Final Report

Impacts of the Waste Minimisation (Solids) Bill

Prepared for

Packaging Council of New Zealand

October 2006

covec
expert analysis + practical advice

Covec is an applied economics practice that provides rigorous and independent analysis and advice. We have a reputation for producing high quality work that includes quantitative analysis and strategic insight. Our consultants solve problems arising from policy, legal, strategic, regulatory, market and environmental issues, and we provide advice to a broad range of companies and government agencies.

Covec develops strategies, designs policy, and produces forecasts, reports, expert testimony and training courses. Our commitment to high-quality, objective advice has provided confidence to some of the largest industrial and governmental organisations in Australasia.

Authorship

This document was written by Reuben Irvine and Tim Denne. For further information email tim@covec.co.nz or phone (09) 916-1960

Disclaimer

Although every effort has been made to ensure the accuracy of the material and the integrity of the analysis presented herein, Covec Ltd accepts no liability for any actions taken on the basis of its contents.

Covec Limited Level 11 Gen-i tower 66 Wyndham Street
PO Box 3224 Shortland Street Auckland New Zealand
t: (09) 916-1970 f: (09) 916-1971 w: www.covec.co.nz

Contents

Executive Summary

The Waste Minimisation (Solids) Bill, (the Bill), provides for a range of measures that seek to reduce the amount of waste created in New Zealand. The analysis in this report indicates that, were some of these measures applied to the packaging and packaged goods industry, substantial costs would be imposed that would not be offset by corresponding benefits. The net overall result would be a negative impact on New Zealand.

The report suggests that policies that provide incentives for input substitution and output reduction provide incentives for least cost achievement of waste management targets. It further suggests that product stewardship schemes can be designed to be these least cost instruments, but that the mechanisms defined in the Waste Bill are unlikely to be least cost.

The report considers the potential impacts if aspects of the Extended Producer Responsibility section of the Bill were imposed on the packaging and packaged goods industry either in the form of deposit refund schemes (container deposit legislation) or as take-back requirements without deposits. In analysing the options, the report reviews relevant international experience and studies. These suggest that such schemes can increase the recovery of targeted containers, but also tend to impose substantial cost.

To avoid criticism from estimating costs of inefficient systems, the analysis in this report examines schemes in other countries and then adopts assumptions consistent with more efficient schemes. The cost estimates produced in this report are based upon return systems in which, after use, product packaging is returned to retail outlets by households. This system would require entirely new collection infrastructure to be created alongside, or instead of, the existing kerbside recycling system. The operation of such a system would require receipt and storage facilities and impose labour costs. Other costs would include the time and effort spent by households returning packaging material, the transportation and processing of recovered material and general administration. The benefits that would accrue include a reduction in waste disposal costs, reduced kerbside recycling costs and reduced litter costs.

The analysis concludes that, although a deposit refund scheme would increase recycling, and reduce waste, by approximately 90,000 tonnes, the net impact on New Zealand would be an annual cost of between $61 million to $121 million. Using the mid-range estimate, the additional cost for every additional tonne recycled would be $1020 per tonne. This is equivalent to a cost per household of $65.

If a product take-back scheme were applied to all consumer product packaging, the net cost to the country would be of a similar magnitude. We estimate that this would be the case even if a product take-back scheme led to an increase in the recycling of packaging material, which is an outcome which would be much less likely under a voluntary scheme.

If the Bill were enacted as currently drafted, extensive information gathering and reporting requirements could be imposed on individual organisations, even if a product take-back scheme were not imposed. To this extent, cost estimates of the information gathering and reporting requirements of the UK recycling system may be relevant. The UK system assigns responsibility for meeting specific recycling targets to all those in the production chain. Scaling down estimates of UK costs on a per capita basis suggests that similar requirements here could impose costs in the vicinity of $2.6 million to $15 million on the packaging and packaged goods industry and $1.4 million to $10 million on the retail sector.

1. Introduction

The Waste Minimisation (Solids) Bill seeks to put in place measures that will enable and require New Zealand businesses, public organisations and households to reduce waste. This report considers Part 6 of the Bill, regarding Extended Producer Responsibility and the responsibilities that could be imposed upon the domestic packaging and packaged goods industry. This industry has raised concerns that the Bill will introduce requirements that can only be met at high cost in comparison to current approaches being used to achieve targeted levels of recovery and recycling.

The analysis examines the potential costs and benefits of deposit refund schemes which are enabled by the Bill, and the potential effects of the Bill's requirements for product stewardship programmes.

In considering the potential effects, the experience of other countries in following similar policies is also described and analysed.

The analysis starts by placing the requirements in the context of the ideal waste management policy, as this sets the context for analysis of costs.

1.1. Optimal Ways to Tackle the Waste Problem

From a public policy perspective, a waste problem exists if waste is managed in a manner that does not produce the most beneficial outcome for society. This would mean that there would be net benefits to society from changes to the quantities of waste (or specific materials) going to landfill, changes to recycling activity, or if the quantity of resources used in product manufacture were different.

There is widespread recognition that levels of waste produced, and quantities going to landfill, are greater than ideal. This may be because disposal is under-priced (disposal costs often do not reflect full social opportunity costs that would include the environmental effects and the costs of the next landfill)[1] and/or because the costs of disposal are not passed on efficiently or effectively to people making purchase decisions that lead ultimately to waste arising.[2]

Theory suggests that the best policy instrument to ensure that waste is managed in an optimal way for society is a charge equal to marginal damage costs.[3] In other words, if the environmental damage associated with one more unit (tonne or cubic metre) of waste can be estimated, this damage cost should be levied on each unit sent to disposal. Such a charge results in the optimal response, i.e. the right level of waste avoidance,

[1] The costs of the next landfill represent the opportunity cost of using landfill space, because every cubic metre used brings forward in time the cost of establishing the next landfill.
[2] A significant number of people appear to place additional value on creating less waste and undertaking more recycling; amongst other reasons, because such activity is viewed as consistent with a less consumerist society. This suggests that they are prepared to incur additional costs to obtain additional recycling.
[3] Baumol WJ and Oates WE (1988) The theory of environmental policy. 2nd Ed. Cambridge.

reuse, recycling and final disposal—that which is most beneficial to society, weighing up the costs and benefits of each option.

The government is currently considering the introduction of a disposal charge, although not based on an assessment of damage costs. Rather it has set targets for recycling and is considering using a disposal charge and other means to achieve targets at least cost. A disposal charge can encourage increased levels of waste minimisation and recycling cost-effectively through providing incentives for:

- **input substitution**—substituting to materials with more recyclable content. This would occur if those that faced the levy chose to purchase products and materials that would provide alternatives to disposal at the end of the product's life;

- **output reduction**—incentives for recycling/reuse or for less material in production thus producing less waste. This would occur if those facing the levy changed purchase decisions such that they handled less material or diverted their waste to recycling facilities to avoid the charge.

If markets operate efficiently and an optimal level of recycling is the objective, a disposal charge is the only instrument required. Alternatively, if the government is targeting certain rates of diversion from landfill (or recycling targets), the charge can be levied at a level that will produce these outcomes at least cost.

However, markets do not operate completely effectively—there are a number of barriers to the theoretical operation of a disposal charge, and other impacts, that need to be borne in mind:

- information and other barriers mean that the costs of disposal are not seen by consumers at the time that they make purchase decisions;

- there is a potential for unauthorised tipping as a response to increased disposal costs.

Product Stewardship Can Mimic the Ideal Instrument

Where there is a possibility of unauthorised tipping,[4] or barriers to optimal outcomes exist, analysts have suggested that the ideal instrument is some combination of a product tax and a recycling subsidy.[5] This combination can provide the desired incentives for input substitution and output reduction that a disposal charge might only produce in theory. The product charge can ensure that purchasers of products pay a differential amount depending on the recyclability of the products, and the recycling

[4] There is little empirical evidence of unauthorised tipping in response to increased landfill disposal prices or unit charging for collection and disposal; this does not suggest that it does not occur, just that it has been little studied. A recent OECD report had numerous references to the issue, for example, but these are largely theoretical and anecdotal. (OECD (2004) Addressing the Economics of Waste)

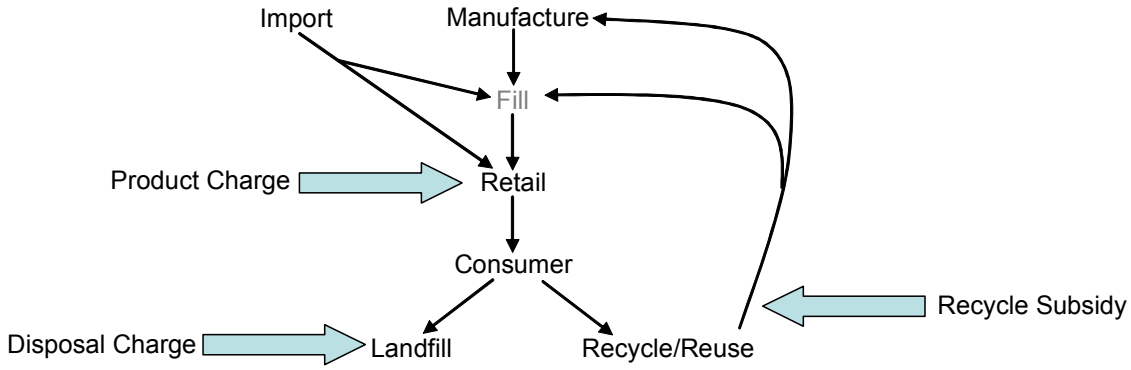
[5] Walls M (2003) The role of economics in extended producer responsibility: making policy choices and setting policy goals. Resources for the Future Discussion Paper 03-11, and Porter, R C (2004) Addressing the Economics of Waste, OECD, Paris.

subsidy can change the relative price of recycling and landfill without the incentives for unauthorised tipping. Product stewardship systems can also mimic these effects. They can achieve:

- an output reduction effect through providing requirements to recycle rather than to dispose of waste—this gives the obligated party (be it industry or local government) the incentive to subsidise recycling; and

- an input substitution effect via an obligation placed on industry that relates to the quantity and type of material used (expected waste)—where an obligation changes with the quantity of product output, the costs falling on firms increase as though they were facing a product charge.

Figure 1 Packaging Chain



Product stewardship schemes that provide incentives for input substitution and output reduction include:

1. the current system that includes voluntary industry acceptance of product stewardship principles, although the incentives are relatively weak and there is scope for free-riding by individual firms;[6]

2. deposit refund schemes or more specifically in a packaging context, container deposit legislation. This involves a product tax (the deposit) and a subsidy in the form of the deposit repaid that provides an incentive to return materials;

3. mandatory product stewardship schemes—as noted above, where the obligation changes with the output of product, the obligation has the same economic incentive effect as a product tax, and obligated firms have the incentive to subsidise recycling.

The analysis here considers options 2 and 3 as changes to the status quo. An assessment of the full benefits of additional recycling (i.e. the full value of reducing quantities of waste) is beyond the scope of this report. Rather we consider the costs of achieving

[6] The incentives are weakened because there is no clarity of the obligation falling on individual firms, industry collectively and local government.

additional levels of recycling using these instruments. The existing context is thus important, i.e. the analysis is concerned with the level of additional costs to achieve additional levels of recycling. Current levels and costs of recycling are discussed below.

1.2. Current Levels and Costs of Recycling

The current approach to encouraging recycling of packaging materials involves voluntary activity by industry under the Packaging Accord and kerbside recycling supported by local government. Current levels of recycling achieved under the Accord are shown in Table 1.

Table 1: Existing recycling rates for packaging material

Packaging material	Consumed, tonnes	Recovered, tonnes	Recovered, %
Paper	293,315	209,925	72
Glass	189,005	92,825	49
Plastic	145,650	31,310	21
Steel	36,865	13,025	31
Aluminium	5,655	3,460	61
Total	673,090	349,640	52

Source: New Zealand Packaging Accord 2005 Progress Report

The costs of existing recycling programmes have been estimated from an analysis of a number of kerbside schemes (see Table 2). We have used these data to estimate the variable costs of a hypothetical recycling scheme that does not include the collection of paper. Fixed costs, which are a substantial proportion of the total costs, are excluded from this analysis.

Table 2 Assumptions Made for Kerbside Cost Analysis

Item				
Kg recycling/household/week	3.5			
Tonnes collected/truck pa	750			
Truck capital cost	$120,000			
	% of Mix	**Tonnes/truck**	**Density (t/m^3)**	**Volume (m^3)**
Glass	82%	615	0.2605	2361
Plastic	12%	90	0.013	6923
Steel	5%	37.5	0.091	412
Aluminium	1%	7.5	0.0565	133
Total	100%	750		9829
		Costs ($/t)		
	Collection	**Processing**	**Transport**	**Revenues**
Glass		8	5-60	59[1]
Plastic		330	50	600
Steel		15	10	110
Aluminium		20	25	1700
Total	150			

[1] In Auckland, based on 25% clear glass at $10/t and 75% dark glass at $75/t. Clear glass and some other glass is beginning to be retained in the South Island and other areas to be used in alternative and lower value end markets.

Additionally, based on industry advice, we assume efficiency benefits associated with reduction in volumes collected; a halving in volume is assumed to improve efficiency by 1.5, i.e. it increases the number of houses that can be visited by 50%. We use these to estimate costs of recycling in Auckland, Lower North Island and the South Island. Transport costs are highest in the lower North Island as we assume glass is shipped to Auckland. In comparison, for the South Island we assume it is used in lower value markets closer to source.

The analysis is used to estimate the net impacts of reductions in volumes of material entering the kerbside recycling stream. Table 3 shows the estimated variable costs of materials entering the kerbside collection system plus the value of the materials. These costs are saved through diverting material from kerbside collection to alternative collection systems. The net costs are an estimate of the subsidy required to support kerbside recycling. These are different from actual subsidies paid as these estimates ignore fixed costs that will not change from diverting some material only.

Table 3 Household Level Variable Costs ($/household) of Kerbside Recycling (Urban Areas) – excluding paper

	Auckland	Lower NI	South Island
Collection	-14.4	-13.5	-12.6
Processing	-4.2	-4.2	-4.2
Transport	-1.0	-3.6	-1.0
Revenues	12.8	12.8	9.2
Net Costs	-6.8	-8.5	-8.6
Subsidy Required	6.8	8.5	8.6

2. Deposit Refund Schemes

2.1. Introduction

It is by no means clear that the proposed Bill intends to establish deposit refund schemes, nor that it will. However, deposit refund schemes are enabled under the Bill. This Section provides a discussion and analysis of the potential consequences.

Deposit refund schemes (DRSs) involve the payment of a deposit when a product is purchased. The deposit is repaid when the product is returned after use. This system provides a strong financial incentive for returning products to a centralised facility to better ensure product reuse, safe disposal or recycling. Karen Palmer and Margaret Walls describe them as equivalent to a product tax-recycling subsidy instrument:

> "*consumers pay a deposit (tax) on a container at the time of purchase and receive a refund (subsidy) equal to their initial deposit when they return it for recycling. The combination of product tax and recycling subsidy gives firms the incentive both to produce less output and to substitute recycled inputs for virgin inputs in production, and it gives consumers the incentive to consume less and recycle more*".[7]

Section 1.1 suggested that a tax-subsidy combination can be an efficient instrument. However, a deposit-refund scheme is regarded as a high-cost approach to its implementation.

Deposit refund schemes have been used in many countries, including New Zealand, but most schemes have been existence for some time. The concerns are that, although a deposit refund scheme can lead to greater levels of recycling, when introduced on top of successful kerbside recycling schemes, it can also divert materials from these existing mechanisms; this can lead to doubling up of fixed costs and very often to higher variable costs of collection. In addition, for the existing kerbside schemes, the loss of revenues from the diverted materials can make them (more) unprofitable, requiring additional support from local government and ratepayers.

Below we compile cost data to examine these additional costs. We start by describing some of the experience with deposit refund schemes, in New Zealand and abroad.

2.2. Experience

This section outlines the experience of DRSs in New Zealand and abroad.

2.2.1. New Zealand experience

In New Zealand during the 1970s beer, soft drinks and milk were packaged in glass, refillable, returnable containers. A voluntary deposit system was common throughout

[7] Palmer K and Walls M (2002) The Product Stewardship Movement Understanding Costs, Effectiveness, and The Role for Policy. RFF Report. Resources for the Future. Washington DC.

the country.[8] These schemes were very largely phased out during the 1980s. A deposit refund scheme for lead-acid batteries operated also, alongside a battery recycling scheme, but this was discontinued because of competition from lower cost imported batteries. Currently a very limited number of voluntary schemes exist.[9]

- Living Nature, a natural skincare company based in Kerikeri, operates a voluntary deposit refund system offering a 20 cent refund per container returned. Glass bottles are washed and reused and the plastic bottles are washed and passed on to the local recycling operation in Kerikeri.

- There are a number of voluntary returnable bottle schemes, that do not include deposits, for example:
  - the Associated Bottle Company (ABC) 'swap-a-crate' system for 745ml beer bottles. Breweries lease bottles from the ABC who wash them for reuse.
  - Mainland Products provides milk in reusable bottles, for home delivery and dairies in the South Island only.
  - A handful of local breweries around New Zealand operate a voluntary return system, for bottles, including Beerworks in Wanaka.

2.2.2. International

Deposit refund schemes have been used internationally to incentivise after-use return of products including:

- Beverage containers;
- Batteries;
- Light bulbs;
- Oil;
- Car hulks.

The classic DRS is used for returnable bottles. A number of schemes operate in the US (Table 4), Canada and some European countries. South Australia has also had a DRS on selected beverage containers since 1977.

The South Australian system

The DRS used in South Australia is illustrated in Figure 2. Containers are sold to retailers by brand-owners, who retain the deposit included in the wholesale purchase price. Containers are then sold to consumers by retailers who are reimbursed for the amount of the deposit in the retail purchase price. A minority of containers are disposed of as waste by consumers, but the majority are taken to collectors in exchange for a deposit refunded to consumers. There are approximately 150 different organisations, typically small charity groups, who operate as collectors. These groups deliver containers to super-collectors, of which there are three. In return for this service, collectors receive a collection fee in addition to the deposits from the Super-collectors.

[8] ZeroWaste, New Zealand (2002) Extended Producer Responsibility: Container Deposit Legislation Report.
[9] ZeroWaste, New Zealand (op cit).

Super-collectors are then entitled to deposit refunds from brand-owners, who also pay super-collectors a handling fee to cover the costs of collection, sorting and processing. Finally, containers are sold by super-collectors to recyclers who pay an amount based upon the market value of the recovered containers materials.

Table 4 US State Beverage Container Deposit Refund Systems

State	Since	Containers covered	Deposit,	% Returned	Handling Fees
California	1987	Beer, soft drinks, wine coolers, mineral water	<24 oz, 2.5¢ >24 oz, 5¢	Aluminium 73% Glass 58% PET 46% Overall 61%	Per container processing fee
Connecticut	1980	Beer, malt, soft drinks, mineral water	Minimum 5¢	Cans 88% Bottles 94% Plastic 70-90%	Beer, 1.5¢; Soft drinks, 2
Delaware	1982	Non-aluminium beer, malt, soft drink, mineral water <2qt	5¢	Insufficient data	20% of deposit
Iowa	1979	Beer, soft drinks, wine, liquor	5¢	Aluminium 95% Glass 85% Plastic 70-90%%	1¢
Maine	1978	Beer, soft drinks, wine, wine coolers, liquor, juice, water, tea	Beer, soft drinks, juice: 5¢. Wine, liquor: 15¢	Beer, soft drink 92% Spirits 80% Wine 80%	3¢
Mass.	1983	Beer, soft drinks, carbonated water	5¢	Overall 85%	2.25¢
Michigan	1978	Beer, soft drinks, canned cocktails, carbonated and mineral water	Refillables: 5¢; Non-refillables: 10¢	Overall 93%	25% of unclaimed deposits
New York	1983	Beer, soft drinks, wine coolers, carbonated mineral water, soda water	5¢	Wine cooler 59% Soft drink 58% Beer 80% Overall 69%	1.5¢
Oregon	1972	Beer, malt, soft drinks, carbonated mineral water	Standard refillables: 3¢; Others: 5¢	Overall 85%	None
Vermont	1973	Soft drinks, beer, malt, mineral water, liquor	Soft drinks, beer: 5¢ Liquor: 15¢	Overall 85%	3¢
Hawaii	2004	Beer, soft drinks, wine coolers, juice, water, tea	5¢	Overall 69%	1¢

Source: Colby College (www.colby.edu/economics/faculty/thtieten/ec476/EE-5.pdf), Hawaii State Department of Health, (http://www.hawaii.gov/health/environmental/waste/sw/sw/hi5/index.html), State of California Resources Agency (www.consrv.ca.gov/DOR/Notices/Images/Biannual506.pdf.), New York State Department of Environmental Conservation (http://www.dec.state.ny.us/website/dshm/redrecy/0304rpt.pdf).

The design of the South Australian DRS has several negative aspects that are likely to hinder both its costs and effectiveness. In particular:

- Collection costs are likely to be relatively high. This is because consumers are not able to return containers to retailers, but must make specific trips to separate locations where containers are collected and deposits are refunded. This

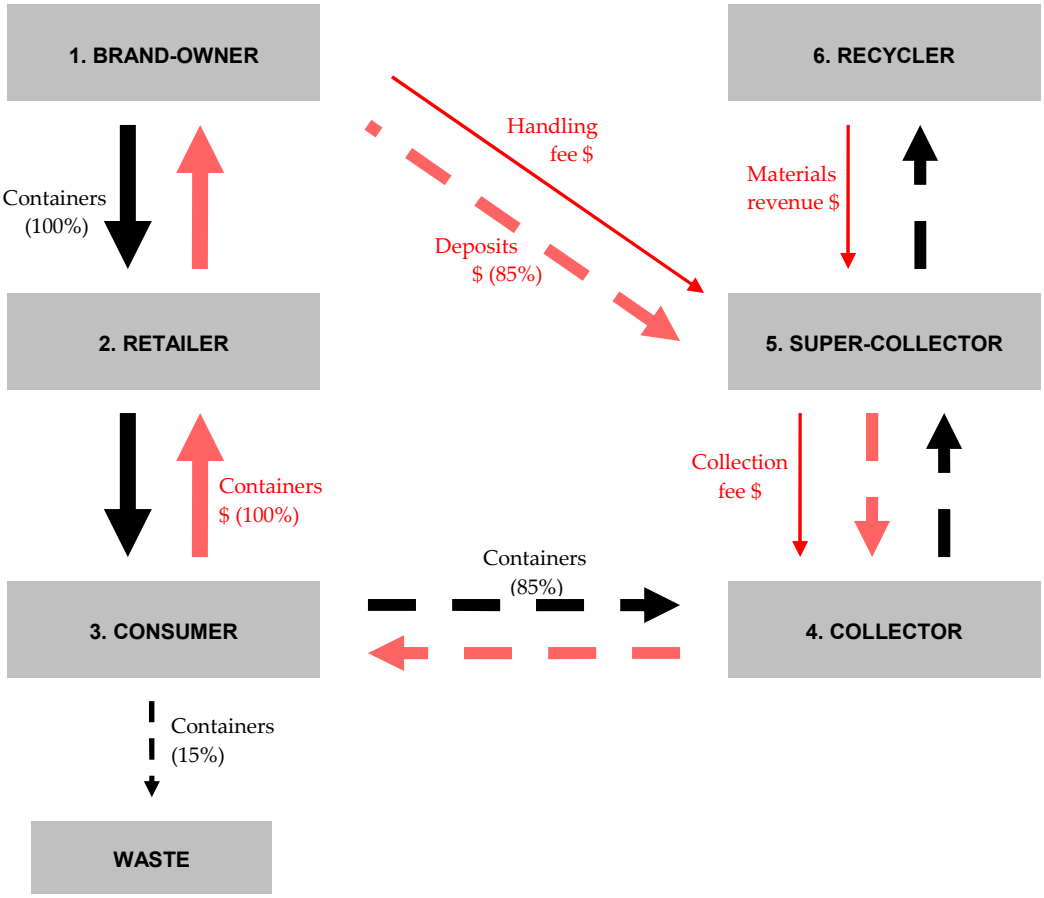
increases consumer costs.

- There are no incentives for brand-owners, or fillers, to assist in increasing the return rate. In fact, brand-owners would prefer low recycling rates because they retain the deposits for any containers that are not returned, typically 15 – 20% of all containers.

- Upon collection, all containers must be sorted into different brands and counted, increasing the processing and sorting costs. This is required to ensure that the deposits and handling fees paid by brand-owners to super-collectors are based upon actual container flows for each brand-owner.

- There is a risk that super-collectors hold market power in negotiations with brand-owners and charge handling fees that are higher than would obtain in a more competitive market. This potential stems from the fact that there are only three super-collectors with which brand-owners must contract, and because the economies of scale for super-collectors create a barrier to entry for any new super-collectors.

Figure 2 South Australian deposit refund scheme



2.3. International studies on impacts of Deposit Refund Schemes

Most studies suggest that the DRSs are effective in achieving high recovery rates (see Table 4)[10] but that they have high costs; including:

- costs of establishing infrastructure for collection and processing of containers;
- operational costs of running the scheme including:
  - householder transport and labour costs of returning the containers,
  - the cost of handling and processing returns, and
  - government costs of administering and monitoring the scheme.

If a DRS is operated alongside a kerbside recycling scheme, costs are highest where the schemes reproduce the required collection and recycling infrastructure. The analysis in this report examines the implications of different approaches.

Australian studies regarding the financial costs of potential DRS schemes suggest that these costs could be sizeable. Estimates of the net financial costs (excluding householder labour costs) of introducing DRS in New South Wales undertaken by White (2001) were between $72 and $107 million per annum compared to the net financial cost of kerbside recycling of $41 million. The financial cost estimates of DRS varied largely depending upon the location and number of container collection facilities. White's estimates of the cost of household labour ranged from $335 to $385 million per annum for DRS. This compared with $285 million for kerbside recycling.[11]

A study, and subsequent peer review, commissioned by the Environmental Protection Agency Victoria to analyse the cost of running a container deposit system in parallel with kerbside recycling found that the additional costs would be substantial.[12] The scheme analysed included: a 10 cent container deposit on all beverage containers; containers returned to point of sale; continuation of the existing kerbside recycling system. Taking all factors into account, the costs of recycling activity after introducing DRS were estimated at between A$74 to A$81 per household. This compared with the average annual cost of kerbside recycling of A$29 per household. This study estimated that the costs of recovering an additional tonne of beverage containers using a DRS would be in the vicinity of A$1159 to A$2219 whereas the market price of these materials ranged from A$72 per tonne for glass to A$1100 per tonne of aluminium.

[10] Also, Fullerton and Wolverton (1997) The case for a two-part instrument: presumptive tax and environmental subsidy, Working Paper no. 5993, National Bureau of Economic Research, Cambridge, Massachusetts, reported that container return rates in US states with DRS varied between 77 and 93%. Beck, R W (2001) Understanding Beverage Container Recovery: A Value Chain Assessment, Report to Businesses and Environmentalists Allied for Recycling, found that the average recovery rate in US states with DRS was 72%, compared with 28% in non-deposit states.

[11] These numbers were reported as only rough estimates and could be in error by a factor of two or more. White, S (2001) Independent Review of Container Deposit Legislation In NSW, University of Technology, Sydney.

[12] Nolan-ITU (2003) Financial Impacts of a Container Deposit System; Environmental Protection Agency Victoria; and Perchards (2003) Container deposit legislation: peer review of a financial impact assessment for three Victorian case studies.

The manual collection and sorting of beverage containers and separation by brand, as occurs in South Australia, may increase the labour costs. In contrast, the use of reverse vending machines, as is common in most European countries that have DRS, could reduce these costs. However, the trade-off is to higher capital costs. The German Environment Ministry's estimate, published in January 2003, was that the capital cost of installing reverse vending machines would be €1 billion, equal to around €12 (NZ$25) per capita.[13] The running costs of these machines were estimated at an additional €135 million per annum.

A study of the likely impacts of a DRS in the ACT, which considered the use of reverse vending machines, estimated that it would impose an increased financial cost of A$2.8 million to $5.9 million per year for recycling.[14] This would effectively double or triple the existing costs of kerbside recycling. Given the extensive kerbside recycling system in place, the additional benefit in terms of increased recovery was estimated to be a only 10% increase in beverage containers. This would result in a marginal cost of A$900 – A$1900 per tonne of recyclable material. These estimates did not include auditing, enforcement or education costs.

A study undertaken for the Environmental Protection Agency of South Australia also indicated that, although DRS had increased the recovery of recyclables, it is a more expensive method of recovery than kerbside systems.[15] A similar study across all US states found that a higher rate of recovery from a DRS came at a higher cost.[16] The estimated net financial costs of collecting beverage containers in the US using DRSs could be in the vicinity of US$889 per tonne.[17] This estimate does not include transport and labour costs incurred by households.

DRSs and kerbside recycling schemes are often considered to be competing systems, and to the extent that valuable recyclable materials are diverted away from kerbside systems, the viability of these systems is reduced. For instance, the Southern Waste Strategy Authority of Tasmania has suggested that a diversion of 80% of beverage containers away from kerbside towards a DRS would reduce the value of kerbside materials by A$11 a year per household.[18] This would increase the cost of kerbside collection to local governments in South Tasmania, in the form of increased subsidy requirements, by 43%. Studies in Tasmania and Northern Queensland have shown that

[13] EUROPEN (2003) Mandatory deposits on non-refillable beverage containers in Germany: The economic, environmental and social effects, http://www.europen.be/issues/casestudy.pdf.
[14] Centre for Environmental Solutions (2002) Impacts of Implementing Container Deposit Legislation in the ACT, http://www.c4es.com.au/docs/ACTNoWasteCDLES02.pdf.
[15] Philip Hudson Consulting (2000) Public Report on the Review of the Economic and Environmental Impacts of the Beverage Provisions of the Environment Protection Act 1993 (Container Deposit legislation) in South Australia, Environment Protection Agency South Australia.
[16] Beck (op cit).
[17] Porter, R C (2004) Addressing the Economics of Waste, OECD, Paris.
[18] Southern Waste Strategy Authority (2006) National Waste Management Policy: Discussion Draft, http://files.thereafter.com.au/swsa/NationalWasteManagementPolic.pdf.

containers to which a DRS would apply constitute 54% and 33% of kerbside collections by volume, but 77% and 59% of by recoverable value.[19]

A report on the experience in Germany, where a DRS has been imposed in addition to an already existing recycling system suggests that this cost industry over €250 million (NZ$500 million) in 2003.[20] This report also suggested that the main recycling system collector (DSD) has lost 20% of its income.

The Australian Productivity Commission, having reviewed the available literature and studies,[21] considered that "the case for introducing DRS in addition to existing kerbside collection schemes on resource recovery grounds is weak." It considered that because the cost of recovery is likely to be substantially higher than under kerbside systems, especially given high administrative and compliance costs, a DRS might only be warranted for products with a disproportionately high cost of illegal disposal.

2.4. Costs and benefits of DRS in New Zealand

To determine the likely impacts of the introduction of a large-scale, comprehensive DRS in New Zealand, we consider what form such a system would take.

Any DRS system introduced in New Zealand would be likely to be broadly similar to the South Australian system but for analysis we have assumed a few key differences. A complaint of policy analysis is often that inefficient existing policies are compared with alternatives assumed to function in an ideal way. To avoid this criticism, the analysis firstly examines how a deposit refund scheme could be designed to be more efficient. This more efficient system is used as the basis for deriving cost estimates. The following assumptions are made:

- Unclaimed deposits would be passed on to an independent public body rather than be retained by brand-owners. The Waste Minimisation Authority, as proposed in the Bill, could potentially fulfil such a function. This would reduce any incentive for brand-owners to discourage the return of containers, as may exist in the South Australian system.

- To reduce the impact on households, retail outlets could be used to accept returned containers and refund deposits, as illustrated in Figure 3. Point-of-sale (POS) return facilities would prevent consumers from making additional specific trips to separate collection centres. A key design aspect would be how many, and what type, of retailers would be required to receive returned containers. To reduce overall compliance costs, it may be preferable for POS returns to occur only at larger retail outlets, such as supermarkets. Our estimates consider two

[19] Martin, R (2005) CDL in a contemporary context – Implications for Tasmania, presentation, Joint Standing Committee Environment, Resources and Development, Hobart, and CDL in a contemporary context – Implications for LAWMAC Region, presentation, LAWMAC.

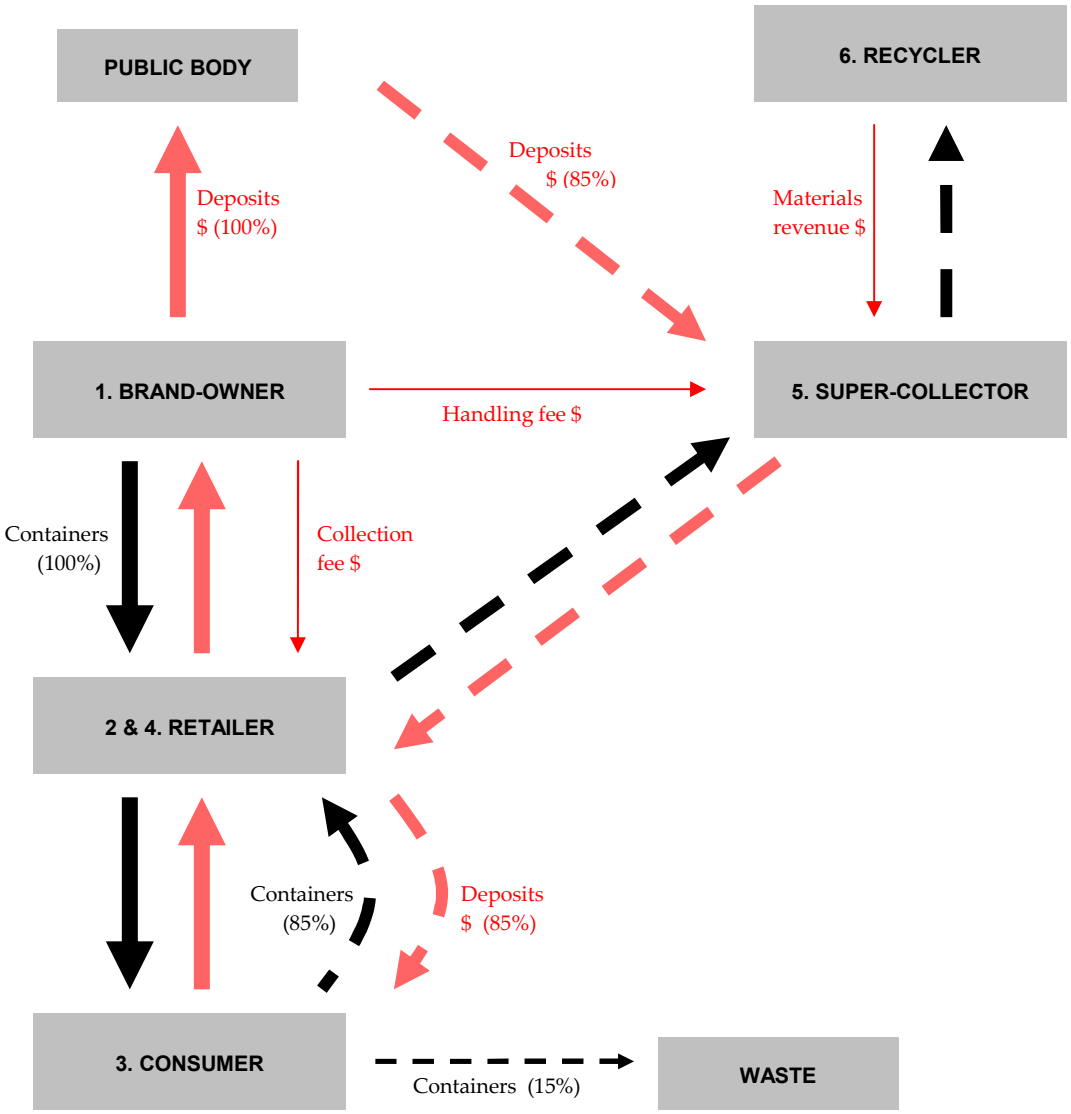
[20] EUROPEN (op. cit.)

[21] Australian Productivity Commission (2006) Waste Management: Draft Report, Commonwealth of Australia, Melbourne.

approaches; if supermarkets are the only return outlets and if all grocery stores are used.

- To minimise sorting and processing costs, outlets that receive and collect containers would not be required to separate containers by brand. This lower cost approach, that contrasts with the South Australian system, is used in California. Information would still need to be collected to ensure that the contributions of different brand-owners to the costs of the system are proportionate to each brand-owners share to total containers collected. This information could be gathered in a less costly manner using other sources, for instance aggregate sales data. Although less accurate, this would provide a suitable approximation for the proportion of containers returned at much lower cost.[22]

Figure 3: Point-of-sale deposit refund system



[22] Beck (op cit) found that the costs of the Californian system were approximately 30% less than the costs of other similar systems in the US that required manual sorting of bottles.

Other relevant design features of a DRS include the amount of the deposit. For simplicity, the amount should equal an existing currency denomination. Regarding the deposit size, although a larger the deposit tends to increase the return rate, there are other factors to be traded-off against the return rate. In particular, the higher the deposit rate, the more likely consumers are to make special additional trips to return containers. To the extent that the value of the material recovered is less than the cost incurred in returning a container, such action by consumers can create a net overall cost to society. Additionally, the higher the deposit rate, the more likely that kerbside collections would be 'raided' for DRS containers, which could cause litter and other problems.[23] We assume that the deposit is applied to all liquid containers up to 3 litres in volume.

Another important design feature is the common use of existing kerbside recycling infrastructure, where possible. To maximise the efficiency of any DRS, we assume that existing kerbside collectors and material processors, either individually or through some amalgamation or partnership, would fulfil the role of Super-collectors. This role would involve collecting returned containers from retailers, processing containers into the necessary forms and the transportation and sale of the recovered material to recyclers.

In line with other DRSs, brand-owners would be expected to reimburse both retailers and Super-collectors for the costs incurred in collection, processing and transportation of containers.

In evaluating a DRS, we classify the different impacts into four categories; private and external costs, and private and external benefits.

2.4.1. Private costs

A DRS would impose costs for the introduction of a new collection infrastructure that would be needed to receive, store and sort containers, refund deposits and keep appropriate records. Business structures to administer and manage these functions would also be necessary.

The private costs associated with a DRS that would be borne directly by industry can be categorised as:

- Collection costs – retailers would need to provide the necessary facilities to receive, sort and store returned containers and refund deposits to consumers.
- Transport and processing costs – returned containers would need to be transported to Super-collectors and processed into a form suitable for sale to recyclers. The materials would then need to be transported to recyclers.
- Education costs – consumers would need to be educated about a new system.

Collection costs

To estimate the costs of collection, the change in container flows resulting from a DRS needs to be estimated. Table 5 sets out the assumptions used and the resulting estimates

[23] This presupposes that kerbside schemes will continue and that there will be an ongoing expectation that some containers covered by the DRS will continue to be included in kerbside collections.

of container flows. Unless stated otherwise, the proportions used are based upon similar figures used in the Australian studies referred to in Section 2.3. Estimates are made for the proportion of DRS containers that are consumed at home. Aluminium containers are considered to used at home in relatively high proportions given the low share of canned beer consumed at licensed premises. In contrast, the figure used for glass DRS containers is lower as nearly half of all beer is consumed away from home and a significant proportion is served in glass bottles. It is assumed similar proportions for away from home consumption would apply to the bottled wine market.

Consequently, we estimate that 2.9 million m^3 of containers, weighing 142,194 tonnes, would be returned to supermarkets throughout New Zealand each year. With a total of 361 supermarkets,[24] and assuming daily collection by Super-collectors, we calculate that this requires an average amount of storage space of 22.2 m^3 per supermarket.

We assume that each cubic metre of storage space requires a square metre of floor space. This is because, although material could be stacked vertically to some extent, supermarkets would also have to allow for the fact that on popular shopping days, the peak flow of returned materials would be in excess of the annual daily average. Some space may also be needed to ensure the stored materials could be loaded onto trucks when collected. Using an approximate price of $1600 per m^2 for floor space, the total cost of this space is estimated to be $12.8 million.[25]

Table 5: Container flows with a DRS (supermarkets only)

Item				
Assumptions:				
	DRS, % of total material	**DRS containers recovered, %**	**DRS consumed at home, %**	**DRS remaining in kerbside, %**
Glass	100	85	70	20
Plastic	33	85	70	20
Aluminium	100	85	80	20
DRS materials:				
	Total, tonnes	**Consumed at home, tonnes**	**Containers, ratio tonnes per m3**	**Household volume (m3)**
Glass	178,190	124,733	0.174	716,856
Plastic	45,510	31,857	0.013	2,450,555
Aluminium	6,465	5,172	0.087	59,448
Total	230,165	161,762		3,226,859
DRS material flows:				
	Kerbside, tonnes	**POS returns, tonnes**	**POS returns, volume (m3)**	**POS, outlet vol. per day (m3)**
Glass	16,307	108,426	623,137	4.76
Plastic	2796	29,062	2,235,515	17.06
Aluminium	466	4,706	54,093	.41
Total	19569	142,194	2,912,744	22.23

[24] Albertson, J (2006) The Retail Market in New Zealand: A Review, New Zealand Retailers Association and ACNielsen, quoted by Coriolis Analysis, http://www.coriolisresearch.com/newsletter/coriolis_chartwatch_2004Q1.html.

[25] This value is based upon discussion with supermarket operators.

Because the storage space requirement depends upon the frequency of collection, we have also considered the storage costs that would be impose if it were more economical to collect material only every three days. In this case, the storage costs would be $38.5 million.

Each supermarket would also require a specific counter area at which containers can be returned and deposits refunded. We estimate at least 10m^2 would be required.[26] It is likely that a collection counter would need to be either at the entrance or near the checkout area, or existing checkout control space or checkout counters may be required. Using a price of $1600 per m^2 for this counter space, this adds an additional $5.8 million in estimated costs.

An annual cost of $500 to $1500 per bin for storage of DRS containers is used.[27] As there are three different materials being collected, each supermarket would use three separate bins of varying sizes in relation to the expected daily volume of each type of container. Total nationwide bin costs would be between $0.5 to $1.6 million.

To operate and manage the return and deposit refund facility in each supermarket, we assume that an average of one and a half employees are used for an average of 12 hours a day. This assumes that return facilities operate for the duration of supermarket opening hours, with more than one staff member on for peak times. This also incorporates the labour required for other functions, including cleaning and moving containers from a short-term counter storage facility to a larger storage facility elsewhere on the supermarket's premises. We have used the average retail wage rate of $14.90 rather than the adult minimum wage.[28] This is to allow for the fact that various management and IT functions would be required in the planning and operation of a point-of-sale return facility. This results in total annual labour costs of $35 million.

If the point-of-sale return facilities were extended to include smaller grocery stores, of which there are 2625,[29] this would affect the costs of this system. Although there would be some redistribution of storage costs across large and small retailers, we expect the net effect of this on overall costs to be insignificant. However, assuming that smaller grocery stores would spend approximately 30 minutes a day dealing with DRS returns transactions, storing containers, organising collection and other associated tasks, using the average retail wage rate results in an additional labour cost to small retailers of $7.1 million.

---

[26] This estimate is similar to those used in the Australian studies Nolan-ITU (2003) and Perchards (2003) and has been confirmed as reasonable in discussions with local supermarket operators.
[27] This is based upon discussions with supermarket operators and quotes received for a one year lease of waste disposal bins of varying sizes (excluding waste disposal charges).
[28] Department of Labour (March 2006) Labour Cost Index and Quarterly Employment Survey, www.dol.govt.nz.
[29] Albertson, J (2006) The Retail Market in New Zealand: A Review, New Zealand Retailers Association and ACNielsen, quoted by Coriolis Analysis, http://www.coriolisresearch.com/newsletter/coriolis_chartwatch_2004Q1.html.

Labour costs could be further reduced by using automated reverse-vending machines, which are common in European countries and in some US states. However, these machines are expensive to install and it is unlikely that they would be suitable for the entire range of containers to which a comprehensive DRS would apply. Consequently, recent Australian studies referred to have used manual systems. Section 2.2.2 outlines estimates of costs of reverse-vending machines in other jurisdictions.

Overall, the total point-of-sale collection costs of a DRS is likely to range from approximately $54.1 million to $87.9 million per annum.

Of note is that the use of labour in the collection of containers, and in the operation of DRS in general, is a cost of the system and not a benefit. This is because the labour diverted into this system, along with any other resources utilised, could otherwise be used productively in the economy, and hence labour has a price. This is especially so in New Zealand now because of high employment rates.[30]

Transport and processing costs

Using an estimated cost of transporting recyclables of $5 per tonne, we estimate that the cost of Super-collectors picking up returned containers from retail outlets would be $711,000. Although transport costs may differ depending upon the frequency of collection, we have used this cost for both scenarios as it is likely to be a minimum cost in either scenario. To the extent this estimate is not precise, it would constitute an underestimate of transport costs.

Using a nominal processing cost of $10 per tonne, based on our predicted flow of DRS containers, processing costs would amount to $1.4 million. Using the same nominal per tonne cost for transporting DRS material from processing sites to recycling facilities, the transport costs would equal approximately $1.2 million. This figure is lower because, given the current market rates for glass cullet, it is assumed that it is not viable to ship any of the glass collected in the South Island to the recycling facility in Auckland.[31]

Overall, we believe a conservative estimate of the costs of transporting and processing all containers returned to retail outlets would be approximately $3.5 million. However, if transportation and processing costs were closer to the current costs of these functions, as outlined in Table 2, the costs would be considerably higher. Allowing for a 20% reduction in existing costs in view of the increased economies of scale likely with larger volumes, transportation and processing costs could be closer to $11.5 million.

Education costs

To facilitate the operation of a new DRS, a nationwide publicity campaign would be required to educate consumers. We estimate that this campaign would constitute a one-

[30] If there was high **unemployment** labour might be treated as having a zero opportunity cost because, depending on skill requirements, workers required for collection and recycling schemes would be assumed to not be working otherwise.

[31] It is assumed that 25% of all glass POS returns are in the South Island based upon the South Island's approximate proportion of the total population.

off cost of around $3.2 million. This amount is based upon the cost of the 2006 Census campaign by Statistics New Zealand which targeted a nationwide audience.[32]

2.4.2. External costs

Along with the private costs of a DRS that would be borne directly by industry, this system would also impose some costs on the wider community. The most obvious costs are the administrative costs of and the costs households incur in the process of returning containers.

Administration costs

The rules and requirements of a DRS would need to be monitored and enforced by a public organisation. This organisation would also be responsible for administering the receipt of deposits from brand-owners and the payment of deposits to Super-collectors. Although likely to be relatively small, this would impose a burden on the Government's finances which is ultimately funded by taxpayers. We expect that this cost would not be likely to exceed $1 million per year.

Household costs

Regarding the costs to households, a majority of containers would be expected to be returned to retail outlets in the course of shopping trips that would have otherwise occurred. In these cases, the incremental cost to consumers of returning containers and obtaining deposits would be small. We assume that an average time of one additional minute is spent returning containers in the process of a shopping trip. However, in a number of cases, specific trips would be undertaken simply to return containers.

We assume the households would make between 26 to 52 return transactions on average per year. This results in an average volume of DRS containers of between 0.04 to 0.08 m^3 (40 to 80 litres). By comparison, the storage space of a typical car boot is around 300 litres. Nationwide, this equates to between 36 million to 73 million return transactions. We assume that 10% of trips are undertaken solely because of the desire to return containers and obtain refunds.[33] These specific DRS trips may involve a single journey or they could involve a detour from a journey undertaken for other reasons. In either circumstance, the time taken and expense incurred constitute additional costs of a DRS.

We assume specific journeys would have an average round trip distance of 4 kilometres and would take 10 minutes. We also assume that each household carries out the same degree of time and effort undertaking kerbside recycling activities as currently. This is because, even though the volume of materials placed out in each kerbside collection is reduced, the majority of households would continue to place material, for example paper, on the kerbside in the same frequency as currently. Additionally, the same total volume of material would need to be sorted into either kerbside or point-of-sale collection storage in each household before being recycled.

[32] http://www.parliament.govt.nz/en-NZ/PB/Debates/QWA/c/8/9/c8939e8baa44431facbc52c08c839aa9.htm.
[33] Nolan-ITU (op. cit.) Perchards (op cit.).

Using a value of households' time equal to the minimum wage, $10.25, and a cost per kilometre travelled of $0.28,[34] we estimate that the total additional cost to households would be in the order of $16.5 million to $33 million.

Kerbside collection
As outlined in the recent Australian studies, the introduction of a DRS alongside an existing kerbside system is typically assumed to lead to a small minority of households ceasing to undertake kerbside recycling and instead focus their recycling activity only on DRS containers. To the extent that this would occur, our estimates would overstate the cost to households of time taken to undertake recycling activity, but it would overstate the benefits of reduced waste disposal, as discussed in Section 2.4.4. Consequently, we assume that there is no change in existing kerbside recycling effort by households.

Environmental externalities
To the extent that there is duplication with the existing system, there will be negative externalities created from additional road traffic. The 3.6 million additional journeys made by households would increase carbon emissions and potentially also increase congestion. Working to offset this would be the fact that kerbside recycling trucks would be expected to cover the same areas in a quicker time because they would be collecting less material from each household. A reduction in total travel time of the kerbside truck fleet would reduce total truck emissions. However, the reduction in emissions would be proportionately less than the reduction in driving time. This is because although faster collection journeys would mean trucks would spend less time idling, more emissions are created from driving than from idling, and the total distance driven would remain unchanged.

2.4.3. Private benefits

Brand-owners already have an incentive to increase recycling rates through the voluntary use of a DRS if it lead to a decrease in their productions costs. The fact that this has not occurred, the use of DRSs have actually diminished in New Zealand, suggests that these benefits are unlikely to exist or are insignificant.

2.4.4. External benefits

There would be expected to be some benefits of a DRS that accrue to wider community.

Kerbside collection
One impact is the effect on the viability of existing kerbside recycling systems. As indicated in Section 2.2.2, studies in other countries have suggested that the value of the materials recovered from existing kerbside recycling collections could fall if these materials were diverted to point-of-sale collection under a DRS. Offsetting this effect is the fact that total collection costs would be reduced because a smaller volume of kerbside recyclables would be collected, processed and transported to recyclers. We

[34] This is the flat-rate reimbursement mileage allowance permitted by Inland Revenue.

estimate that the total recyclables collected from kerbside would fall from approximately 233,000 to 156,000 tonnes.

Based upon this reduced flow of material and the estimated kerbside recycling costs outlined in Table 2, our analysis suggests that the cost reduction effect would dominate, resulting in a net gain of $4.8 million. This net cost reduction in kerbside collection would manifest itself as a smaller subsidies being required from Local Authorities.

Production externalities
This analysis does not examine changes in the external costs of production using virgin materials relative to recycled materials. This is complicated through a range of factors, including the location of these activities (in New Zealand or overseas), and in general, the assumption is that these externalities should be tackled through policy aimed specifically at these issues rather than through waste management policy.

Litter
A higher rate of recycling for DRS containers would be expected to reduce the quantity of such containers which are disposed of as litter, reducing litter costs. However, DRS containers typically account for a small minority of the litter stream. Assuming a 5% reduction in litter costs, DRS would provide a benefit of approximately $660,000.[35] Additionally, to the extent that existing kerbside bins were 'raided' for DRS containers, street litter could be worsened. The degree to which this would occur would depend upon the value of the deposit. Using a deposit of the smallest currency denomination, 10c, is expected to minimise any 'raiding' activity whilst retaining an adequate incentive on households to recycle.

Waste disposal
The higher recovery rate for liquid containers from a DRS would mean fewer containers would be disposed of as waste. This is particularly true for products that are consumed away from home which would otherwise be placed in public rubbish bins. We estimate that a DRS would divert approximately 89,183 tonnes of recyclable material out of the waste stream. If the costs of disposal are around $75 to $100 per tonne, this would reduce disposal costs by $6.7 million to $8.9 million.

Reducing the volume of waste would reduce the negative externalities, as discussed in Section 1.1, leading to a benefit to society. Without further study, the precise magnitude of this benefit is unquantifiable, especially as landfill waste externalities are likely to be location specific. However, there is no evidence to suggest that any externalities would be sufficiently large to offset the negative net impact calculated below, particularly because container waste is largely inert.

[35] 5% is the percentage reduction assumed in White (2001), Nolan-ITU (2003), Perchards (2003) based upon DRS containers making up less than 10% of the litter stream. Total New Zealand litter costs are estimated by using the costs of collecting illegally and inappropriately dumped waste faced by a selection of Local Authorities and scaling the average of these figures up on a total population basis.

2.4.5. Net impact of DRS

The international experience with DRSs suggests that such a system is highly likely to increase the recovery rate of those containers to which deposits are applied. We believe that this would also be the case in New Zealand.

However, such a system would operate in parallel with the existing kerbside recycling system and would impose substantial costs to society. In total, we estimate that the costs to the country of implementing a DRS significantly outweigh the benefits. Specifically, the net incremental costs of introducing of a DRS would be in the order of $60.7 million to $121.2 million per year, with additional education costs of $3.2 million for the first year of operation.

Using the mid-range cost estimate, a DRS would impose costs of $1,020 per tonne, or the equivalent of $65 per household, for each additional tonne of material collected above that which is currently collected using kerbside systems.

Table 6: Net impact of DRS

Costs/benefits	Estimates ($)		
	Low	Medium	High
POS space (storage, bins, etc)	19,156,042	32,523,834	45,891,627
POS labour	34,952,092	38,481,995	42,011,898
Transport & processing	3,453,166	7,454,936	11,456,706
Household costs	16,513,467	24,770,200	33,026,933
Administration	1,000,000	1,000,000	1,000,000
Minus benefits (less kerbside, waste)	- 14,378,291	- 13,263,504	- 12,148,718
Overall impact: Net cost	$60,696,477	$90,967,462	$121,238,447

Many of the costs that would arise would be directly imposed upon a relatively narrow group of producers and products. This is because, in practice, a DRS cannot be applied to all packaging, but only that which maintains its structural integrity after consumption. Consequently, the prices of products subject to a DRS may rise by some degree as the extra costs are indirectly passed onto consumers. This price increase would distort consumers' purchases away from container deposit products and towards products without deposits. Non-deposit products may or may not use packaging that has a greater cost associated with disposal. For example, greater use of paper or plastic packaging, rather than glass or aluminium containers, could lead to a fall in recycling of some product packaging compared to that recycled under the existing kerbside system.

The findings of our analysis, i.e. that a DRS system would impose substantial costs, is also supported by the fact that in countries where obligations have been placed on industry to improve recycling rates, industry has not chosen to use deposit refund schemes to achieve these higher rates. Rather they have opted to continue to support kerbside recycling schemes.

3. Extended Producer Responsibility

3.1. Introduction

Extended producer responsibility (EPR) schemes embody the notion that producers should be made physically or financially responsible for the environmental impacts of their products at the end of the products' life.[36] EPRs have been adopted as a means for relieving local government of some of the financial costs of waste management and introducing an incentive for waste reduction through reducing resource use in products.

Currently, producer responsibility schemes in New Zealand are voluntary. The Waste Bill introduces the potential for more formalised and mandatory requirements. The Bill includes requirements for schemes that require returns to specified locations. This approach is likely to be relatively costly, based upon international experience that suggests alternative approaches, especially those that provide greater flexibility to industry in how additional volumes are returned, can be more cost-effective. Usually these operate using the existing kerbside recycling schemes rather than establishing additional infrastructure.

Practical examples of the use of EPR have come predominantly from Europe, starting with the German Packaging Ordinance, followed by the French Eco Emballage and extended to a trading programme in the form of the UK's PRN scheme. These are described briefly below.

3.2. International Experience

3.2.1. Germany

Germany's Packaging Ordinance, originally introduced in 1991 to require manufacturers to take back transport packaging (e.g. crates, drums, pallets and polystyrene containers), now requires that all types of consumer packaging used to contain and/or transport goods from the point of sale to consumption, must be taken back by manufacturers for recycling or reuse. The legislation was set up in a way that required take-back to point of sale, but industry could make alternative arrangements that avoided take-back, provided that the recycling outcome was sufficient. Thus the requirements of the Packaging Ordinance can be met through obligated firms joining compliance schemes. The most well known are the Duales System Deutshcland (DSD) for consumer packaging and the Resy system for used paper and corrugated board shipping containers.

This is a key cost-reduction option available in the EU systems—the ability to establish alternative systems that are not rigidly prescribed in legislation but which can achieve recycling and recovery objectives at least cost.

[36] Walls M (2003) The Role of Economics in Extended Producer Responsibility: Making Policy Choices and Setting Policy Goals.

The DSD is a non-profit organisation that collects, sorts and recycles post consumer packaging from households and small businesses. Manufacturers pay a fee (based on weight and material) to the DSD that entitles them to label their products with the Green Dot. The DSD organises separate collection schemes for materials that are labelled; these include kerbside and bring[37] systems. Materials are sorted under contract to DSD and shipped to recycling facilities. The fees paid to DSD are set in a way that covers the costs of collection, sorting and other treatment prior to sale to recyclers.

It is estimated that the introduction of the Packaging Ordinance has led both to the achievement of national recycling targets and to a reduction in the quantity of packaging used; an estimate of the reduction in use in 2000 found an 18% reduction from what was estimated to have happened otherwise.[38]

The system has led to very large investments in recycling capacity, including sorting and processing faculties, estimated at €20 billion in Germany and €10 billion in France for its Eco Emballage system (see below).[39]

A 1997 OECD study estimated that costs then for a tonne of material that went through the DSD system and which would otherwise have gone to final disposal was around 700 DM (approximately NZ$700); the total costs of the system were estimated at approximately 3.4 billion DM. Of the total costs, 80% were for collection, transport, and sorting, with 15% for plastic recycling subsidies. The OECD notes that 700 DM approaches costs for handling a tonne of hazardous waste. DSD licence fees per material are similar currently to those existing then—current fees are approximately €0.076/kg for glass to €0.18/kg for paper and paperboard up to €1.35/kg for plastic;[40] in contrast, those quoted by the OECD were 150 DM/t (€0.077/kg) for glass, 400 DM /t (€0.2/kg) for paper and 2,950 DM/t (€1.5/kg) for plastic.[41] This suggests that cost of the scheme are currently broadly the same in actual terms (lower in real terms).

Although it is difficult to compare costs across countries, to put the per tonne costs cited by the OECD into some perspective, Palmer and Walls[42] compare with US costs, and specifically a US EPA-funded study which analysed 18 successful community recycling programmes that achieved high rates of waste diversion and recycling. Total costs of waste diversion, including both recycling and composting programmes, ranged across the communities, but the highest cost was less than half the German figure.

---

[37] Bring systems require the waste to be brought to a separate location rather than picked up from the household or firm Examples include community bottle banks.

[38] Quoden J (2004) Effects of the Introduction of an EPR Management System on the Economy. In: OECD. Economic Aspects of Extended Producer Responsibility.

[39] Quoden (op cit)

[40] www.gruener-punkt.de.

[41] These are converted at the "irrevocable conversion rate" of DM 1.9558: €1

[42] Palmer K and Walls M (2002) The Product Stewardship Movement Understanding Costs, Effectiveness, and The Role for Policy. RFF Report. Resources for the Future. Washington DC

3.2.2. France

A French system drew on the German experience but did not introduce specific recycling targets, retained local authorities as the collectors of waste and allowed incineration with energy recovery as an option. Eco Emballage was created by industry to subsidise the additional costs of collection and sorting of recyclables.

3.2.3. UK

The UK system built on these systems and introduced alternative and more flexible approaches that could reduce the costs. National targets for recovery and recycling are distributed to individual companies in the packaging chain that meet minimum thresholds for turnover and amount of packaging handled. Compliance with these regulations was initially achieved either internally within firms or through membership of compliance organisations; but markets in compliance certificates developed also, enabling firms to comply without joining a compliance scheme.

There is an overall obligation for recovery (70% in 2008)[43] and, to achieve this, obligations for individual materials are allocated to those who:

(i) manufacture raw materials for packaging (6%);
(ii) convert raw materials into packaging (9%);
(iii) pack and fill packaging, or use packaging to wrap goods (37%);
(iv) sell packaging to the final user (48%).

Using these numerical obligations, for a packer/filler, for every tonne of packaging that it uses, the obligation is to recover 70% x 37% = 25.9%. To demonstrate compliance with these obligations companies must hold evidence in the form of Packaging Waste Recovery Notes (PRNs). The most common way to comply with these requirements is for firms to pay a compliance organisation to coordinate the achievement of the obligations and to provide PRNs. Currently there are 19 compliance organisations.[44] They charge a management fee and invoice separately for PRNs. The price of PRNs is set in the market and represents the difference between the costs of recycling, including the purchase of materials from collectors, and the value of the processed materials. For their part, firms contracting with compliance schemes provide detailed information on quantities of packaging handled and therefore the size of the obligation to be fulfilled.

Registered recyclers (processors of materials) can produce PRNs when they process a tonne of material, e.g. recycle a tonne of glass cullet. Although it was not the original intention of the regulations, PRNs have become tradable commodities. Rather than becoming directly involved in recycling or joining a coordinated compliance scheme, PRNs can now be purchased online.[45]

[43] This is the target for business and is greater than the national target (60%). The difference is because the business target does not cover small and medium-sized businesses.
[44] http://www.defra.gov.uk/environment/waste/topics/packaging/pdf/compliance-schemes.pdf
[45] See for example, www.t2e.co.uk/

3.3. EPR under Waste Minimisation (Solids) Bill

The Bill sets out a range of different potential responsibilities for brand-owners. Despite some guidelines, the imposition of these responsibilities would depend to some degree upon of the Waste Minimisation Authority, itself a proposed creation of this proposed legislation.

The proposed discretion provided to the Waste Minimisation Authority creates difficulty in estimating the costs and benefits that would be arise from the passing of this Bill. To estimate the potential effects, we consider two different scenarios. The first assumes the Packaging Accord is accepted as an approved Product Stewardship Programme (PSP). The second scenario assumes that a PSP is imposed upon brand-owners who are currently signatories of the Packaging Accord.[46]

3.4. Situation 1: Packaging Accord accepted as PSP

Should Section 6 of the Bill become legislation without significant changes, it is possible that the Director of the Waste Minimisation Authority would consider that the existing Packaging Accord meets the criteria of a Product Stewardship Programme (PSP). This would be based upon products produced by Packaging Accord members being found to be subject to Section 52(3) as it is currently drafted, for instance if there is significant potential for the recovery and recycling of a product or the materials of which it is comprised.

Providing this is the case, the specific requirements on Packaging Accord members in this instance would be:

- The confirmation of responsibility for specific PSP duties (Section 50).
- Application for approval of the Packaging Accord for PSP (Section 53)
- Information collecting and reporting requirements (Section 57)

3.4.1. Impact of reporting requirements

The main impact of this scenario would be to provide the Waste Minimisation Authority with extensive information regarding existing recycling activities and to increase the compliance cost burden upon brand-owners. The administrative requirements could require Packaging Accord members to effectively detail every recycling system in the country.[47]

Similarly, each member of the Packaging Accord would be required to provide extensive annual information regarding the precise flows of packaging material, including the amount recovered, reused, recycled and use once recycled. Given the

[46] See http://www.mfe.govt.nz/issues/sustainable-industry/initiatives/packaging/ for a description of the Packaging Accord.

[47] This assumes the Bill is amended to reflect the fact that Packing Accord members do not contract directly with existing recyclers including kerbside collectors. Rather, this is done by Local Authorities, on behalf of residential households, and private and public organisations.

generic nature of much packaging material, for example plastic or paper packaging, it may be impractical, or at least costly, for many individual brand-owners to meet this requirement with any degree of precision.

Even if amended, general reporting requirements would still impose some compliance costs. Although it is not possible to estimate the magnitude of these costs with a high degree of certainty, it is useful to consider the effects of similar requirements in other jurisdictions and of other similar requirements within New Zealand.

The extended producer responsibility system in the UK described in Section 3.2 requires a range of information gathering and reporting requirements on individual organisations. One study that estimated the compliance costs of these requirements, found that the annual costs imposed upon brand-owners were between £12.9 million to £77.4 million, with similar costs faced by retailers of between £7.1 million to £49.8 million.[48] Regarding the costs to brand-owners, this equates to between NZ$38 million to NZ$226 million. Scaled down on a per capita basis, in a New Zealand context the cost of these requirements would amount to between $2.6 million to $15.4 million. The same estimate of costs for retailers is a range of between $1.4 million to $10 million.

3.5. Situation 2: PSP imposed upon Packaging Accord members

If a newly formed Waste Minimisation Authority were to consider that the Packaging Accord did not constitute an acceptable Product Stewardship Programme (PSP), a PSP may be imposed upon Packaging Accord members. The Bill sets out the measures that could be imposed as part of a PSP. One of these potential requirements is a take-back responsibility, whereby brand-owners are responsible for collecting waste materials that remain after products have been consumed.

Specifically, the Bill allows for brand-owners to be responsible for:

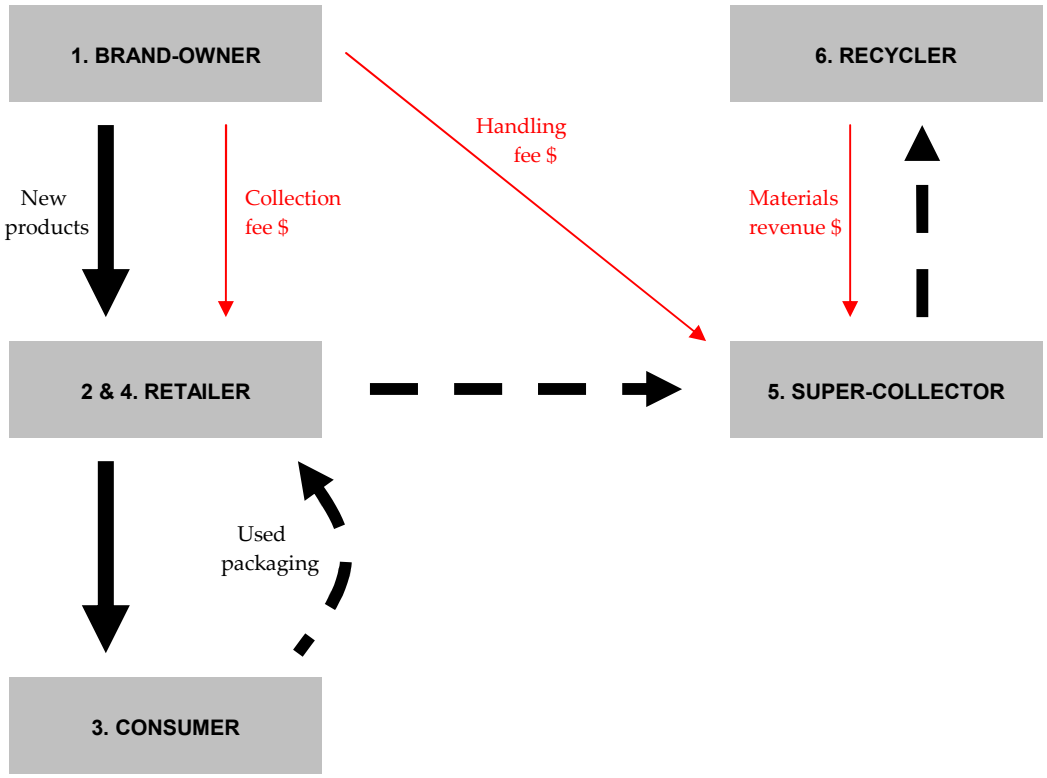
- enabling the collection of waste material, including the establishment of collection facilities and the transport of material, etc (Section 60);
- adhering to the waste minimisation hierarchy, including the reuse or recycling of 75% of collected material, as well as meeting any other specific targets set by Waste Minimisation Authority (Section 55 and 61); and
- the provision of recycling information to consumers, including signage, flyers and advertising (Section 59).

We consider that any take-back system imposed upon brand-owners is likely to resemble the system represented in Figure 4. Its main features would be that retail outlets would provide the take-back facilities on behalf of brand-owners. Returned packaging material would then be collected by Super-collectors who are likely to be those organisations involved in current recycling collection activity. Recovered material would then be sold to final recyclers.

[48] UK Department for Environment, Food & Rural Affairs (1998) Review of the Producer Responsibility Obligations (Packaging Waste) Regulations 1997: A Consultation Paper, www.defra.gov.uk.

We assume retail outlets would provide take-back facilities for packaging material because it is likely to be cheaper for brand-owners to hire space and facilities from existing retailers than to create new infrastructure dedicated solely to the receipt of packaging material. It also reduces the costs imposed upon households of returning packaging because the number of trips needed to undertake recycling is reduced.

Figure 4: Take-back system as provided for in Waste Minimisation (Solids) Bill.



3.5.1. Costs and benefits of take-back scheme

Based upon our findings regarding the impact of a DRS, requiring product packaging to be returned to the point of sale is likely to be more costly than relying on current kerbside collection systems alone.

This total cost would be reduced if a product take-back system were to replace existing kerbside systems. However, to the extent existing kerbside systems were replaced, serious doubt must be raised as to the likelihood that a take-back system would result in packaging material recycling rates that exceeded, or even matched, existing rates. This is because returning product packaging back to the point of sale to recycle would require more effort from households than the existing kerbside system. International experience suggests that recovery rates tend to be lower the greater the effort is required of households to undertake recycling activity.[49]

Although a DRS could be applied to increase recycling rates for containers, deposits are only practical for items that retain their structural integrity and are manageable in a

[49] Perchards (op. cit.).

collection and verification process. This means that more than half of all packaging material (i.e. the majority of paper and plastic packaging) would not be suitable for a DRS. For this material, moving away from kerbside collection towards point-of-sale return could have a negative effect on recovery rates.

Given that the potential costs of a DRS are outlined in Section 2.4., this Section considers the potential impact of a voluntary product take-back scheme in the absence of deposits. The nature of the costs and benefits from a take-back scheme to both the packaging industry, and New Zealand overall, would be very similar to those arising from a DRS. This reflects the fact that a DRS is a form of extended producer responsibility system.

To estimate the costs of this approach, we have modelled a system which would apply to all final consumer product packaging. Intermediate products used in the production process would not be included. This is because commercial organisations typically already have an incentive to recycle where possible to reduce waste disposal costs.

Our estimates rely on the same assumptions outlined in Section 2.4, with the following exceptions:

- The number of large retailers that would be used in this approach is 633, consisting of supermarkets (361) and departments stores (272), with the number of smaller retailers being 11,846.[50] At least 50% of all material is returned to large retailers. The resulting storage space required for each smaller retailer is assumed to be negligible and so is priced at zero.

- Labour costs to small retailers vary proportionately with the rate of returned material. If the recovery rate were to remain the same as the status quo, we assume small retailers would spend on average 10 minutes per day involved in take-back related activities. These activities would include receiving and storing returned packaging material and recording specific return related data, such as the relevant brand-owner responsible for producing returned packaging.

- Households return packaging material on average of 52 times a year. This number is reduced if the overall recycling rate is lower than the current level. If we analyse a lower recovery rate, we assume the number of returns is proportionately lower, i.e. a 50% reduction in recycling leads to 50% fewer returns per household.

- We assume that 80% of all litter costs are in relation to packaging material. Any increase in the rate of packing material recovery reduces litter costs by a proportionate amount and vice versa.

- There are no significant Government administrative or enforcement costs.

[50] Albertson, J (2006) The Retail Market in New Zealand: A Review, New Zealand Retailers Association.

- Information reporting costs for brand-owners are not included as similar requirements may be imposed in the absence of product take-back scheme.

Because it is not possible to determine the effect a product take-back scheme would have on existing packaging material recovery rates, and on the existing kerbside recycling system, we have estimated the costs that would arise under four different scenarios:

- Scenario 1: The rate of recovery of packing material used by households remains the same, with half of the current flow of household material collected via existing kerbside systems and half being diverted to (POS) facilities.

- Scenario 2: The household rate of recovery remains the same, but kerbside recycling systems are replaced by a POS take-back system.

- Scenario 3: Kerbside recycling is replaced by a POS take-back system and household recovery rates increase by 50% above current levels.

- Scenario 4: Kerbside recycling is replaced by a POS take-back system and household recovery rates decrease by 50% below current levels.

Our estimates of the additional net costs of a POS take-back system are displayed in Table 7. The additional cost per tonne of household material recovered is also displayed.[51] These figures reflect the increase in the total cost per tonne of collecting household recycling above the current cost.

Table 7: Packaging take-back scheme cost estimates

Scenario	Estimates of additional costs		
	Range ($m)	Mid-point ($m)	Additional $/tonne
Scenario 1: Same recycling rate	85 – 107	96	412
Scenario 2: Same recycling rate	133 – 175	154	661
Scenario 3: 50% more recycled	172 – 236	204	641
Scenario 4: 50% less recycled	95 – 115	104	707

These estimates indicate that the net impact of a POS take-back system are likely to be negative and substantial across a range of potential outcomes.

3.5.2. Alternative approach

Given the likely costs from such a take-back system, a more appropriate, lower cost method of enforcing extended producer responsibility could be to introduce something akin to the UK system, outlined in section 3.2. This approach would utilise the existing kerbside collection system and would avoid the establishment of new, costly infrastructure that would effectively duplicate much of the existing system.

[51] These figures uses the mid-point estimate of additional costs.

Overall, a UK-type system would have the advantage of flexibility, in that those responsible for achieving recycling targets would have the ability to choose the best method of recycling. This would help ensure that lowest cost methods are used, preventing unnecessary cost burdens.