulation, education, enforcement, etc.;
- potential effect of the processes in rural and remote locations; and
- highlight any factors that would limit the effectiveness of the various measures.

Deliverables

The deliverables of this project are a consolidated report and possible presentation to the Waste Management Board that provides:

- Documented account of the methodology used in the study;
- Documented account of the organisations/businesses contacted in the analysis, including federal, state, regional and local governments and their respective agencies, manufacturing and retail businesses, brokers, recycling and transport companies, etc.;
- Document literary, internet/web review and bibliography;

- Documented findings of each assessment conducted against criteria listed in the scope of works;
- Recommendations and conclusions drawn on the basis of the overall analysis.

Project approach

The project was approached in the following stages:

1. Project initiation;

An inception meeting was held with the Department of Environment soon after beginning the project. The purpose of the inception meeting was to:

- Confirm the objectives and deliverables for the project
- Clarify project management and reporting arrangements, and
- Collect available information held by the Department to support the project.

2. Consideration of the possible impacts of banning used tyres from inappropriate disposal in landfill;

3. Consideration of the possible impacts of making the recycling of used tyres compulsory;

Stages two and three were broken down into several categories of bans/mandatory recycling.

The Used Tyre Strategy² states that to discourage the outflow of used tyres from approved tyre reuse/recycling processes, regulation may be required to restrict disposal options providing there is a viable economic alternative. Reclaim Industries has argued that there is a need to restrict the disposal of truck tyres to landfill now in order to guarantee the supply for recycling and to allow them to raise the gate price to a level sufficient to make recycling viable.

In effect Reclaim is currently receiving all of the truck tyres from the metropolitan region since Rick Cross has asked OTR Tyres not to bring truck tyres to his landfill at Stanley Road Australind but to take them to Reclaim instead, and the STEG landfill does not bale truck tyres for storage, preferring to have them taken directly to Reclaim. This means that over the past year Reclaim Industries has received all of the truck tyres from the metropolitan region.

However the voluntary "ban" on landfill disposal has not allowed Reclaim to raise their price for receiving these tyres as the option of landfill disposal still exists.

As outlined in the Strategy there are several options to address the issue of whole used tyres going to landfill:

² Used Tyre Strategy for Western Australia (Draft), Department of Environment WA, November 2005.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

1. a blanket ban on burying whole and part tyres in landfills across the State providing such a ban may allow exceptions in those districts without viable alternative or where distance from alternative options undermines economic rationale. These districts would generally be rural and for exception applications to be successful, licensed tyre waste transporters would need to be prohibited from taking used tyres from urban areas to the rural local government area seeking the exception;
2. requiring charges by the landfill operator to be reflective of the real cost of landfill management and the resource waste caused by tyre dumping. The charges need to be equal to the charge by tyre recyclers or slightly higher to encourage the recycling of used tyres option;
3. require specific handling requirements for tyres prior to burial. This may include a process to sort, separate from other waste, bale, cut, record and map, etc (whatever appropriate) to support the future recovery of tyres at the most economical cost; and
4. impose an advanced disposal fee on new tyres to fund recovery/recycling of used tyres including transport (as per national scheme).

Local government, as the administrator of most landfills in Western Australia, would generally support a ban on tyres being buried in their landfills provided the ban is supported by accessible alternative reuse/recovery options for used tyres and the requirement being underpinned by regulation.

There are various permutations possible for a ban on tyres to landfill or mandatory recycling:

A total ban on all used tyre disposal to landfill, including passenger tyres, truck tyres and oversize tyres whether whole, baled or shredded or mandatory recycling of all used tyres;

A ban on the disposal of particular types of tyres to landfill, for example only those tyres currently able to be recycled or mandatory recycling of particular categories of used tyres;

A ban on the disposal of particular forms of tyres to landfill, for example a ban on whole tyres with a requirement for cutting or shredding, a ban on loose tyres with a requirement for baling.

Any of these bans or requirements might be applied in selective regions of the State, for example only in the metropolitan region (or for tyres originating in the metropolitan region), in the wider TLEZ or state-wide including regional and country areas.

The potential impacts of each of these options needs to be considered.

4. Analysis of the support framework or mechanisms required;

There are several mechanisms government can use to achieve policy implementation, including legislation/regulation, education, and improved enforcement.

2. Potential impacts of a total ban on all used tyre disposal to landfill/mandatory recycling

This Chapter addresses the first option: banning the disposal of used tyres to landfill or requiring that all tyres be recycled.

It is a commonly held view (for example van Beukering³) that a ban on the landfilling of whole and shredded tyres is crucial to stimulate the recycling of tyres by making the dumping of tyres impossible, except through illegal disposal and therefore forcing the development of other ways of dealing with used tyres.

Impacts of a landfill ban in other jurisdictions

The EU Directive 1999/31/EC on the landfill of waste obliges all EU countries to ban the disposal of whole tyres to landfill from July 2003 and shredded tyres from July 2006⁴. Several European countries implemented total bans on tyre disposal to landfill well before 2006: the Netherlands in 1995, Austria in 1996, Denmark, Portugal and Sweden in 2001, and Finland, France and Germany in 2002⁵.

Most countries appear to be increasing the recovering of energy or recycling waste tyres. Over the past few years, due to the publicity surrounding the Landfill Directive ban on landfilling used tyres, there has been a noticeable decline in the practice of landfilling whole tyres.

The ban has been clearly transposed into national legislation and measures taken to ensure that the licensing and enforcement of landfill operators and tyre processors is carried out effectively.

Tyre manufacturers and the recycling and energy recovery industries have responded to the change and there are also economic factors that now weigh heavily toward the recycling or processing rather than dumping in landfills.

In conjunction with landfill bans there are three different types of system for dealing with end of life tyres within the EU15:

- Free market economy;
- State/tax system; and
- Statutory 'take back' system through a producer responsibility approach.

³ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

⁴ EU 1999, *Directive 1999/31/EC on the Landfill of Waste*, European Union; available at www.europa.eu.int/scadplus/leg/en/lvb/l21208.htm

⁵ Report on Implementation of The Landfill Directive in the 15 Member States of the European Union, Golder Associates (UK) for the European Commission, October 2005.

Only Denmark operates a state/tax system; all the other Member States operate either through a free market system or a producer responsibility system. Where a producer responsibility system is in operation a company has been set up by the tyre producers to take responsibility for the collection and recycling of end of life tyres.

Progress towards achieving total diversion from landfill is variable to date, with Northern European countries all achieving the objective of banning or significantly reducing tyres from landfill, but Eastern European and some Southern European countries still landfilling most of their used tyres⁶. Denmark and Finland have emphasised recycling while Austria, Germany and Sweden favour energy recovery.

Overall landfilling in Europe declined from 35% to 32% between 2002 and 2003. Recycling grew from 11% in 1996 to 27% in 2003, due partly to improvements in technologies but the implementation of the European landfill ban also provided a strong incentive for the material recycling industry. The net-export of used tyres also increased during this period, reaching 8% in 2003, from a base of less than 2% seven years earlier.

Portugal recovers almost 100% of its used tyres, of which more than 60% are recycled. According to the national law in Portugal the following goals must be achieved by January 2007: 95% of tyres produced must be collected, 30% of which must be for re-treading and 65% recycled. One of the reasons for the high recycling rates in Portugal may be because Portugal exports shredded tyre products to the USA, where they are used for Astroturf in stadiums⁷.

Only the Netherlands exports 80% of its scrap tyres and Ireland and Spain retread most scrap tyres. Some countries such as Ireland (75 %), Greece (72 %), Spain (60% and France (22 %) landfilled a large amount of waste tyres in 2003⁸.

The long transition period allowed the industry to prepare and develop capacity and infrastructure. In 2004 about 25% of the 48 million used tyres were landfilled, by 2005 95% of tyres were recovered for energy or recycling⁹. It seems that the forecast "landfill ban crisis"¹⁰ will be a non-event.

The total ban on disposal of tyres to landfill came into effect in the UK on the 16 July 2006¹¹. The ban applies to all tyres except large tyres from agricultural or heavy plant vehicles (with a diameter greater than 1.4m) and bicycle tyres.

⁶ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

⁷ Report on Implementation of The Landfill Directive in the 15 Member States of the European Union, Golder Associates (UK) for the European Commission, October 2005.

⁸ Report on Implementation of The Landfill Directive in the 15 Member States of the European Union, Golder Associates (UK) for the European Commission, October 2005.

⁹ Press Release 10 July 2006, www.environment-agency.gov.uk/news

¹⁰ For example UK industrial tyre sector facing landfill ban crisis, European Rubber Journal, December, 2003.

¹¹ Press Release 10 July 2006, www.environment-agency.gov.uk/news

The Tyre Recovery Association in the UK expected gate prices for used tyres to increase following implementation of the total ban on disposal of tyres to landfill¹². They forecast this may be an issue for collectors, particularly those with collection contracts with retailers until the extra costs can be passed back along to retailers and the consumer. The higher gate price was expected to cause an increase in illegal dumping or “fly-tipping”.

Illegal fly-tipping of tyres is estimated to cost local authorities and businesses over £2 million per year in England and Wales. As the Landfill Directive takes effect, the cost of waste tyre disposal is set to increase and the issue of fly-tipping could get worse¹³.

The UK Environment Agency has launched a Tyre Watch programme to reduce fly-tipping¹⁴.

URS noted in their report on the proposed national product stewardship scheme¹⁵ that in NSW a number of landfillers are involved in tyre collection and processing and use the landfill as a “buffer” between collection requirements and market demand for processed rubber. This would probably be a consideration in WA during any transition to a landfill ban.

South Australia has had a ban on the disposal of whole tyres to landfill, with the exception of oversize tyres, for several years, and is now planning to ban the disposal of all tyres to landfill and encourage other options such as tyre derived fuel and recycling¹⁶. Zero Waste SA plans to facilitate the establishment of these options in SA before announcing the ban. There will be a reasonably long transition period to allow adjustment, particularly for collectors who have invested in shredding equipment to meet the current requirements. As shredding will still be required for recycling and for energy recovery from tyres there is not likely to be much financial disadvantage to collectors.

Mandatory recycling in other jurisdictions

Specific targets for recycling sometimes supplement landfill bans. For example Dutch legislation on passenger car tyres demanded that material recycling would be employed for 20% of the collected used tyres from July 2003. Because current processing capacity or other outlets for material recycling in the Netherlands were insufficient to achieve the target, this stimulated the various options for material recycling. The Dutch government envisaged that producers would add a fee on new tyres to raise the money needed for this investment¹⁷.

¹² www.tyrecovery.org.uk Summer newsletter

¹³ Department for Environment, Planning and Countryside www.countryside.wales.gov.uk/

¹⁴ www.environment-agency.gov.uk/business

¹⁵ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

¹⁶ Vaughan Levitzke, Zero Waste SA, Personal communication.

¹⁷ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

As mentioned previously, Portugal has set legislated targets for collection, retreading and recycling¹⁸, which may be more easily achievable there as one private company, Valorpneu, covers almost the entire tyre market in Portugal.

Impact on recyclers

Reclaim Industries is WA's only tyre recycler. They have been established as various entities since 1993 and have been processing used tyres since 2001¹⁹. Reclaim Industries Limited has been listed on the Australian Stock Exchange since February 2002. Reclaim Industries holds 100% of Playsafe Australia Pty Ltd, Reclaim Corporation Pty Ltd and Leisure Safe Holdings Pty Ltd²⁰. The facility in WA is known within the Reclaim Industries group as the WA Whole Tyre Reduction facility. This facility converts used truck tyres into granulated rubber for use in surfacing, moulded and granule products for a wide range of industries. The entire product from the WA facility is used by the manufacturing parts of the group, based in the Eastern States.

Reclaim Industries is currently only able to process truck tyres. Passenger and light truck tyres contain much more fibre which contaminates the rubber product and would require the purchase of another module to remove the fluff and fibre. As there is more rubber, of higher quality, in truck tyres, recycling these tyres provides a better return than would passenger tyres.

Reclaim Industries currently processes about 7% (approximately 2,552,697 kg) of the used tyres generated annually in WA, based on data supplied by Reclaim for the first six months of 2006 and calculated using the Controlled Waste Tracking System data and figures provided by STEG²¹. The numbers of tyres received for processing at Reclaim increased from January 2006 when Rick Cross decided to no longer accept truck tyres from the metropolitan area²². For the six months from January 34,199 truck tyres (1,624,452 kg) were received. The numbers received in the preceding six months would have been slightly lower.

During the 2004-2005 financial year the group made an operating loss of \$1,096,652, an increased loss of about 35% on the 2004 loss.

Some of these losses were related to warranty claims, which will be addressed through improved quality control and application procedures. About \$90,000 was spent in freighting approximately 600 tonnes of cut truck tyres from South Australia to the WA facility to supplement production requirements and the higher costs of freighting rubber from WA to the eastern States due to higher fuel costs.

¹⁸ Report on Implementation of The Landfill Directive in the 15 Member States of the European Union, Golder Associates (UK) for the European Commission, October 2005.

¹⁹ Chris Forrester, Reclaim Industries, Personal communication.

²⁰ Reclaim Industries Annual Report 05.

²¹ Records supplied by Peter Bertei, STEG.

²² Chris Forrester, Reclaim Industries, Personal communication.

Since October 2005 the company has reversed this situation and is now profitable²³.

Sales revenue increased during the 2004-2005 financial year to \$8.4 million and the sales outlook is strong, with the company unable to meet demand for its products²⁴. The company has a self-colouring process for artificial turf that is generating a great deal of interest in overseas markets, for example one order in Taiwan would require 800 tonnes²⁵, however they do not have sufficient product to meet this demand.

The WA facility increased its production for the 2005 year by 28%. Production in the second six months of the financial year was 68% higher than for the first six months. The costs of maintaining a skilled shift even when there is insufficient supply of tyres has resulted in high labour costs per unit of output. The company attempted to address a "key risk, cost and efficiency issue" relating to sourcing sufficient quantities of waste tyres by securing a major contract in WA for the collection and disposal of waste tyres. This contract commenced in April 2005.

Reclaim Industries argues that it needs to spend money on its plant to upgrade it but cannot do so without certainty of supply and certainty of a reasonable gate price for the tyres. All of the truck tyres in the metropolitan region are being handled with 2 shifts and this throughput could easily be doubled.

A ban on landfill disposal of all tyres in any form would potentially increase the numbers of truck tyre available for recycling by Reclaim and may provide certainty of supply. However as they are currently handling almost all of the truck tyres from the metropolitan region the extra truck tyres would need to be transported from regional and country areas. Reclaim Industries may be able to raise its gate price for these tyres, however as, at least in the short to medium term, there would be such large stockpiles of other tyres created it would probably still be cheaper to stockpile truck tyres with other types of tyres than to sort and transport them.

The increase in certainty of supply of used tyres may attract other recyclers to the State however this would depend on the comparative costs of stockpiling and recycling as any recycler will still need to compete with recyclers in the eastern States who receive a higher price for each tyre (discussed in Chapter 3). This may change with the national scheme which hopefully will create a more level playing field nationally through phasing out of disposal fees and provision of a rebate or subsidy to the reprocessor. It now seems likely that the national scheme will not be launched until at least late 2007.

A requirement that all tyres must be recycled would presumably force collectors to take tyres to a recycling facility. As discussed above Reclaim Industries is currently the only tyre recycler in WA and only processes truck tyres. Such a clear policy push towards recycling may provide the

²³ Chris Forrester, Reclaim Industries, Personal communication.

²⁴ Reclaim Industries Annual Report 05.

²⁵ Chris Forrester, Reclaim Industries, Personal communication.

impetus for Reclaim to expand its capacity to deal with passenger tyres and perhaps even oversize tyres. If the industry was convinced of the long term certainty of the market other recyclers would potentially establish in WA as well.

Several businesses have expressed interest in establishing recycling facilities in WA²⁶, and at least one of these is interested in establishing a large plant to shred and crumb passenger and earthmoving tyres²⁷.

Tyre Recyclers WA is purchasing equipment to granulate and grind rubber buffings from passenger and 4WD drive tyres as well as truck tyres and forklift tyres to produce 30 mesh, used in road making and adhesives²⁸. At first this operation will produce 1 tonne/day.

There are estimates that a supply of 1 million tyres for recycling or reuse is required in an area of 250 km around a tyre recycler before the operation becomes viable²⁹. On a typical population generation rate of 1 tyre per person per year this would require more dense populations than most of rural and remote Western Australia, however there is a high generation rate for large tyres used in the mining and agricultural industries. Some shredding and crushing plant requires a minimum of 800,000 tyres per year to be economically viable.

Some civil engineering applications can operate on a lower-density supply, with one company indicating a population of 20,000 within a 100 km radius is generally sufficient for a civil engineering project³⁰.

However it is clear that a viable recycling industry can only be established in areas with more dense populations than most of rural and remote Western Australia and that with the current supply of used tyres, WA only has sufficient resources to support perhaps one or two recyclers in Perth assuming the majority of used tyres can be recovered.

The number of waste tyres generated in South Australia is of the order of 1.4 million per annum³¹. Around 90% of these tyres are disposed to landfill. A small number of tyres are transported to Victoria for use as waste-to-energy. All waste tyres must be shredded before disposal in landfill – the only exception is large earthmoving tyres in remote areas where there is no shredding facility.

A key constraint to increasing the scope for tyre recycling in South Australia is the small number of tyres which critically hinders the economic viability of a waste tyre recycling plant. There are only two existing retreaders and rubber reprocessors in the state, and there are limited 'boutique' applications.

²⁶ Triple Bottom Line Analysis of the Used Tyre Industry, Sustainable Strategic Solutions for the Department of Environment WA, July, 2005.

²⁷ Jonathon Youngs, Saypol, Personal communication.

²⁸ Will Van Grootel, Tyre Recyclers WA, Personal communication.

²⁹ Draft End-of-Life Tyres Issues Paper, 2004, Department of the Environment and Heritage.

³⁰ Used Tyre Remote Benefit Proposal, Department of the Environment and Heritage, 2005.

³¹ Economics of Tyre Recycling, ARRB Transport Research Ltd, June 2004.

There is also the possibility that tyres could be sent interstate or exported to Asia. In the eastern States tyres from Brisbane, Sydney, Adelaide and Melbourne are transported to a central recycling plant in Victoria. During 2004-05 Reclaim Industries freighted truck tyres by rail from South Australia to Western Australia at a cost of \$140/tonne to meet production needs³².

In the future a viable option may be the processing of all WA and SA tyre at one facility, perhaps transporting them from their State of origin after initial shredding.

Despite the cost of transporting tyres, trade in used tyres between European countries has increased, with a flow from high- to low-income countries³³. This is due to several factors including the comparative advantage of low-income countries in labour-intensive retreading and recycling of tyres due to low wage levels and the relatively simple process of retreading and recycling.

Many tyres are imported for reuse purposes as safety standards regarding minimum tread depth and the enforcement of these standards are less strict in lower income countries. Third, international differences in disposal fees promote the trade of used tyres that are not recyclable. Because disposal fees are much lower in low-income countries, it is a lucrative business to collect tyres in the North with the disposal fee paid for by consumers in the North, and export these tyres to low-income countries. For example, the disposal fee in the Netherlands is twice the fee in the Czech Republic³⁴.

It is possible that many of the same market dynamics could operate between Australia and South-east Asian countries. Oversized tyres are already exported to Malaysia and Korea for retreading³⁵.

Tyre derived fuel

Reclaim Industries has bought 50% of SA Tyre, a tyre collection company in South Australia and has suggested that the WA facility might be relocated to SA. It seems unlikely that Reclaim Industries will move to processing passenger tyres for granulated rubber for surfacing and other products either in WA (if they remain here) or in South Australia, although it has been suggested they may apply for an infrastructure grant for machinery to remove fibres from passenger tyre rubber.

However Reclaim is interested in processing passenger tyres for use as tyre derived fuel. Adelaide Brighton owns Cockburn Cement (Kwinana) and has been investigating the possibility of using fuel derived fuel at Cockburn³⁶. The Adelaide Brighton kiln would need the used tyres processed into

³² Tim Francis, Reclaim Industries, Personal communication.

³³ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

³⁴ Rosendorfová, M., I. Výbochová and P.J.H. van Beukering (1998), Waste Management and Recycling of Tyres in Europe, R98/13, Institute for Environmental Studies, Amsterdam, cited in Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

³⁵ Vince Schepsis, Tyre Clean Australia, Personal communication.

³⁶ Chris Forrester, Reclaim Industries, Personal communication.

15 mm tyre chips to burn with other wastes. The Adelaide kiln currently takes other wastes for use as fuel, including green waste and timber pallets. The Adelaide facility could use 8,000 tonnes per year.

As the kilns are constructed differently the Cockburn Cement kiln could burn whole used tyres up to the size of 4 WD tyres as fuel³⁷. This use could potentially take up to 10,000 tonnes per year, a significant proportion of the estimated 18,000 tonnes of passenger tyres generated in WA each year.

There are other industrial kilns in WA that may also be potential users of tyre derived fuel, for example at Muchea and the WMC kiln at Kalgoorlie.

In Europe by 2003 30% of used tyres were used for energy recovery, 28% were recycled and 18% landfilled, with the remainder retreaded or exported. This is quite a change from 1994 when 62% were landfilled, 11% went to energy recovery and 6% were recycled³⁸.

Because of their high calorific value, used tyres are used as a supplement fuel in pulp and paper mills, industrial boilers, cement kilns and power plants. A tonne of tyres is equivalent to a tonne of good quality coal or to 0.7 tonne of fuel oil.

Energy recovery through incineration is currently the major destination for used tyres in most OECD countries. Depending on the technology used, tyres can represent up to 25% of the total fuel of cement kilns. A major advantage of burning used tyres in cement kilns is that solid waste is not generated as the ash residues from the tyre combustion are bound to the final product, while the sulphur is not emitted as it is transformed and bound into gypsum, which is added to the final product³⁹.

In Europe, the USA, Japan and Korea, cement kilns are among the most common end users of tyres for their energy content. In some countries, such as Austria, France, Germany and Sweden, up to 65% of the total quantity of used tyres is incinerated in cement kilns. In Europe and the US totally dedicated tyres-to-energy power plants have been built⁴⁰.

The high proportion of used tyres being used as fuel indicates that the disposal fee paid to cement kilns is lower than the disposal fee paid to reprocessors. In a number of European countries it is cheaper to landfill or incinerate tyres, rather than to recover them.

³⁷ Chris Forrester, Reclaim Industries, Personal communication.

³⁸ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

³⁹ Jones, K.P. (1997). "Rubber and the Environment". International Rubber Research and Development Board. Paper presented at the International Rubber Forum, 12-13 June 1997, Liverpool. International Rubber Study Group. London, cited in Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

⁴⁰ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

It is certainly cheaper to landfill tyres in WA than it is to recycle them. Tyres have not been used as fuel to any extent to date in WA, however it is likely that TDF would be highly economically viable compared with recycling, particularly as the Cockburn cement kiln is able to use whole tyres.

One review⁴¹ of options for used tyres found that after retreading, which is the best strategy for value recovery, requiring the least new material and energy to achieve the highest value-added use in the economy, energy recovery is the second best option. In Europe further expansion of tyre derived fuel (TDF) is hampered by local regulations and lack of adequate infrastructure for collection and transport.

For example in Austria, energy recovery declined from 70% in 1993 to 40% in 2000, partly due to special emission regulations for TDF in 1993⁴². The incineration of other waste is not subject to the same regulation and as a result, it has become more attractive to use alternative waste materials, such as plastics as fuel input for the cement industry.

In addition to the possible political issues of using tyre derived fuel it is generally considered to be of lower environmental benefit than recycling⁴³, though a detailed life cycle analysis would need to be undertaken for WA in order to determine if this is the case here. The establishment of a TDF option for passenger tyres in WA is likely to prevent the development of recycling for passenger tyres⁴⁴.

Sims Tyrecycle claims to process 7 million of the 20 million waste tyres generated annually in Australia, however it is unclear what proportion of this is actually landfilled as the web site ⁴⁵states the most common avenues for tyre disposal are:

- For reuse as second hand tyres and retreadable casings
- Supplied to the cement industry as tyre derived fuel for energy recovery
- Granulated as feed stock material for the production of rubber crumb
- Shredded for civil engineering applications
- As a last resort, applied to landfill in its reduced form.

The URS Report⁴⁶ states that Sims Tyrecycle collect and dispose of 66,500 tonnes of tyres per year or 28% of the tyres entering the national end-of-life tyres and produced about 10,000 tonnes

⁴¹ Amari, T., N.J. Themelis, and I.K. Wernick (1999). Resource recovery from used rubber tires, *Resource Policy* 25; 179-188, cited in *Improving Markets for Used Rubber Tyres*, Pieter van Beukering, Chapter 4 in *Improving Recycling Markets*, Environment Policy Committee OECD, September 2005.

⁴² MoA (1993) Regulation of the Federal Ministry of Agriculture for Air Emission Limits in Cement Kilns (BGBl No. 63/1993), Vienna, cited in *Improving Markets for Used Rubber Tyres*, Pieter van Beukering, Chapter 4 in *Improving Recycling Markets*, Environment Policy Committee OECD, September 2005.

⁴³ For example UK Waste Tyre Management Best Practice: Handling of Post-Consumer Tyres – Collection & Storage The Waste & Resources Action Programme, May 2006 www.wrap.org.uk

⁴⁴ Will Van Grootel, Tyre Recyclers WA, Personal communication.

⁴⁵ www.sims-group.com/tyrecycle/tyre-recycling/tyre-recycling_sc.asp

⁴⁶ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

of rubber crumb in 2005 or about 56% of the rubber crumb produced in Australia. Sims Tyrecycle supplies whole tyres as fuel to the Blue Circle cement kiln at Waurin Ponds in Victoria. It has been estimated that 50% of all Victorian generated waste tyres are used as fuel in cement kilns⁴⁷.

Sims Tyrecycle does not crumb passenger tyres but sends them all to the Blue Circle kiln⁴⁸, including all of the passenger tyres it receives from South Australia⁴⁹.

Oversized tyres

There is currently no reprocessing of oversized tyres in Australia. The large percentage of steel in these tyres (up to 50%) and the large size makes shredding difficult. There is however interest in developing reprocessing options for oversized tyres, for example AustralAsian Rubber is planning to import European equipment to establish a plant to handle oversized tyres in Brisbane⁵⁰.

A major tyre repairer and retreader based in WA is considering importing machinery to shred used oversized tyres to produce crumb for different applications⁵¹. Used tyres would be brought to the plant by trucks used to take new tyres to sites. Several research projects investigating possible new applications for the use of rubber crumb are underway in Perth. The business has been negotiating with the major mining companies and plans to make announcements in the next three to four months.

The use of oversized tyres in civil engineering applications is well established and there is the potential to expand this use. Mine tyres have engineering value as a structural device because of their mass and strength. They are virtually indestructible. The potential demand for the structural value provided by mine tyres is "far greater than could be met by the annual flow of mine tyres"⁵².

There is also some limited use of oversized tyres for TDF with Flexthead International sending casings that are not suitable for retreading to Blue Circle Cement at a cost of \$300/tonne⁵³.

It seems likely that a ban on the landfilling of all tyres or a requirement to recycle all tyres could lead to increased use of oversized tyres for these applications.

Impacts on landfill operators

Currently at least 40%⁵⁴ of the approximately 36,000 tonnes of used tyres generated each year in WA is landfilled. Almost 70% of the 13,140 tonnes of passenger tyres generated in the metropolitan region is landfilled.

⁴⁷ A National Approach to Waste Tyres, prepared for Environment Australia by Atech Group, 2001.

⁴⁸ Chris Forrester, Reclaim Industries, Personal communication.

⁴⁹ Ian Harvey, ZeroWaste SA, Personal communication.

⁵⁰ John Rossi, AustralAsian Rubber, Pty Ltd., Personal communication.

⁵¹ Confidential industry source.

⁵² Tim Edwards, Ecoflex Australia, Personal communication.

⁵³ Tim Prest, Flexthead International, Personal communication.

There are only two landfills receiving tyres from the metropolitan region in any volume: the JW Cross landfill at Stanley Road Australind and the STEG tyre monofill at Brookton.

The Australind landfill is an inert landfill that receives other inert waste as well as tyres which are buried separately. While most of the tyres received here originate in the metropolitan region, Rick Cross also operates a bin collection system for tyres from the south-west including Dunsborough and Busselton. The landfill has been receiving very large volumes of tyres from the metropolitan region due to the cheaper landfill price, however Rick Cross has increased prices significantly over the past year, from \$10/m³ which equates to about \$300 for a 7 tonne truck or \$42-43/tonne to \$50/tonne in 2005 and recently to \$15/m³ or about \$90/tonne⁵⁵. The price will increase further in 2006 to \$20/m³.

The price increases are partly driven by the realisation the low rates have been bringing most collectors to deliver their tyres from the metropolitan region to the landfill, resulting in such large volumes it is difficult for the landfill to meet its licence conditions for cover and fire control. The other factor contributing to increased prices is the increase in the landfill levy for waste from the metropolitan region and the change to measurement of waste in cubic metres rather than tonnes⁵⁶. Rick Cross has also informed collectors that loose tyres will no longer be accepted from the metropolitan region and should be baled prior to delivery, recognising the bales are much easier to handle and have a greater potential for recovery in the future.

The \$30 charged per bale is much less than the price for loose tyres as a bale equates to about 120 passenger tyres or just over 1 tonne.

While a total ban on landfilling of tyres would impact financially on this business, as the landfill is an inert site that receives many other wastes the impact is not likely to close the business. In the future there may be some prospect of income from recovery of the tyres already stored at the landfill.

The STEG monofill receives tyres only from the metropolitan region and monofills them as bales. The current gate price is \$55/tonne, effectively \$55/bale⁵⁷. As this monofill receives only tyres a total ban on tyre landfilling would close the business, resulting in loss of employment for the operator. In time if the demand for tyres increased due to increased recycling or use of tyres for fuel there may be the prospect of retrieving and selling the stored tyres.

Major regional landfills receiving significant volumes of tyres include those at Albany, Broome, Geraldton, Kalgoorlie-Boulder, Geraldton, Karratha and Port Hedland⁵⁸. Of these, the Albany

⁵⁴ Review of Management of Used Tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

⁵⁵ Rick Cross, JW Cross and Sons, Personal communication.

⁵⁶ Rick Cross, JW Cross and Sons, Personal communication.

⁵⁷ Peter Bertei, STEG, Personal communication.

⁵⁸ Review of Management of Used Tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

(Vancouver Waste) and Geraldton (Humpty Doo) site are privately managed monofills and a ban on landfilling or a requirement for recycling would impose a significant financial impact on these operations. Most of the other Council run sites would welcome alternative destinations for used tyres, which are difficult to manage at landfills and in some cases are using so much landfill capacity that new landfills will be required⁵⁹.

There are however likely to be more difficult issues with collection and transport of tyres from remote and rural areas perhaps requiring stockpiling until sufficient tyres are accumulated to justify collection or shredding prior to transport. Management of these stockpiles could be undertaken by current landfill operators or new facilities could be established on major transport routes⁶⁰.

In Port Hedland there are currently no contractors in the area able to assist with recycling, shredding, baling or cutting, all of which would make the issues more manageable. The Town would be keen to participate in establishing a regional tyre facility.

Impact on collectors

Assuming that a landfill ban on tyres and/or a mandatory requirement for recycling were phased in with appropriate transition periods (discussed in more detail in Chapter 5), the required infrastructure for recycling and or energy recovery would be in place to cope with the volumes of tyres being generated. Given the need to compete with other States for recycling infrastructure and the loss of the landfilling option, it is probable that the gate price charged by recyclers will have increased to levels comparable to other States. Collectors would presumably pass this cost onto retailers who may absorb the extra cost or pass it in turn onto customers.

There should be no other negative impact on collectors who will simply deliver tyres to a different destination. The requirement to transport tyres to recycling or energy recovery facilities should create opportunities for collectors, who currently operate in a very competitive industry. Presumably there will be higher costs of entry for collectors planning to operate in rural and remote regions, due to the higher cost of fuel and the need to purchase mobile shredders or balers to make transport more economical. These higher costs will be reflected in the collection charges.

Impacts of stockpiling

An immediate ban on the disposal of all tyres in any form to landfill would lead to very large stockpiles of used tyres across the State in quite a short time. If the ban was announced with an appropriate transitional period, likely to be at least two to three years, the impacts on stockpiles might be less dramatic but there are still likely to be significant adjustment issues.

⁵⁹ Darryal Eastwell, Manager Environmental Health, Town of Port Hedland, Personal communication.

⁶⁰ Triple Bottom Line Analysis of the Used Tyre Industry, Sustainable Strategic Solutions for the Department of Environment WA, July, 2005.

There can be very significant social and environmental impacts from stockpiled tyres including impacts on visual amenity.

The most commonly reported potential environmental impacts are⁶¹:

- compounds leaching from the tyres and contaminating soil, groundwater and surface water;
- tyre fires causing the release of pyrolytic oils and other compounds into the soil and groundwater and smoke, coupled with contaminated runoff of water used to extinguish the fire;
- tyre piles may become breeding grounds for insects, particularly mosquitoes, rodents and other animals.

If stockpiles were created as a result of a ban on landfill or mandatory recycling extra enforcement effort would be required to ensure such impacts were minimised. Draft guidelines for the management of above-ground stockpiles have recently been developed⁶².

Regional impacts

A ban on landfilling tyres could be applied state-wide or only in particular regions. The existing Tyre Landfill Exclusion Zone (TLEZ) is defined in the *Environmental Protection Regulations 1987 Part 6 Tyres*. The zone covers the Perth metropolitan area and surrounding local government districts and includes the towns of Beverley, Boddington, Brookton, Chittering, Gingin, Mandurah, Murray, Northam, Toodyay, Wandering and York⁶³.

Tyres may only be disposed in the TLEZ with the written permission of the CEO of the Department of Environment and Conservation. Outside the TLEZ they may be disposed at a licensed landfill site or at other sites approved by the CEO.

In effect the TLEZ has been rendered ineffective through the provision of exemptions to several landfills within the zone. Assuming a transition period sufficient to allow the development of recycling and energy recovery infrastructure it would seem a ban on landfilling of tyres could be implemented in the TLEZ with little negative impact on stakeholders, other than those identified for monofill operators. There would however need to be increased enforcement to prevent the illegal transport of tyres from within the TLEZ to landfills outside the area.

There are however a much broader range of issues to be considered for areas outside the TLEZ. As noted above the collection costs will be much higher assuming tyres need to be brought to Perth for recycling or energy recovery. Some civil engineering applications will use tyres,

⁶¹ End-of-Life Tyre Management: Storage Options Final Report for the Ministry for the Environment (New Zealand), MWH New Zealand, July 2004.

⁶² Recovery of Tyres in Remote Locations, GHD for the Department of Environment WA, July 2006.

⁶³ Technical Report: Management of Used Tyres in Western Australia, TJ Waters Environmental 2003.

particularly oversized mine tyres close to their source, creating little extra expense other than the need to stockpile sufficient numbers for particular projects.

The cost imposed on the generators of other used tyres in remote and regional areas is likely to be significant and politically difficult.

The national product stewardship scheme includes a proposal for a rebate on the transport of used tyres from remote and rural areas to make the cost equal to sourcing used tyres from metropolitan areas in recognition of this issue⁶⁴.

Table 1: Relative average costs for the transport of tyres⁶⁵

Region	Assumed kilometres for transport	Cost \$/EPU	Cost \$/tonne
Metropolitan	25	0.81	102
Regional centre	150	1.96	245
Rural	400	3.35	418

The modelling assumed the rebate would commence in the second year of the scheme and would operate for five years, at a cost of \$35.9 million Net Present Value. It is not possible from the published results to determine how much of that rebate would be allocated to WA.

The modelling does however illustrate the fact that tyres are unlikely to be transported from remote and rural areas without either a rebate or a very high demand for used tyres for recycling/recovery.

Additional environmental costs are incurred in transporting tyres for recycling or energy recovery and a cost-benefit analysis should be undertaken to determine whether the extra greenhouse gas emissions negate the environmental benefits of resource recovery/substitution.

Summary

A landfill ban or a mandatory requirement for recycling would both increase the price paid to recyclers.

In most other jurisdictions that have implemented landfill bans on tyres the use of TDF has been established as a major outlet for used tyres. It seems likely that WA would also need this outlet before 100% of used tyres could be successfully diverted from landfill. The use of tyres as fuel in cement kilns is likely to be much cheaper than recycling into rubber crumb, particularly as the

⁶⁴ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

⁶⁵ Table Reproduced from Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

Cockburn Cement kiln would not require pre-treatment of the tyres and this fact may prevent the development of recycling options if TDF was approved.

A total ban on landfilling or a mandatory requirement for recycling would require a long transition period and substantial effort to create options for recycling and recovery and may still result in substantial stockpiles, particularly in remote and rural regions. There are significant transport cost issues to be overcome before a state-wide ban or requirement could be considered.

Table 2: Potential impacts of a ban on disposal of all tyres to landfill/ mandatory recycling of all tyres

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Improved use of landfill space Potential negative impacts of stockpiles	Increased costs of enforcement to prevent illegal dumping & manage stockpiles	Possibly increased employment for management of stockpiles, local civil engineering projects Potential negative impacts of stockpiles
Tyre recycling industry	Improved environmental outcomes from recycling and/or energy recovery	Expanded business opportunities, security of supply/increased competition for tyres from new entrants	Increased employment
Community (metropolitan and country)	Perceived negative impacts of TDF	Potentially higher costs of tyre replacement to cover gate fee for recycling/recovery; Potentially much higher costs for rural & remote tyre consumers	Potential loss of amenity due to tyre stockpiles/dumping (country)
State government	Improved environmental outcomes from recycling and/or energy recovery	Increased costs of enforcement to prevent illegal transport/dumping & manage stockpiles	Increased employment in recycling industry
Manufacturing or retail sectors		Higher costs of tyre collection, may need to be passed on to consumers Cheaper fuel for some sectors (TDF)	
Mining sector		Potentially high costs for collection, may be offset by savings in using tyres for civil engineering projects at mines	
Landfill operators	Improved management of landfills	Loss of income, particularly tyre monofills/potential to sell stored tyres	
Waste collectors/transporters	Greenhouse gas emissions of transport from rural & remote areas	Increased opportunities if tyres are collected from remote/rural areas	Increased employment

3. Potential impacts of a ban on the disposal of particular types of tyres to landfill/ Mandatory recycling of particular types of tyres

This Chapter examines the option of banning the disposal of particular types of tyres to landfill or alternatively of imposing a mandatory requirement that some types of tyres should be recycled.

Impacts of a ban on the disposal of passenger tyres to landfill/Mandatory recycling of passenger tyres

As discussed in the previous chapter there is the potential for passenger tyres to be used as fuel in cement kilns and power stations.

In Victoria over 15,000 tonnes of tyres per year are used as fuel in cement kilns⁶⁶.

The Cockburn Cement kiln could burn whole used tyres up to the size of 4 WD tyres as fuel⁶⁷. This use could potentially take up to 10,000 tonnes per year, a significant proportion of the estimated 18,000 tonnes of passenger tyres generated in WA each year.

If 73% of the 1.8 million used passenger tyres generated in WA each year are in the Perth metropolitan region⁶⁸, this represents 13,140 tonnes. It has been estimated that about 66% of this volume (8,652 tonnes) is currently landfilled at one of three landfills⁶⁹ so use as TDF would certainly divert at least this much volume from landfill.

The use of passenger and 4WD tyres as fuel would almost certainly prevent the development of recycling options in WA as discussed below.

Acceptance of the use of tyres as fuel would require community consultation and perhaps considerable time as well as the development or adoption of acceptable emission standards.

If the ban was only applied in metropolitan regions extra enforcement effort may be required to ensure tyres are not illegally disposed of outside the metropolitan area.

A State-wide ban would presumably result in extensive stockpiling of used passenger tyres in remote and rural areas unless there was subsidised transport to cover the costs of collectors and allow equivalent prices to be paid to the kiln operator as for metropolitan tyres. As discussed in Chapter 2, it would be politically difficult to pass the high costs of transport on to the tyre retailer and through them to rural and remote consumers.

Without the TDF option it seems probable that a ban on landfill would not necessarily increase the recycling of passenger tyres in WA. There is currently no capacity in Victoria, WA or SA to

⁶⁶ Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis, Nolan-ITU for Zero Waste SA, October 2004.

⁶⁷ Chris Forrester, Reclaim Industries, Personal communication.

⁶⁸ Economics of Tyre Recycling, ARRB Transport Research Ltd, June 2004.

⁶⁹ Review of Management of Used Tyres at Landfill Sites, Sustainable Strategic Solutions for the Department of Environment and Conservation WA, August 2006.

reprocess passenger tyres for crumb rubber⁷⁰. The only business crumbing passenger tyres is Chip Tyre in Queensland which operates at a tip site and has ready access to landfill space to dispose of the large quantities of fluff resulting from the process. While the shredders needed for processing passenger tyres are smaller and need less maintenance than those shredding truck tyres, the lower rubber content and higher fibre results in lower returns⁷¹. The costs of stockpiling would have to be high enough to force the gate price for passenger tyres up considerably to provide the incentives needed for developing this capacity according to Reclaim Industries.

Severe limitations on the size of stockpiles, combined with extensive enforcement efforts to prevent illegal stockpiling and dumping may be required to achieve this outcome.

One business planning to establish a crumbing facility in WA will focus on larger tyres, up to the large earthmovers, but will also have the capacity to process passenger tyres⁷². The fine crumb to be produced by this plant commands high market prices and would not necessarily require a higher gate price to make the business profitable.

Another operator is attempting to establish a joint venture with Chinese companies who would invest in a turn-key plant capable of crumbing passenger and 4WD tyres⁷³. The crumb will be exported to China as there is not a large enough market in Australia. The plant is a large investment (\$1.5M) and will be capable of producing at least 15 tonnes/day with one shift.

The joint venture would be assisted by certainty regarding the rebate to be paid under the national scheme; in particular they need clarification of whether the benefit will be paid on crumb sent offshore. This business is also concerned about the possible development of an energy recovery option in WA as this would make recycling of passenger tyres uneconomic and the possibility of the Government approving another tyre landfill which accepts loose tyres which may lower the price of landfilling. Both an energy option and a cheap landfill option would make it impossible to collect and reprocess tyres at a profitable level, at least until the national scheme is in place.

Depending on the costs of stockpiling it may become feasible to export passenger tyres for cheap reprocessing in south-east Asia or to send tyres interstate.

A requirement that passenger tyres must be recycled may encourage the establishment of infrastructure to recycle these tyres, however it is more likely that this mandatory requirement will result in either stockpiling, or if this is not an option, in increased transport of tyres from WA and/or illegal dumping.

⁷⁰ Chris Forrester, Reclaim Industries, Personal communication.

⁷¹ Chris Forrester, Reclaim Industries, Personal communication.

⁷² Jonathon Youngs, Saypol, Personal communication.

⁷³ Will Van Grootel, Tyre Recyclers WA, Personal communication.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

Table 3: Effects of a ban on passenger tyres to landfill/mandatory recycling of passenger tyres

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Issues of stockpiling in rural/remote regions: mosquito breeding, fire risk	Possible costs of managing stockpiles/enforcement	Possible impacts on visual, noise amenity of stockpiles in rural areas
Tyre recycling industry		Unlikely to stimulate crumbing which has other constraints	
Community (metropolitan and country)		Higher prices for tyres to cover costs of collection and transport from rural/regional areas. Slight increase possible if ban applies only to metropolitan area.	Possible impacts on visual, noise amenity of stockpiles in rural areas
State government	Improved environmental outcomes for TDF compared with current fuels/resource conservation, poorer outcomes for TDF compared with recycling	Need for significant enforcement effort to prevent illegal dumping and manage stockpiles, particularly if applied outside metropolitan area.	Need for considerable effort in community consultation to achieve acceptance of TDF
Manufacturing or retail sectors	Improved environmental outcomes for TDF compared with other fuels	Very positive impact if tyres can be used for TDF	Likely to be considerable community concern regarding TDF
Mining sector		Higher prices for tyres to cover costs of collection and transport.	
Landfill operators		Negative impact on monofill operators: closure of business/	Loss of employment
Waste collectors/transporters		Increased business opportunities with collection from outside metropolitan area	

Impacts of a ban on the disposal of truck tyres to landfill/Mandatory recycling of truck tyres

As truck tyres are currently recycled in WA and there is potentially extra capacity to recycle more of these tyres, there may be value in banning the disposal of these tyres to landfill or imposing a requirement for mandatory recycling.

Reclaim Industries is considering closing the WA operation because the gate price it receives for accepting truck tyres is too low to make the business competitive. In SA, where there is a ban on the disposal of whole tyres to landfill, the cost of shredding makes landfill comparable to sending tyres for recycling and the gate price for a truck tyre is three times higher than in WA. Reclaim

competes with tyre reprocessors operating in the Eastern States who receive much higher gate prices for the tyres they recycle.

Some stakeholders have expressed a view that recycling by Reclaim is intrinsically uneconomically viable because of their reliance on being paid a gate fee to take used tyres. However this is the situation throughout Australia⁷⁴ and indeed throughout most countries, including in Europe, where the disposal fee is an important source of income for tyre processing companies⁷⁵.

In Europe the cost to used tyre collectors of landfilling and incineration compared with recycling is often the main driver for the fate of the tyres, with the disposal fee paid to the cement kilns being lower than the fee paid to recyclers and where landfill fees are lowest most tyres are disposed to landfill.

URS notes that in most cases the fee paid by the collector to a transformer (reprocessor) is less than the fees the collector would need to pay a landfill operator. This is the case in other States of Australia where landfill fees are much higher than in WA. URS uses average figures of \$150/tonne (whole loose tyres) paid by the collector to the landfill operator and \$125/tonne paid by the collector to the transformer.

In WA landfill operators charge between \$90 - \$125/tonne loose tyres⁷⁶ and \$30 - \$55/tonne baled tyres⁷⁷. Balers charge about \$1/EPU or about \$120/tonne so that the price of landfilling baled tyres is \$150 - \$175/tonne.

The level at which landfill gate fees are set is an important factor in providing incentives for different management options. Collectors must be required to pay less to transformers to take their tyres than to landfill operators in order for tyres to be supplied to recyclers rather than landfilled.⁷⁸ This dynamic is similar in most recycling businesses, including paper and cardboard and plastics where part of the income is derived from being paid to collect or accept "wastes" and part is derived from sales of the recycled material. The National Product Stewardship Scheme aims to alter this by providing a subsidy to processors and therefore increase market demand for used tyres, eventually moving over about ten years to a point where tyres will have value and be bought for recycling.

Reclaim currently receives from \$3.40 to \$7.25 to collect each truck tyre. Bridgestone is willing to pay a premium due to the company's concern to ensure its tyres are properly handled. The \$7.25 collection fee results in a gate price of about \$3.85, equivalent to about \$77/tonne, which is now considerably less than the recently increased landfill fees.

⁷⁴ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

⁷⁵ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

⁷⁶ Rick Cross, JW Cross and Sons, personal communication: Current charges are \$15/m³ with about 6m³ equivalent to a tonne. This charge is about to increase to \$20/m³.

⁷⁷ Rick Cross, JW Cross and Sons, Personal communication; Peter Bertel, STEG, Personal communication.

⁷⁸ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

Reclaim Industries acknowledges that it is itself partly responsible for the low gate price in WA as it undercut the market in 2005 in order to win contracts for tyre collection and improve its certainty of supply. Reclaim Industries is currently losing money on each passenger tyre collected on its behalf as collection and disposal costs \$1.40.

Reclaim says that there is still one collector who undercuts their price⁷⁹.

Table 4: Industry pricing for used tyre collection

Collector	Passenger (\$ per tyre)	Light Truck (\$ per tyre)	Truck (\$ per tyre)
Reclaim/Reclaim contractors ⁸⁰	0.70		3.40 SPT Metro 7.25 Bridgestone Metro
WA South west ⁸¹	2.00	3.00	8.00
Northern WA	2.50	4.00	7.00
East (Kalgoorlie region)	3.00	5.00	9.00
Perth Metro	1.50	2.60 – 2.80	8.00 – 10.00
SA Tyre ⁸²	1.45 Bridgestone Metro 1.90 Other metro customers	3.10 Bridgestone Metro 3.95 Other metro customers	7.90 Bridgestone Metro 9.50 Other metro customers
Budget Retreads SA ⁸³	2.00 Metro 1.90 dropped off 3 country (Gawler to Mildura)	4.00 Metro 4.00 dropped off 5.00 country	12.00 Metro 11.00 dropped off 14.00 country
"Industry" ⁸⁴	1.60 Adelaide metro		8.00 Adelaide metro
"Industry"	1.20 Melbourne metro		5.00 Melbourne metro
"Industry"	1.50 Sydney metro		8.00 Sydney metro
"Industry"	1.50 Brisbane metro		8.00 Brisbane metro

The prices quoted are exclusive of GST.

Reclaim believes that if there were a ban on the disposal of truck tyres to landfill collection prices could be raised to around \$7.90 (+ GST) for Bridgestone, \$9.50 (+ GST) for others⁸⁵, allowing Reclaim to charge a gate price of about \$5.50 per tyre.

A gate price of \$5.50/truck tyre is equivalent to about \$110/tonne of truck tyres which is in the mid-range of current landfill prices for loose tyres (\$90 - \$125/tonne) and lower than the price for baling and monofilling (\$150 - \$175/tonne).

⁷⁹ Chris Forrester, Reclaim Industries, Personal communication.

⁸⁰ Chris Forrester, Reclaim Industries, Personal communication.

⁸¹ WA regional figures provided by Marie Donato, Motor Trade Association. Figures are averages & were provided by MTA members.

⁸² SA Tyre figures provided by Chris Forrester, Reclaim Industries.

⁸³ Sue Weeks, Budget Retreads, Personal communication.

⁸⁴ "Industry" figures provided by Allan Kerr, Sims Tyrecycle to Chris Forrester, Reclaim Industries.

⁸⁵ Chris Forrester, Reclaim Industries, Personal communication.

Reclaim is selling its products at market price and claim this is not the issue affecting their competitiveness⁸⁶; however some stakeholders believe that if there is such demand for the product Reclaim should be able to raise its prices even though other reprocessors supply cheaper crumb.

Competition from imported crumb is not the issue as imported product from South Africa and Malaysia is more expensive and of a lower quality. Most Asian crumbed rubber is from buffings (retreaded tyres) or shoe soles.

Impacts on retailers

Current up-front disposal fees charged by tyre retailers are in the order of \$2.50 per passenger tyre⁸⁷, ⁸⁸ or up to \$10 per truck tyre⁸⁹, however many retailers now include this fee in the price of a new tyre⁹⁰ so the price is not transparent.

Under the national product stewardship scheme the Department of Environment and Heritage expects that the up front disposal fee will be replaced by the payment of the rebate to recyclers⁹¹. It is expected that the benefit payment to recyclers and re-users of tyres will reduce the fee that they charge collectors (and possibly turn into a payment over time). It is hoped that this will, in turn, reduce the rate at which retailers are charged by the collectors for the used tyres (using a benefit payment to create a pull-through effect in they system for used tyres).

The National Tyre Product Stewardship Scheme would reinforce the market opportunities for tyre-derived products. The payment of the benefit is expected to cover the up-front costs associated with transport, sorting, shredding and crumbing of tyres. The remainder of upfront costs (if any) would be corrected by the increased demand for tyres from competitors through market forces. A critical aspect is the access to sufficient supply of used tyres to meet the demand.

The description of the disposal fee by retailers as an “environmental levy” may become an issue with the commencement of the industry scheme for tyres. This description may contravene trade practices law and the ACCC or the relevant fair trading authority in each State or Territory “should be requested” to stop the term being used. Information will be provided to retailers relating to the details of the industry scheme to encourage the correct use of the correct term. The Motor Trade Association of Australia will inform its members about appropriate descriptions of the disposal fee⁹². At the least from the beginning of the scheme the Motor Trade Association will promote transparency in the use of disposal fees so that consumers will be told how much they are being charged for tyre disposal.

⁸⁶ Chris Forrester, Reclaim Industries, Personal communication.

⁸⁷ Michael Bissell, Department of Environment and Heritage, Personal communication.

⁸⁸ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

⁸⁹ Chris Forrester, Reclaim Industries, Personal communication.

⁹⁰ Marie Donato, MTA WA, Personal communication.

⁹¹ Michael Bissell, Department of Environment and Heritage, Personal communication.

⁹² Draft End-of-Life Tyres Issues Paper, Department of Environment and Heritage, August 2004.

If the average price of a truck tyre is \$300⁹³ and retailers currently charge \$10 for disposal it would seem that Reclaim raising its gate price would not impact on the consumer, particularly as the higher gate price would only be to around the level of recently increased landfill prices. However there will be an impact on tyre retailers who will pay more for tyre collection and they may pass this cost onto the consumer.

The Department of Environment and Conservation has previously examined the possibility of a ban on the disposal of used truck tyres from the metropolitan region to landfill. This was to be implemented through changes to the license conditions of landfills in the Perth Metropolitan and greater Bunbury areas receiving used tyres. During the 21 day comment period concerns were expressed by landfill operators that truck tyres would still be delivered to landfills but recyclers were unwilling to collect them from landfills outside the metropolitan region, for example Australind. Collectors would need to pay the extra cost of transporting tyres to Perth from Bunbury and delivery to the recycling facility would result in a higher gate charge than at the landfill. It was also suggested that illegal dumping in bushland would become more frequent as a result of the policy⁹⁴.

Since January 2006 Reclaim Industries has effectively been receiving all truck tyres from the metropolitan region as STEG has continued to refuse to accept them and Rick Cross has told collectors they should be taken to the Reclaim facility rather than delivered to the Australind landfill. There seems to be no issue for collectors in sorting truck tyres from passenger tyres as this change has been implemented without protest. Truck tyre retailers are generally in separate locations to passenger tyre retailers so perhaps truck tyres are collected separately.

If the ban was State-wide there would be a need to transport tyres from country landfills or retailers to Perth. This would cost \$5 per tyre for tyres generated in the South-West from the Australind landfill and would mean a collection fee of \$10 per tyre to cover this cost and a \$5 gate fee for Reclaim⁹⁵. Rick Cross currently charges \$5 per truck tyre, to increase to \$7 per tyre in September. The cost of transporting tyres longer distances would obviously be higher.

The impacts of a State-wide ban on the landfilling of truck tyres would result in stockpiling in rural and remote areas and create additional sorting and enforcement costs. A ban on stockpiling and/or a requirement to recycle truck tyres would have a much greater impact in regional areas as not only the higher gate price but also the cost of transporting tyres to Perth would need to be passed on to the retailer and presumably the consumer. Coupled with the effects of higher fuel costs on transporters and the communities they service this is likely to be very hard to implement for political reasons.

⁹³ Chris Forrester, Reclaim Industries, Personal communication.

⁹⁴ Philip Hine, Department of Environment and Conservation, Personal communication.

⁹⁵ Rick Cross, JW Cross and Sons, Personal communication.

Impacts on recyclers

The Department also expressed concern that Reclaim Industries may not be able to deal with the increased numbers of truck tyres if landfill disposal was banned for truck tyres from the metropolitan region, however industry cooperation has led to the current situation where all truck tyres from the metropolitan region are sent to Reclaim Industries. Since Rick Cross stopped accepting truck tyres from the metropolitan region in January 2006 the volumes received by Reclaim have increased considerably⁹⁶.

Reclaim Industries has temporarily stopped accepting tyres (mid July) while they undertake maintenance activities and consider the future, with a final decision regarding continuing operations in WA to be made within 3 months. They are still processing the tyres they have stockpiled and still collecting tyres from South Pacific and Bridgestone under contract, however these tyres are currently being landfilled. The Bridgestone contract has just been renewed.

Reclaim would invest in another granulator if truck tyres were banned from landfill. Their preference would be for a ban on the disposal of truck tyres to landfill in the TLEZ Zone 1 initially, with a transition period of 4 - 6 months. Reclaim would need to obtain another shredder as theirs has been sent to SA for shredding passenger tyres to landfill.

The social impacts of losing the Reclaim facility from WA include loss of employment: the workers in the factory and office and potentially the indigenous workers employed by Cecil Phillips' company Blackatyre, which only collects tyres for Reclaim.

It seems certain that Reclaim Industries will establish a facility in South Australia, whether or not they retain the operation in WA. However there are questions regarding the certainty of supply in South Australia with its relatively small population.

The recycling data for South Australia included in the Hyder Report⁹⁷ estimates 8,100 tonnes of used rubber was generated in 2002-03, with only 1% of this being recycled. A more recent Nolan ITU report⁹⁸ estimated that in 2003 there were 16,500 tonnes of passenger tyres sold into SA each year, with a further 9,600 tonnes of other tyres including truck tyres. In 2003 (the most recent data available) less than 100 tonnes was recycled in SA⁹⁹.

Sims Tyrecycle is already collecting truck tyres from South Pacific in Adelaide and sending them to Melbourne to a very large plant where they process tyres from Brisbane, Sydney and Melbourne as well as Adelaide.

⁹⁶ Chris Forrester, Reclaim Industries, Personal communication.

⁹⁷ Waste and Recycling in Australia, Report prepared for the Department of Environment and Heritage, Hyder Consulting Pty Ltd, February 2006.

⁹⁸ Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis, Nolan-ITU for Zero Waste SA, October 2004.

⁹⁹ Review of Recycling Activity in South Australia Stage 1 - Quantification of Future Expansion Priorities, Nolan-ITU for Zero Waste SA, November 2004.

The product from this plant is mostly being exported to China where Sims Tyrecycle has a large contract for at least the next two years. Reclaim Industries is picking up the resulting business in the Australian market¹⁰⁰.

Another company, Biofloat, uses the rubber from truck tyres to manufacture truck body liners and dam covers¹⁰¹.

Zero Waste SA has provided Reclaim Industries with contacts for financial assistance and there is the option of establishing a facility in the recycling precinct where the land is controlled by the Adelaide City Council. There is also the possibility of infrastructure grants.

If Reclaim Industries did close the WA facility there is the possibility that another recycler may establish itself in WA. A ban on landfilling of truck tyres is unlikely to attract another recycler if Reclaim Industries remains in WA as there is insufficient supply of truck tyres to meet the needs of two recyclers, with Reclaim already processing virtually all of the truck tyres from the metropolitan region.

Governments are understandably wary of distorting markets through regulatory actions, particularly where there is a monopoly provider as is currently the case with rubber recycling in WA, however recent increases in the landfill prices for tyres and in collection prices have already increased the gate price for tyre disposal to within the range Reclaim industries proposes to charge for recycling. Several European countries with much larger volumes of used tyres have only one recycler¹⁰². For example Valorpneu, a private company in Portugal covers almost the entire tyre market. In Austria there is only one material recycling plant, called GVG Gummiverwertungs GmbH, which shreds about 30,000 tonnes of tyres per year, of which 15,000 to 18,000 tonnes is made into rubber granules and 3,000 to 6,000 tonnes into rubber meal. The remainder is burned in cement kilns.

The question remaining is whether a ban on the disposal of truck tyres to landfill or a mandatory requirement for recycling is the best way to achieve (and maintain) the recycling of truck tyres in WA.

Impact on landfill operators

There would be no impact on landfill operators of a landfill ban for truck tyres from the metropolitan region as this is effectively the status quo, achieved through voluntary decisions by landfill operators not to accept truck tyres. There would be potentially positive impacts on rural and regional landfills as truck tyres take up landfill space and are difficult to manage in landfills. The

¹⁰⁰ Chris Forrester Reclaim Industries, Personal communication.

¹⁰¹ Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis, Nolan-ITU for Zero Waste SA, October 2004.

¹⁰² Report on Implementation of The Landfill Directive in the 15 Member States of the European Union, Golder Associates (UK) for the European Commission, October 2005.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

extent of the negative impacts would depend very much on how the tyres were managed, whether they were still delivered to landfills and stockpiled for future transport to Perth or stored elsewhere. The most likely situation is that landfill operators would no longer accept truck tyres which would need to be either transported from retail premises to Perth or, given the high cost of this transport in the absence of transport subsidies they would be stockpiled.

Table 5: Effects of a ban on truck tyres to landfill/mandatory recycling of truck tyres

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Possible impacts of stockpiles in rural/remote areas	Possible need to manage stockpiles, prevent illegal dumping in rural/remote areas	Possible amenity impacts of tyre stockpiles
Tyre recycling industry		Improved business certainty through increased gate price, certainty of supply	
Community (metropolitan and country)		Slightly higher prices for truck tyres in metropolitan area; significantly higher prices for collection & transport may lead to higher price for goods in regional areas	
State government		Increased enforcement effort to ensure diversion of truck tyres from landfill, significantly increased effort if regulation is to extend outside metropolitan area.	
Manufacturing or retail sectors		Slightly higher collection & transport costs, probably not significant compared with effects of landfill price increases, very significant if extended to regional areas	
Mining sector		Significantly higher costs for collection and transport from rural/remote areas borne directly by company or indirectly through higher tyre prices	
Landfill operators	Savings in landfill space due to diversion of truck tyres (rural & remote)	No change for tyres from metropolitan area, may need to sort, manage stockpiles at regional landfills	
Waste collectors/transporters		No change for metropolitan area, increased business	

		for regional areas	
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Impacts of a ban on the disposal of oversize tyres to landfill/Mandatory recycling of oversize tyres

As there are currently few options for the recycling of oversize tyres in Australia the impacts of either a ban on landfilling these tyres or mandatory recycling would be significant.

The only established use to date is in civil engineering applications which do have the potential to use large quantities of oversize tyres, for example Ecoflex used well in excess of 500,000 EPU in 2004/05 and plans to use about 1 million EPU in 2006/07¹⁰³. One million EPU equates to about 20,000 medium earthmoving tyres or 9,500 tonnes to be used nationally. Western Australia uses at least 18,000 tonnes of off-the-road tyres each year¹⁰⁴, about one-quarter of the national usage, so there is considerable scope for expansion. A landfill ban or requirement to recycle these tyres may accelerate the uptake of projects using these tyres as construction units.

The economic, social and environmental impacts of either ban or mandatory recycling are potentially significant for mining companies and remote communities as tyres would need to be stockpiled to accumulate sufficient volumes for projects and until they were required for a construction project within reasonable (economically viable) proximity. Stockpiles would need to be well managed to avoid adverse effects such as providing habitat for mosquitoes to breed and the potential for fires. There are also issues of visual amenity which however may be minimal away from population centres.

As most oversize tyres are currently disposed of on mine sites there would need to be additional education and enforcement to divert tyres from this disposal.

The impact on landfill operators would be positive except where they are forced to manage stockpiles.

There are businesses keen to establish facilities to shred and crumb oversize/off-the-road tyres in WA, however the main barrier to their establishment is the large investment need for the plant, rather than an insufficient supply due to cheap landfill so a ban on landfilling these tyres on its own is unlikely to stimulate recycling¹⁰⁵.

¹⁰³ Tim Edwards, Ecoflex, Personal communication.

¹⁰⁴ Economics of Tyre Recycling, ARRB Transport Research Ltd, June 2004.

¹⁰⁵ Jonathon Youngs, Saypol, Personal communication.

Table 6: Effects of a ban on truck tyres to landfill/mandatory recycling of oversize tyres

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Potential impacts of stockpiles, especially fire risk, mosquito breeding	Could be a need to manage stockpiles, considerable savings available through use in construction	
Tyre recycling industry		Ban is unlikely to stimulate industry, may encourage use in construction projects	
Community (metropolitan and country)	Potential impacts of stockpiles, especially fire risk, mosquito breeding		Potential impacts of stockpiles; visual amenity, noise, traffic
State government		Cost of enforcement and education	
Manufacturing or retail sectors		Mandatory recycling may force the price of tyres up through higher costs for transporting them to recycler	
Mining sector		Mandatory recycling may force the price of tyres up through higher costs for transporting them to recycler	
Landfill operators		No real negative impact, easier to manage landfills without over size tyres	
Waste collectors/transporters		Increased business moving oversized tyres to recyclers, stockpiles	

Summary

As there are currently no options in WA for the recycling or recovery of passenger tyres a ban on their landfill disposal or a requirement to recycle them is unlikely to result in increased recycling or recovery. There is one business seriously considering a facility to crumb passenger tyres. This business requires certainty regarding the national scheme as well as the requirements for landfilling of tyres in WA. A ban on landfilling is not sought but clear direction on the likely costs of landfilling (due to baling/shredding/number of landfills) and the development of TDF options is needed.

There is existing capacity to recycle truck tyres and the recent increases in landfill prices have already made recycling a cheaper option for these tyres. Voluntary industry efforts have resulted in the diversion of almost all truck tyres from the metropolitan area to recycling and it would make sense to entrench this status quo through the imposition of a ban on landfilling of truck tyres or alternatively a requirement that they be recycled. The issue of WA having a monopoly provider of recycling services creates concern that this provider could push the gate price for receiving truck

tyres to an unreasonably high level. Now that landfill prices have increased this is not such an issue. So long as the gate price for recycling remains comparable to or below the landfill price recycling would be the rational market choice in any case.

Until there are transport subsidies available through the national product stewardship scheme it seems likely a state-wide ban on landfilling of truck tyres would result only in extra enforcement costs and stockpiling. A mandatory requirement for recycling would be likely to distort markets considerably and impact on rural and remote communities who would be forced to pay for the cost of tyre transport though higher costs for goods and services.

As there are currently limited options for the recycling of oversize tyres in WA, the only established use being in construction projects, it is doubtful that a ban on landfilling of these tyres or a requirement to recycle them would lead to a significant increase in recycling. This is particularly the case as most of these tyres are generated in remote and rural areas and would need to be stockpiled for later use or transported to Perth. However efforts should be made to raise awareness of the benefits of using tyres in construction, particularly in terms of the cost savings for regional councils.

4. Potential impacts of a ban on the disposal of particular forms of tyres to landfill/imposing a requirement for pre-treatment

As an alternative to a ban on landfilling, there could be a ban on the disposal of particular forms of tyres to landfill, for example whole tyres, or a requirement to treat tyres in some way prior to landfilling. This may have the effect of raising the cost of landfilling.

Impacts of a ban on whole tyres to landfill/ a requirement to shred tyres prior to landfilling

Reclaim Industries claims that the South Australian ban on the disposal of whole tyres to landfill provides them with much greater business certainty as it increases the cost of landfill disposal and makes establishing in SA much more attractive than remaining in WA. In South Australia tyres must be shredded to a maximum size of 250mm before landfilling¹⁰⁶. Earthmoving tyres can still be disposed of whole to landfill in spite of at least one operator being keen to move into shredding these tyres¹⁰⁷.

Most Australian States have encouraged shredding of tyres to landfill in order to save on landfill space and better manage compaction¹⁰⁸. Queensland has a policy limiting the disposal of whole tyres at new (from 2004) landfills to encourage the use of scrap tyres as a resource. For new development applications there is a limit of 10,000 EPU to be disposed of annually as whole tyres at any one facility¹⁰⁹.

There is little evidence that the requirement to shred tyres has increased tyre recycling in other States, however the prices charged for landfill disposal (of all wastes) are significantly higher and the added cost of shredding does make the higher gate price charged by tyre recyclers more competitive with landfilling.

The tyre collection industry has low barriers to entry¹¹⁰, with many collectors operating on slim margins due to high competition.

It costs about \$200,000 to buy a shredder which creates a barrier to entry for collectors and results in a higher price for collection. There are also high maintenance costs for shredders (which also affect recyclers). One source¹¹¹ reports that in the US the maintenance costs of shredder machines are 200-300% higher than the costs claimed by equipment manufacturers. One reason is the shorter than projected service lives of perishable items such as shredder knives.

¹⁰⁶EPA Guideline Waste Tyres, July 2003, www.epa.sa.gov.au/pdfs/guide_tyres.pdf

¹⁰⁷ Sue Weeks, Budget Retreads, Personal communication.

¹⁰⁸ Economics of Tyre Recycling, ARRB Transport Research Ltd, June 2004.

¹⁰⁹ Operational Policy: Limitation on the disposal of whole tyres at new landfills, EPA Queensland.

¹¹⁰ Financial and Economic Analysis of the Proposed Used Tyre Product Stewardship Scheme, URS, December 2005.

¹¹¹ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

There are very few shredders currently in WA, although some regional landfills require shredding prior to burial. Interestingly the landfill managed by the shire of Broome is encouraging shredding of tyres through a cheaper disposal rate for shredded compared with whole tyres as shredded tyres are easier to compact within the landfill¹¹². Some regional landfills bury shredded tyres with other wastes.

WA still has the cheapest landfill prices in Australia and Perth the lowest price of any capital city, even after the recent increase in the landfill levy¹¹³. Increasing the cost of disposal of tyres through requiring shredding is unlikely to raise prices to a level that will make recycling competitive with recycling in other States. In WA tyre monofill operators charge between \$90 - \$125/tonne for loose tyres¹¹⁴, while in South Australia the prices for collection, shredding and disposal of truck tyres from the metropolitan area range from \$158/tonne (SA Tyre)¹¹⁵ to \$248/tonne (Budget Retreads)¹¹⁶.

Some of this price will be due to higher landfill prices compared with Western Australia. In 2005 the metropolitan landfill gate fee including the landfill levy in South Australia was \$35/tonne, compared with approximately \$15/tonne in WA¹¹⁷. Inert landfill prices in WA have since increased due to an increase in the landfill levy and there have been significant price increases at tyre monofills.

There is considerable evidence that shredded tyres in landfill are a potentially greater environmental risk than whole tyres in landfill. A review of regulatory requirements for tyre monofills¹¹⁸ found that cut or shredded tyres are more likely to leach metals due to the greater surface area and the exposure of steel. Monofills receiving shredded tyres in several states of the US¹¹⁹ are constructed and operated as sanitary landfills with a liner and leachate collection system and extensive monitoring. A study conducted for the New Zealand government¹²⁰ recommended that a similar system should be developed for tyre monofills receiving shredded tyres in New Zealand.

There is also some evidence that tyre fires in landfills are more likely to occur where tyres have been shredded.

¹¹² Danielle Rippin, Environmental Health Officer, Shire of Broome, Personal communication.

¹¹³ Waste and Recycling in Australia, Report prepared for the Department of Environment and Heritage, Hyder Consulting Pty Ltd, February 2006.

¹¹⁴ Vic Cross, JW Cross and Sons, personal communication: Current charges are \$15/m³. with about 6m³ equivalent to a tonne. This charge is about to increase to \$20/m³.

¹¹⁵ SA Tyre figures provided by Chris Forrester, Reclaim Industries.

¹¹⁶ Sue Weeks, Budget Retreads, Personal communication.

¹¹⁷ Ian Harvey, Zero Waste SA, Personal communication.

¹¹⁸ Review of Management of Used tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

¹¹⁹ Waste Tire Monofill Proposed Regulatory Requirements. California Integrated Waste Management Board, October, 2003; Ohio Administrative Code, www.epa.state.oh.us

¹²⁰ End-of-Life Tyre Management: Storage Options Final Report for the Ministry for the Environment (New Zealand), MWH New Zealand, July 2004.

A recent report prepared by S3 for the Department of Environment compared the requirements for tyre landfills in several jurisdictions¹²¹. The California Code of Regulations (administered by the California Integrated Waste Management Board – CIWMB), has a strong emphasis on fire control. Many of these requirements are due to the decision to shred tyres for compaction to exclude air and save space. The report used by the CIWMB as technical background¹²² for the prescriptive standards in the Waste Tire Monofill Regulations notes that shredded tyres are vulnerable to landfill fires, stating that several shredded tire fills have been reported to combust but the mechanism that causes the internal heating that leads to combustion is not presently well understood. One best practice guideline for storage of used tyres¹²³ states that stored shredded tyres with metal content should be continually monitored for heat build up due to oxidation of the metal which generates enough heat to start fires.

Uncontrolled tyre fires usually have major environmental impacts, which include¹²⁴:

- *air pollution*: black smoke and other substances such as volatile organic compounds, dioxins and polycyclic aromatic hydrocarbons are released into the atmosphere
- *water pollution*: the intense heat allows pyrolysis of the rubber to occur, resulting in an oily decomposition product which is manifested as an oil runoff. This runoff can be carried by water, if water is used to put out the fire. Other combustion residues (such as zinc, cadmium and lead) can also be carried by fire water off the site
- *soil pollution*: residues that remain on the site after the fire can cause two types of pollution; these are immediate pollution by liquid decomposition products penetrating soil, and gradual pollution from leaching of ash and unburned residues following rainfall or other water entry.

The costs associated with fighting and cleanup of tyre fires depends upon the size and location of the tyre stockpile. A tyre fire at Salisbury in Queensland in 1992 is estimated to have cost the fire brigade \$750,000 to extinguish and clean up the site. A similar fire at Bindoon, Western Australia in 1990 is estimated to have cost the WA EPA \$600,000 to clean-up a contaminated watercourse¹²⁵. There are also potential health impacts from tyre fires. A fire at a retail tyre outlet

¹²¹ Review of Management of Used tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

¹²² Technical Considerations for Scrap Tire Monofills by Geosyntec Consultants, Inc., April 25, 1998,

¹²³ UK Waste Tyre Management Best Practice: Handling of Post-Consumer Tyres – Collection & Storage, The Waste & Resources Action Programme www.wrap.org.uk, May 2006.

¹²⁴ *Basel Convention Technical Guidelines on the Identification and Management of Used Tyres*, Basel Convention on the control of transboundary movements on hazardous wastes and their disposal. Document No. 10, 1999, cited in *End-of-Life Tyre Management: Storage Options Final Report for the Ministry for the Environment (New Zealand)*, MWH New Zealand, July 2004

¹²⁵ Best practice environmental management of waste tyres: Storage, transport, reuse, reprocessing and disposal, Department of Primary Industries, Water and Environment (Tasmania), February 2002.

in Sydney in 2002 caused the hospitalisation of people from surrounding areas due to respiratory concerns¹²⁶.

The greenhouse gas emissions due to the energy requirements of shredding should also be noted as an important impact¹²⁷. Emissions created in the recycling process are also likely to be significant but can be offset against the emissions created in the extraction of the raw materials or manufacture of products replaced by recycled rubber.

South Australia is planning to ban the disposal of all tyres to landfill and encourage other options such as tyre derived fuel and recycling¹²⁸, which may be recognition of the failure of the requirement to shred tyres to encourage these options. Almost all tyres that are recycled in South Australia are actually sent interstate for crumbing or TDF¹²⁹. There will be a reasonably long transition period to allow adjustment, particularly for collectors who have invested in shredding equipment to meet the current requirements, however as most recycling /recovery options will require shredding there should not be a big impact.

Table 7: Effects of a requirement to shred tyres prior to landfill

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Greater potential for tyre fires and groundwater contamination		
Tyre recycling industry		May allow higher gate price for recycling & guarantee supply of truck tyres. No evidence need to shred will encourage recycling of passenger or oversize tyres.	Greater security for employees, contractors of Reclaim Industries
Community (metropolitan and country)		Cost of tyres will rise to reflect higher cost of collection & shredding, probably not significant in metro areas.	May flow on to slightly higher cost for goods and services in rural/remote areas
State government	Irreversible loss of resources embodied in tyres, additional greenhouse emissions	Need for additional enforcement	Possible (probably insignificant) effects on rural/remote employment etc)
Manufacturing or retail sectors		Higher costs of transport due to higher cost of tyres, probably not significant except in remote areas	
Mining sector		Unlikely to be applicable to oversize tyres, some slight	

¹²⁶ Report on the Extended Producer Responsibility Consultation Program, Department of Environment and Conservation, NSW, March 2004.

¹²⁷ Philip Hine, Department of Environment and Conservation, Personal communication.

¹²⁸ Vaughan Levitzke, Zero Waste SA, Personal communication.

¹²⁹ Ian Harvey, Zero Waste SA, Personal communication.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

		impact due to higher price of other tyres.	
Landfill operators	Easier to manage shredded tyres in mixed landfills	Savings in landfill space, monofill baling tyres would close	
Waste collectors/transporters	Greater impact through greenhouse emissions, energy use	Need to purchase & maintain a shredder, may force some without capital from the business	Possible loss of jobs

Impacts of a requirement to bale tyres prior to landfilling

A requirement to bale tyres prior to landfilling is an alternative to shredding. The baling of tyres prior to burial has several advantages¹³⁰. The biggest advantage is the possibility that the tyres can be retrieved in the future for reprocessing. The tyres are compact and can be stacked in an orderly manner into a monofill cell. The additional cost of baling compared with burial of loose tyres is offset somewhat by the saving in landfill space as up to three times the number of baled tyres can be buried¹³¹. Baling compresses tyres so that air and water are excluded, minimising the risk of fires and leaching. Dirt is also excluded from the interior of the bale.

In WA landfill operators charge between \$90 - \$125/tonne loose tyres¹³² and \$30 - \$55/tonne baled tyres¹³³. Balers charge about \$1/EPU or about \$120/tonne so that the price of landfilling baled tyres is \$150 - \$175/tonne, comparable with the lower end of the range for disposal of shredded tyres in South Australia.

The Brookton (STEG) landfill receives tyres pressed into bales of 1 tonne at the depot or using a mobile press. The bales are then arranged in landfill cells each containing 1015 bales with a weight of 1015 tonnes¹³⁴. The baled tyres are stacked in layers in cells with a 0.5m minimum clean fill fire blanket between each set of layers. The top layer is dressed with at least 0.8m top soil to encourage plant growth. The very tight baling means significant exclusion of air to reduce fire risk. As there is clay beneath the monofill water is retained, further reducing the fire risk and minimising any prospect of leaching.

Tyre cells are plotted and logged by GPS before burial to facilitate future recovery. The available storage area is about 100 acres, providing potential storage for 2.5 million tonnes of tyres.

¹³⁰ Review of Management of Used Tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

¹³¹ Triple Bottom Line Analysis of the Used Tyre Industry, Sustainable Strategic Solutions for the Department of Environment WA, July, 2005.

¹³² Rick Cross, JW Cross and Sons, personal communication: Current charges are \$15/m³ with about 6m³ equivalent to a tonne. This charge is about to increase to \$20/m³.

¹³³ Rick Cross, JW Cross and Sons, Personal communication; Peter Bertei, STEG, Personal communication.

¹³⁴ Peter Bertei, STEG, Personal communication.

The JW Cross landfill accepts baled tyres and loose tyres. The tyres are either buried or stacked above ground in a "mound" type landfill then surrounded and covered by fill. Rick Cross is keen to increase the proportion of baled tyres as compared with loose tyres received at the landfill as bales are easier to manage¹³⁵ and has given notice to collectors that tyres from the metropolitan region will need to be baled before delivery to the landfill by about the end of September 2006. In response at least one major collector is now sending tyres to Tyre Waste WA for baling and these tyres are then monofilled at STEG rather than being transported to Australind, however another collector has purchased a baler and continues to send large quantities of baled tyres to Australind¹³⁶.

The WA Government Used Tyre Strategy¹³⁷ aims to maximise the opportunities for the recovery of tyres (and the resources embodied in those tyres) either now or in the future. The Strategy states that current used tyre management practices act as a barrier to reuse, recycling, and energy recovery options because, under existing Western Australian practices and regulations, these disposal options are comparatively cheap and do not reflect the real cost of used tyre disposal.

The aim of tyre landfills should be to manage tyres so that they can be economically recovered. Monofill storage of baled tyres would allow this future recovery for recycling or energy recovery. Even after considerable periods the buried tyres are quite clean as demonstrated during a recent recovery trial¹³⁸, and could be transported in bales to a recycling/recovery facility.

A requirement to bale tyres prior to landfilling could also be considered for rural and remote regions. The most economical method would be to wait until a stockpile of approximately 1,000 tyres has accumulated at a Council site or at several neighbouring sites, and then have the tyres baled by a mobile baler. The mobile baler owned by the current operator can handle 2,500 tyres per day, i.e. producing 25 bales per day¹³⁹.

When baled, 1,000 tyres can be stored in a landfill cell 2m deep x 10m long x 5m wide, easily dug with a front end loader. Councils or Regional Councils could establish small tyre monofills. Alternatively tyre storage facilities could be privately managed.

While the current landfill fees for baled and unbaled tyres are almost identical it is obvious that baling reduces the amount of land needed considerably. This may or may not be a deciding factor when establishing rural and remote storage facilities. The extra cost of baling can be offset by both lower land costs and cheaper costs for eventual transport to Perth and perhaps by cheaper recovery costs.

¹³⁵ Rick Cross, Stanley Road landfill, Personal communication.

¹³⁶ Will Van Grootel, Tyre Recyclers WA, Personal communication.

¹³⁷ Used Tyre Strategy for Western Australia (Draft), Department of Environment WA, November 2005.

¹³⁸ Review of Management of Used Tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

¹³⁹ David Gooch, Tyre Waste WA, Personal communication.

Baling is not currently practicable for oversize tyres, although a baler has been redesigned to compress tyres up to 2.5 m¹⁴⁰. Tyres this size can be compressed to one-third of their original size (1 tyre/bale) and there is a possibility of further redesigning balers to manage larger tyres and compress them further. David Gooch has also undertaken trials to cut oversize tyres into 10-12 pieces using jigsaws, a labour intensive process. The cut pieces are then compressed into a bale with the exposed steel in the centre¹⁴¹. However as it has been shown that shredded and cut tyres are more likely to leach contaminants into the environment due to the exposed steel, the best option is probably burial of whole oversize tyres, perhaps in a dedicated monofill cell.

There are likely to be considerable economic benefits in the long term from the improved management of used tyres as a resource for the future. These benefits should include business and employment opportunities for Western Australians, perhaps in regional and rural areas and the freeing of other resources which are replaced with tyre derived products. Ending the practice of burying tyres in mixed landfill will also benefit rural landfills, freeing up landfill space and resolving the management problems caused by whole tyres floating in landfills.

There should also be a range of social benefits accruing from the proper management of used tyres including alleviating problems for disposal for country landfills, preventing illegal dumping and providing possible business or community development opportunities for small communities¹⁴². These issues should be examined as part of planning for centralised storage locations. In the longer term the recovery of used tyres as a resource will also provide social benefits in terms of employment and business opportunities as well as resource conservation.

Table 8: Effects of a requirement to bale tyres prior to landfill

Stakeholder group	Environmental Impact	Economic Impact	Social Impact
Local government (including Regional Councils)	Need to manage stockpiles until tyres are baled	Cost of managing stockpiles, possible cost of purchasing a baler with other Councils	Possible social impacts of stockpiles
Tyre recycling industry		Requirement to bale would raise price of tyre disposal, should allow higher gate price for recycling. Baled tyres are a future resource for recycling.	
Community (metropolitan and country)	Possible impacts of stockpiles	Slightly higher prices for tyres due to higher "disposal" costs, probably not significant	Possible impacts of stockpiles, possible additional employment to manage stockpiles, balers
State government	Slightly higher emission from baler, movement of	Enforcement costs, particularly if State-wide	Future employment through recyclers

¹⁴⁰ David Gooch, Tyre Waste WA, Personal communication.

¹⁴¹ David Gooch, Tyre Waste WA, Personal communication.

¹⁴² Triple Bottom Line Analysis of the Used Tyre Industry, Sustainable Strategic Solutions for the Department of Environment WA, July, 2005.

Impacts of Banning Tyres to Landfill/Mandatory Recycling

	mobile balers, offset by saving resources embodied in tyres.		
Manufacturing or retail sectors		Slight increase in cost of transport due to higher prices for tyre "disposal"	
Mining sector		Slight increase in cost of transport due to higher prices for tyre "disposal", probably not applicable to oversize tyres	
Landfill operators	Better management of landfills without tyres.	Need to create tyre monofill areas at landfills. Savings in landfill space. May need to purchase a baler.	Possible extra employment
Waste collectors/transporters	Some increase in energy use/emissions due to baling	Need to purchase balers or deliver to monofills with a baler, may drive some collectors from the industry	Opportunities to create business with a mobile baler, servicing rural/remote areas

Summary

A ban on the landfilling of whole tyres and/or a requirement to shred tyres prior to landfilling is not recommended as there are significant environmental costs and no evidence that shredding to landfill increases recycling. A ban on whole tyre disposal does increase the price of landfill disposal however this can also be achieved through a requirement to bale tyres and store them in monofills, which has the advantage of conserving the used tyres as a resource for the future and avoids most of the potential negative environmental impacts.

The current prices for baling and monofilling in WA are still lower than the prices for shredding and disposal in South Australia but are higher than the current prices for landfilling of loose tyres. The recent voluntary adoption of a requirement for baling of tyres from the metropolitan region by most in the industry demonstrates that the costs can be absorbed or passed on without major industry disruption. A requirement to bale all tyres for storage in monofill from the metropolitan region will need to be enforced but should require no extra resources as there is already enforcement of the landfill levy. Only a short transition period should be required to reinforce the evolving status quo. Oversize tyres should be stored in one section of tyre monofills.

If the requirement for baling was extended state-wide there would need to be a longer transition period and substantial work with regional councils to assist them to establish regional stockpiles and baling arrangements or facilities. Many Councils would be keen to participate in such arrangements to resolve issues at their landfill sites and in many areas the change could probably be developed without regulation.

5. Analysis of the support framework or mechanisms required

It is recommended that:

- (1) Truck tyres at least those from the metropolitan region, should be diverted from landfill through either a ban on landfill disposal of these tyres or a requirement that they be recycled.
- (2) Passenger tyres from the metropolitan region should be baled and stored in tyre monofills, and tyres too large to be baled should be stacked in one section of the monofill.

Diversion of truck tyres from landfill

The Department of Environment and Conservation (formerly Department of Environment) has previously considered a ban on the disposal of truck tyres to landfill through amending the licence conditions of landfill operators¹⁴³. This would be the easiest and quickest means of achieving the change, although the licence conditions may need to still allow landfills to receive truck tyres from outside the metropolitan area.

The *Environmental Protection Regulations 1987* establish a tyre landfill exclusion zone (TLEZ) in the metropolitan area and surrounding country areas where tyres may not be disposed of to landfill without permission from the Chief Executive Officer of the Department.

It is suggested that the first stage should involve only truck tyres originating from Zone 1 of the TLEZ, that is not including Bunbury, and a fairly short transition period, for example 3 months. Truck tyres originating in the wider TLEZ should be banned from landfill through changes to licence conditions with a longer transition period, for example six months. Under the *Environmental Protection Act 1986* licence conditions can require the disposal of waste in a specified manner and can also require the reuse of wastes or for licensees to make wastes available for reuse by others where practicable.

The advantage of using licence conditions to achieve a ban on landfill disposal of truck tyres is that it would require no extra enforcement effort as the disposal of tyres from the metropolitan region is already monitored as part of the Landfill Levy requirements.

There are other means available to prevent truck tyres being disposed of to landfill. Wastes are classified as acceptable for burial in particular classes of landfill by the *Landfill Waste Classification and Definitions 1996*, published by the Department's CEO. This classification can be amended to prohibit the landfilling of wastes or specify the type of landfill able to accept them.

¹⁴³ Philip Hine, Department of Environment and Conservation, Personal communication.

The proposed Waste Avoidance and Resource Recovery (WARR) Bill will create offences and penalties relating to unacceptable practices in waste management, waste disposal and resource recovery¹⁴⁴.

The bill will provide for broader powers for levies than in the current Landfill Levy Act so that there can be levies on the disposal of wastes other than just waste to landfill and will also provide enhanced powers to ban the disposal of particular items. Regulations banning landfill disposal of truck tyres could be developed under the new Act. Such Regulations might be needed if a state-wide ban on the disposal of truck tyres to landfill was proposed, however enforcement costs are likely to make such Regulations unworkable.

The WA Government could impose a levy on truck tyres going to landfill, raising the cost of landfill and making recycling comparatively cheaper. Again, the imposition of state-wide bans or levies on the disposal of truck tyres would be difficult to enforce.

A requirement for mandatory recycling of truck tyres is also likely to be very administratively difficult to implement and enforce. The *Environmental Protection (Controlled Waste) Regulations 2004* allow used tyres to be tracked during transportation to disposal or recycling destinations. Truck tyre retailers could be required to take back every truck tyre they replace (currently a generally accepted practice but there is no formal requirement) and to keep records showing they have sent the tyres for recycling.

The Controlled Waste Tracking System could possibly be adapted to show which loads of tyres contain truck tyres and there could be a requirement to show that these tyres have been delivered to a recycling facility, however this would require much more intensive data entry, collection and monitoring and the system is not yet tracking all tyre movements in the metropolitan region¹⁴⁵.

Specific targets for recycling sometimes supplement landfill bans. For example Dutch legislation on passenger car tyres demands that material recycling will be employed for 20% of the collected used tyres from July 2003. At the time the processing capacity or other outlets for material recycling in the Netherlands was insufficient to achieve the target, but the view was that the target would stimulate the various options for material recycling. The Dutch government assumed that producers would add a fee on new tyres to raise the money needed for this investment¹⁴⁶.

This is a similar approach to that proposed for the national product stewardship scheme for tyres, which will effectively pay a subsidy in the form of 'benefit payments' to recyclers using an advanced

¹⁴⁴ Jill Lethlean, Department of Environment and Conservation, Personal communication.

¹⁴⁵ Review of Management of Used Tyres at Landfill, Report by S3 to the Department of Environment and Conservation, August 2006.

¹⁴⁶ Improving Markets for Used Rubber Tyres, Pieter van Beukering, Chapter 4 in Improving Recycling Markets, Environment Policy Committee OECD, September 2005.

recycling fee paid on each new tyre. As this scheme will be national it is more likely to be effective than one developed unilaterally by WA.

As an interim measure to increase tyre recycling, recyclers could be paid a subsidy per tyre or for a specific volume of recycled product, or grants could be provided to assist recyclers establish or expand facilities.

There are various other policy approaches available to achieve recycling targets. For example a tradeable recycling credit system imposes a minimum recycling level or rate on a particular industry and allows trading between responsible parties to reduce the cost of achieving that minimum level¹⁴⁷. For example each importer of truck tyres into WA could be required to meet a recycling rate target for its products. The target could be an overall weight volume target. Producers could do the recycling themselves or pay a recycler to do it or they could purchase credits from others who have recycled more than their own target. At the end of each year brand owners would have to show they had either met the recycling target or hold enough credits purchased from others to comply with the target. There would need to be extensive penalties for not meeting either requirement.

This approach is likely to be very expensive in terms of transaction costs and monitoring, for little real gain. A mandated target for recycling would require some means of enforcement, even if it were only the threat of regulatory action if the targets were not met (as for the National Packaging Covenant Mark II).

Requirement for baling and monofilling

A requirement for tyres other than truck tyres to be compressed by baling and monofilled is also most easily and efficiently achieved through variations to landfill licence conditions, particularly for tyres from the metropolitan region. The conditions will need to recognise that large tyres cannot be baled and need to be stacked in one section of the monofill.

It may be difficult to monitor this requirement at landfills receiving tyres from outside the metropolitan region, for example the JW Cross landfill at Australind, so the licence condition might simply require baling and monofilling of all tyres landfilled at any facility receiving tyres from the metropolitan region.

Draft guidelines for the monofill storage of baled tyres have recently been developed and presumably a period of consultation will be required prior to their finalisation. Both of the monofills receiving significant quantities of tyres from the metropolitan region already require that these tyres be baled, however extending the requirement to all tyres going into the landfill will mean that Rick Cross will require access to a baler. He has previously expressed a willingness to obtain a baler if

¹⁴⁷ Palmer, K. and Walls, M. *The Product Stewardship Movement*, Resources for the Future 2002.

required but as there are no surplus machines in WA a transition period of at least three months is recommended.

Again the requirement to bale and monofill tyres could be imposed through modification of the *Landfill Waste Classification and Definitions 1996* or new Regulations, and if a state-wide requirement for baling and monofilling was proposed one of these options might be needed to cover unlicensed landfills. The immediate recommendation however is to encourage regional landfills to adopt baling and monofilling through assisting them to develop regional facilities including areas for safe stockpiling of sufficient numbers of tyres to enable economies of scale for baling, rather than imposing requirements that will need long transition periods to become workable.

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