FINAL REPORT

Product Stewardship Case Study for End-of-life Tyres

Source: Netwaste

Prepared for

Ministry for the Environment
Manatū Mō Te Taiao

by

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Disclaimer

The opinions expressed in this report are those of the author and sector representatives only and do not represent those of the Ministry for the Environment or the Government.

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Study scope

A fully-fledged product stewardship scheme for tyres in New Zealand would be directed at improving environmental performance across tyre manufacture, distribution, use, collection and disposal. Consumers, for example, would be educated regarding the most environmentally responsible use of tyres (increasing tyre life through improved driving techniques) and encouraged to return end-of-life tyres to the retailers. Manufacturers would be encouraged to investigate better 'Design for Environment' options and there would be some evaluation on means to minimise transport/distribution distances. However, this report will only investigate minimising the disposal impacts in the tyre life cycle.

The focus of this evaluation is to review TyreTrack and evaluate how it could be expanded to meet specified government product stewardship policy objectives. Other components of the tyre life cycle cannot be significantly influenced in New Zealand – primarily because of the small size of our market (despite some manufacturing occurring here). Product stewardship, as applied to tyres and in the context of this case study, therefore becomes environmentally responsible reuse and disposal options for tyres. Used tyre imports and the high overall level of car ownership in New Zealand due to lack of public transport are other aspects that can be influenced in New Zealand, but are not covered by the scope of this work.

TyreTrack review

The Ministry for the Environment and members of the tyre sector – including manufacturers and importers – have been aware of the tyre disposal issue for some time. The TyreTrack scheme was established two years ago, as an initial step, primarily to minimise illegal dumping of tyres. The stated objectives of this scheme were to:

- ensure that a high proportion of end-of-life tyres are recycled or disposed of appropriately in sanitary landfills;
- improve rates of tyre recycling and reprocessing by providing good information about volumes of tyres available for disposal.

The TyreTrack scheme was not intended to act as a product stewardship scheme; ie, encouraging environmentally responsible practices across all facets of the tyre life cycle. It was, however, intended as a tracking system that would act as a precursor to more responsible disposal and, hopefully, recycling.

Approximately 40% of the tyre sector have registered for the scheme. There is a perception that registration will generate additional administrative loads without any significant benefits. The registered participants include the retailers owned by the two major tyre manufactures – Bridgestone and South Pacific Tyres, who are committed to responsible tyre disposal. The majority of the 300–600 smaller tyre retailers have not registered. Additionally, it is understood that even the registered retailers don't report on all of the tyre movements. Between 25 to 35% of end-of-life tyres are

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recorded by TyreTrack. As a result, TyreTrack has only been able to contribute to the stated objectives – ensuring that approximately 30% of tyres are disposed of appropriately and retailers have access to information that could allow for improved recycling. Unfortunately, no evidence was collected during this case study to confirm that recycling rates had actually improved.

Recommendations could be developed to improve the performance of TyreTrack by increasing sector participation to allow widespread tracking of tyre disposal. However, we do not believe that this approach will meet the stated Ministry for the Environment product stewardship policy objectives, in particular, that relating to leading to environmental gains. Therefore, we have taken a broader approach to evaluate the potential for greater reuse of tyres, and developed recommendations to overcome the perceived and actual hurdles arising from tyre reuse.

Current tyre disposal

Nearly four million tyres are disposed of in New Zealand every year. Of these, and on the basis of information collected by TyreTrack, 75% are sent to landfill. The remaining 25% are used for farm silage covers, speedways, playground and other valid alternatives, or disposed of illegally. In most cases, the tyres are quartered or shredded before landfill disposal, although even shredded tyres create problems in landfills in terms of void spaces, their ability to harbour insects and potential for tyre materials to float to the surface of the landfill. Whole tyres create even greater environmental issues.

This is an unacceptable situation from an environmental perspective. In the USA, in 2003, more than 80% of waste tyres were recovered (URS Australia 2005). Similarly, in 2003 the European Union (EU) diverted more than 75% of tyres from landfills. Thirty-five of the USA states have some form of waste disposal levy to actively discourage disposal of tyres at landfills. In the EU, whole tyres have been banned from landfills since 2003, and shredded tyres are to be banned from landfills from July 2006. In many developing countries, for example India, all waste tyres are recovered with no scheme in place – due largely to low labour costs and rubber demand being higher than supply.

Potential tyre reuse

In New Zealand, we have two cement plants and one steel manufacturing plant that could potentially use the bulk of tyres currently being sent to landfill. Tyres would provide an alternative fuel source for the cement plants and an alternative raw material and fuel source for the steel manufacturing process.

In addition to the currently available, larger-scale end-uses, there are a myriad of other alternative end-uses (retaining walls, building foundations, road surfaces, erosion control, moulded products, new tyres) that are either currently small scale with the potential to increase in size, or for which new technologies are being developed. The issue for potential reuse becomes one of ensuring that the inherent value contained within end-of-life tyres is realised and exploited.

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Barriers to alternative end-uses

There are both perceived and real barriers to alternative potential end-uses for tyres. These include concerns regarding atmospheric emissions from tyre burning, security of supply and transport logistics and costs. The low cost of landfill disposal is also likely to be a barrier as it makes the alternative uses, by comparison, less economically attractive.

TyreTrack

TyreTrack provides an on-line system to allow tyre retailers to find responsible ways of disposing of their waste tyres. To date, approximately 30% of the tyre sector have registered with TyreTrack.

To the extent that it is able (based on applying to only 30% of the sector), TyreTrack enables better transparency of tyre movements, which encourages the participants to dispose of them in an appropriate way. At the same time there is no mechanism that would ensure that total tyre figures are provided and those wishing to dispose of the tyres in an irresponsible way are not constrained by the scheme.

TyreTrack provides good, regionally based information for a third of waste tyres in New Zealand. It performs better in metropolitan areas, while coverage in rural areas is minimal.

TyreTrack does not stack up particularly well against broader government product stewardship objectives – including environmental and social benefits – because it was not established to achieve these outcomes. Nonetheless, TyreTrack forms an excellent established basis for an active industry forum and there is strong industry support to expand its operations and enforce membership.

Due to a large amount of goodwill that TyreTrack can call upon it provides a good base for development of a wider scheme.

Alternative product stewardship approaches

In light of the restricted nature of TyreTrack three product stewardship approaches were evaluated against the government policy objectives and a broader range of environmental, social and stakeholder criteria.

The three scenarios evaluated were:

- *status quo* – retain existing TyreTrack system as it is;
- expanded scheme – implement a fully expanded waste management scheme for tyres including regulatory and fiscal interventions;

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- business-to-business partnerships – cease all government intervention (including TyreTrack) and leave it to the private sector to arrange sustainable disposal options. This would enable organisations in the private sector to establish partnerships to divert tyres from landfills – for example, between Bridgestone Tyres and Pacific Steel.

The results showed that the government policy objectives and broader social and environmental goals would be best achieved through an expanded scheme. The costs of any expanded scheme will, however, need to be evaluated against the benefits and compared with the approach of leaving the issue of tyre disposal to private sector

Recommendations

We recommend that Ministry for the Environment take leadership on the issue of tyre disposal in New Zealand by developing a scheme which encourages tyre reuse for their highest net resource value. We are currently at risk of leaving an environmentally unacceptable legacy for the next generation as large volumes of tyres accumulate in our landfills. This situation is exacerbated by the reality that feasible alternative end-uses already exist, and more are continually being developed.

More specifically we recommend the following.

1. The Ministry for the Environment apply the currently preferred product stewardship policy to the tyre sector by developing regulatory and fiscal intervention mechanisms to:
   - establish mandatory membership of TyreTrack and reporting for all tyre movements;
   - establish an advanced disposal fee, to be applied to tyres at point of manufacture and import.

2. The Ministry for the Environment carry out further studies to evaluate the implementation of a waste disposal fee. These studies should:
   - further evaluate the scope of the waste disposal fee in terms of the products that it applies to;
   - determine the organisational infrastructure requirements to support the waste disposal fee – for example, expanding the jurisdiction of a current body such as the Waste Management Institute;
   - quantify the potential "market ramification" risks (for example, exacerbating illegal dumping) and ensuring the scheme is designed to mitigate these.

3. The Ministry for the Environment continue to provide support for local and regional councils to limit the illegal dumping of tyres. Mechanisms for this support include:
   - enforcement against illegal tyre dumping through the Resource Management Act;
   - evaluating the effectiveness of the currently adopted, Auckland based (Waitakere and North Shore) schemes to register waste collectors and establishing how this could be more broadly applied across the country;

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- the use of district plans to restrict the numbers of tyres that might be stored on private properties;
- more effective mechanisms for policing and preventing tyre dumping on public and private property, including tighter penalties under the Litter Act;
- encouraging local councils to use existing district plan provisions and environmental field officers to investigate possible illegal tyre dumps and, where possible, prosecute the offenders.

4. The Ministry for the Environment continue to support development of viable alternative end-uses for tyres. This includes:
   - support for regional councils on interpretation of the Resource Management Act to ensure the focus is on environmental effects (including atmospheric emissions) rather than prescribing material and energy inputs to processes (for example, as in the situation at Pacific Steel where new resource consents are required for burning tyres, despite no predicted increase in atmospheric emissions);
   - support for additional research into the environmental effects of alternative end-uses, including burning tyres as an energy source;
   - evaluating further the potential for ongoing use of tyres on farms as silage pile covers, and therefore the available "resource" for other uses;
   - keeping abreast of, and where possible supporting, New Zealand-based developments of alternative end-uses for tyres.

5. The Ministry for the Environment carry out additional investigations into a possible Product Responsibility Authority which could take the form of an expanded Environmental Choice. The role of this body would be to provide umbrella support across all sectors for improving the environmental performance of products over their entire life cycle, including manufacture, use and disposal. It would:
   - provide education on all aspects of product environmental performance – for example, the roles of customers, retailers and landfill operators in adopting environmentally responsible tyre disposal methods;
   - coordinate information exchange/learnings/best practice amongst the different sector product stewardship schemes (given the common objective to divert waste from landfill there will be significant common ground to be shared amongst participants on what works and what doesn't etc);
   - carry out research into life cycle impacts of different products in New Zealand and continue to develop specifications for product environmental labels;
   - provide support for both government (Govt[3]) and private sector product procurement initiatives designed to selectively purchase environmentally preferable products.

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6. The Ministry for the Environment continue to work with both private sector and local government landfill operators to develop guidelines for storage and disposal of tyres that are entering landfills.

7. The Ministry for the Environment support environmentally responsible disposal of tyres, through government procurement programmes such as Govt[3] which will allow for preferential purchase from tyre retailers who are using TyreTrack.

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1.1 Background

URS New Zealand has been contracted by the Ministry for the Environment to work with the tyre sector to carry out an end-of-life (EoL) tyre product stewardship study.

This study is expected to assist policy development in regards to product stewardship. It follows from the release of the "Product Stewardship and Water Efficiency Labelling" discussion document by the Ministry for the Environment in July 2005. This document looked at ways of improving the uptake, effectiveness and stability of existing and future schemes. In particular, it proposed that light-handed legislation is introduced to back-up voluntary arrangements. A number of specific case studies have been commissioned to examine the application of product stewardship to those products. These include cell phones, paints, whiteware, agrichemical containers and tyres.

In New Zealand, product stewardship is defined[1] as "an approach whereby producers, importers, brand owners, retailers, customers and other parties involved in the life cycle of a product accept a responsibility for the environmental impacts of a product through its life cycle". This report will only investigate minimising the disposal impacts in the tyre life cycle.

To date there has been a significant amount of research into EoL tyres in New Zealand and this has been quoted throughout this report. The Ministry for the Environment has been focusing on three related areas of work related to EoL tyres (for more information please refer to the Ministry for the Environment website, www.mfe.govt.nz). These are:

- supporting the establishment of a voluntary collection system for tyres, TyreTrack, which began operating on 1 July 2004;
- developing a package of information for councils on tyre storage management and enforcement options;
- actively encouraging tyre recycling and the recovery of energy from tyres.

1.2 Objectives of the study

The key objective of this study is to review the present TyreTrack scheme and to understand what assistance a more formal product stewardship policy could have on the management of EoL tyres in New Zealand. The specific Terms of Reference are to evaluate:

- the extent to which TyreTrack presently meets its objectives and likelihood of it further developing under current arrangements;
- the economic and environmental impacts of the present regime and the extent to which these would change if management continues in the same manner;

[1] Ministry for the Environment. 2005. Product Stewardship and Water Efficiency Labelling Discussion Document.

- the strengths and weaknesses of the present arrangements, including risk factors and consistency with product stewardship policy;
- recommended improvements for managing EoL tyres within the current policy environment and a potential new policy environment;
- evaluate the proposed policy in regards to its effects on EoL tyres.

This review links back to the more general contract objective to "road test" existing product stewardship schemes in New Zealand. That is to identify what is, and what isn't, working and the interaction of the proposed policy with these schemes as a means to inform policy decisions.

1.3 Study scope, previous investigations and our overall approach

The relationship between the potential application of a fully fledged set of product stewardship initiatives and the scope of this study is described diagrammatically in Figure 1.1. A distinction is made between the components of the tyre life cycle that occur in New Zealand and overseas. Some of the product stewardship initiatives which could apply to the New Zealand phases of the tyre life cycle are therefore:

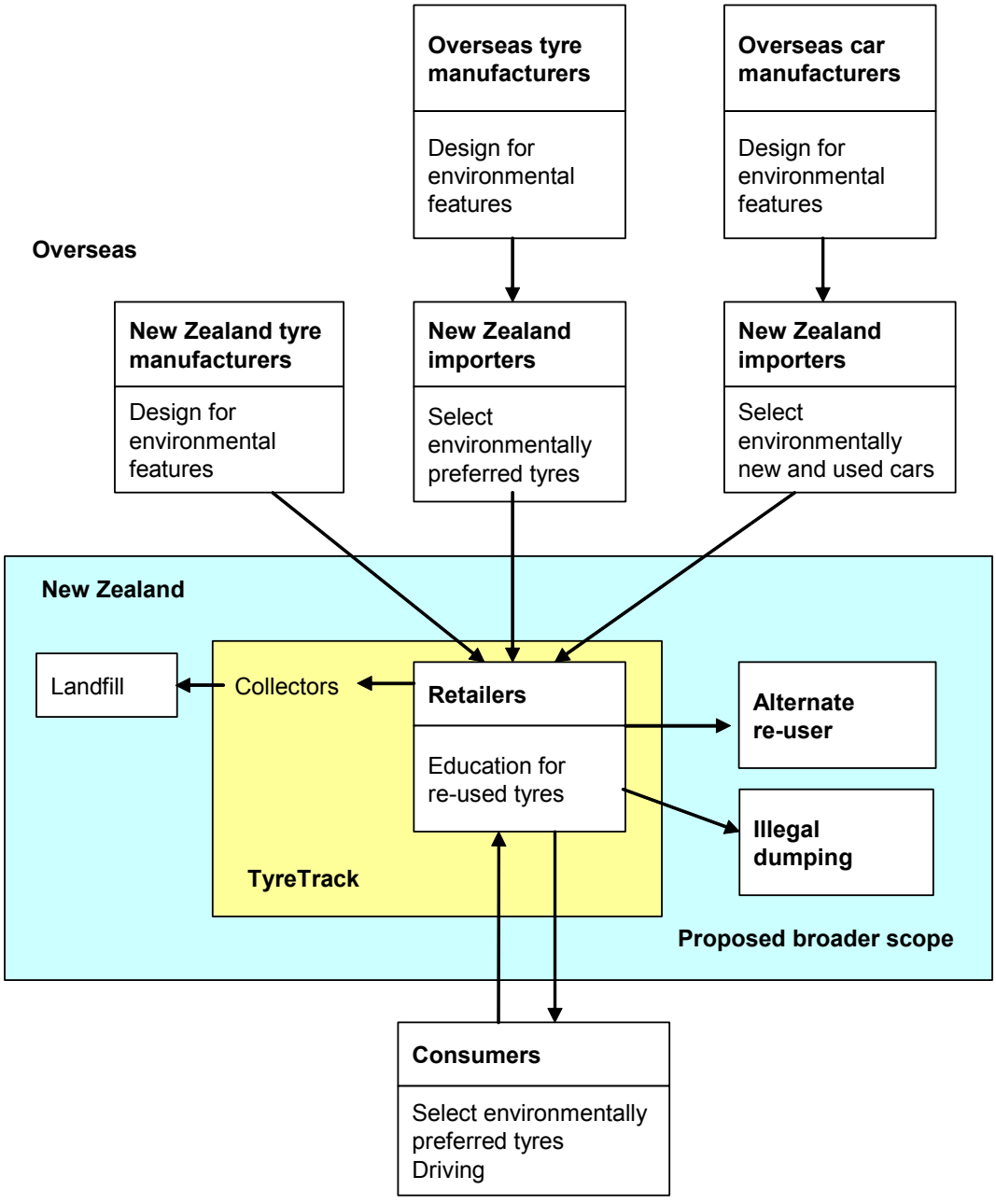
- manufacturers in New Zealand incorporating "Design for Environment" features into tyres – for example, minimising hazardous components, easier disassembly or extending lifespan;
- importers of both new and used tyres and vehicles including environmental considerations into import choices – that is tyre and car (to the extent that these relate to the tyres) brands that reflect superior environmental credentials and durability/lifespan;
- tyre retailers ensuring that the EoL tyres are reused by selling them to economically viable reuse operators;
- consumers being educated to select tyres from companies taking an environmentally responsible approach to tyre importing, manufacture and reuse.

At its broadest level this study focuses on the disposal phase of the tyre life cycle only – that is, government support to encourage responsible disposal and potential reuse options. At a specific level the study evaluates TyreTrack as a tool to achieve better information on tyre disposal – which is a useful precursor to more responsible end-uses.

Tyre reuse and disposal in New Zealand is a broad and complex issue with many different stakeholders (importers, manufacturers, retailers, collectors, landfill operators, potential end-users, central government and local government). In addition, there has been a significant amount of previous work, both in Australia and New Zealand to try and resolve the fundamental issue which is "what to do with the large volumes of EoL tyres generated each year?" Particularly relevant studies referenced throughout this report include:

- MWH 2004 – End-of-life Tyre Management – Storage Options;
- Firecone 2004 – Management of End-of-life Tyres;
- Ministry for the Environment 2004 – Enforcement Action under the resource Management Act 1991 to Deal with Unauthorised Storage, Dumping and Disposal of End-of-life Tyres;
- URS Australia 2005 – Financial and Economic Analysis of the Proposed National Used Tyre Product Stewardship Scheme;
- Atech Group 2001 – A National Approach to Waste Tyres in Australia.

Figure 1-1: Relationship between entire tyre life cycle product stewardship potential and this study



Our approach has been to interview as many stakeholders as possible, hold multi-stakeholder meetings, review previous work and overseas practices and use this information to:

- describe the tyre sector in New Zealand including existing social and environmental issues (Sections 2.0 and 3.0);
- provide background information on potential tyre reuse options and barriers to these (Section 4.0);
- evaluate TyreTrack with respect to its original objectives, existing stated government policy objectives and its potential to achieve more (Section 5.0);
- briefly overview international practices (Section 6.0);
- evaluate three broad policy options (against stated government policy objectives plus additional socio-economic and business criteria) (Section 7.0).

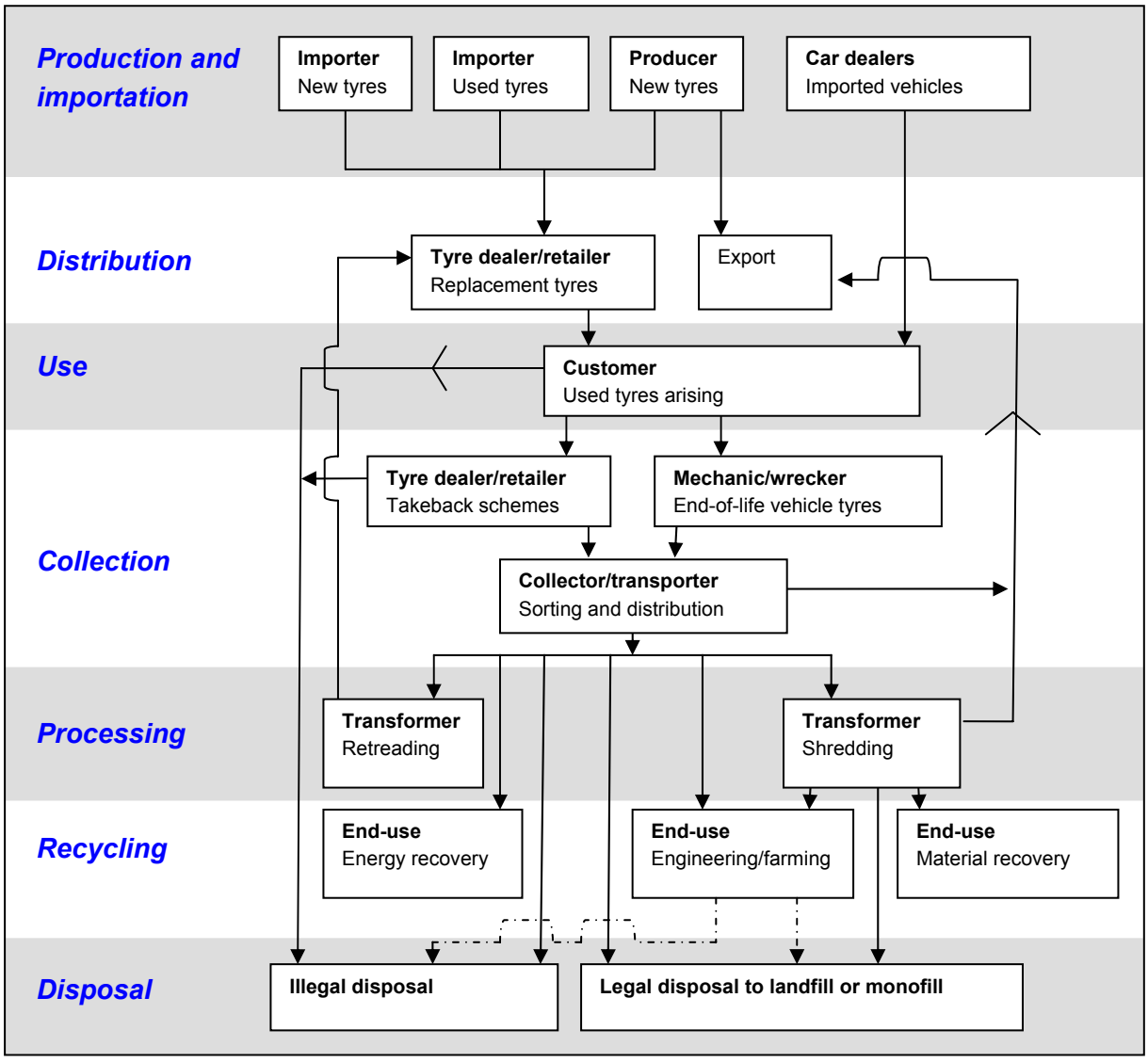
On the basis of the two separate evaluations (TyreTrack and broader policy options), we have developed a set of recommendations (Section 8.0). We have attempted to further analyse these recommendations in detail including the need, in some areas, for further research and analysis.

A detailed description of the tasks forming the case study and the individuals who have been involved is provided in Appendix A.

2.1 Tyre life cycle in New Zealand

The product life cycle of a tyre in New Zealand is presented in the figure below.

Figure 2-1: Product life cycle of a tyre in New Zealand



* Note: Some used tyres on farms will ultimately be disposed of to landfills or illegally.

Production and importation

The manufacturing and importing section of the tyre industry in New Zealand comprises:

- two domestic manufacturers (Bridgestone and South Pacific Tyres);
- a range of tyre importers – bringing in both new and used tyres;
- used and new vehicle importers – who bring "fixed" tyres (attached to vehicles) into the country.

Types of tyres

There are a raft of different tyre "types", including passenger, truck (light and heavy), bus, motor cycle, and specialised tyres (for example, off-road heavy haulage vehicles, aircraft tyres). There is also significant variation within any one group. For example, passenger tyres vary with respect to aspect ratio, rim, diameter, tread width, tread pattern, composition, construction and tyre performance. For the purposes of this study we are using the term "tyre" in a generic sense – primarily to refer to passenger tyres that weigh approximately 9.5 kg each. (Please note for comparative purposes an average truck tyre weighs approximately 47.5 kg). Also note that in New Zealand the total tyre numbers are approximately 75% car and 25% truck/commercial tyres. By mass, the figures are approximately 54% for cars and 46% for truck/commercial tyres.

Numbers

There are three to four million tyres disposed of, in some way, in New Zealand every year (this is a general estimate based on TyreTrack numbers and research in other developed countries). We have not been able to compile any definitive data on the number of tyres entering the market nor being disposed of. As an approximation, the number of tyres entering the market would be slightly higher than the number of tyres being disposed of, to take account of the increasing number of cars on the road. For the purposes of this study, we have assumed that approximately four million tyres enter the New Zealand market annually. There is an anecdotal assumption that one Equivalent Passenger Unit (EPU), or typical passenger tyre, is disposed of per person per year. Our study in Australia (URS Australia 2005) showed that this assumption was low – on account of the number of large earthmoving tyres – and a more accurate assumption may be in the order of 1.5 EPUs per person per year. If this is the case, there may be more tyres being disposed of in New Zealand than assumed in this report.

Tyres sourcing

There are three main ways in which tyres can enter the market.

- New Zealand production of new tyres – there are two producers, Bridgestone and South Pacific Tyres, who own a similar share of the market.
- Import of tyres – the large importers include Tyres 4 U (new tyres), Value Tyres (used tyres) and Imex (both types). The rest of the market is very fragmented, with small importers including Blairs, TRS, Specialty Tyres, and Fielding Tyres. There are 30 or more importers of new tyres into New Zealand. The majority of tyres imported into New Zealand are new.
- Tyres imported as part of vehicles – approximately 100,000 new and 200,000 used cars are imported into New Zealand annually. Both used and new tyres enter the New Zealand market this way.

Based on a total figure of four million tyres, the breakdown of tyre sources in New Zealand is estimated as follows:

- New Zealand produced new – 1 million (approximately 500,000 from Bridgestone and 500,000 from South Pacific Tyres);
- imported loose – 1.2 to 1.4 million new and 600,000 used;
- imported on new and used cars – 1.2 million.

Passenger and light track tyres are produced in New Zealand for the local and export markets. Heavy and specialty tyres are all imported.

The average price of a new passenger tyre in New Zealand is between $50 and $200. The average price for a used passenger tyre is between $30 and $100. (Note, these prices have been relatively stable over the last few years but, depending on the value of the New Zealand dollar, imported tyre prices could start to increase as crude oil prices increase.)

As the number of passenger vehicles on New Zealand roads is increasing annually, it is safe to assume that the EoL tyre numbers are also increasing.

Distribution

It is currently estimated that there are between 600 and 900 tyre retailers in New Zealand. A review of the retailers registered in the Telecom yellow pages indicates there are close to 650 retailers in the North Island and 200 in the South Island. Approximately 300 are owned or franchised by the tyre producers and include Firestone, Beaurepaires, Goodyear and Frank Allen. There is an overall trend for consolidation of smaller retailers under the auspices of the two main manufacturers – Bridgestone and South Pacific Tyres.

The remainder of the 300 to 600 retailers (over 50% of the market) is very fragmented, with individual shops or small chains like Tony's Tyres (approximately 20 stores). Auckland research quoted by South Pacific Tyres indicates there are also a large number (2,000 for Auckland region) of individual garages that occasionally sell tyres and are able to change them. Individual customers are not likely to be changing their own tyres due to the technical difficulty.

Use

The majority of the customers dispose of their tyres at the point of sale, when they buy the replacement tyres. There is a wide range of prices charged for disposal of tyres from $1 to $5. Some retailers don't charge or don't highlight the disposal charge in order to retain price sensitive customers.

There has been an overall trend for tyres to last longer and for "retreading" of tyres to become less common. Labour costs for retreading are typically greater than the differential between the new and used product and it is, therefore, no longer economical to retread tyres.

Collection and processing

There are approximately 30 dedicated tyre collectors operating in New Zealand (at the time of writing this report), however, only half of them collect high volumes of tyres. It is estimated that 30% of the tyre disposal is conducted through these specialised collectors. Nine of the collectors also offer shredding services. J&J Laughton is the only collector who recovers steel and produces granulated rubber. Ninety-five percent of tyres disposed through the collectors are either shredded or quartered. The collectors require resource consents which specify, as a condition, that the tyres can only be stockpiled for up to two years.

Collection and transport of EoL tyres is also undertaken by general waste management companies. Large transportation companies (including Mainfreight and Toll), as well as small unregistered operators, take the tyres to landfills or transfer stations.

The current number of collectors was deemed insufficient by the interviewed representatives of the industry. Some collectors operate nationwide, moving their shredders between different locations as needed. The market pressures in the tyre collection industry are very high, with high competition and low margins. The number of collectors is currently on the decline. Additionally, due to a number of health and safety incidents, compliance costs are likely to rise.

There are dedicated collectors servicing most regions in New Zealand with the exception of Nelson, Hawkes Bay, Northland and Southland. Based on anecdotal information collected during this study, the collectors in these regions have gone out of business largely for economic reasons arising from the large distances and small numbers of tyres involved.

A number of councils (Waitakere, North Shore City and Rodney) have introduced a licensing system for tyre collectors. Under this system the collector is required to pay a $300 fee per year, provide a letter from a bank confirming viability of the business and provide quality, health and safety assurance documentation about the fleet and equipment. An additional $300 is charged if the collector also operates a shredder. Although the application of a licensing fee has been the subject of some debate in the sector, it does have the effect of "formalising" the reporting of tyre numbers and will therefore support TyreTrack objectives.

Disposal

Nearly four million tyres are disposed of in New Zealand every year. Of these, and on the basis of information collected by TyreTrack, 75% are sent to landfill. The remaining 25% are used for farm silage covers, speedways, playground and other alternatives or disposed of illegally.

There are less than 100[2] landfills in New Zealand and some service areas of more than 200 km in diameter. In those areas councils tend to operate transfer stations which accept tyres. Stricter landfill regulation increases the operational and construction costs, which must be carried by ratepayers or recovered in landfill fees. Some landfill closures are also due to compliance issues. There is no unified policy in regard to tyre acceptance, but an increasing number of landfills accept only shredded or quartered tyres.

Based on a review of tyre disposal practices in Australia (URS 2005), South Australia, Tasmania, Victoria, Western Australia and the Sydney metropolitan area landfills have all banned disposal of whole tyres. This is in response to problems with tyres creating void space, their ability to harbour insects and the potential for tyres to rise to the surface of the landfill. In these locations the tyres must be shredded.

In New Zealand, Waste Management operate a large proportion of our landfills and report that many of these will no longer accept whole tyres. Acceptance criteria vary from landfill to landfill and do not seem to be regulated by local council district scheme provisions or regulatory controls.

The fee for the landfill disposal ranges from $45 to $400 per tonne of tyres (45 cents to $4 per tyre), with higher prices in municipal areas and lower prices in rural areas. It is understood (based on anecdotal evidence from both Australia and New Zealand) that the landfill fee may also vary significantly depending on the landfill operator/collector relationship (in particular, the volume of tyres being supplied by the collector). It is also likely that landfill costs are influenced by whether or not the tyres are being used as liners or for alternative engineering purposes within the landfill.

Current alternative end-uses

Based on anecdotal evidence collected during this study, 10–15% of tyres (400,000–600,000 per annum) have a different end-use than disposal to landfill or illegal dumping.

A large proportion of these are used by farmers to cover silage pits. Disposal of tyres to farms is the cheapest method of disposal – the farmers usually pick up tyres and transport them to their farms. In some cases, the farmers pay in the order of $1 per tyre.[3] There are, however, questions in regards to final disposal of the farm tyres. It is possible that some are buried on the farms in the empty silage pits. Although the current farm disposal practices may be slightly preferable than illegal dumping, the tyres may eventually comprise an unregulated landfill on the farms. Over the long term, this practice contributes to the dispersion of waste tyres throughout the countryside.

[2] MfE 2004. New Zealand Waste Strategy 2002 – Reviewing Progress and Moving Forward.

[3] Anecdotal information supplied by Lindsay Halliday, Holcim New Zealand.

Some analysts expect the farm demand will be reduced over time.[4] There is some anecdotal evidence for a general shift towards advanced silage bailing technologies that don't use tyres – as the baled silage is drier than tyre-covered pit silage and therefore provides a better food source. This trend may have been offset over the past few years with the significant increase in dairy farming activity in New Zealand.

Other current end-uses diverting low quantities of tyres from New Zealand landfills include:

- arena surfacing;
- matting/toys;
- garden mulches;
- retaining walls;
- other engineering applications such as road surfacing (although there is very little at this point).

Unaccounted tyres

On the basis that approximately 75% of tyres are sent to landfill, then approximately 25% are either used on farms, speedways, playgrounds and for various civil engineering purposes, or are disposed of illegally. As a result of the research completed for this study, we have not been able to ascertain even an approximate figure for the tyres that are "dumped" illegally in New Zealand. We have heard anecdotal reports of farms with holes and gullies that will "receive" old tyres for a fee of approximately $1 per tyre, as opposed to the $2 to $3 landfill disposal fee. In addition, there is anecdotal information to support the use of a relatively large number of tyres as a structural drainage material for landfills. Despite being an effective end-use, this is a "one-off" function and the number of tyres used for this purpose will gradually decline as the demand is met.

TyreTrack administrators at the Motor Trade Association (MTA) report they receive regular calls from construction site owners and operators to advise that a load of tyres has been illegally dumped on their site. The only option for these individuals is to arrange, and pay, for the tyres to be collected and disposed of legally at a landfill. (In these cases, the tyres would then constitute part of the 75% going to landfill).

The prospect of approximately 300,000 tyres per year being illegally disposed of within New Zealand is alarming and should be investigated in further detail.

The issue of illegal tyre dumping has been previously analysed.[5] The Firecone study reported an alarming number of incidents where a landowner has been left to pay for disposal of large numbers of tyres (up to $100,000 costs) dumped on their private property.

[4] Firecone. 2004. Management of End-of-life Tyres.

[5] Firecone. 2004. Management of End-of-life Tyres.

2.2 Tyre composition

The tyre composition impacts on potential end-uses and is, therefore, relevant to any evaluation of more effectively using EoL tyres as a resource. In general, manufacturers design and construct tyres to maximise their life. Tyre design is changing constantly in response to market demands relating to safety, economy, performance, unit costs, material availability and needs of the automobile industry (URS Australia 2005). In general, tyres are made up of synthetic or sometimes natural rubber, carbon black, steel wire, textile and various chemicals. Between approximately 75% to 80% of the weight of car and truck tyres is rubber.[6] Approximately 1.5% by weight is made up of chemicals including copper compounds, zinc compounds, cadmium, lead, acidic solutions and organohalogens.

The carbon black and other chemicals are combined into the rubber during the manufacturing process and are difficult to separate out for reuse. In most cases EoL tyres are quartered or shredded (these are both mechanical processes involving cutting up the tyres).

2.3 New Zealand specific considerations

There are a number of New Zealand-specific aspects to the tyre sector and, in particular, to EoL tyres that are important considerations for future initiatives to promote environmentally responsible tyre disposal here. These aspects create a situation that is different to that in Europe, the United States and other developing countries and that has implications for the successful adoption of alternative tyre end-uses. They are briefly discussed as follows.

Dispersed used tyres

Both the generation and current storage of EoL tyres in New Zealand are highly dispersed. This creates a situation where the logistics of collecting large volumes of tyres – for potential alternative end-uses – may be prohibitive from a cost perspective. Many of the successful tyre reuse schemes overseas have been developed using large volumes of tyres available in single, central-city locations.

[6] Basel Convention Working Group 1999. "Basel Convention Technical Guidelines on the Identification and Management of Used Tyres. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Document Number 10.

Regional private sector landfills

In New Zealand, as with many overseas developed countries, there is a trend towards large, highly "engineered" landfills (which will include extensive drainage controls and leachate collection systems) to service a large region. Smaller, rural non-engineered "dumps" or "tips" are being gradually replaced by these regional landfill facilities. Some of the larger, well-designed and operated landfills are now operated (and, in some cases, either partly or fully owned) by the private sector. Waste Management, for example, operates the large Redvale and Whitford landfills in Auckland and the Kate Valley landfill in Christchurch.

Tyres disposed of legally in a landfill are therefore not necessarily creating an unacceptable environmental impact. In this regard, landfill disposal could be viewed as "safe". In addition, a proportion of the tyres being sent to landfills are effectively being used as a liner for landfills and are, therefore, part of environmentally responsible landfill design practices. For purely disposal purposes, however, there is a space consideration as tyres do not degrade for extremely long periods of time.

3.1 Environmental issues

Environmental impacts from tyre use appear at all stages of the product life cycle, from the mining of resources (eg, crude oil), production (eg, energy use or hazardous waste), use (eg, generation of noise, impact of energy efficiency of the vehicles or rubber loss), through to collection, processing and disposal of EoL tyres. As discussed in Section 1.2, this study focuses on the EoL impacts of tyres. The key environmental issues are both operationally based (including landfill space issues, contaminated leachate and visual pollution) and risk based (including fire risks).

Key environmental issues related to disposal of tyres in landfills or illegal dumps include the following.

- Land use – whole tyres are not easily compactable and therefore use a lot of landfill space. The elasticity of the material also causes the tyres to move within waste causing instability of the landfill sites and hindering any future reclamation. Whole tyres create void spaces within the landfill and these can harbour insects. Shredded tyres are preferable to whole tyres and the latter are prohibited at many North Island landfill.
- Fires – tyres are flammable and fires of tyre stockpiles are very difficult to extinguish. There are cases of tyre fires that have cost authorities nearly $100,000 in direct costs and pollution management. These fires also release large amounts of toxic materials into the air and water.
- Heavy metals leachate – tyres contain steel and various additives which can cause toxic leachate from landfill or from other end-use of tyres (eg, when used for drainage). The leachate characteristics of tyres were recently reviewed by MWH.[7] The results show that, depending on the whether the tyres' steel components are exposed, there may be elevated manganese and iron levels within the leachate. Other contaminants, including aluminium, zinc, and organic compounds, were not elevated to any significant level. All of the leachate contaminant levels were considered "safe" (below relevant environmental standards). These results are, however, based on both field and laboratory investigations and cannot be directly related to specific sites – the risk of groundwater and soil contamination will be determined by a myriad of different factors including exposure (for example, chipped tyres will expose more steel than whole tyres), how the tyres are stacked, any leachate control systems (for example, in engineered landfills), distance to groundwater, permeability and chemistry of the soil and contact time with water.
- Resource recovery – tyres represent a significant amount of "embodied energy" and materials. It is therefore, from an eco-efficiency perspective, critical that we seriously consider alternative uses for EoL tyres.
- Visual pollution and pest control – stockpiles of tyres cause visual pollution and create a habitat for various pests, in particular insects and vermin.

[7] MWH July 2004. End of Life Tyre Management: Storage Options.

3.2 Socio-economic and regulatory issues

Use of tyres is directly related to the use of cars, and therefore one of the key social issues related to tyres is dependency on cars for access to education, jobs and amenities. In proportion to the purchase price of a tyre, and indeed of a car, the cost of disposal is quite minor and it is assumed it would not have an impact on the decision to own a car or what tyres to buy – used or new.

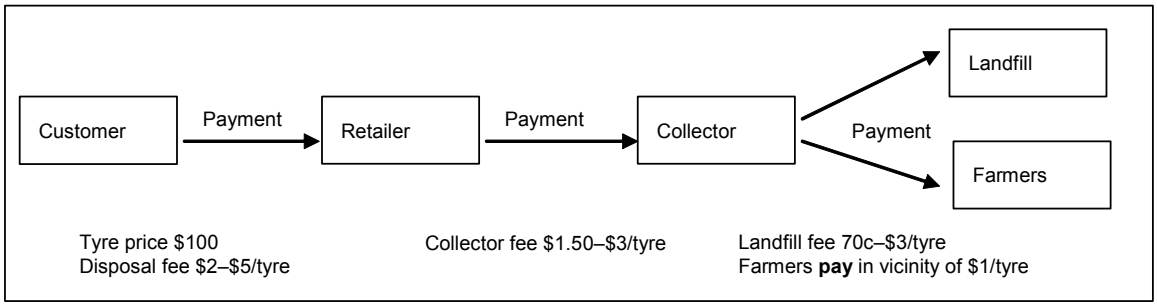
The economic cost of illegal tyre dumping is a significant issue. According to a previous study,[8] the fines and enforcement for illegal tyre dumping are inadequate. Tyre dumping is illegal under Section 15 of the Litter Act. The maximum fine is $500 for an individual and $2,000 for a corporate. However, this does not discourage dumping of tyres, especially when the cost of legal disposal can be significantly above these fines, depending on the number of tyres. (Note that the fines that can be imposed under the Litter Act are currently being reviewed) As described in Section 2, there is already a reported incident of a landowner paying $100,000 for legal disposal of tyres dumped on his property.

Tyre dumping could also be legislated for under the Resource Management Act (1991). This would require, however, the local council to establish a rule in the district plan preventing unauthorised tyre piles. There are numerous provisions within the Act to control where solid wastes can, and cannot, be stored.

Finally, the Local Government Act (Part 8) allows local authorities to make bylaws to protect the public from nuisance and to maintain public health and safety. This provision could readily cover unauthorised tyre dumping and size and nature of tyre piles. To our knowledge, tyre dumping is not currently regulated under either the Resource Management or Local Government Acts. There are incidences where the local council have used fire prevention bylaws to insist on a tyre pile being removed. Both the Resource Management and Local Government Acts apply to the property owners rather than potential tyre "dumpers" and would therefore not necessarily act as a deterrent to tyre dumping.

The figure below presents the current costs of disposal and collection of tyres in New Zealand.

Figure 3-1: Current cost of disposal and collection of tyres in New Zealand



[8] Firecone. 2004. Management of End-of-life Tyres.

The Collectors Interest Group estimates that, for the collection business to be economic, 30% of tyres would need to be recycled. The reasoning for this figure is uncertain as the collectors should be dependent on the differential between what they charge the retailer and what they are charged by the landfill operators, rather than the absolute charge or the percentage recycling rate. In reality, a large number of customers (especially in rural areas) are opposed to paying disposal fees. Instead, they prefer to find an alternative for disposing of their tyres. Even in the municipal areas $5 is considered the highest fee that the customers would be willing to pay. Consequently, retailers operating in the highly competitive tyre sales environment are not willing to impose that fee. This situation could change if the awareness of the "tyre problem" was higher and the need to pay the disposal fee was widely understood.

4.1 Alternative end-uses

Potential end-uses for the waste tyres can be divided into categories.

- Energy recovery – tyre-derived fuel for cement kilns, smelters, paper mills and power stations or blasting material for mining.
- Civil engineering – retaining walls, building foundations, paving roads, erosion control, stemming or landfill engineering.
- Material recovery – production of steel, new tyres, road surfacing, flooring and mats, moulded products (eg, speed humps, crash barriers) or adhesives.

The following provides a brief overview of potential reuses specific to the New Zealand market. As part of an investigation into a regional waste recovery unit in Wellington, alternative end-uses have been previously evaluated and reported on in some detail.[9]

Energy recovery

In New Zealand there are at least two operations that could use large volumes of tyres as a potentially viable alternative energy source.

- Golden Bay Cement, based in Whangarei.
- Holcim Cement, based in Westport.

The net calorific value of tyres is between 26 and 34 GJ per tonne[10] which is similar to that of common fuel sources such as coal. A tyre burns completely at 650°C, producing principally carbon dioxide and water, with the addition of some inert residues such as ash and slag. The temperature inside cement kilns, at 1800°C, is significantly higher than this and thus ensures complete combustion. Cement kilns will accept whole tyres as fuel, which saves preparation (quartering or shredding) costs.

Material recovery

One of the largest potential users of tyres for material recovery is Pacific Steel, based in Otahuhu.

The use of tyres as a material input to the steel manufacturing process was trialled at Pacific Steel for a three month period, approximately two years ago. Tyres are regarded by the company as an excellent alternative to Activated Carbon and also provide an energy input.[11] About half a million tyres per year (approximately the entire Auckland market) could be used as input.

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9 www.mfe.govt.nz/publications/waste/devt-regional-waste-recovery-sector.

10 MWH New Zealand Ltd (June 2003). Development of a Regional Waste Recovery/Processing Sector. A Report prepared for the Wellington City Council, Ministry for the Environment and Ministry of Economic Development.

11 Personal communication. Rod Murray, Environmental Manager, Pacific Steel.

In addition, the steel rims from the tyres can be directly fed to the steel manufacturing process. Use of tyres for steel manufacture therefore represents a "holistic" end-use. Whole tyres can be used, though halved or quartered tyres are preferred. Larger off-road haulage and tractor tyres can also be used.

The results of the three month trial showed that tyres were a technically feasible material input into the steel production process. Production yields increased and there were no significant increases in atmospheric emissions. The heat flows to the bag house were, however, more variable and, as a result, Pacific Steel would need to upgrade the baghouse.

Civil engineering and tyre transformation

There are a large number of "civil engineering related" alternative end-uses for tyres. Most of these rely on the stability and rigidity of the tyre. Examples are:

- landfill engineering;
- retaining walls and soil embankments (which require minimal processing of whole tyres);
- anti-erosion measures, artificial reefs and flood defences (using whole tyres).

Tyres can also be transformed, which is defined as gradually reducing a tyre to smaller and smaller particles and using the resultant material as a resource. This is increasingly common overseas. There are many technologies being developed to transform tyres into a Tyre Derived Product (TDP). The TDPs are created by physical grinding or by cryogenic processing (freezing and then shattering). Possible uses for TDPs include:

- stemming and drainage (using shredded tyres);
- rubber mulches (using buffings from solid rubber tyres);
- matting and flooring (using crumbed rubber);
- road surfacing (using crumbed rubber);
- spray seals (using crumbed rubber).

Road surfacing using crumbed rubber mixed with bitumen is now being widely adopted overseas. The road surface is longer lasting and also quieter than the equivalent, pure bitumen option.

There is also ongoing research into development of more durable and rubber-less tyres. There are technical difficulties associated with producing devulcanised rubber fibres for different manufacturers' standards.

In New Zealand, there are a number of new initiatives investigating civil engineering-type applications for used tyres. Through feedback received from stakeholders during this study, URS understands that companies such as the Australian-based "Ecoflex", which use tyres for a range of engineering applications, are active in the New Zealand EoL tyre market (www.ecoflex.com.au).

4.2 Barriers

There are both perceived and real barriers to alternative potential end-uses for tyres.

Environmental

Tyres are "built to last" and therefore do not degrade easily. This creates issues for regulatory authorities providing consents for using and burning tyres. There is now extensive evidence from overseas showing that tyres can be burnt at high temperatures (such as those present in an electric arc or a cement kiln) without creating unacceptable atmospheric emissions. Following a comprehensive review of alternative tyre disposal options in the United Kingdom, the Environmental Agency has recommended that burning tyres in high temperature cement kilns is preferable to landfilling, from an environmental perspective.[12] This supports findings from other overseas investigations that show burning tyres at high temperatures does not produce unacceptable atmospheric emissions. In Australia, for example, burning tyres as an energy source for cement kilns is common practice and is used at CemAust in Gladsone and Blue Circle at Waurn Ponds.

On the basis of information collected during this case study, Pacific Steel, for example, is confident of its ability to use tyres in the steel manufacturing process without exceeding existing resource consent conditions. The environmental issues are, therefore, more of a perceived than actual concern and it is our recommendation that further research is carried out to check this initial conclusion.

Security of supply and transport

Security of supply and transport costs have been put forward as issues for larger-scale reuse of tyres (in cement and steel manufacturing). These factors are not issues in their own right but have arisen from the cost/benefit analysis and therefore economic feasibility of any proposed reuse. Again, representatives of Pacific Steel have confirmed during this study that they are confident their proposed tyre reuse (as an alternative to activated carbon) would be economically feasible and represent a win/win economically – for both the end-user and the tyre manufacturer. This situation may be different in rural areas in New Zealand, in particular the South Island where relatively small numbers of dispersed tyres would be expensive to collect and transport to one location, for example, the Holcim Cement Plant at Westport.

Costs for landfill disposal vs alternative reuse options

We believe that lower cost landfill disposal provides a major barrier to the economic viability of alternative reuse of tyres. The topic of landfill pricing is extensive and encompasses a range of environmental and social cots, and landfill operator business issues. It is beyond the scope of this

[12] United Kingdom Environmental Agency. 2001. Tyres Disposal Protocol.

study to evaluate or comment in detail on appropriate pricing structures for waste disposal at landfill. We believe, however, that it is appropriate to conclude that if landfill disposal was more expensive (and therefore a better reflection of all environmental and social costs for linear throughput of products, as opposed to greater reuse and resource recovery) there would be greater economic incentives for alternative tyre reuse. In the South Island, for example, cheaper landfills accepting whole tyres compete for the supply with other landfills. This is a reported barrier to energy recovery at the cement kilns.

The total cost of tyre collection and transport is estimated at $1.50 to $2 per passenger tyre in the South Island. In Australia, cement manufacturers are not buying tyres but are paid for taking them.[13] On the basis of our Australian study, it was calculated that tyres were worth (as an equivalent energy source to coal) between $74–$88 per tonne (depending on whether whole or shredded), which equates to less than $1 per passenger tyre. This is slightly more than the equivalent coal price of $60 per tonne. Tyres also contain steel, which provides a substitute to ferrous oxides, and produce lower ash percentages to coal.

The cement plants in Australia currently charge approximately or $250 per tonne (about $2.50 per tyre) for taking the tyres. Despite this current situation, the Cement Industry Federation in Australia has indicated that an estimated price of between $35–$74 per tonne (about 0.35 cents to 0.74 cents per tyre) would be the highest that kilns would pay for tyre-derived fuel.

The situation in Australia – with cement manufacturers being paid to take EoL tyres – has arisen through private sector arrangements between the cement manufacturers and the tyre retailers/collectors and is a result of negotiations from two different perspectives.

- From the cement manufacturer's perspective, use of tyres as a partial substitution for fuel may generate both supply uncertainties and quality issues. Although the tyres may represent a slight reduction in energy costs, this may be offset by the risks arising from a less reliable source and the capital costs to construct additional storage and supply facilities. There would also be operational issues as mixed fuels might lead to more process problems and capacity constraints.
- From the tyre manufacturer's perspective, the EoL tyre "energy product" has a value as either an alternative fuel or a materials source.

If landfill costs were increased, the starting position for negotiations between users (for example, the cement manufacturers) and generators (including the tyre retailers and manufacturers) would be based on the attractiveness of alternatives to landfill. Under the current arrangements it is simpler, and in many cases more cost effective, to dispose of the tyres in landfill.

[13] URS. 2005. Financial and Economic Analysis of Proposed National Used Tyre Product Stewardship Scheme.

Australian studies[14] have found that values for tyres as prepared units for engineering purposes, such as retaining walls, building foundation formwork and flexible roads, can be in the region of AUD $200 per tonne ($2 per tyre). Opportunities to use tyres in these market areas would appear to be available in New Zealand.

Increased values are potentially obtainable in the use of rubber crumb (1 to 2 mm) as a diesel fuel and as a substitute in blasting mixes. These uses have values in the region of AUD $500 to $600 per tonne ($5–$6 per tyre). Road surfacing using rubber crumb at the 30 mesh grade (0.5 mm) for spray seal and asphalt applications is valued at between AUD $400 to $600 per tonne ($4–$6 per tyre) in the Australian market. Rubber crumb (1 to 10 mm) for flooring and mat manufacturing is currently valued at between AUD $350 to 600 per tonne. Rubber crumb, in adhesive manufacturing, attracts prices of between AUD $550 to $900 per tonne. Although rubber crumbing appears economically attractive, feedback obtained during this case study suggests that even a coarse crumbing process (to 50 mm) costs up to $80 per tonne.

Higher end value moulded products using fine rubber powders at 100 micron and smaller have a value in the region of $500 to $1000 per tonne ($5–$10 per tyre) and can be used in the elastomer market. Steel and textile recovery, a by-product of tyre crumbing, generates recovered fibres and steel, both of which have an end-use value.

Despite the seemingly attractive economics, none of these markets for EoL tyres have been developed in New Zealand. Likely reasons for this include available tyre numbers (security of supply), transport distances and logistical issues. Also, the technologies for reuse of tyres are still very new overseas and, in many cases, are still under development.

Lack of information and tracking for tyres

Given that TyreTrack records the movement of only a third of New Zealand waste tyres, there is currently limited information on the numbers and locations of tyres potentially available for reuse. As a result, potential alternative end-users would find it difficult to develop business models that required some understanding of the distribution and nature of the input product, ie, the tyres. This situation would be resolved if participation in TyreTrack increased – either due to greater incentives or regulation to enforce mandatory membership.

[14] URS Australia. 2005. Financial and Economic Analysis of Proposed National Used Tyre Product Stewardship Scheme.

Australian findings

An Australian study[15] of tyre end-uses lists the following barriers to their wider uptake:

- cheap landfill pricing;
- unsupportive public procurement policies;
- private sector inertia in using different systems;
- lack of consistent and reliable EoL tyre supply;
- lack of regulation supporting the recycling of EoL tyres;
- distance from collection point to end-users;
- competition from raw materials priced at low levels;
- concern by regulators over the heavy metal leachate;
- operational difficulties in burning tyres;
- negative public perception of environmental issues associated with burning tyres;
- lack of appropriate specification for use of tyre rubber in road surfacing;
- health and safety issues.

Summary

In summary, some of the above reuses for tyres have been developed as commercially viable options overseas. So why hasn't this occurred to date in New Zealand? The answer relates to the complex economics of disposal and reuse from different perspectives, including the retailers/collectors, the alternative end-users and the landfill operators. Despite claims from some industry representatives that reuse options are already economically viable and are being hindered by perceived environmental concerns, a much higher landfill disposal fee would "drive" the market towards reuse and more accurately reflect the overall cost, including social and environmental, of tyre use and disposal.

[15] Atech Group. 2001. A National Approach to Waste Tyres.

5.1 Mechanics of the scheme

The TyreTrack scheme is managed by the MTA. It has been operating since July 2004 and was due to be reviewed before June 2006. The scheme objectives are to:

- ensure that a high proportion of EoL tyres are disposed of appropriately in sanitary landfills;
- improve rates of tyre recycling and reprocessing by providing good information about volumes of tyres available for disposal.

TyreTrack provides an on-line system to allow tyre retailers to find responsible ways of disposing of their waste tyres. When a retailer becomes a member of TyreTrack, they are given an individual login and password, which enables them to record the number of tyres they have available for disposal. They can then either choose a registered collector from the list or make the collection open to tender. The system informs the registered collectors about the new tyre supply. Collectors register interest by providing the price and information about how the waste tyres will be used. The retailer can choose from the collectors that have tendered for the tyre supply.

Registered collectors are obliged to record with TyreTrack in what way the tyres are disposed of, providing a landfill address or contact details for the end-use customer (eg, horse arena, farmers). (Note that TyreTrack does not require information on types of tyres. Estimates obtained during this study indicate these are 75% cars and 25% trucks/other.) Collectors are obliged to provide evidence of disposal in the form of weighbridge receipts, their monthly landfill account or other similar documents. Currently, e-mail reports are also accepted as evidence and are verified by the TyreTrack administrator through personal contact with landfills and end-users.

Some of the member retailers dispose of their tyres without using the registered collectors (eg, allowing farmers to pick them up or using a general waste management agent to take tyres to landfill). In that case they are still encouraged to register the tyres online in order to allow the scheme to track the overall movements of waste tyres in the economy. Similarly, the registered collectors report on the tyres collected from non-member retailers.

Where the tyre retailers or collectors don't have easy access to internet, they are able to send written records of tyres disposed and collected to the TyreTrack administrator, who enters the numbers into the system manually.

The scheme has some educational materials available to allow the retailers to inform their customers and non-registered waste tyre users about the scheme and the environmental hazards associated with waste tyres. This information has also been forwarded to polytechnics where training for tyre fitting is provided and to Auckland Regional Council's vehicle dismantling sites.

The TyreTrack website provides free space for tyre end-users to advertise their business and to look for tyre suppliers.

The scheme is jointly funded by the Ministry for the Environment and the MTA, with the MTA providing office space for the assigned administrator. The scheme is supported by a stakeholder group including tyre producers, importers, collectors, industry association and Local Government New Zealand representatives. The role of the stakeholder group is to provide ongoing advice and support; however, decision-making power lies with the Ministry for the Environment.

Based on anecdotal information from TyreTrack administrators, it was originally envisaged that a large proportion of tyre retailers would register with the scheme as it would address the difficulties experienced in obtaining reliable tyre collectors to transport tyres to landfill. Unfortunately, this has not proved to be the case and approximately only 30% of the existing tyre retailers in New Zealand participate in the scheme.

Currently, the majority of the tyres registered are not entered through the tendering process, but are simply a record of the routine transactions outside the system and are entered by the administrator manually.

At the end of 2005 an agreement was reached with a number of Auckland city councils to use TyreTrack for the enforcement of the tyre bylaws. TyreTrack is now reporting to North Shore City on the number of tyres entering and leaving its region.

5.2 Current registration and activity

Less than 400 tyre retailers are registered with the TyreTrack scheme, which is estimated as a third of the market. Over half of these retailers registered are those controlled by the tyre producers (that is, the "mainstream" Bridgestone and South Pacific Tyres retail facilities). A total of 43 collectors are registered with the scheme, but only 14 report tyre collection and disposal. The remainder are listed, and available for direct approach by the retailers. Last year 1.4 million tyres were recorded in the scheme. The majority of activity took place in the metropolitan areas with very little participation from remote or rural locations.

Appendix B provides quantitative information on the number of TyreTrack retailers and collectors per region in January 2006, as well as the total number of tenders and tyres registered in 2005. The data shows that the bulk of the tyres registered (nearly 1 million of the 1.4 million) are from the Auckland region. Using the anecdotal rule of thumb – one EoL tyre generated per person per year – these results indicate that TyreTrack includes information on the majority of Auckland tyres. For the remainder of the country (about 3.7 million people and only 400,000 tyres registered) TyreTrack therefore accounts for approximately only 10% of used tyre movements.

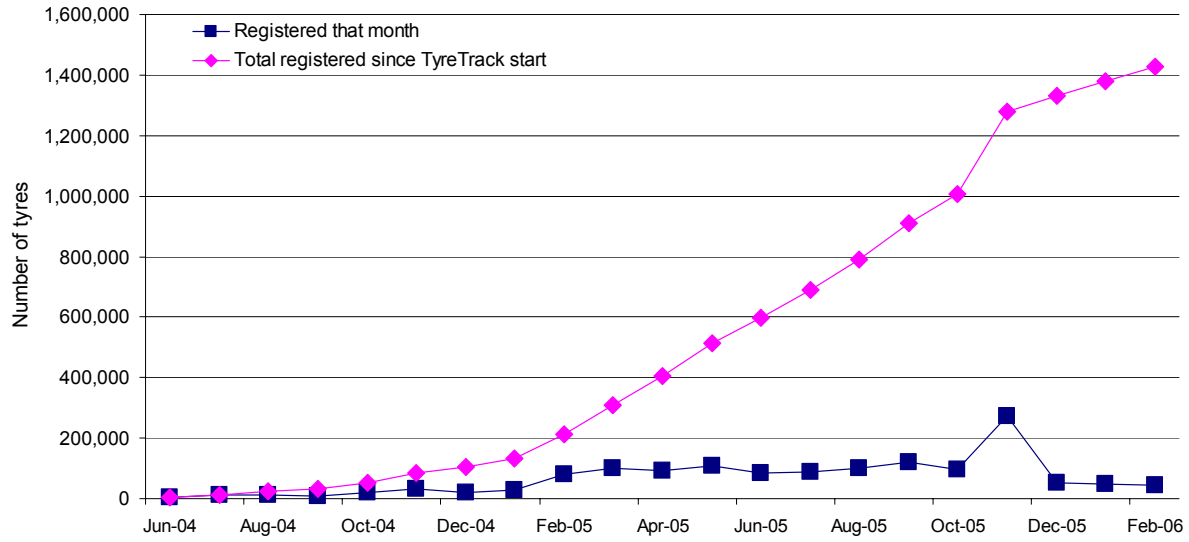
The TyreTrack website received over 600 visits in February 2006.

There is no target in regard to the volume of tyres diverted from landfill.

5.3 Review against objectives

To the extent that TyreTrack covers the used tyre sector (30%), it performs well against its stated objectives. Figure 5–1 provides an evaluation of tyres recorded with TyreTrack since June 2004.

Figure 5-1: Number of tyres



Source: Waste Awareness.

The TyreTrack objectives are evaluated as follows:

- Ensure that a high proportion of EoL tyres are disposed of appropriately in sanitary landfills or are recycled.

  TyreTrack enables better transparency of tyre movements, which encourages the participants to dispose of them in an appropriate way. At the same time, there are no mechanisms that would ensure total tyre figures are provided and that the scheme constrains those wishing to dispose of the tyres in an irresponsible way.

  No evidence has been found during this study to show that illegal tyre dumping has diminished as a result of TyreTrack. This information would be exceedingly difficult to obtain as we do not know the numbers of tyres that are being dumped illegally in New Zealand, and therefore are not able to predict TyreTrack's influence on these. Presumably, for the 30% of tyres registered with TyreTrack, there is less risk that these will be disposed of illegally.

- Improve rates of tyre recycling and reprocessing by providing would-be recyclers with good information about volumes of tyres becoming available for disposal by region.

  TyreTrack provides good, regionally based information for a third of waste tyres in New Zealand. It performs better in metropolitan areas, while coverage in rural areas is minimal. The effect of this information on development of the end-use market cannot be reliably estimated at this time. Based on anecdotal feedback obtained during this study, both retailers and collectors signed up to TyreTrack do not report movements of all of their tyres. Therefore, although there is more information on tyre movements throughout the country, TyreTrack does not explicitly provide an incentive to improve either recycling or reprocessing.

  TyreTrack is, however, widely supported in the sector and provides a potential platform (with some reconfiguring and additional government support) for supporting alternative tyre recycling and reprocessing initiatives by supplying information on waste tyre supply flows. Perhaps, more importantly, TyreTrack has raised the profile of the illegal tyre dumping issue in New Zealand and provided a government-supported scheme for retailers, small garages and collectors who choose to take a responsible approach to tyre disposal.

5.4 Potential to expand with no further government intervention

TyreTrack has a stated objective to double the number of tyres registered every year, requiring two million tyres registered by the end of 2006.

The potential for TyreTrack to continue to expand under the current policy regime (some support from the Ministry for the Environment for administering the scheme but no further direct intervention) has been canvassed with a range of stakeholders during this study. The responses are mixed and are summarised as follows:

- TyreTrack has reached capacity numbers as the larger operators (arguably the low-lying fruit) have already registered with the scheme and there is no incentive for other retailers or collectors to do so;
- the number of tyres tracked through TyreTrack will continue to rise as the scheme continues to raise its profile throughout the tyre sector and as the demand for tyres to fulfil alternative "one-off" uses (such covering for silage heaps on farms) lessens.

The conclusion that TyreTrack has reached an upper growth limit (say, in the range of 1.5 million tyres per year) is based on the lack of incentives for smaller retailers and garages to sign up to TyreTrack. These businesses do not need the available tendering system and, if anything, there is a downside to registering (increased administrative costs and additional disposal costs if these are currently "subsidised" or free through illegal dumping activity). These smaller businesses are also unlikely to be government suppliers and therefore will not be incentivised by any preferential buying of TyreTrack-registered tyres by government departments. With increased communication efforts, TyreTrack could perhaps reach two million tyres by the end of next year (an internal target).

There are also other compounding influences on either a retailer or collector's decision to sign up to TyreTrack. One major collector has advised during this study that his company's preference is for retailers and repair yards (his customers) not to sign up to TyreTrack, as this means other, competing, collectors could then offer their services to them.

In support of the second view (continued growth in TyreTrack numbers), a recent article[16] in the "Waste Awareness" (the official, bi-monthly magazine for the Waste Management Institute) agreed that the number of tyres registered with TyreTrack will reach the two million mark by the end of 2006. It is likely that some of this predicted growth will come from the Bridgestone and South Pacific Tyres retailers who have not registered to date, but now are becoming more aware of the scheme. It is also likely that a greater number of tyres will be reported from the registered, larger companies as the individual "shop floor" managers become more aware of TyreTrack reporting requirements.

It is likely that these two opposing "trend factors" will cancel each other out and, assuming the status quo remains, then the number of tyres being tracked with TyreTrack will remain at around the 1–1.5 million per annum mark, primarily stemming from the larger-scale retailers such as Bridgestone and South Pacific Tyres complying.

Preferential procurement of tyres from TyreTrack registered suppliers is one form of government intervention that would be relatively easily to apply and has the potential to make a significant difference. If through, for example, the Govt[3] programme all government departments only purchased tyres from TyreTrack suppliers there would be a significant incentive for retailers to sign up. However, it could equally be argued the suppliers likely to be bidding for the large-scale government department tyre contracts would be the large retailers such as South Pacific Tyres and Bridgestone. Both of these are already signed up to TyreTrack.

In general, based on discussions held with the tyre sector group during preparation of this report, registration with TyreTrack is not expected to increase significantly without some change in government policy and support. Existing scheme administrators and registrants advise it is unlikely TyreTrack would evolve beyond the current participation levels without a significant change, for example, mandatory registration.

As a result of limited participation in TyreTrack, there are currently a majority of, primarily small, tyre retailers "free-riding" on the system. Based on discussions with MTA administrators, the most effective way of addressing this issue is to legislate to make membership mandatory for both retailers and collectors. This approach would, however, be very difficult to enforce due to the large number of small garages and tyre sales outlets scattered throughout small towns and cities in New Zealand. Also, the number of tyres recorded in the system may need to be separately checked. Under the current arrangements a retailer or collector registers with TyreTrack but does not necessarily record all tyres that are handled.

[16] Waste Awareness, April–May 2006, pp 17–18 "ResourceRecovery@WasteMINZ – TyreTrack".

5.5 Review against broader government policy objectives

As part of the project brief, the Ministry for the Environment requires TyreTrack to be reviewed against broader government policy objectives. These are listed as follows:

- leads to environmental gains;
- is effective and efficient;
- contains publicly reported, challenging, performance measures, quantifiable where possible;
- is transparent;
- does not reduce market competition;
- sets safe standards for collection and handling;
- provides a forum for communication/industry-wide discussion to address any issues;
- includes public information and education components;
- includes provision for monitoring and reporting on effectiveness;
- compares favourably with international best practice;
- is compliant with international trade agreements;
- cost of enforcement and management of "free riders";
- internalises waste management costs.

In addition to the above, the benefits of any regulatory aspects supporting the schemes should outweigh the costs.

As part of the requirement for schemes to be "effective and efficient", the Government needs to ensure that:

- the schemes are stable and there is widespread uptake by the private sector;
- the risks are minimised;
- the scheme benefits outweigh the costs – considering a raft of dimensions including the nature of the waste (how much and its geographical spread), how it is currently managed (waste tracking mechanisms and other waste minimisation programmes) and other major impacts arising from product manufacture, use and disposal (ie, whether product disposal is a significant impact from the entire life cycle);
- there is potential for scheme improvement (considering, for example, improved waste minimisation, green design or alternative waste uses);
- requirements for company and public maintenance and participation.

Administrative costs must also be taken into account, including costs of enforcement and management of free riders.

A detailed review of TyreTrack against government product stewardship policy objectives has been completed and is included in Appendix B. The review provides an expected outcome given that TyreTrack was not designed to meet specific tracking objectives, not the broad product stewardship policy objectives listed above. As a result, the scheme falls well short of meeting these more general objectives. The evaluation is, however, useful in that it highlights more specifically where the gaps, which could be potentially filled by an expanded scheme, are. In summary, these are listed as follows:

- the scheme doesn't, on its own, create a mechanism to divert tyres from landfill or encourage alternative end-uses;
- the scheme deals only with the EoL, while ignoring design and life use stages;
- lack of enforcement and free riders create competitive pressures for members;
- the scheme doesn't provide enough support to collectors and end-users.

It is difficult to speculate further on whether TyreTrack is helping to prevent illegal dumping and stockpiling in support of general government objectives. Awareness of the tyre disposal issue has certainly been raised, but there is currently no requirement for even the registered TyreTrack participants to report movements for all of the tyres they are handling.

In summary, TyreTrack is assisting in the exchange of information, and therefore assumedly the legal disposal of tyres at landfill, for 30% of the market. Given this situation, it can not be expected to be completely fulfilling originally developed specific objectives, or broader-based government policy objectives. Nonetheless, TyreTrack forms an excellent established basis for an active industry forum and there is strong industry support to expand its operations and enforce membership.

Given the above conclusions, that TyreTrack is not currently meeting all of its intended objectives and is not fulfilling proposed government policy objectives, what are the options for expanding the current arrangements? The answers to these are canvassed further in Section 7.0 which evaluates different alternative options.

Overseas Experience

In the majority of developed countries, governments have implemented some form of financial or regulatory measure to intervene in the used-tyre market and ensure that EoL tyres are diverted from landfills and reused. In the United States more than 35 states have tyre recovery schemes in place and, in 2003, 80.4% of waste tyres were reused.[17] In the European Union (EU) whole tyres have been banned from landfills since 2003 and shredded tyres will be banned from July 2006. Across all of the EU states, more than 73.5% of tyres were diverted from landfill in 2003. This result is attributable to a successful tyre recovery schemes funded by a tyre levy. In most cases, the levy is applied at the point of manufacture and the funds used subsidise collection and transport of the used tyres. In comparison to New Zealand, the volume and relatively concentrated nature of EoL tyres could be ensuring the economic viability of reuse schemes.

The following policies or initiatives are used internationally, and have been used to help develop recommendations arising from this report.

- General facilitation:
  - education, information, research and marketing strategies;
  - establishment of advisory bodies;
  - encouraging the creation of advisory bodies by stakeholders.
- Enhanced regulatory requirements:
  - banning of whole tyres in landfills;
  - permitting only shredded (not quartered) tyres in landfills;
  - specific storage standards for tyre mono-fills;
  - limits on the maximum number of tyres in any one-tyre pile site;
  - limits on the maximum number of tyres on any one property;
  - storage requirements for outdoor tyre piles (security, shielding from public view, pile size limits, berms, fire control provisions and fire breaks).
- Strengthened compliance mechanisms:
  - registration of all tyre collectors, shredders and tyre piles;
  - documentation of movement of tyres through the supply chain;
  - accreditation of scrap-pile operators and processors;
  - heavy fines for illegal dumping;
  - promulgation of industry standards for storage and processing;
  - making it compulsory for retailers to accept EoL tyres (takeback schemes).

[17] URS Australia 2005.

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- Subsidisation of collection, storage, or transformation:
  - tax credits;
  - low-cost loans;
  - central government grants;
  - payment per tonne of tyres recycled;
  - budgeted funds for site clean-ups;
  - increased industry responsibility;
  - voluntary or mandated industry bodies responsible for managing the system.
- Broader measures to reduce supply (not as relevant to this study as it focuses on disposal):
  - improve tyre life (ie, measures to improve tyre quality and consumer education such as correct inflation);
  - reduce vehicle mileage (ie, enhance public transport options);
  - improve the retread rate.

Of these approaches, the most popular overseas appears to be a mix of tyre levies (to support the economic attractiveness of reuse alternatives) and support for the development of viable end-use alternatives. To date, the most popular end-uses are either large-scale tyre burning as a fuel source for cement kilns and simple civil engineering uses, such as erosion control structures. The details, size and implementation of the waste levies are beyond the scope of this analysis.

Appendix C provides an overview of the findings of the international research.

7.1 What could be done?

On the basis of the evaluation of the existing TyreTrack scheme (Section 5.0) and a brief review of overseas initiatives (Section 6), it is clear the existing situation in New Zealand could be improved. Despite TyreTrack successfully raising awareness of the used-tyre problem in New Zealand and currently providing a mechanism for tracking over a million tyres per annum, there appears to be significant further scope for increased diversion of tyres from landfills and illegal dumping to viable end-uses.

The objective of this section is to look beyond TyreTrack, as it is currently structured, to future potential expansion and the policy framework necessary to meet stated government objectives as applied to tyres.

In this context, the following scenarios are evaluated.

- Retaining the status quo – no government financial or regulatory intervention, but continuing level of support for TyreTrack.
- An expanded scheme – financial and regulatory intervention to expand TyreTrack, develop and impose additional regulations (mandatory sign-up to TyreTrack, increase fines for illegal disposal, increased landfill charges and potentially an Advanced Disposal Fee (ADF)).
- Business-to-business partnerships – cease all government intervention (including TyreTrack) and leave it to the private sector to arrange sustainable disposal options. This would enable organisations in the private sector to establish partnerships to divert tyres from landfills – for example, between Bridgestone Tyres and Pacific Steel.

Of these scenarios, options 2 and 3 are both consistent with the currently preferred government policy option – general support/facilitation/education for private sector initiatives and intervention, where required, for sectors where "free-riders" have a competitive advantage compared to companies taking a responsible approach to product stewardship.

7.2 Evaluation framework

The above scenarios which could be applied to the tyre sector have been evaluated against:

- product stewardship government policy objectives;
- environmental and social outcomes;
- stakeholder opportunities and risks.

The objective is to inform government policy development, as it could potentially apply to tyres. The evaluation has included all of the product stewardship policy objectives, as listed in Section 5. These have also been expanded to include more general environmental and social outcomes and stakeholder opportunities than those listed by Ministry for the Environment as specific policy objectives. The specific additional criteria under each of these groupings are listed in Appendix D.

7.3 Evaluation

Appendix E provides an analysis of each of these options with respect to the stated government policy objectives and also additional social and environmental and stakeholder opportunity criteria. Note that the analysis focuses on the extent to which these three scenarios meet a set of objectives. There has been less analysis of the differential costs of implementing each of the scenarios.

The key findings of the analysis are as follows.

- The *status quo* (TyreTrack) falls well short of both the government policy objectives and the broader environmental and social considerations. This supports the earlier analysis of TyreTrack but, in this case, the findings are compared with the alternatives (fully-fledged regulatory and financial intervention, mandatory sign-up or private sector arrangements only).
- An expanded scheme, including enforced mandatory sign-up to TyreTrack and fiscal intervention to cover the real costs of tyre disposal, could be designed to meet all stated objectives.
- Leaving further developments to the private sector only would potentially meet some government environmental objectives (for example, diverting tyres to landfill) but not the broader government policy objectives including education and dissemination of information. A fully functioning private sector arrangement (for instance, between Pacific Steel and Bridgestone Tyres) would alter the existing competitiveness of the larger retailers vs. the smaller retailers who would not be able to cost-effectively collect and transport dispersed tyres into a central location. It would also potentially provide a competitive advantage to the tyre-user, in this case Pacific Steel, if the tyre material input was more cost-effective than current alternatives. These arrangements could be seen as a natural market response to raised environmental awareness amongst companies and customers, providing an advantage to those who are in the best position to find efficient solutions. (Also note that leaving the development of schemes to the private sector may not create a change in the overall "drivers" for responsible tyre disposal.)

The latter two scenarios are not, necessarily, mutually exclusive – an enhanced tracking scheme (through mandatory participation), more realistic disposal costs (through some form of fiscal intervention) and private sector arrangements could occur simultaneously and would all contribute to alleviating the existing problem.

The analysis of different options focussed more on the potential benefits than the costs. The costs of an expanded scheme with mandatory sign-up to TyreTrack are significantly greater (in respect to government support and enforcement) than private sector arrangements.

7.4 Application of the currently proposed policy to the tyre sector

On the basis of the evaluation completed of the different future scenarios and existing New Zealand practices, the currently proposed product stewardship policy could be effectively applied in the tyre sector. This statement assumes the tyre sector would be one of the product sectors where some fiscal and/or regulatory intervention was targeted to eliminate the risk of "free riders" not accepting responsibility for the environmentally acceptable disposal of EoL tyres.

The specific nature of the fiscal and/or regulatory intervention will need to be further developed in a more detailed economic analysis. However, the following initial conclusions can be made. They are based on the premise that central government, in this case the Ministry for the Environment working with other relevant government departments such as the Ministry of Transport, take the lead in further developing the product stewardship policy and implementing any fiscal/regulatory intervention.

Regulation to require mandatory registration to TyreTrack

Based on current experience (where only 30% of the market has voluntarily registered), the most effective way of achieving 100% participation in TyreTrack would be through legislation to make registration mandatory. This legislation could be developed as a first "test case" in the application of the currently proposed product stewardship policy. The regulation would need to be drafted to:

- enhance the administrative functions for the existing TyreTrack scheme;
- allow for mandatory enforcement actions and penalties if collectors/retailers did not register with the scheme;
- require all tyres to be reported through TyreTrack.

The legislation would need to be actively enforced. It is envisaged enforcement costs would initially be high but, as more retailers signed up, the costs "per tyre tracked" would gradually decrease. (Note that the requirement for mandatory sign-up could apply to the existing TyreTrack or a revised version of the scheme).

Actions needed to support regulations

The regulations requiring mandatory registration with TyreTrack, to be developed under the auspices of the currently preferred product stewardship policy, would need to be supported through:

- expanding the current administrative body within the MTA to support the expanded scheme;
- funds to assist with enforcement;
- working with local councils to develop ways to actively enforce registration.

Financial incentives to register with TyreTrack

The proposed policy and assumed regulatory intervention for the tyre sector would be most effective in achieving the stated aims (related to responsible tyre disposal) if there were significant incentives for both small and large retailers and collectors to register with TyreTrack. This situation would reduce enforcement actions and costs. At this stage, there is no financial incentive to register with TyreTrack, aside from potentially more efficient access to retailers (if you operate as a collector) or to collectors (if you operate as a retailer). The potential for large scale tyre procurers, for example, government departments and large corporations, to only buy from registered retailers would help with the business case for registering, but probably only for the larger retailers operating in these markets. For the small, local garage, with a pile of tyres accumulating in the shed until they are carted away by a local farmer, there is little incentive to register.

Further study should be carried out on the possible use of the proposed ADF. This is discussed in detail below as a means of generating funds which could be used to support administration costs.

Advanced disposal fee

The feedback received from the sector group and from some of the stakeholders consulted during this study supports the implementation of an ADF. This would operate in a similar manner to the Advanced Recycling Fee (ARF) being proposed in Australia.[18] (Note that the term ARF was considered as a recommendation arising from this study, but discarded as it would not be currently accurate to refer to "recycling" tyres when the majority are being disposed of. ADF was seen as a broader term, potentially covering disposal at landfill and also alternative reuses.)

This ADF is an alternative form of "fiscal intervention" and, therefore, generates the same concerns in terms of working through the implications for the different facets of the tyre sector (that is further evaluation is required). It could be developed, with the regulatory and fiscal measures discussed above in specific relation to TyreTrack, under the auspices of the currently preferred product stewardship policy.

The ADF appears to have received support to date for two reasons. Firstly, that it would be relatively simple to administer as it could potentially be applied as a customs levy on imported tyres and at the Bridgestone and South Pacific Tyre manufacturing plants in New Zealand. Secondly, because it could generate funds that could be used to support development of higher-value tyre reuse options and, potentially, supplement transport costs to ensure these alternatives are economically viable. The disadvantage of this approach, however, is it does not send any direct market signals that would influence behaviours to avoid landfill disposal of tyres. If the manufacturers or importers pass on the additional ADF to the customer, there would be no incentive directly arising from the ADF for the retailers collecting the used tyres to select reuse options instead of landfill. One possible scenario

[18] URS Australia. 2005. Financial and Economic Analysis of the Proposed National Used Tyre Product Stewardship Scheme.

would be for the ADF to be developed and applied first to help generate commercially viable, tyre-reuse options and then the Waste Disposal Fee (or WDF, discussed further below) would be developed and applied, once these reuse alternatives were in place.

To cover the full spectrum of tyres entering New Zealand, the ADF would need to be applied to new and used cars. Further analysis is required to investigate alternative options for application of a "tyre levy" to cars, for example, through Ministry of Transport regulations.

It is not possible to establish the appropriate value of an ADF as a result of this initial evaluation of options for government intervention in the tyre sector. Assuming the ADF was applied at $2 per tyre, approximately $8 million would be generated from the scheme. Allowing for approximately $400,000 in additional enforcement and administration costs (on the basis that sign-up to TyreTrack would be mandatory), there would be in the order of $7.6 million available for education and promoting alternative tyre end-uses.

Funds from the tyre ADF should be passed directly on to TyreTrack to be managed. Further study is required to identify the specific infrastructure requirements (expanding TyreTrack administration) and how funds would be allocated. It is recommended that the funds are directed towards enforcing the proposed legislation, plus research, feasibility evaluations and market testing of different New Zealand based tyre-reuse options.

7.5 Other supporting measures

In addition to specific regulatory and fiscal intervention to be developed under the auspices of the currently preferred product stewardship policy, the following New Zealand initiatives should be considered to address the issues of tyre disposal.

Waste disposal fee

The potential for a waste levy or WDF in New Zealand is currently being evaluated. A Ministry for the Environment paper on the topic entitled "Issues Associated with a Solid Waste Levy" has just been released (March 2006). This paper is the latest step in a series of studies and evaluations that have been completed, in association with the development and implementation of New Zealand's Waste Strategy, on the potential for a waste levy (eg, the New Zealand Institute of Economic Research's 2002 study "A Landfill Levy – Economic Principals and Implementation of a Waste Levy" and the Ministry for the Environment's "Landfill Full Cost Accounting Guide"). In addition, the New Zealand Business Council for Sustainable Development (NZBCSD) is starting an evaluation of a possible WDF for New Zealand. Both the Ministry for the Environment and the tyre sector representatives should consider contributing to this study. Findings from the study should be used to support the limited analysis completed for this study on the costs and benefits of some form of WDF.

To provide the price signals required to divert tyres from landfill, the most appropriate form of fiscal intervention is to apply a WDF at the landfill gate/point of entry. The retailer would have two options – pay a collector a high price for disposal at landfill or a lower price for an alternative use.

The major risk arising from a more accurate pricing of tyre disposal to landfill (which takes into account the externalities of landfilling) would be to exacerbate the existing illegal dumping problem. To avoid this occurring, the measure would need to be implemented alongside the mandatory membership of TyreTrack. In this way all tyres would be tracked from the retailer/collector and there would be no opportunity for illegal dumping. The Ministry for the Environment might also consider delaying imposition of the WDF until viable end-uses have been better established.

One possible outcome from imposing a tyre WDF in the current situation would be the gradual decline of small tyre retailers. It is possible these small operators would not be able to cost-effectively dispose of tyres to alternative end-users such as Pacific Steel. Their choices would be more restricted than the larger companies, and they might gradually become less competitive as they would need to continue charging the higher WDF price through to their customers. This potential impact supports the argument that alternative tyre end-uses need to switch from being a cost to a revenue source. One of the key government policy objectives is to maintain market competitiveness. As a result, the impact of any WDF on both small and medium retailers/collectors would need to be evaluated as part of the detailed scheme design. The WDF scheme could be designed to minimise impact on small operators and the mandatory registration with TyreTrack would help "even the playing field" by ensuring that potential end-users were aware of the locations of all available EoL tyres.

The proposed WDF should not necessarily impact on the economics of the collectors – they would continue to act as a middle-person, charging the retailer slightly more for collection than the disposal fee to cover their transport and shredding costs, plus a profit margin. This analysis is theoretically correct except that, in New Zealand, the collectors are an optional service which might be circumvented once the price pressure increases. Again, a well-designed scheme could mitigate this risk.

Controls on tyre disposal and tyre piles

There appears to be a level of support amongst sector group members for standardised requirements in regards to disposal of tyres to landfill and stockpiling. On the basis of previous studies,[19] there is considerable information available on responsible stockpiling of tyres. Some local councils, for example Hmilton, have produced guidelines for responsible tyre piles.[20] The available guidance should be expanded to develop guidelines for landfill and transfer station operators.

[19] MWH 2004 and Firecone 2004.

[20] www.mfe.govt.nz/publications/waste/tyre-storage-enforcement-action-jul04/html/page14.html.

Minimise illegal disposal – through the Resource Management Act, district scheme provisions and Litter Act fines

The Ministry for the Environment has recently completed a study evaluating the potential for the Resource Management Act (RMA) to be used to impose penalties on illegal tyre dumping.[21] The study concludes that if there is a potential impact (for example, tyres stored near a river or creating a fire risk), then enforcement action can be taken under the RMA.

Potentially, district councils could develop bylaws preventing tyre dumps and, under the Local Government Act, could impose penalties for illegal disposal of tyres (note that district councils are already actively using RMA provisions to prevent illegal disposal of waste products, including tyres). The bylaws would, however, need to be specifically related back to one or more of a set of prescribed purposes (including preventing public nuisance, health and safety). Based on anecdotal evidence collected during this study, it is likely that local government authorities would use the Resource Management Act rather than the Local Government Act provisions to discourage illegal tyre dumping.

The Litter Act provides another vehicle for penalising illegal tyre dumpers and revisions of this act should be evaluated, potentially as either an alternative, or an additional, regulatory control to the Local Government Act bylaw development. We understand the fines applicable under the Litter Act are currently before the Select Committee as part of the Local Government Reform Bill.

Interpretation of the Resource Management Act

Based on feedback received during this study, in particular from Pacific Steel, the interpretation of the RMA to allow for prescriptive conditions on industrial material and energy inputs is hindering significantly high volume potential reuse of tyres. This does not seem to be a barrier overseas and we are unable to define any reason why it should be in New Zealand. Conditions for discharge permits under the RMA should focus on environmental emissions and this would allow the flexibility for industry to change their material and energy inputs while meeting specified acceptable environmental limits. As a result there would be a significant environmental gain (diversion of tyres from illegal dumps and landfills) and no environmental loss (emission conditions continue to be met). Based on discussions with Auckland Regional Council representatives, there is some support for including additional flexibility in the development of permit conditions, as long as "due process" is carried out to ensure that, as appropriate, the public have an opportunity to contribute. Rigorous effective monitoring programmes would also need to be in place to ensure that, despite changes in material and fuel inputs, the atmospheric emissions from the process were not significantly altered.

[21] MfE. 2005. Enforcement Action under the Resource Management Act 1991 to deal with unlawful storage dumping and disposal of tyres.

There is currently no provision in the RMA to balance different environmental trade-offs, for example, diversion of material from landfill compared to atmospheric emissions. We do not believe, however, that this bigger picture perspective is required for tyre burning. On the basis of overseas experience, decisions on the acceptability of atmospheric emissions from controlled, high-temperature tyre burning can be made based solely on the nature of the emissions themselves. In other words, trade-off against landfill space issues is not required to support the environmental acceptability of burning to provide an energy source.

Education

Significant educational material has already been developed by the Ministry for the Environment on the environmental issues associated with tyres (refer to the Ministry for the Environment website). The study stakeholders and the industry group have indicated, however, a need for further education about tyres.

- Customers: It is believed customers are not aware of the environmental and social hazards associated with tyres. Tyre waste is quite inert and New Zealand doesn't have large tyre stockpiles. Most of the population live in urban areas and are not exposed to the visual pollution on remote farms. As a result, customers are unwilling to pay a disposal fee and the retailers are hesitant to charge one, preferring to divert the tyres to farmers or dispose of them in a way that doesn't accrue any costs. Education about the tyre problem, potential solutions and individual responsibility would help convince customers of the need to pay a disposal fee and choose retailers who deal with their tyres in a responsible way. It could also increase demand for end-use products.
- Retailers: There is some resistance among small tyre retailers to participating in the scheme and recording EoL tyre destinations. Promotion of the scheme and its benefits among these retailers could help reduce this resistance. Customer pressure would play a role here too.
- Collectors and end-users: Increased participation from collectors and end-users would make the scheme more attractive to the retailers. Collectors and high-volume end-users would benefit from more comprehensive information about tyre flows. Mandatory participation in the TyreTrack scheme would provide more robust information for the end-use market and allow a more secure operating environment.

Infrastructure

As governments, manufacturers, retailers and consumers increasingly evaluate the environmental performance of different products, there is a growing need for a type of product or environmental organisation to overview and coordinate initiatives in this area.

In Australia, there is now a Product Responsibility Organisation (PRO) that provides "umbrella level" advice on product stewardship beyond different sectors. This organisation was established following significant analysis.[22] Given the number of product stewardship-related issues that apply across different sectors, we support the establishment of this type of central educational and administrative organisation. One option that should be considered is the expansion of the current Environmental Choice organisation. Environmental Choice currently administers development and implementation of Environmental Choice product labelling in New Zealand. It is, therefore, well placed to work across different sectors assisting with the implementation of different product stewardship schemes. The role of this organisation could include:

- providing education on all aspects of product environmental performance – eg, the roles of consumers, retailers and landfills in adopting environmentally responsible tyre disposal methods;
- coordinating information exchange/learnings/best practice amongst the different sector product stewardship schemes – for example, TyreTrack and private sector cell phone takeback schemes (given the common objective to divert waste from landfill there would be significant common ground to be shared amongst participants on what works and what doesn't etc);
- carrying out research into life cycle impacts of different products in New Zealand and continue to develop specifications for product environmental labels;
- providing support for both government (eg, Govt^3) and private sector product procurement initiatives designed to selectively purchase environmentally preferable products.

7.6 Other relevant feedback

The following points were raised repeatedly by stakeholders and sector group members during the study, and are relevant to the development of recommendations.

- There is a significant amount of goodwill generated by TyreTrack and the scheme could potentially be expanded to cover wider responsibilities such as education and research into alternative end-uses.
- There is wide support for the ADF, as long as it is used to support landfill disposal and the development of end-uses and is applied across the whole of the industry.
- Improvements to the current regulatory environment are strongly supported, including standardising tyre disposal, and encouraging or facilitating alternative end-use "start-up" companies.
- A large number of industry members would support enforcement of participation in TyreTrack.

[22] Environmental Protection and Heritage Council. 2004. Co-regulatory Frameworks for Product Stewardship – An Industry Discussion Paper.

The following recommendations are based on the proceeding evaluation of:

- the tyre sector in New Zealand – in particular waste disposal, and the environmental and social issues arising from this;
- potential alternative uses of end-of life tyres and barriers to their implementation;
- the performance of the existing TyreTrack scheme – in terms of specific objectives and overall policy goals;
- potential future scenarios (status quo, expanded scheme, and business-to-business arrangements).

At a general level, we recommend the existing TyreTrack scheme be expanded, with further regulatory intervention and economic tools used to encourage the sector to implement commercially viable, alternative end-uses for tyres. We recommend the Ministry for the Environment take leadership on the issue of tyre disposal in New Zealand by developing a scheme which incentivises tyre reuse (essentially a tyre recycling scheme). We are currently at risk of leaving an environmentally unacceptable legacy for the next generation as large volumes of tyres accumulate in our landfills. This situation is exacerbated by the reality that feasible alternative end-uses already exist, and more are continually being developed.

Our specific recommendations are provided as follows. The objectives of these recommendations are to advise on "next steps" in the development of well-designed government support and fiscal or regulatory intervention to resolve the issue of EoL tyres that could be effectively used for alternative purposes. Note that all of the recommendations relate to one, joint sector scheme as opposed to multiple arrangements. The clear message communicated by the tyre sector group was their desire for a collective approach to the issue of used tyres.

8.1 Recommendation 1

The Ministry for the Environment apply the currently preferred product stewardship policy to the tyre sector by developing regulatory and fiscal intervention mechanisms to:

- establish mandatory of TyreTrack, reporting all tyre movements;
- apply an ADF to tyres at point of manufacture and import.

Further we recommend:

1. the revenue from the ADF be managed by the expanded TyreTrack administration on behalf of the industry in general, and specifically for the tyre brands and vehicle importers;
2. ADF revenue be used to develop sustainable end-uses for tyre-derived products.

This recommendation cannot be implemented without further detailed, economic evaluation of the proposed fiscal and regulatory intervention.

This study has allowed for a broad-brush evaluation of the myriad of issues arising from what to do with tyres once they have reached their EoL. It is intended primarily to feed into product stewardship policy development. The above recommendation is for a fiscal intervention to rectify a market that is currently failing due to inappropriate costing of externalities (environmental effects of disposal). This intervention should be examined in more detail.

The following questions have not yet been addressed, and will need to be before the Ministry for the Environment proceeds with the fiscal intervention.

1. What should be the value of the tyre levy?
2. How should a tyre levy be collected?
3. What are the "flow-on" effects in terms of specific costs (eg, increased tyre prices) and market effects (eg, the likely decline in commercially viable small retailers)?
4. How should the funds be administered and allocated?
5. What specific market objectives should the tyre levy induce?
6. How will payment of a tyre levy be enforced and what are the costs?

8.2 Recommendation 2

The Ministry for the Environment carry out further studies to evaluate the implementation of a WDF. These studies should:

- further evaluate the scope of the WDF in terms of products that it applies to;
- determine the organisational infrastructure required to support the WDF (eg, expanding the jurisdiction of a current body such as the Waste Management Institute);
- quantify the potential "market ramification" risks (eg, exacerbating illegal dumping) and ensure the scheme is designed to mitigate these.

As described above, the adoption of the WDF has the potential, which must be guarded against, to exacerbate the existing problem of illegal tyre dumping. The Ministry for the Environment should actively encourage, educate and support local councils to develop bylaws through the Local Government Act to provide for significant penalties for illegal dumping.

Note that the revenue arising from the WDF will gradually decrease over time as fewer tyres are sent to landfill. This decrease should parallel the decrease in enforcement costs discussed above.

8.3 Recommendation 3

The Ministry for the Environment continue to provide support for local and regional councils to limit the illegal dumping of tyres. Mechanisms for this support include:

- enforcement against illegal tyre dumping through the Resource Management Act;
- evaluating the effectiveness of the currently adopted Auckland-based (Waitakere and North Shore) schemes to register waste collectors and how this could be more broadly applied across the country;
- the use of district plans to restrict the numbers of tyres that might be stored on private properties;
- more effective mechanisms for policing and preventing tyre dumping on public and private property, including tighter penalties under the Litter Act;
- encouraging local councils to use existing district plan provisions and environmental field officers to investigate possible illegal tyre dumps and, where possible, prosecute the offenders.

8.4 Recommendation 4

The Ministry for the Environment continue to support development of viable alternative end-uses for tyres. This includes:

- assistance for regional councils on interpretation of the RMA to ensure that the focus is on environmental effects (including atmospheric emissions) rather than prescribing material and energy inputs to processes (eg, the situation at Pacific Steel where new resource consents are required for burning tyres, despite no predicted increase in atmospheric emissions);
- assistance for additional research into the environmental effects of alternative end-uses, including burning tyres as an energy source;
- evaluating further the potential for ongoing use of tyres on farms, as silage pile covers, and therefore the available "resource" for other uses;
- keeping abreast of, and where possible assisting, New Zealand-based developments of alternative end-uses for tyres.

8.5 Recommendation 5

The Ministry for the Environment carry out additional investigations into a possible Product Responsibility Authority which could take the form of an expanded Environmental Choice organisation. The role of this body would be to provide umbrella support across all sectors for improving the environmental performance of products over all life cycle phases including manufacture, use and disposal. It would:

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- provide education on all aspects of product environmental performance (eg, the roles of consumers, retailers and landfill operators in adopting environmentally responsible tyre disposal methods);
- coordinate information exchange/learnings/best practice amongst the different sector product stewardship schemes (given the common objective to divert waste from landfill there would be significant common ground to be shared amongst participants on what works and what doesn't etc);
- carry out research into life-cycle impacts of different products in New Zealand and continue to develop specifications for product environmental labels;
- provide support for both government (eg, Govt[3]) and private sector product procurement initiatives designed to selectively purchase environmentally preferable products.

8.6 Recommendation 6

The Ministry for the Environment continue to work with landfill operators, including private sector operators such as Waste Management, and local councils to develop guidelines for storage and disposal of tyres which are entering landfills.

8.7 Recommendation 7

The Ministry for the Environment support environmentally responsible disposal of tyres, through government procurement programmes such as Govt[3] which would allow for preferential purchase from tyre retailers who are using TyreTrack.

Appendix A
Case Study Methodology

Tasks completed

The Ministry for the Environment seeks to have a strong industry involvement in the case studies. To meet this objective, the following tasks are being carried out to complete this review:

- develop an evaluation framework for the existing TyreTrack scheme;
- review overseas tyre product stewardship initiatives;
- discuss (on a one-to-one basis) the existing scheme with identified sector group members and other stakeholders (week beginning 6 March);
- complete an initial evaluation and report (week beginning 13 March);
- circulate the initial report to sector group members (24 March) and meet to discuss (tentatively scheduled 29 March, Wellington);
- prepare a draft case study report based on initial feedback and circulate for further feedback (11 April);
- finalise study report including recommendations (21 April).

URS also participated in the TyreTrack steering Group Meeting on the 10 March 2006.

Sector consultation

This case study has been limited to high-level review of information available in the public domain and interviews and discussions with the following industry representatives.

- John Staples, General Manager, Bridgestone.
- Alistair Corbett, Motor Sport and Market Information Manager and Tony Ward, National Operations Manager, South Pacific Tyres.
- Perry Scarfe, General Manager, Tyres4U.
- John Marshall Wellington representative, Value Tyres.
- Ian Stronach, Marketing Manager, MTA.
- Jim Laughton, J&J Laughton Shredding Services (indirectly through Nigel Clark).
- Nigel Clark, Tyre Collectors Interest Group, Wasteminz.
- Hans Buwalda, Health, Safety and Environmental Manager, Fletcher Building.
- Rod Murray, Environmental Manager, Pacific Steel.
- Lindsay Halliday, Alternative Fuels Operations Manager, Geocycle, a division of Holcim, New Zealand.
- Will Teale, Environmental Advisor, Waste Management.
- Kristen Karavias, TyreTrack Administrator.
- Darrel McConnel, MD, Imex Imports.
- Paula Bradshaw and Michael Hardy, Auckland Regional Council.
- Irene Clark, Local Government New Zealand.

Appendix B
TyreTrack Participation and Review

Participation data

Region	Retailers	Collectors	Non-member retailers*	Tenders**	Tyres***
Auckland region	79	12	5	4163	998,950
Bay of Plenty	42	2	1	163	21,233
Canterbury	54	8		92	58,265
Gisborne region	8	2	1	87	24,955
Hawkes Bay	17	2	1	91	15,244
Manawatu/Wanganui	31	3	1	49	30,271
Marlborough	9			12	2,175
Nelson Bays	7	1		9	1,514
Northland	16	1		15	1,388
Otago	21	3		20	4,994
Southland	15			19	3,729
Taranaki	13	2		66	5,478
Waikato	44	3	1	230	37,644
Wellington region	42	6	1	392	204,991
West Coast	1				
Total	**399**	**45**	**11**	**5,408**	**1,410,831**

* Non-member retailers are retailers who are not members of TyreTrack but send some of their tyres to registered collectors. TyreTrack is informed about the tyre movement by the registered collectors.

** Number of tyre supply offers registered by TyreTrack retailers.

*** TyreTrack doesn't differentiate between different types of tyres. Regardless of size and types, all tyres are assigned value 1.

Appendix B
TyreTrack Participation and Review

Review against government policy objectives

Criteria	Evaluation
The scheme is efficient and effective	The scheme has been operating for two years and has achieved a 30% uptake. It cannot be considered to be effective and efficient (as measured by diversion of tyres from landfill and illegal dumps) until there is significantly greater participation across the sector. The scheme is stable and it can be assumed that the benefits outweigh the costs of running it. (The cost of running TyreTrack is $50,000 a year and its key benefits include better information about volumes and directions of tyre movements, education among tyre retailers, support for the collection industry and knowledge exchange in regards to end-uses).
Contains publicly reported, challenging, performance measures, quantifiable where possible	The scheme contains performance measures but they are related to the numbers of tyres tracked, not recycled.
Transparency	The scheme is very transparent and seems to be trusted by the industry, although there are some problems with non-disclosure to protect uncertain end-users.
Encourages market competition	The scheme encourages market competition by providing a better networking environment and distribution of information. This conclusion is only relevant for the 30% of the sector registered with the scheme. It encourages transporter and recycler competition.
Sets safe standards for collecting and handling	The scheme does not deal with standards for safe collection and handling. It has been recognised that health and safety is a problem and WasteMinz is preparing support brochures.
Forum for communication and industry-wide participation	The scheme provides a good forum for communication among industry members and for discussing issues with the Ministry.
Includes public information and education	The scheme has some educational components but these are deemed insufficient.
Includes provision for monitoring and reporting on effectiveness	The scheme allows good monitoring the flow of tyres registered under the scheme.
Compares favourably with international best practice	This scheme is restricted in scope when compared to international best practice. It does not divert tyres from landfill, it does not provide a mechanism to encourage development of end-uses and it does not embody concepts such as facilitating net-highest resource-value recovery of tyres.
Is compliant with international trade agreements	The scheme does not impact on trade agreements.
Cost of enforcement and management of free riders	There are no enforcement mechanisms and the problem of free riders is not managed, even though this problem is considered one of the key weaknesses of the scheme.
Internalise waste management costs	The scheme does not influence the distribution of waste management costs. At the moment these costs are carried by customers when replacing tyres or by councils when dealing with problems of illegal dumping or fires. If customers are paying fees they are internalised.
Other issues raised by the stakeholders	Retailers are reluctant to provide information about the final destination of the tyres, as they want to protect the farmers and other end-users in case new legislation will force them to dispose of the tyres in a different way and lead to additional costs. A large number of stakeholders see the scheme as a monitoring tool, but without the appropriate benefits of a full scale product stewardship programme. There is no agreement whether the scheme should be enforced (disadvantages – administration costs, protection of farmers and other "suspicious" end-users; benefits – reduction of free rider problem of cost undercutting, increased volume of tyres recorded and available to end-users).

Criteria	Evaluation
Other issues raised by the stakeholders (continued)	MTA should be more proactive in recruiting members. There is no agreement in regards to who should cover the cost of disposal – producers and new tyre importers are in favour of an ADF charged at the point of entry to market while importers of old tyres and some retailers want to maintain the current situation. The majority of stakeholders favoured using the ADF to encourage development of an end-use market. Some wanted it to help the collector industry. Either central government or an independent industry body should manage the fund. (Note that in Australia, funding is overseen by a Product Responsibility Organisation made up of producers (www.ephc.gov.au).) More attention needs to be given to development of end-uses so that value of EoL tyres increases and encourages market forces diverting tyres away from landfill. A collection fee would encourage illegal dumping and divert people from participating in the scheme. Some stakeholders believe only market forces can lead to the desired outcome while others believe, without regulation, free riders will hinder development of the end-use market. Any regulatory regime needs to be more friendly towards end-uses, eg, how long to trial before allowing use, resource consents. There is a need for standardisation of the regulations across councils for both disposal and end-uses. Landfills should be required to have dedicated tyre areas (mono-fill). There is a need for education of both public and retailers. It would be difficult to engage rural retailers and those in the remote location due to the lack of access to technology or travel distances. With the current arrangement, only 50% of retailers can be recruited to the scheme. There is a need to consider the car culture in New Zealand. The dependency on cars is a factor contributing to the EoL tyre problem. The key problem from an end-user perspective is the dispersion of the tyre supply and costs of transport. This problem is likely to be exacerbated by the activities of farmers who disperse a significant amount of EoL tyres throughout the countryside. Some end-uses (eg, cement kilns) require a large amount of tyres (note that the only cement kiln in Australia to take tyres on a consistent basis uses just under 10,000 tonnes per year) and need to secure a long-term supply to warrant the initial investment required to implement the end-use technology. Competition from landfills and farmers reduces these amounts to uneconomic levels in rural areas. End-users would like to see mechanisms favouring end-use of tyres where energy or materials are recovered (eg, levy-based benefit). Due to the concentration of tyres in municipal areas, it is likely that schemes encouraging alternative uses will result in increased activities in those areas, leaving the rural areas with a more intense problem than before. (This statement assumes that the “value” of tyres remains insufficient to justify the transport costs.) Local government supports the voluntary scheme with the safety net regulation to manage free riders. Nonetheless, local government would also be prepared to support a mandatory scheme. Voluntary schemes tend to work when the demand for EoL tyres is higher than the supply. There are benefits to having varied regulation among different councils responding to specific local conditions. It is important to recognise and support local end-users. EoL tyres should be treated as close to the production source as possible. Administrative problems experienced by the collectors could be dealt with through better information provision. The combination of the current, locally-managed disposal system and a producer/importer levy managed at the national level by an independent product stewardship organisation would be acceptable. Large players (producers/importers) would like to see stricter regulations (supporting mandatory schemes and an ADF) that would provide a clear and secure operating environment. It appears the remaining two-thirds of the industry (small, fragmented operators) resist regulation, as they operate on tighter margins and find administrative costs too high. A clarification of tyre disposal and management regulations is needed urgently. The current changeable environment is a major obstacle for the development of the end-use industry.

Appendix C
International Research

The following general resources were evaluated to better understand the opportunities and costs associated with different tyre product stewardship schemes overseas.

- The JWGT submission in response to the EPHC discussion paper (Australia).
- URS Australia 2005: 'Financial and Economic Analysis of the Proposed National Used Tyre Product Stewardship Scheme'.
- 'Scrap Tires in the US – Overview 2002 Update'.
- 'End-of-life Tyres – An Overall Picture of End-of-life Tyre Management in Europe'.
- Environment Canada Website: www.ec.gc.ca/epr/en/stewardship.cfm
- 'Industry Product Stewardship Business Plan (British Columbia).

The following provides a summary of the research completed.

Introduction

Approximately 150 million scrap tyres are generated in Europe each year, with one-fifth of those in the UK alone. According to the Ministry for the Environment figures, three to four million tyres reach the end of their life each year in New Zealand. As most are sent to landfill, this represents a major threat to the environment, both in terms of visual pollution and increased fire risk. Unlike many consumer goods, a tyre retains much of its structural, physical and chemical integrity until the end of its life, which opens up a number of opportunities from a product stewardship perspective.

Background

Given the fledgling nature of existing tyre recycling schemes in New Zealand, a review of possible solutions to this problem was necessary. The project brief provided by the Ministry for the Environment requires the study of cases of existing product stewardship to determine how this would best be achieved in New Zealand, and what role the Government would play.

Case studies

Credential environmental

Credential Environmental is a leading UK tyre waste management and recycling company made up of three integrated operating companies, each working in a defined area of waste and resource management to provide economic and sustainable solutions. Its focus is on innovation and forward thinking in response to the demands of a constantly changing market. The company produces a range of graded rubber crumb from waste tyres using latest technology. This is packaged on-site and sold for equestrian surfaces, floor covering, play and leisure surfaces, landscaping and turf applications and agricultural and horticultural products.

UK landfill directive

In July 1999, the British government adopted the EC Landfill Directive, which effectively banned the disposal of whole tyres to landfill from July 2003, and shredded tyres by July 2006. The cost of implementing this ban is carried by producers. The British Government is currently consulting on tyre recovery measures to meet the demands of this regulation.

In January 1998, the British Government asked the Used Tyre Working Group (UTWG) to recommend its preferred means of ensuring the UK would meet these requirements. The Group favoured a market-based approach, although it recognised this might not guarantee total compliance. The industry and Government continue to work alongside each other, through the UTWG, to develop a market-based approach (www.dti.gov.uk/sustainability/downloads/tyre.pdf).

Additionally, in 2006 EU member states agreed to incorporate United Nations regulations into EU law, so that recycled tyres fulfil similar standards of safety and quality control than new ones. Millions of tyres can thus be recycled and put back on European roads. The new standards involve the retreading process, which uses less raw materials and less energy, and therefore produces less tyre waste.

In order to promote this practice and to improve safety guarantees, the World Business Council has adopted a decision that aligns EU standards for retreaded tyres with the requirements of the United Nations Economic Commission for Europe (UNECE). On top of environmental benefits, safety enhancement and legal certainty, this decision has the advantage to prevent the EU from developing its own legislation, which may have been resented by European tyre manufacturers in search for global market shares (http://www.euractiv.com/, 5 April 2006. *EU agrees on recycling standards for tyres*. World Business Council on Sustainable Development).

Current Ministry for the Environment initiatives

The Ministry for the Environment commissioned Firecone in 2003 to assess the nature and size of the waste tyre problem, and the economic, social and environmental costs and benefits of the range of solutions available – from ensuring improved compliance with existing laws and regulations through to facilitating or subsidising the reuse of tyres and their constituent parts. As part of this study, a range of international policy approaches were reviewed, with five 'packages' of policy measures identified as offering the most promise. A range of measures available are summarised in Section 6.

Appendix C
International Research

Australian government approach

In 2005, URS Australia assessed Australia's need for a tyre product stewardship scheme and made recommendations accordingly. The proposed scheme sought to establish tyre product stewardship through an Extended Product Responsibility (EPR) framework. This approach aimed to address the current market failure where the majority of EoL tyres are disposed to landfill and discarded illegally, or used for applications that may not represent their highest net resource value. It was proposed the scheme be national, industry-led and co-regulatory, with an ARF to fund a benefit system. Modelling has showed the scheme to be financially viable, generating revenues of $7 million. Ongoing monitoring of the scheme and of the number and value of tyres sourced from different market areas was also recommended to assess the scheme's effectiveness.

Appendix D: Additional Criteria Used to Evaluate Tyre Scheme Options

Environmental and social outcomes

The product stewardship schemes have the potential to effect the following environmental and social outcomes (externalities) including:

- more efficient use of resources;
- reduced volume of waste and thus landfill requirements;
- increased resources recovered;
- effects on biodiversity and ecosystems;
- transport costs;
- minimising human health effects arising from hazardous waste management;
- alternative land use arising from reduced landfill requirements;
- soil resources and water quality – landfill leachate;
- relationship with Maori;
- community benefits through reuse of product;
- community business opportunities;
- local and regional economic well-being;
- economic security implications.

Stakeholder opportunities and risks

In addition to environmental and social outcomes (externalities), the product stewardship schemes have the potential to impact on a range of stakeholder groups. These include manufacturers, brand owners, wholesalers, importers, distributors, retailers, service providers, as well as local and regional government.

Potential internal stakeholder opportunities and risks include:

- branding and reputation;
- enhanced product design;
- competitiveness;
- business support including company participation, maintenance requirements, education;
- business risks including changes in industry that could affect the scheme;
- administration costs;
- impact on imports;
- implications for trade agreements;
- safe collection and handling of recovered materials.

Appendix E: Evaluation of Different Project Stewardship Alternatives

Evaluation of different product stewardship alternatives against government policy and broader social/environmental and stakeholder objectives

Criteria	Evaluation
The scheme is efficient and effective	The "status quo" is not efficient or effective in diverting tyres from landfills to reuse options. An expanded TyreTrack scheme supported by regulatory intervention and financial contributions could be designed to be both efficient and effective. The "leave it completely to the private sector" option could be effective for a proportion of the market in large metropolitan areas.
Contains publicly reported, challenging, performance measures, quantifiable where possible	The status quo TyreTrack system provides reported information. The expanded scheme could be designed to provide publicly reported information and performance measures. Any arrangement between two or more different private sector organisations would not achieve this objective.
Transparency	The status quo is transparent and any expanded scheme could be designed to achieve this objective. Any arrangement between two or more private sector organisations would not achieve this objective.
Encourages market competition	The status quo encourages competition amongst registered users, as would both an expanded scheme and private sector-only arrangements.
Sets safe standards for collecting and handling	The status quo does not include safe handling but an expanded scheme could. Private sector arrangements would not necessarily address safety considerations.
Forum for communication and industry wide participation	An expanded scheme would provide significantly greater communication and participation than currently exists. The private sector arrangements would not achieve this.
Includes public information and education	An expanded scheme would provide significantly greater education opportunities than currently exists. The private sector arrangements would not achieve this.
Includes provision for monitoring and reporting on effectiveness	An expanded scheme would provide a broader network for monitoring, as compared to the status quo which only covers 30% of the market. Private sector arrangements would not include provision for monitoring.
Compares favourably with international best practice	An expanded scheme could be designed on a par with international best practice, as the status quo has a highly restricted scope. Private sector arrangements in themselves may be examples of best practice, but research on overseas practices indicates that there is an umbrella product stewardship scheme in place as well.
Is compliant with international trade agreements	The expanded scheme would need to be compliant with international trade agreements, in particular the World Trade Organisation "Technical Barriers to Trade". The status quo is, and private sector arrangements would be, fully compliant.
Cost of enforcement and management of free riders	One of the key objectives of the expanded scheme would be to manage free riders. The status quo does not achieve this and the issue would not be relevant to private sector arrangements.
Internalise waste management costs	The expanded scheme could be designed to internalise waste management costs and simultaneously assign waste disposal costs to landfill operations. The status quo does not achieve this. Depending on the private sector arrangement, it may internalise waste management costs.
Environmental outcomes	The status quo does not achieve any environmental outcomes apart from potentially preventing some illegal tyre dumping for 30% of the sector (though this analysis is countered by the observation that it is largely the responsible retailers and collectors which will be signed up to the scheme – the illegal dumpers will likely just be continuing existing practices). The expanded scheme would be designed to reduce illegal dumping and landfill disposal. This would have significant environmental and social benefits including improving landfill leachate, using less space, minimising risk of fires and unfair allocation of costs for disposal following illegal dumping. Additionally the expanded scheme would increase recovery of materials and energy. Private sector arrangements also have the potential to significantly improve environmental outcomes through resource efficiency gains and diversion of a problem waste product from our landfills.

Appendix E: Evaluation of Different Project Stewardship Alternatives

Criteria	Evaluation
Social outcomes	There are some community benefits arising from the status quo, which could be increased through the expanded scheme. An example could be providing local entrepreneurs with an easier way to source tyres to run their programmes (eg, community gardens or playgrounds). Tyre retailing is a significant industry creating a large number of jobs. The status quo improves the levels of understanding and communication in the industry, encouraging industry development, and this would be built upon in an expanded scheme. Due to the low prices of the raw materials the business opportunities in the tyre end-use are low. The status quo supports those opportunities by reducing the costs of information search, and this advantage would increase through the expanded system. (Note that this analysis is completely dependent on the end-use.) To a lesser extent a private sector arrangement would contribute to these social gains. Note that the environmental and social impacts arising from the current disposal (which could be addressed with the expanded scheme and to a lesser extent with private sector arrangements) are fully addressed in Section 3. Also note that this evaluation does not cover raw material use in the production of tyres (crude oil) and its impact on oil mining areas as well as contribution to climate change and resulting ecosystem effects. This study considers the wasting of the resource value of tyres at the end of their life. The status quo, expanded scheme or private sector arrangement do not affect the take up of new tyres which is driven by a requirement to have tyres fitted to vehicles that are legal.
Stakeholder opportunities and risks	The status quo improves the reputation of the industry by informing the public about the recycling scheme. The interviewed stakeholders felt there was a need for educating both the public and the industry about the scale of the environmental impact caused by EoL tyres in order to encourage wider participation and limit the number of customers avoiding payment of the disposal fee. The scheme improves market competitiveness by providing better information for the market players. Participation in the scheme results in increased administration cost related to the management of tyres, which gives an advantage to the free riders. Some retailers don't inform the customers about the disposal fee and activities because they are worried that customers will assume a higher price and shop elsewhere. The scheme offers a level of business support by providing a forum for exchange of knowledge and a reliable source of information. All of these benefits would be enhanced through an expanded scheme. It is possible that a private sector arrangement would positively impact on business reputation but it would not create an opportunity for across-industry participation or ideas exchange. There is a key industry risk related to the competitive pressures experienced by the collectors under all three scenarios, but potentially this risk is greatest for the expanded scheme (in particular, if a WDF is applied). The number of collector businesses is declining and this creates a bottle neck. This, in turn, leads to illegal dumping, lack of participation in the scheme on the retailer side and lack of supply security and consistency on the end-user side. Additionally, the collection industry operates within a very competitive environment and it is possible that cost-cutting leads to health and safety hazards. The administration costs of the status quo are very low, but the industry finds it difficult to find time to ensure compliance with the reporting requirements. This would not be an issue with the expanded scheme as registration would be mandatory and, therefore, costs would be increased across the entire sector and likely passed on to consumers. The status quo does not impact on import or export of tyres. A number of stakeholders indicated that import of used tyres was unnecessarily aggravating the problem by reducing the average life-time of the tyre. The expanded scheme could potentially affect imports.