Management of End-Of-Life Tyres

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Introduction and Background

The Ministry for the Environment has commissioned Firecone to assess the nature and size of the problems associated with the current regime for managing end-of-life (EOL) tyres, and the costs and benefits of the range of potential solutions for addressing those problems. Specifically, Firecone has been asked to advise on:

- the nature and size of the weaknesses of the current regime, and overall tyre management situation, including greater clarity about which aspects are working well and which are not (considering the full range of environmental, social and economic costs and benefits)
- the range of potential solutions that could be adopted to address those weaknesses identified – from ensuring improved compliance with existing laws and regulations, through to facilitating or subsidising the re-use of tyres or their constituent parts
- the broad environmental, social and economic costs and benefits of each of those potential solutions identified
- the next steps that should be taken to develop those solutions that look to be preferable.

In the remainder of this introduction and background section we briefly summarise:

- where EOL tyres come from and how they are used or disposed of (the 'supply chain')
- tyre numbers and likely future trends
- the current regulatory requirements relating to EOL tyres
- the health and environmental impacts of the current management approach

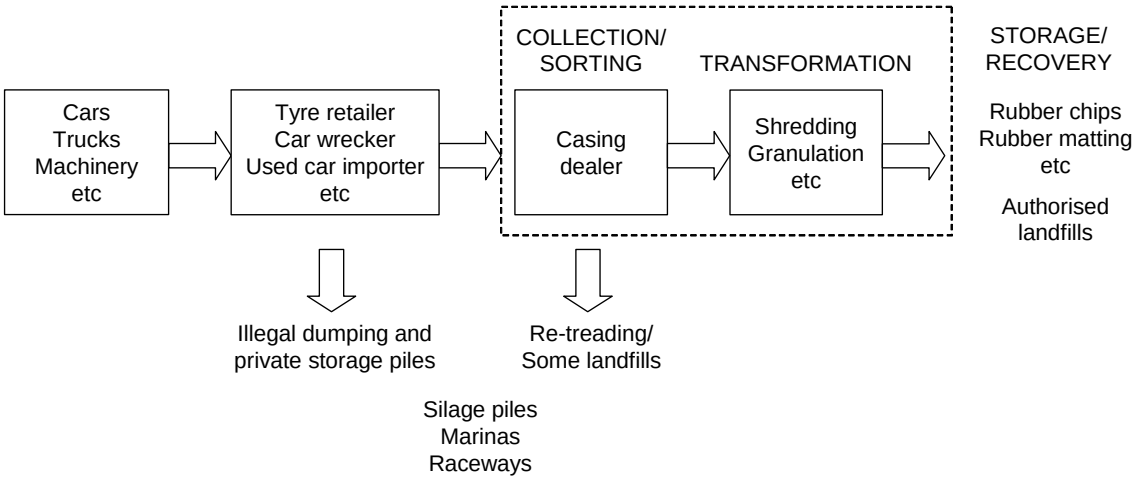
Readers who are familiar with the tyre industry should skip to the next section 'Weaknesses of the Current Arrangements'.

The used tyre 'supply chain'

Tyres come from a number of sources, and go to a number of uses and locations. Understanding this 'supply chain' is an important prerequisite for discussing how the management regime for EOL tyres could be improved.

A simplified diagram of the supply chain for EOL tyres in New Zealand is shown in Figure 1 below.

Figure 1: Stylised supply chain for used tyres in New Zealand



The following points should be noted in relation to the supply chain for EOL tyres:

Tyre sources

- While accurate statistics do not exist, our discussions with council staff and members of the tyre industry suggest that the majority of EOL tyres comes from firms which retail tyres and have removed EOL tyres to fit new ones.
- Not all used tyres enter the system in this way. The other main sources of used tyres are:
  - used car importers (some of the tyres on used imports are thrown away when the vehicle arrives as they are unsuitable for New Zealand roads)
  - Tyre manufacturers (scrap tyres)
  - Re-treaders (scrap)
  - Garages
  - Vehicle wreckers
  - Large transport companies (some transport operators have their own workshops and replace their tyres themselves, which means that the EOL tyres are not automatically returned to the tyre retailer).
- In addition, EOL tyres can reappear when people who have been using them decide they no longer need them (farmers shifting to bailed silage technologies, for example, no longer need the tyres they had previously used as covers for their silage pits).

Tyre destinations

- Tyres can 'exit' the system in a number of places. The most significant destinations and uses we are aware of are:
  - farms
    - silage cover weights
    - culverts and minor structural uses
  - official landfill sites
    - whole
    - quartered or shredded

  - private piles
  - dumping
    - on others' private land
    - on public land
  - recycling
    - chips as replacement for drainage metal
    - chips in horse exercise yards
    - rubber mats (such as for playgrounds)
  - other
    - marinas
    - racetracks.

- A number of commercial operators now exist that will collect and transform (quarter or shred) tyres (the degree of transformation can vary significantly from simply quartering of the tyres, to crumbing the product into very fine pieces and removing the non-rubber component).
- Much of the shredded or quartered tyres still go to authorised landfills.
- A small number of commercial operators further recycle crumbed rubber to make products such as rubber matting.
- A significant number of EOL whole tyres are still dumped or put into private piles.

Tyre numbers and growth patterns

It is surprisingly difficult to determine the number of EOL tyres that enter the system each year. Drawing on previous studies, the best estimate appears to be around 3.2 million per annum. However, estimates from previous studies range from 2.5 million (Opus) to 4 million (based on international evidence which suggests a ratio of one tyre per person per year).

On balance, we consider that the number of EOL tyres entering the system is likely to steadily increase over the next 3–5 years:

- Vehicle numbers are increasing rapidly (there has been an increase of 0.5 million in the last five years,[1] and we have seen no evidence to suggest that this rate of increase is slowing).
- The number of used cars imported is also continuing to grow, reaching a record high in 2003[2] (which means that a greater number of tyres is likely to be discarded immediately on the cars' arrival).

[1] Department of Statistics: 12 month moving average of the total number of licensed vehicles between October 1998 and 2003.

[2] Department of Statistics: Hot Off The Press Overseas Merchandise Trade (Imports) June 2003 Commentary.

- The number of tyres re-treaded in New Zealand has been significantly reduced (from around 350,000 in the 1980s to 80,000 in 2003).[3]
- The number of dairy cows is growing (dairy cattle numbers have increased by 34% between 1994 and 2002).[4] However, at the same time a shift towards more advanced silage bailing technologies that don't use tyres appears to be occurring[5] (bailed silage is drier than pit silage which makes it a better food source). So it is difficult to know whether the use of tyres for silage piles will increase or decrease.

With the exception of the likely number of tyres used for silage pile weights in the coming years, which is uncertain, these indicators all suggest an increase in the number of tyres entering the system over the short to medium term.

Existing legislative and regulatory controls

There are no central or local government regulations that relate specifically to the management of EOL tyres. But a number of broader controls exist that are relevant.

Dumping of tyres

It is illegal to dump tyres on any property, whether publicly or privately owned, without the owner's permission. Under section 15 of the Litter Act every person commits an offence who, without reasonable excuse:

- deposits any litter in or on any public place or, in the case of any private land without the consent of its occupier; or
- having deposited any litter (whether inadvertently or otherwise) leaves the litter there.

In the case of an individual, they are liable to a fine not exceeding $500. In the case of a body corporate, they are liable to a fine not exceeding $2000.

Prohibiting or controlling the management of private tyre piles

Under the Resource Management Act (RMA) (section 9.1) no person may use any land in a manner that contravenes a rule in a district plan or proposed district plan unless the activity is expressly allowed by a resource consent granted by the territorial authority responsible for the plan. There is no doubt that storing tyres is a form of land use. Accordingly, local authorities have the clear ability to control or ban tyre piles through their district plans.

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[3] 'A Long-term Proposal for the Environmentally Responsible Disposal of Scrap Tyres'. Background Section.

[4] Department of Statistics: '2002 Agricultural Production Census (Final Results)'.

[5] Unfortunately, we have not been able to find reliable statistics on the use of different bailing technologies, and the council officers we discussed the issue with had differing views about the extent to which this shift is occurring.

However, at present we are not aware of any local authority having done this.

Similarly, the Local Government Act (Part 8) gives local authorities the right to make bylaws to protect the public from nuisance, and to maintain public health and safety. It explicitly states that this includes the right to pass bylaws on:

- waste management
- trade wastes
- solid wastes

While we have not sought specific legal advice on this issue, we suspect that if they preferred, local authorities could use bylaws also to control or ban private tyre piles.

Finally, the RMA can be used to prohibit or control the establishment of tyre piles where another activity that requires consent – such as moving earth to create space for a pile – needs to be undertaken to create the pile.

Managing the fire risk of private piles

The fire service can require action over inappropriate tyre storage inside or adjacent to buildings, under its general powers. Similarly, any Rural Fire Authority can act to implement any fire control measures thought necessary on rural properties where tyre piles are thought to pose an unacceptable fire risk. And finally, local authorities can use their bylaw making powers to control activities they consider involve fire risks.

The Waipa District Council has a Fire Prevention Bylaw in place, and has used that Bylaw to insist on a tyre pile being removed. However, we are not aware of widespread use of these powers.

Impacts of disposal and storage

The disposal and storage of EOL tyres has a number of potential adverse environmental and health impacts. However, the nature and severity of those impacts depend on how the tyres have been stored or disposed of.

Where it is done properly, placing tyres in landfills has only very limited adverse environmental impacts, and no known adverse health impacts. Some leachate is likely to occur, but evidence suggests that it is relatively innocuous from a health and environmental perspective.[6, 7] Moreover, as landfills in New Zealand have been progressively upgraded, an increasing proportion of them now collect and treat leachate.

However, the impacts can be considerably greater where tyres are not stored adequately. The principal impacts come from tyres being stored without being shredded or crumbed – which has adverse implications for landfill management and the potential to provide a habitat for disease-carrying mosquitoes – and insufficient management of the fire risk.

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6 Preliminary Discussion Paper on Scrap Tyre Management in New Zealand, page 9.

7 'A National Approach to Waste Tyres', Australian Commonwealth Department of Environment, 2001.

Storage of whole tyres

Placing whole tyres in landfills (rather than quartering or shredding them) frequently causes practical difficulties. Whole tyres are very bulky for their mass. They also frequently trap gases and can slowly 'float' to the surface.[8] Together, these factors mean that placing whole tyres in landfills leads to the available space being filled up more quickly, and the landfill potentially becoming unstable. As a result the landfill management is more difficult and costly.

Mosquito related diseases

It is well established that water pooled in tyres provides an ideal breeding ground for some types of mosquito.[9] In overseas jurisdictions piles of whole tyres stored above ground have therefore proved to be of considerable concern.

New Zealand currently has very few mosquitoes capable of carrying serious diseases, and those that exist do not appear to breed in tyres. However, mosquitoes capable of carrying serious diseases that are known to breed in tyres are discovered by MAF at the border relatively frequently. Accordingly the future establishment of a population of such mosquitoes in New Zealand is possible.

If establishment of a population occurred, above-ground tyre piles near urban centres would be a significant concern, as spraying them against mosquitoes is costly and ineffective.

Management of the fire risk

Tyre fires produce hazardous air emissions and toxic effluent run-off which have adverse health and environmental implications. With regard to the health impacts, tyre fires produce smoke and run-off containing a range of toxic and carcinogenic compounds, including: dioxins; furans; mercury and lead.[10] Nearby, downwind communities therefore typically need to be evacuated in the event of a tyre fire. By way of example, 10 households were evacuated during a recent tyre fire near Hamilton, and one child was hospitalised.

With regard to the environmental impacts, the air emissions have the potential to contaminate water supplies and crops and the effluent run-off can contaminate nearby water sources and ground water.[11] The land itself can also be contaminated by the effluent run-off, limiting its further use. Environment Waikato collected 30,000[12] litres of oil from a nearby waterway during the tyre fire mentioned above.

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8 Tyres in the Environment, Section 4.5.

9 See New Zealand Ministry of Health Media Release, 21 March 2003.

10 'A National Approach to Waste Tyres', Australian Commonwealth Department of Environment, 2001.

11 'Preliminary Discussion Paper on Scrap Tyre Management in New Zealand', page 8.

12 Letter from Environment Waikato to MfE, 19 May 2003.

New Zealand has yet to experience a large tyre fire – the Hamilton fire involved around 30,000 tyres. But overseas experience indicates that large tyre fires (involving piles of a million or more tyres) can burn for years.

Weaknesses of the Current Arrangements

There are a number of aspects of the current EOL tyre management regime that we consider are not working well:

- there is considerable illegal dumping of tyres
- the increasing tendency for landfills to require tyres to be shredded before being placed in landfills is increasing the cost of disposing of tyres and may have the effect of reducing the number of tyres that are disposed of properly
- large number of tyres are stored in private piles (with no controls over their management)
- current controls are insufficient and councils are facing enforcement problems
- potentially commercially viable recycling options face unnecessary difficulties
- a range of parties is being subject to high financial costs
- a potentially valuable resource may not be used as efficiently as possible.

Each of these weaknesses is discussed in more detail in the sections below.

Dumping of tyres

Our discussions with council staff indicate that the illegal dumping of tyres on both private and public land is a significant problem. In the Auckland and Waikato regions it also appears to be a growing problem. Several recent examples of illegal dumping that we have become aware of through our discussions with councils are summarised below:

North Auckland property

- Up to 8000 tyres were dumped on a privately owned rural property.
- The owner 'staked out' the property and caught an operator dumping 250 tyres. He also took photos.
- The operator was required to remove the 250 tyres and pay $100 reparation. But because there was proof of his dumping only the most recent 250 tyres, the operator was not required to remove any of the tyres that had been dumped previously.
- The estimated cost to the owner of removing the tyres exceeds $8000.
- The council has refused to pay for removal of the tyres and is threatening to prosecute the owner if he does not do so.

West Auckland property

- A property owner let his land to a mechanic who stored 10,000 tyres without the owner's consent.
- The tenant subsequently closed his business and broke the lease, but left the tyres.
- The landowner has not been able to legally require the tenant to remove the tyres, and faces costs of around $10,000 to have them removed at his expense.

Mt Wellington property

- 60,000 tyres were dumped at a disused army barracks.
- There was no evidence on who dumped the tyres, so the cost of removing them fell to the landowner.

Hamilton property

- 80,000 tyres were recently dumped on a Waikato property over the course of a single weekend.
- At the time of writing there is no evidence about who dumped the tyres.

The need for proof is proving a key weakness in prosecuting dumpers of tyres under the Litter Act. To date, operators appear to have found it relatively straightforward to dump tyres without being observed, by using uninhabited properties and dumping tyres at night. And as noted above, even when the owner of a North Auckland property caught a dumper of tyres 'red handed', the dumper was required to remove only the single truckload of tyres he was caught physically dumping. In other words the courts took the view that proof of the dumping of each and every load of tyres was required.

This problem is exacerbated by the low level of fines involved. Even when dumpers are caught and prosecuted, the fines levied on them are low relative to the transport, processing and landfill costs that would be incurred if the tyres were disposed of properly. Combined with the low likelihood of being caught, these low fines provide a relatively strong incentive for less scrupulous operators to dump tyres, rather than have them disposed of properly.

Increased cost for storing tyres in authorised landfills

The requirement to shred or quarter tyres before placing them in landfills is making it more expensive to dispose of tyres properly. (MfE's discussions with tyre recyclers suggests that the cost of collecting and shredding tyres, transporting them to a landfill, and paying the relevant landfill costs, is in the order of $1.50–$2.00 per tyre.)

The evidence we have seen supports the shift towards requiring tyres to be shredded. However, the potential for the resulting cost increase to encourage operators to dump tyres, or store them in private piles, needs to be taken into account. Specifically, it means that a more rigorous regulatory regime is likely to be needed.

Inadequate arrangements for private tyre piles

Some of the council staff we talked to also suggested that operators are increasingly storing tyres on their own land, or on another party's land with the owner's consent. As far as we can determine it is legal for operators to do this so long as they comply with the general legislative controls discussed earlier in this paper.

At present levels, the environmental impact of these private tyre piles generally appears to be manageable: fire risk and unsightliness are the key problems associated with them and have been the focus of council concerns and activity to date. However, the practice is likely to become more of a concern if the numbers or size of the piles increase.

With larger piles, the risk of fires will become increasingly high unless mechanisms are put in place to ensure that the piles are designed and managed properly. As noted above, local authorities have the right to place controls on the establishment of tyre piles under their district plans. However, to date no councils appear to have done this.

Insufficient controls

While district plans or bylaws have the potential to be an effective mechanism for controlling the location and management of tyre piles, they are not yet being used by councils for this purpose. Accordingly, where councils are concerned with the placement or size of a particular pile, they are being forced to use other legislative provisions to require landowners to remove or modify their tyre piles. To date, the RMA appears to be the mechanism most frequently used. But as noted previously, the RMA is directly relevant only where the creation of a tyre pile has involved another activity, such as earth works, which require consent.

Until a clear and enforceable set of controls relating to tyre piles exist in all jurisdictions where they present a problem, councils will inevitably continue to face challenge when attempting to control tyre piles.

Enforcement difficulties

In addition to the lack of clear controls on tyre piles, tyre dumping is causing enforcement difficulties for councils. Both Auckland and Waikato local authorities have suffered instances where landowners subject to an abatement order have paid to have the tyres removed, but the tyres have simply been dumped somewhere else in the region. As a result, councils can become engaged in a series of enforcement and legal disputes over the same pile of tyres.

Moreover, landowners that have had tyres dumped on their property without permission sometimes resist the responsibility for removing the tyres. This makes enforcement more contentious and costly.

Accordingly, until the problem of tyre dumping is resolved, councils are unlikely to be able to enforce the legislative and regulatory requirements that are in place, even if those requirements have been strengthened.

Costs

The current EOL tyre regime is placing significant costs on:

- landowners who have had tyres dumped on their properties
- local and regional councils (through increased legal costs; the costs of dealing with the effects of tyre fires; paying to have tyres removed where nobody else can be found to do so; and removing tyres dumped on council-owned land)
- fire authorities and the fire service, when they are called to extinguish tyre fires.

We have not been able to estimate the overall national level of these costs in a robust way. But evidence provided by Councils on specific instances in the Waikato region is available, and provides a useful indication of the magnitudes involved.

Tyre fires

- The recent tyre fire in Waikato (which took 16 hours to put out) cost:
  - DOC $45,000 to extinguish the fire (acting as the rural fire authority for that area)
  - Environment Waikato $31,000 to collect the oil discharged and prosecute the site operator for the water and air discharges
  - the Waikato District Council $14,000 to deal with the effects on the local population (including temporary accommodation for 10 families).
- Significantly bigger tyre piles exist in the Waikato region so a future fire could involve significantly higher costs.

Tyre removal and associated legal costs

- The failure of Rubber Technologies (a firm set up to shred and recycle tyres, that went into receivership with large piles of tyres on a number of properties) cost the Waikato District Council $22,000 in staff costs and an additional $23,000 in legal costs.
- Retrieving tyres from rivers, reserves and public land cost Auckland City Council $28,000 in 2002/03.
- Removing tyres that had been illegally dumped on their property:
  - cost a landowner in the Hamilton region $100,000
  - cost two Auckland landowners – $8000 and $10,000 respectively.

A very rough way of seeing how these figures could convert into an overall national cost is to calculate the number of tyres that are likely to be being dumped or stored in private piles each year. J&J Laughton is the only significant shredder in the Auckland and Waikato regions. He is currently shredding about 500,000 tyres per year.[13] But the region is currently likely to be producing about 1.5–2 million tyres per year.

[13] MfE file note from discussions with Jim Laughton, 28 June 2002.

This suggests that the number of tyres being illegally dumped or stored in piles on private land in the Auckland and Waikato regions runs well into the hundreds of thousands. As most of the examples above relate to piles of 10,000 – 20,000, the overall cost of dealing with hundreds of thousands of dumped tyres, or privately stored tyre piles, could easily run into the millions of dollars.

Increased recycling difficulties

Before EOL tyres can be re-used or recycled, they have to be transported to the location they are needed in, and transformed into an appropriate state. For example, before rubber products can be made out of tyres, they must often be shred into crumbs of an appropriate size, and have the non-rubber components removed. Supply of a sufficient level must also be secured.

If the management regime for EOL tyres were working more effectively, the majority of tyres would be transformed to at least some degree and being placed in landfills. Accordingly, a potential recycler would find it easier to identify and collect tyres, and wouldn't have to transform them to the same degree. Accordingly they would face reduced cost. Similarly, with more tyres being placed in landfills, it would be easier for potential recyclers to secure a sufficient level of supply.

Accordingly improving the current regime should at least marginally improve the viability of potential recycling options.

Waste of a potential resource

Where EOL tyres are dumped or placed in landfills, they are clearly seen as waste products by those responsible for them. But this does not mean that EOL tyres have no resource value. Rather it means that the cost of securing that potential resource is not economic at current prices and given current institutional arrangements.

It has been clearly established internationally that tyres have a range of potential uses:

- re-treading
- a fuel source:
  - tyres have a high energy content compared with other wastes and fossil fuels (they have a higher calorific value per tonne than coal and almost 70% of the calorific value of crude oil)[14]
  - they have been used internationally to fuel cement kilns and power stations
- landfill engineering
- transforming into other rubber products
  - granulated rubber surfaces (play areas, sports fields, running tracks)
  - road surfacing materials

[14] Tyres in the Environment, Figure 4.5.

- engineering uses

– recovery of constituent parts/materials[15]
  - steel 14%; gas 22%; carbon 41%; oil 23%.

Looking at this from a financial perspective, an Australian study[16] estimated that the materials for the initial construction for a new tyre cost at A$2000–A$2500 per tonne, and that the production of coarse crumb can recover A$200–A$500 per tonne of value from tyres. They estimate superfine crumb can recover up to A$1000 per tonne.

Accordingly it is important for the Government to remain cognisant of the fact that tyres have potential resource value, and to implement any policy changes that, at reasonable cost, would make it more cost-effective to retrieve the resource value in tyres that are currently being discarded.

15 Tyres in the Environment, Figure 4.8.

16 Joint Working Group Tyres submission to the EPHC discussion paper, page 4.

Improving the Storage and Disposal Regime

Separate storage and disposal from recycling

In our discussion with MfE, industry, councils and other interested parties we have noticed a tendency to see issues relating to greater recycling of tyres in broadly the same light as issues relating to the need to ensure that an effective waste management regime for EOL tyres is put in place.

We agree that these issues are interlinked. But in our view there are risks in seeing them as all being part of a single problem. Instead we recommend that they should be handled separately, while ensuring that the approach taken to each one 'dovetails' with the other. Our reasons for recommending they be handled separately are that:

- at the very least, New Zealand needs an effective storage/disposal regime for tyres (as it does for any significant waste product)
- government has a well established role in New Zealand of ensuring, and sometimes paying for, waste management. But this is not the case for encouraging recycling
- the policy questions associated with the two issues are quite different
- the disposal regime needs to be robust to changes in the types of recycling that occur, and the occasional failure in those recycling enterprises
    - New Zealand's history with recycling suggests that sporadic failures in recycling ventures are likely (as with Rubber Technologies)
    - It's therefore more sensible to design the two components separately, so that each can exist independently of the other
- providing an effective storage/disposal regime will help to address market supply problems.

Accordingly we discuss only changes to the storage and disposal regime in this section. Possible mechanisms for encouraging greater levels of recycling are discussed in the following section 'Encouraging greater levels of recycling'.

Approaches used internationally

It is frequently useful to review the sorts of policy approaches that are used internationally before deciding what approach should be adopted in New Zealand. We have identified a large number of policies used or being considered internationally,[17] and have grouped them under headings for convenience:

- General facilitation
  - education, information, research and marketing strategies
  - establishment of advisory bodies
  - or encouraging the creation of advisory bodies by stakeholders.
- Broader measures to reduce supply
  - improve tyre life (i.e. measures to improve tyre quality and education about matters such as correct inflation)
  - reduce vehicle mileage (i.e. enhance public transport options)
  - improve the retread rate.
- Enhanced regulatory requirements
  - banning of whole tyres in landfills
  - permit only shredded (not quartered) tyres in landfills
  - specific storage standards for tyre mono-fills
  - limits on maximum number of tyres in any one-tyre pile site
  - limits on 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; fire breaks).
- Strengthened compliance mechanisms
  - registration of all tyre collectors, shredders and tyre piles
  - documentation of movement of tyres through '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 scrap tyres (take-back schemes).
- Subsidisation of collection, storage, or transformation
  - tax credits
  - low-cost loans
  - central government grants
  - payment per tonne of tyres recycled
  - earmarked funds for site clean-ups.

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[17] A number of sources were drawn on to create this list, including:
- The JWGT submission in response to the EPHC discussion paper
- 'Scrap Tires in the US – Overview 2002 Update'
- 'End Of Life Tyres – An Overall Picture Of ELTs Management In Europe'
- Environment Canada Website: http://www.ec.gc.ca/epr/en/stewardship.cfm
- 'Industry Product Stewardship Business Plan (British Columbia).

- Increased industry responsibility
  - voluntary or mandated industry bodies responsible for managing the system.

Core changes

The Government would clearly not want to implement all of these possible policies. A choice between a number of broad different approaches is required. But in our view there is a subset of core policy changes that are needed regardless of the broad policy approach the Government ultimately chooses to adopt.

Accordingly, before turning to a discussion of the broad policy options, this section discusses the core policy changes that in our view should be implemented as soon as practical.

Establishment of district plan requirements

It is essential that a clear set of policies in relation to private tyre piles be established in all regions where piles exist, or may occur. Without this, councils will inevitably struggle to control the activity.

The Government should therefore facilitate the establishment of tyre pile requirements for inclusion in local authorities' district plans. Once these requirements have been incorporated in their district plans, councils will be able to ban tyre piles in certain situations, and to set standards for their operation where they are allowed.

We therefore recommend that the Government draw up a set of guidelines that specify:

- the number of tyres a landowner can store on his/her property before a resource consent is required
- the maximum number of tyres allowed per tyre pile and per property
- location requirements (distance from boundaries, buildings and waterways)
- pile height, width, and length
- fire safety precautions (such as berms, sprinkler systems and fire breaks).

More effective mechanisms for policing and preventing tyre dumping

The illegal dumping of tyres must also be resolved regardless of the broad management approach taken to EOL tyres. It is true that the industry could take the steps necessary to prevent dumping, rather than the Government, if some form of extended producer responsibility scheme was pursued. However, we consider that it is desirable to strengthen the Litter Act regardless. This reflects the fact that the problem of dumping is not limited to tyres – it occurs with used cars, for example – and that it is sensible to ensure that dumping can be prevented regardless of any future changes in the broad management regime for EOL tyres.

Such strengthening could include the introduction of higher maximum penalties under the Littler Act, or the introduction of a new category of offence relating to the dumping of large quantities of material.

It may also be sensible for the Government to encourage industry initiatives to ensure improved behaviour by collection and transportation operators. For example the industry could establish a voluntary code of practice and award some form of 'quality mark' to those operators who agreed to adopt the code.

We therefore recommend that the Government initiate a review of the Litter Act with a view to implementing changes to strengthen provisions against the deliberate dumping of tyres and other large-volume waste products such as used cars.

Agreed responsibility for funding the clean up of tyres where no private party can be held responsible

It is almost inevitable that responsibility for removing tyres will fall on councils and central government in some cases. This reflects the fact that tyres may be dumped on council or government-owned land, and that unmanaged tyre dumps will sometimes occur when a firm becomes insolvent, in which case it may not be possible for councils to pursue costs from any private party.

However, we suspect that at present both councils and the Government are resisting taking responsibility for the cost of removing specific tyre piles for fear of creating a precedent, or more generally of encouraging the dumping of tyres on land for which the Government or councils are ultimately responsible.

Turning first to the concern of encouraging the dumping of tyres on council or government land, we do not see this outcome as likely. Unscrupulous operators or tyre owners already seem able to dump EOL tyres with little risk of being caught or fined. Accordingly their behaviour is unlikely to be affected by any government/ council policy over who will pay for removing tyres when no one else can be held responsible.

Turning to the concern of setting a precedent, we agree that this is a risk. However, simply avoiding paying for the removal of tyre piles is unlikely to be sustainable in the medium to long term. Accordingly we suggest that it would be better for both councils and the Government to agree a sensible approach now, in order to ensure that the precedent set when either party is first required to pay, is a sensible one. To that end, we would suggest that a key aspect to any agreement reached would be that both councils and the Government would pay for removal of a particular pile only once all efforts to pursue relevant private parties for those costs had failed.

Accordingly we recommend that a national policy be established on who will be responsible for meeting the costs involved in tyre removal, and under what circumstances.

Encouraging the use of mono-fills

It seems inevitable that a significant portion of New Zealand's EOL tyres will continue to be placed in landfills over the foreseeable future, given the current lack of commercially viable recycling options in many parts of the country. However, steady advancements in tyre recycling are being made internationally, and it is likely that recycling will become more profitable over time.

Given that tyres do not degrade to any significant degree, we therefore see logic in encouraging councils to store all tyres in appropriately managed mono-fills. This would allow tyres to be recovered and recycled at some stage in the future if there was an appropriate use for them.

We therefore recommend that the Government work with councils to encourage them to introduce a requirement for appropriately managed tyre mono-fills.

Impact of core changes

If these core changes were made we would expect a far greater proportion of New Zealand's EOL tyres to end up in authorised landfills or better managed private storage sites. This in itself would be a significant step forward from the current approach. But it will not address all of the weakness identified in the current regime:

- tyres may still be dispersed across a number of different sites, meaning that potential recyclers would still face insecure supplies and relatively high transport costs
- councils are still likely to need to ensure compliance and prosecute illegal dumping
- some individual landowners may still suffer dumping on their land and therefore be subject to high costs.

So further additions to the regime may be warranted.

Options for further enhancements

Specific policy changes to enhance the EOL tyre management regime could potentially be made in all of the areas discussed previously:

- general facilitation
- enhanced regulatory requirements
- strengthened enforcement mechanisms
- subsidisation of specific components of the regime
- increased industry responsibility.

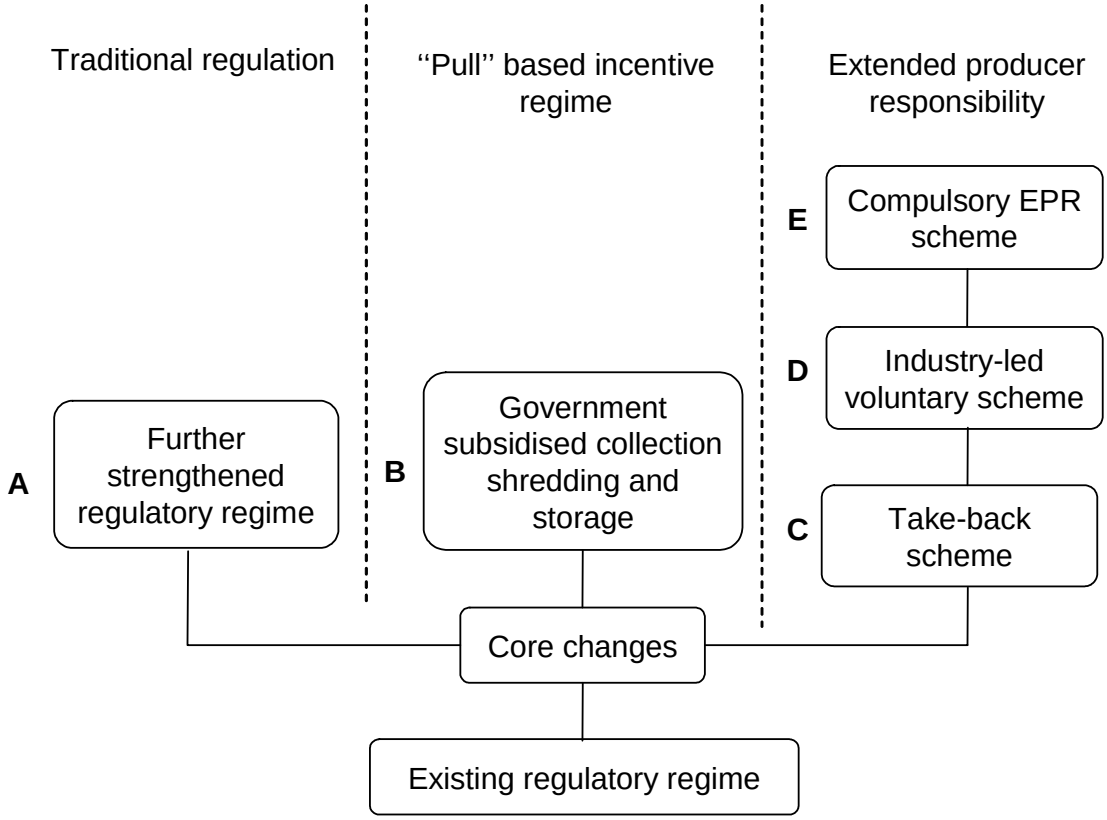
Actions in each of these areas are not necessarily mutually exclusive. But nor will all possible combinations of different policies be sensible. Accordingly we have identified five 'packages' of policy measures we consider offer the most promise. Those packages are:

- further strengthening the existing regulatory regime

- government subsidy of collection, shredding and storage activities
- a take-back scheme
- an industry-led voluntary scheme
- a compulsory Expanded Producer Responsibility (EPR) scheme.

These options are shown in Figure 2 below.

Figure 2: Overview of options for further enhancing New Zealand's EOL tyre management regime



Each of these options is first described, and then assessed in the sections below. We then finish the section by drawing conclusions about which options are likely to be the most appropriate.

Further strengthening the existing regime

Once the core changes discussed in the previous section have been implemented, there will be a clear specification of what behaviours are, and are not, allowable in relation to the disposal of used tyres. Any further strengthening the regime should therefore focus on enforcement.

In our view the only way that enforcement of the regime could be strengthened significantly would be to monitor the movement of EOL tyres through the supply chain more carefully. If implemented effectively, a monitoring regime of this nature would make it much more difficult for operators to dump or store tyres inappropriately.

An effective monitoring regime would require:

- registration and auditing of all sources of tyres
  - there are around 600 retail tyre outlets in New Zealand
  - it seems likely that they produce most of the used tyres in New Zealand
  - these outlets could be registered, and required to supply EOL tyres to accredited users only, and keep accurate records of the sources and destinations of all tyres bought and sold
- accrediting of all tyre collectors, processors and storage facilities
  - for registration to be effective, all users of EOL tyres would also need to be accredited to ensure that their use of tyres was acceptable
  - otherwise rogue collectors/processors would be likely to emerge.

An incentive-based regime

The current approach to EOL tyre management can essentially be described as a penalty-based regime. The activities that parties are, and are not, allowed to undertake are specified under legislation (albeit imperfectly at present) and any parties that act inconsistently with those requirements are penalised.

Under an incentive-based regime, this approach is turned on its head. Instead of 'pushing' tyres through the supply chain by specifying and enforcing allowable behaviours, an incentive-based regime would 'pull' tyres through by rewarding parties for undertaking the activities that are sought.

While incentive-based approaches can take a number of forms, the most appropriate approach in the context of EOL tyres is likely to be to subsidise the collection, transformation, and storing or tyres. Once an appropriate level for the subsidy had been determined, tyres would cease being waste products in the eyes of operators. While operators would still face costs to collect, transport and transform EOL tyres, those tyres would be worth more than they are now. So it would be in operators' interests to collect and transform them.

Under a regime of this type:

- the Government would tender the right for one or more operators in each region to:
  - receive and collect used casings
  - manage the necessary storage/stockpiling function
  - facilitate the availability of good casings for re-treading
  - supply those casings not worth re-treading to accredited recyclers and end users on a commercial basis
  - dispose of the remaining shredded product in authorised landfills
- each operator would be paid the agreed fee per tyre disposed of (evidence on the costs of collecting and shredding tyres suggests that this subsidy would need to be in the order of $1.50–$2.00 per tyre)

- an auditing regime would need to be established to ensure operators did not attempt to cheat the system.

A take back scheme

Under a take-back scheme, all tyre retailers would be required to accept (typically for no charge) any EOL or unwanted tyre.

Given the nature of the retail tyre industry, used tyres are typically already taken back from users when new tyres are fitted. But this is not universally the case. A formal take-back scheme would differ from the current arrangements in that tyre retailers would be required to accept any used tyres presented to them, regardless of whether they were selling new tyres to the person providing them, or whether they were tyres that the retailer had originally sold.

A voluntary industry scheme

Industry may well be better placed than the Government to arrange for operators to collect, shred and dispose of tyres. Under a voluntary industry approach, the Government would work with the tyre industry to develop a management approach that was suitable to all parties, but it would then be the responsibility of industry to run the system.

Under this approach we would expect:

- industry would enter into a voluntary agreement
- the industry would develop the arrangements, in consultation with the Government, considered most suitable to ensure that all tyres were collected, shredded and disposed of
- the industry would run that system once it had been put in place
- the costs of whatever arrangement was put in place would be recouped through payments from all industry participants (who would be likely to recover those costs through charging higher retail tyre prices)
- the Government would agree the arrangements proposed (including the proposed institutional arrangements and minimum shredding and storage/ disposal standards).

A compulsory extended producer responsibility scheme

Lastly, an increasing number of countries are establishing formal extended producer responsibility (EPR) arrangements. Under a compulsory EPR approach, the Government would pass legislation making the tyre industry legally responsible for appropriately disposing of EOL tyres, and providing industry members, or a representative body, with the powers necessary to undertake the task.

There are two broad ways an EPR regime could be implemented: creating an industry body and making it responsible for managing EOL tyres, or making each industry member responsible for managing its tyres.

Under an industry body approach we would expect:

- a formal tyre industry management body would be established
  - empowered by legislation
  - responsible for the storage/disposal of all tyres in New Zealand
  - participation in the scheme would be compulsory
- fees (and penalties if relevant) would be set in regulation
- the body would be funded through an industry-specific tax or some form of levy (probably on both imports and manufacture)
- the management body would be responsible for end-to-end management of the storage/disposal system
- the recycling options and/or disposal methods would be approved by Government
- the management body would be required to report on operations and financial performance
- the Responsible Minister would have the right to intervene in the event of breach of duties and if necessary disband the body.

Under an individual firm approach:

- each industry member (such as retailer, importer, or owner of the trade mark under which a product is sold) would be required under legislation to ensure its tyres were stored or disposed of properly
- the industry member would have to prepare a plan for the Government setting out how they would meet their requirements
- groups of industry members would be allowed, or encouraged, to band together into an association and manage their responsibility jointly (but participation in the association would be voluntary)
- each industry member, or group of members, would be required to report on operations and financial performance
- each member would fund the cost of their obligations as they saw fit, and any voluntary association would levy its members as it saw fit (so long as it did not breach any Commerce Act provisions).

Advantages and disadvantages of the different options

In this section we discuss the advantages and disadvantages of each option, and provide our assessment of which approaches are likely to be most suitable.

Any choice between broad policy options of this nature requires a degree of judgement: the choice cannot be made in a purely mechanistic way. But it is nevertheless important to have a clear sense of the criteria that will be used to guide the decision. In our view, the choice between these options should be based on an assessment of each of them against the following criteria:

- *financial cost:* all other things constant, it is clearly preferable to choose the solution that imposes the smallest overall financial cost on the government, consumers and industry
- *equity*: for an option to be politically sustainable, and to secure 'buy-in' from all relevant parties, it must be perceived by them to be fair
- *effectiveness* at encouraging/securing:
  - increased levels of recycling
  - reduced EOL tyre numbers
  - more cost-effective storage and disposal techniques
- *degree of compliance*: the effectiveness of each of the options discussed will depend crucially on the extent to which the parties involved comply with the requirements placed on them
- *competitive neutrality:* for broader economic reasons, it is important to minimise the extent to which:
  - any firms within the industry are disadvantaged relative to their counterparts; and
  - the tyre industry is advantaged or disadvantaged relative to other industries.

Further strengthening the existing regime

In our view it would be quite possible to put a system in place that tracked the movement of all EOL tyres through the supply chain, and to accredit all recipients of EOL tyres to ensure they used or stored them appropriately. By doing so, the Government could significantly increase compliance with the proposed regulatory requirements, and thereby reduce the level of dumping and use of private tyre piles.

However, we expect that doing so would be costly in terms of the time and resources required to set up and operate the system. Significant costs would be likely to stem from the:

- drafting and passing of the legislation required
- establishment of the systems and processes needed (such as reporting by retailers and accrediting users)
- time taken by operators to provide the necessary information
- government staff that would be needed to audit the information provided by operators.

While we have not been able to estimate the likely costs, on balance we expect that this option would be unduly costly, given the magnitude of the current problems and the costs of the other options available. In that regard we would note that these costs would be over and above the costs of transporting and transforming the tyres which occur under all options.

An incentive-based regime

We consider that an incentive-based regime could be very effective. It could also be implemented relatively quickly and at reasonable cost. No legislation would be required and the system could be used for all types and sizes of tyres, regardless of their source.

The key tasks and costs involved would be for the Government to:

- draw up a contract specifying the services it wanted delivered, and the associated terms and conditions; and
- call for tenders from operators interested in providing the service.

The disadvantages of this approach are that it would place additional costs on the Government – probably in the order of $6–8 million. It would also release the industry from responsibility for helping to address the problem, which is inconsistent with the Government's support for the principle of extended producer responsibility, as set out in the NZ Waste Policy published in 2002. By removing the responsibility from industry this approach would also reduce incentives on industry participants to develop more cost-effective solutions.

A take-back scheme

A take-back scheme on its own would be unlikely to solve the key problems we have identified with the current regime. Unscrupulous operators could still dump tyres, and the number and size of private tyre piles would not be affected. However, a take-back scheme could be effective if used in conjunction with a voluntary industry scheme, or as part of an overall tightening of the current regime.

The key disadvantages with a take-back scheme are that it would require legislation to implement, and that it would disadvantage the tyre industry relative to the other suppliers of EOL tyres (such as wreckers and car importers) unless a way could be found to include those other suppliers in the scheme, or subject them to equivalent controls.

A voluntary industry scheme

A voluntary industry scheme would impose only modest costs on the Government, whose involvement would be limited to ensuring that the approach developed by industry met its objectives, and reviewing the ongoing effectiveness of the regime once it had been in place for 2–3 years. Similarly, the costs of a voluntary scheme on the industry should be manageable (again, these costs are likely to be in the order of $6–$8 million). A voluntary industry scheme would also be consistent with the NZ Waste Strategy (2002) which promotes the general principle of making producers carry the costs and responsibility of managing the wastes caused by their industry.

The key weaknesses with a voluntary approach are that:

- it relies on all players in the industry being able to work together effectively
- not all EOL tyres entering the supply chain come from operators within the tyre industry. Accordingly some tyre sources outside the industry would need

to be included in the scheme, which could make it harder to reach agreement, or they would have to be covered by other mechanisms

- the Government has no obvious sanctions to impose if things go wrong (other than implementing a different regime altogether)
- care must be taken to ensure that the competition policy provisions under the Commerce Act are not breached.

However, we consider that each of these weaknesses should be able to be managed to a reasonable level. Combining a formal take-back scheme and voluntary industry scheme would solve the first concern, as it would mean that all tyres were covered by the Agreement, regardless of their source. Similarly, we believe that it should be possible to avoid raising Commerce Act concerns by focusing on the level of contribution each party is required to contribute to the scheme, rather than attempting to make any agreement on price setting. With regard to working together, the tyre industry has shown an ability to work together in the past which suggests it should be able to run a voluntary scheme effectively.

A compulsory extended producer responsibility scheme

Lastly, a formal extended producer responsibility (EPR) scheme would have the advantages of:

- sheeting home responsibility for EOL tyres to the industry
- providing a complete and robust solution.

The key benefits of making the industry responsible for managing EOL tyres, are that it will give industry a greater incentive to find innovative ways to increase recycling, reduce EOL tyre numbers and to keep storage and disposal costs down. Again, a formal expended producer responsibility scheme would be consistent with the recent NZ Waste Strategy.

But a compulsory EPR scheme would be likely to be at least slightly more costly for both Government and industry than a voluntary scheme, as at a minimum it would require legislation to implement, and is likely to require more formal reporting and control mechanisms. If a formal industry management body were established, the Government would need to retain oversight of it, given that it would have a number of statutory powers.

Overall assessment of the options

None of these options is inherently better or worse than any other. All have strengths and weaknesses, and all could be made to work. The choice between them therefore needs to be based on the Government's objectives, and take account of the characteristics of the EOL tyre supply chain.

It should also be remembered that we have recommended that the following core changes be implemented regardless of which, if any, of the additional options for strengthening the regime is chosen:

- establishment of restrictions on private tyre piles in district plans

- strengthening the Litter Act to prevent tyre dumping
- agreeing funding for the clean-up of tyres where no private party can be held responsible
- encouraging landfills to accept whole tyres where shredding facilities are not readily available
- encouraging the creation of tyre mono-fills.

These steps in themselves will go a long way towards fixing the weaknesses in the current regime that we have identified. Any assessment of the costs and benefits of further action need to take this into account.

Given this, we consider that options A (further strengthening the existing regime) and C (introducing a take-back scheme on its own) are unlikely to be as cost effective as the remaining options, and should therefore be discarded.

However, the choice between the remaining three options is less straightforward:

- B: Government subsidisation of collection, transformation and disposal activities
- D: a voluntary industry approach
- E: a formal EPR regime.

On balance we would suggest that either B or D be pursued first, and E be adopted only if the more cost-effective approaches prove not to be effective. This reflects the fact that options B and D will be cheaper and quicker to implement, and that the core changes proposed will already have addressed a significant proportion of the concerns with the EOL tyre regime that we have identified. Put another way, we see logic in assessing the effectiveness of a lower-cost approach first, before turning to the more formal and costly approach of a formal EPR regime.

However, we accept that the success of a voluntary industry scheme is less certain than that of a formal EPR scheme, and therefore accept that option E may still be needed in the future.

Turning to the final choice between options B and D, it is difficult to reach a clear conclusion without taking account of the Government's broader intentions in the area of waste management and resource utilisation. If EOL tyres were a 'one-off' challenge we would recommend that option B be implemented, as there are less risks around its likely effectiveness. However, we understand that the Government is in the process of reviewing its approach to a number of waste products such as oil, used cars, and electronic goods. We would see Option D as making more sense if the Government decides that it is inclined toward the approach of steadily increasing the degree of producer responsibility across a range of sectors.

Encouraging Greater Levels of Recycling

The discussion in this report so far has focused on how to improve the storage and disposal regime for EOL tyres. We have focused primarily on that area as:

- that is the area where we consider improvements to the current arrangements are most needed; and
- implementing any of the four enhanced disposal regimes discussed in the previous section will remove the explicit barriers to recycling that are inherent in the current system, so will help encourage greater levels of recycling to some degree.

However, we accept that it is very unlikely that a commercially viable use will be found for all of New Zealand's EOL tyres. While MfE has been contacted by a number of entrepreneurs who believe they have commercially viable schemes that could use a significant portion of the EOL tyres currently produced in New Zealand, international evidence suggests that the majority of tyres will continue to be disposed of unless the Government chooses to actively encourage recycling activity.

Governments around the world have therefore chosen to directly encourage recycling activity and New Zealand may well also chose to do so too.

Options open to the Government

Non-financial options

The Government has only limited options open to it to encourage EOL tyre recycling, short of providing direct subsidises. Moreover, these non-financial options are unlikely to provide any more than a modest increase in the level of recycling. However, the two key options we have identified would also be relatively cheap for the Government to put in place, so we recommend that it do so. The two key options we recommend are for the Government to:

- encourage potential recyclers to use existing business facilitation measures
  - Foundation for Research Science and Technology (FRST) research portfolios
    - New Economy Research Fund
    - Research for Industry
    - Environmental Research
  - NZ Investment Fund
  - NZ Trade and Enterprise (NZTE) Business Development programmes
    - BIZ
    - Incubators

- undertake further analysis of the likely patterns of supply and demand for EOL tyres, and determine whether there is a need for intervention to ensure security of supply, and if so to:
  - facilitate negotiations between tyre storage/dump operators and potential recyclers
  - act as a central point for enquiries about use of EOL tyres
  - provide advice on which uses are likely to be most sensible.

Subsidisation

To have any real impact on the level of recycling that occurs in the short to medium term, the Government is likely to need to directly subsidise recycling operations.

The key question regarding subsidisation of recycling activities is not whether it can be done; rather it is whether it should be done. Answering this question requires a brief discussion of the economic concept of externalities.

Any recycling activity – indeed almost all economic activity – will have a range of economic, social and environmental impacts that extend beyond the direct financial costs and benefits captured by the firm undertaking it. Yet the firms involved will typically base their decision on whether to recycle, and if so in what quantities, on the direct financial costs and benefits they face. Government intervention to encourage new recycling opportunities may therefore be appropriate where the activity offers net benefit from a societal perspective, but is not financially profitable for the recycler.

However, it should be stressed that the fact that externalities of some degree are relatively common does not mean that it will always, or even frequently, be optimal for the Government to subsidise the recycling of tyres. In many cases the size of any externalities will be insufficient to warrant a different approach to that firms would take based purely on their desire to maximise profits.

Any decision to subsidise recycling activities therefore needs to be based on a robust assessment of the full costs and benefits involved. We would recommend that the government should only subsidise recycling activity if doing so provides a clear net national benefit.

Accordingly, we recommend that the Government:

- continue to identify possible recyclers and recycling options
- work to gain a greater understanding of the factors that make the most promising recycling options uneconomic, and the extent of subsidy that would be needed
- undertake an assessment to determine whether subsidisation of recycling activities is likely to provide a net national benefit.

Turning to the issue of how the Government could subsidise recycling activity if it chose to, the most effective approach is likely to be for the Government to tender the right to access the subsidy against criteria relating to:

- the long-term financial viability of the proposals

- the broader economic, environmental and social net benefits provided by each proposal.

Summary of Recommendations

We recommend that the Government implement the following 'core', high priority improvements as soon as possible, and regardless of which options for further strengthening the regime (if any) are adopted:

- Develop recommended standards for tyre piles on private land and encourage councils to include them in their District Plans.
- Review the Litter Act:
  - Is it the right piece of legislation to use to stop illegal dumping?
  - What level should penalties be set at?
  - Is there a need for a new offence to be defined in relation to the dumping of large quantities of waste?
- Discuss with councils how to fund the removal of tyres from public land, and from private land where it is impractical to pursue the landowner.
  - Is a central government funding warranted?
- Check whether landfills are refusing to accept whole tyres (rather than arranging to quarter them themselves). If necessary, encourage councils to avoid this.
- Encourage industry to establish a 'quality mark' regime or something similar for collection, transformation and storage activities.
- Encourage councils to introduce tyre mono-fills.

In our view, these changes will go well down the track to addressing the weaknesses we have identified in the current EOL tyre management regime.

But actions to further strengthen the storage and disposal regime may still be warranted. If the Government chooses to do so, we would recommend that it initially pursue either:

- Option B: Government subsidisation of collection, transformation and disposal activities; or
- Option D: a voluntary industry approach.

If these prove ineffective we would then suggest that a formal extended producer responsibility scheme be considered.

Lastly, the Government may also want to do more to encourage greater recycling of EOL tyres. We recommend that a number of modest steps be taken as soon as possible:

- Continue to identify possible recyclers and recycling options.
- Encourage promising recyclers to pursue existing sources of funding and support (such as through FRST and NZTE.
- Undertake further analysis of the likely patterns of supply and demand for EOL tyres, and determine whether there is a need for intervention to ensure security of supply for the most promising recycling options.

- Work to gain a greater understanding of the factors that make the most promising recycling options uneconomic, and the extent of subsidy that would be needed.
- Undertake an assessment to determine whether subsidisation of recycling activities is likely to provide a net national benefit.

If the Government chooses to subsidise recycling activity, we recommend that it tender the right to access any subsidy against criteria relating to each project's financial viability and the broader economic, environmental and social benefits it offers.

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Councils interviewed

Agency	Person
Auckland City Council	Jan Burbery
Environment Waikato	David Stagg
Gisborne District Council	Louise Bennett
Hastings District Council	Neal Absalom
Horizons Manawatu	Fiona Taylor
Otago Regional Council	Barry Strong
Palmerston North City Council	Allan Fielding
Papakura District Council	Sue Martin
Timaru District Council	Blue Forsyth
Waikato District Council	Nath Pritchard
Westland District Council	Richard Cotton