

# **Waste or Rationality?**

## **Economic perspectives on waste management and policies in New Zealand**

### **Report to Business New Zealand<sup>1</sup>**

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## **Preface**

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## Executive Summary

Waste is a growing concern in developed countries like New Zealand, and finding workable solutions acceptable for all affected parties is challenging. But how big a problem is waste, and how effective and efficient are the policies and strategies enacted to address it?

This report examines the economics of waste management and policy in New Zealand. It focuses on solid waste, but the economic principles described are equally applicable to liquids and other waste streams.

Waste is perceived to be a problem mainly because of:

- The risks of wastes detracting from community well-being if they harm the environment and human health;
- Perceived scarcity of space for landfills, which increases the difficulty and cost involved in locating landfills accessible to sources of waste;
- Concern over availability and conservation of raw materials;
- Moral distaste at what some regard as wasteful over-consumption.

From an economic perspective, material waste is simply material no longer of value in its current use which its owner would willingly discard. Whether it gets reused, recycled or disposed in a landfill depends on which option is most beneficial or least costly to the owner. Ensuring the discard decisions of private individuals and businesses are also most beneficial for the community at large is a justifiable issue for public policy to address.

Taking account of the hidden consequences of actions is a primary consideration for policy. This includes not only correcting the distortions and failures in market operations that cause problems with waste, but also putting in place policy that avoids undue impacts on business activities that have widely felt consequences for investment and community well-being.

### **Economics of waste**

There is an economically optimal level of waste abatement by a community that occurs where the marginal cost of an additional unit of waste abatement equals the cost of an additional unit of disposal. While some material are so valuable or so hazardous to warrant incurring high cost in recovery, for most materials the optimal level is unlikely to be zero waste because marginal abatement costs rise at successive levels of abatement.

Such economic prescriptions can incorporate the environmental and social dimensions of sustainable development in the way that effects are included and valued in the analysis. Aligning incentives on private choices with community-wide benefits requires identifying if there are significant

consequences of wastes outside of private considerations that policy needs to address, and what policy measures are most effective and efficient in doing so.

In line with other established practice in public policy formation, an economic direction for waste management policy would be:

- Aim to improve community well-being by reducing risks from waste, where:
  - Well-being reflects the value obtained from use of all resources, not just materials but also energy, capital, people's time and labour;
  - Value to the community includes both market values and the non-market values derived from the quality of the natural environment, and hence reflects all dimensions of sustainable development;
- Promote an economically efficient mix of waste disposal, material recovery, reuse and recycling.
- Intervene to address demonstrable market failures and distortions in waste management activities such as:
  - Environmental externalities not covered by other policies (e.g. general policy towards greenhouse gas emissions);
  - Market imperfections like local monopolies where it can be demonstrated that costs and prices are higher than they need be;
  - Information failures, where information is not produced because of the impossibility of those who create it obtaining value from it, or where information asymmetry between buyers and sellers distorts choices;
  - Regulatory failures – removing instances where regulatory policies are demonstrably counter-productive to economic efficiency;
  - Provision of economic public goods, which are indivisible collective goods and services (such as some forms of information provision).
- Subject all public policy initiatives to rigorous and consistent cost benefit analysis to compare them against what is most likely to happen in the absence of the initiatives.

### **Measures applicable to waste policy**

A wide range of measures have been proposed and applied in waste policy in different countries, and there is substantial overseas experience to inform policy development in New Zealand. As the externalities of waste, and the economics of proposed solutions to them, vary widely with local conditions, there is a risk that copying measures applied in other countries will not be efficient for use in New Zealand.

Broadly the policy approaches can be divided between:

- “Moral suasion” through education and information campaigns to shift behavioural norms towards voluntary restraint of wastes;
- Self-regulation and co-management – such as industry groups that jointly agree to reduce wastes amongst their members;
- Regulation and prescriptive direction;
  - Regulation to effect price adjustments;
  - Regulation to set performance standards and quantity controls;
  - Regulation to change the structure of suppliers and regulators;
- Direct public involvement in supplying services through ownership or partnerships with private entities.

Within the price adjusting regulations there is a broad distinction between:

- Market adjustment through taxes and subsidies, of which there are numerous international examples in waste policy;
- Market creation devices like tradable permits or quotas.

The overseas experience of applying waste instruments has not always had economic efficiency as its paramount concern. While taxes and levies on waste disposed have long been used in the Australian states and Scandinavian countries, their rates have been primarily intended to raise revenue or achieve waste diversion targets, with rates bearing no relation to the efficient price that reflects the full cost of externalities. Physical waste reduction targets are widely used, but with little demonstrable link to efficiency or community well-being.

### **How big is the problem of waste in New Zealand?**

Waste volumes in New Zealand, as in other countries, have been increasing in recent years, in line with growth in population, economic activity, incomes, consumption, and changes in lifestyles (e.g. more and smaller households, greater use of convenience foods). A positive correlation between aggregate wealth, consumption and waste in the community is probably unavoidable, although technical advancements will continue to create economically worthwhile opportunities to reduce the ratio of waste going to landfill and wealth.

Although comprehensive, up-to-date information for New Zealand is not available, and international comparisons are difficult because of differing definitions between countries, New Zealand’s waste disposal per head of population appears lower than that in Australia, but higher than the average for OECD countries. The OECD average is heavily influenced by European countries with high population densities and tighter land constraints than New Zealand, and which have greater economic justification for diverting material from landfills to recycling or incineration with energy recovery.

Organic wastes, rubble, timber and paper account for the largest shares of waste disposed to landfills in New Zealand, together comprising nearly two thirds of disposal by volume. Some of the waste issues that have captured public attention in recent years – for instance, disposable nappies, glass and plastic – are not major contributors to landfill depletion.

There have in the past been demonstrable market failures from a relatively unregulated waste industry, characterised by a large number of old, poorly managed and unregulated landfills, and with a high involvement of local government in waste collection and disposal, which distorted the prices paid for waste services through rate-funding. Problems included:

- Contamination of surface waters and aquifers from leachates seeping from old, unlined landfills;
- Risks of on-site fires, explosions and toxic emissions from mixed wastes in landfills;
- Neighbourhood nuisance effects, such as noise, odours, and attraction of pest species and vermin to landfills;
- The global effect of emissions from landfills of methane, a potent greenhouse gas.

In New Zealand, since the 1991 Resource Management Act, tighter consenting requirements have increased the standards achieved by landfills and closed many facilities that could not meet the standards at reasonable cost. Price distortions have been reduced as disposal fees reflect the Landfill Full Costing Guide, the move by many councils to “pay per throw” charging rather than rate funding of household collections, and the greater involvement of specialist private waste management companies that bring commercial considerations to their operations.

Without comprehensive information on the wastes being deposited in landfills it is hard to gauge the scale of adverse effect and externality caused by landfilled wastes. However, overseas evidence suggests the economic value of residual externalities of wastes in modern, well-managed landfills are less than the general operational costs of such landfills. There is a risk that popular conceptions of waste reflect an outmoded picture of past waste problems rather than the current situation, and are an unreliable guide for policy direction.

### **What are the market failures arising with waste?**

Market failures that may occur in the waste management area include:

- Localised effects like noise, odour and pest nuisance are addressed by consent compliance and largely internalised by the cost of operating facilities that comply with those consents;

- Leachate and explosion risk are addressed by best practice guidelines and by good design and operation of waste facilities, and internalised in their operating costs;
- Greenhouse gas emissions are not currently consistently addressed, but would be by a carbon tax, emissions trading or similar national policy instrument appropriate to this global externality.

Of the other public concerns around waste:

- Land availability for landfills is not a market failure: New Zealand has a lot of land relative to its population and its functioning land market will incorporate in land prices any long term opportunity cost of land used in landfills.
- Resource conservation is not a market failure: materials that end up in landfills are available and traded on international markets, where increasing scarcity will be signalled by rising prices in the market, inducing increased activity to find new supplies or substitute materials.
- Environmental effects of raw material production: there may be economic externalities associated with virgin material production, but waste disposal policy has only indirect and tenuous influence on material production activities, and may be counter-productive (e.g. waste reduction policies cannot practically distinguish between timber from sustainable or unsustainable sources).

Many of the perceived problems of waste turn out not to be externalities at all, or else are internalised by other policy measures. There remains a possibility of residual externalities not addressed by other measures, but these are likely to be small.

One possible mis-priced effect is the long run marginal cost of landfill depletion. This is the contribution of each tonne of waste deposited today to bringing forward the date when new capacity is required in future. It is probably not well reflected in current accounting charges for depreciation, but as the new capacity is usually some way in the future, the present value of this usage cost per tonne of waste deposited is unlikely to be large.

Transport of waste also creates the possibility of under-priced externalities, which may increase as landfills become fewer, larger and located more remote from sources of waste. Diesel vehicles paying road user charges contribute to the costs of maintaining the road network, but not to other externalities of transport, such as environmental impacts, accidents or congestion. However, alternative options for waste management, such as recycling materials, also involve substantial transport of materials, and this provides no reason to favour recycling over disposal. Improving pricing for transport would be a more effective solution to these externalities than tinkering with waste policy.

## What are the alternatives to waste?

Alternatives to waste commonly focus on the so-called “5 Rs” hierarchy: reduce, reuse, recover, recycle, residual disposal. The implication of this hierarchy is that there is some general preference ordering for discarding material, such that reduction at source is preferable to reuse, which is in turn preferable to recovery and so on. This hierarchy is commonly encountered internationally and is reflected in the current New Zealand Waste Strategy’s aims of minimising waste and maximising reuse, recovery and recycling.

Without some qualification, such as waste minimisation *at reasonable cost*, these aims and the hierarchy that underpins them are misleading and inefficient. The viability of recycling depends on location factors and there is no economic reason to prefer recycling over landfilling in all situations.

The characteristics of New Zealand present particular challenges for the viability of recycling materials. Population density is low and wastes dispersed over large areas of country, increasing the costs of material collection and limiting the realisation of economies of scale. Because of the size and concentrated structure of industries in New Zealand, for many materials there is only one plant capable of using substantial recovered material, generally located at one end of the country, rather than centrally: Auckland for glass, paper and steel, and Bluff for aluminium.

The country is elongated and internal transport costs are high, but the alternative of exporting recovered materials is subject to fluctuating commodity prices and exchange rates. Recycling operations may be faced with periodic operational losses, storing material until prices improve, or disposing of it at landfill, which does not look good with the public.

There remain many niche opportunities for recycling, and some materials (such as metals) have been substantially recycled without government assistance for many years. But other materials, such as glass, face bigger hurdles to viable recycling, because of their high bulk, low value and wide dispersion. When such materials account for a small volume of landfill disposal and are relatively inert, there is little externality benefit to be obtained from supporting their diversion from disposal.

## New Zealand’s waste policy

New Zealand’s waste policy is currently determined by the non-statutory New Zealand Waste Strategy (2002), but it has also been influenced by other legislative changes over the past 15 years. These include:

- Consenting requirements and national environmental standards brought in under the Resource Management Act (1991) have prompted improved management practices at landfills and other waste facilities, and led to closure of many smaller, older landfills with lower performance standards;

- Amendments to the Local Government legislation have required local councils to produce waste management plans and encouraged councils to become more involved in waste management and recycling;
- Non-statutory guidance from the Ministry for the Environment, such as on landfill full costing and best practice management, have helped spread cost reflective pricing and remove some of the distortions in council-run waste management facilities;
- Voluntary producer responsibility schemes such as the Packaging Accord (2004) and other take-back schemes for batteries, car tyres and paints have reduced the volume of such materials going to landfill.

Waste policy moved into a more “activist” phase with the New Zealand Waste Strategy (2002), which ostensibly defines waste in terms of the externalities of landfills but provides little evidence of the risks to well-being posed by them as a means of prioritising action. Its adoption of targets for waste minimisation and maximising reuse, recycling and recovery of materials has in turn led government and councils to more ambitious policies with more ambiguous benefits:

- Targets expressed in physical terms, without regard to the costs and benefits for all resources used in achieving them, create risk of overstepping the societal optimum where marginal benefits equal marginal cost.
- Proposals for waste levies to change behaviour and/or provide revenue to fund waste reduction initiatives have surfaced repeatedly, but have not been adopted so far as there is no basis for setting a charge for externalities, and waste levies are a costly, inefficient and unsustainable mechanism for raising revenue.
- Extended producer responsibility (EPR) schemes combine elements of charges and subsidies to specific materials or products and may be effective in reaching target reductions, but if the basis for targets is unclear they are not likely to be efficient. Current EPR schemes like the Packaging Accord 2004 are voluntary, but pursuit of targets may push policy towards mandatory EPR, adding costs and reducing flexibility for no demonstrable benefit for the environment or resource productivity in the economy.
- Information provision is a priority that has not been progressed, so there are fundamental deficiencies in assessing the scale and extent of waste activity and the associated externalities that might constitute a problem to be addressed by policy.

### **Future directions for waste policy**

The risk for future policy is that now the low hanging fruit of easy waste management improvements have been achieved, pursuit of further improvements will encounter diminishing returns to effort and increasing cost in implementing policy. There is further risk that pursuing targets for waste minimisation and maximising material recovery, reuse and recycling,

without in most cases explicit consideration of the costs and benefits of so doing, will itself be wasteful of resources, diverting them from other activities of greater value to the community, without any demonstrable gain for environmental quality.

Faced with the expectations created by physical reduction targets, government and councils are likely to initiate new policies for further achievement of those targets. They may be attracted to tighter regulatory solutions because such solutions demonstrate responsiveness to their constituents while the costs are typically borne elsewhere, by consumers and businesses - hidden, diffuse and difficult to measure.

Continuing changes in the policy environment not only divert resources in affected businesses from productive activities, they also create uncertainty over what may or may not be required in future, with a potentially chilling effect on investment. Every dollar diverted to waste abatement has opportunity cost in alternative uses forgone, such as other environmental remediation, education, health, or business investment, which if made explicit may be more valuable to the public than waste reduction.

The risks for future waste policy are compounded by waste policy formation being dominated by those with a direct but narrow interest in waste management, as evident in a recent waste levy proposal prepared by councils and waste management and recycling businesses. Waste policy affects all walks of life, including households and general businesses who are the consumers of waste management services, not just the providers of those services. Yet the consumer interests are less apparent in waste discussion documents than the views of regulators and businesses with a direct interest in moulding policy to their advantage.

To reduce these risks of inefficient policy consequences it is timely to review and revise the current New Zealand Waste Strategy and refocus on those activities demonstrably likely to result in net community benefits:

- Make the maximisation of community well-being the explicit aim of the New Zealand Waste Strategy;
  - Replace references to “resource use efficiency” in all policy documents with “economic efficiency” which is more consistent with community-wide well-being;
  - Remove all references to “zero waste” from documents expounding serious waste policy;
- Require new waste initiatives that impact on private businesses and consumers to undertake cost benefit analyses from a national perspective;
  - A cost benefit approach would restore consumer welfare to the position it usually holds in public policy analysis;

- Develop guidelines on how such analysis can address in a consistent manner all dimensions of interest for sustainable development (economic, social, environmental);
- Demonstrate how to consistently deal with risk, uncertainty and potential hazards throughout the analysis period;
- Collect and analyse improved information on the generation of waste and their flows to disposal and recycling, and their associated externality effects:
  - Commission a detailed study of the externalities associated with different components of waste management in different circumstances (similar in scope to the Surface Transport Costs and Charges Study);
  - Establish guidelines on the priorities to be given to different types of waste according to the expected value of risk to community well-being each type creates in different circumstances in New Zealand;
  - Replace physical targets for waste reduction with indicative targets of potential risk reduction from addressing different types of waste;
- Undertake comparative analysis of the costs and benefits of tackling different types of waste in different regions to establish where the greatest community net benefit is likely to be obtained.

Waste management has changed markedly over the past 16 years, reducing risks and providing benefits for the community at large. While it is natural that government and councils should want to maintain that momentum of improvement, further initiatives building on these early achievements can be expected to face increasing costs and diminishing returns. This makes it even more important for policy to be based on comprehensive economic assessment of initiatives to avoid the reduction of material waste resulting in waste of non-material resources that are diverted from other uses of greater value to the community.

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# 1. Introduction

Waste management is a prominent environmental issue in most developed countries, including in New Zealand. Developing politically acceptable and workable strategies for the management of waste is challenging because of polarised views on priorities and acceptable trade-offs, with waste management itself having become a significant business activity. The choice of policy measures has considerable consequences for businesses and those who depend on them, because of the potential compliance and other costs. But how big a problem does waste really pose, and how effective and efficient are the proposed policies to deal with it?

This report examines the economics of waste management in New Zealand and its implications for policies and strategies proposed by central and local government. By applying an economic lens to the management and disposal of waste, it aims to address the fundamental question of what level of effort to reduce, reuse, recover or recycle materials from the waste stream is likely to be worthwhile and leave the community as a whole better off.

## 1.1 Why economics and waste?

While waste management is commonly viewed in terms of physical volumes and considered to be the domain of engineers, it is also fundamentally an economic issue. A central criterion in economic analysis is that of efficiency, which entails maximising the value obtained from use of available resources, or minimising the resources required to achieve a given outcome. An alternative way of viewing efficiency is the elimination of wasteful use of *all* available resources - not just materials but also energy, labour and the non-market contributions to quality of life derived from the natural environment. This is done by providing the right incentives for resources to be reallocated to higher valued uses.

Focusing on reductions in the volume of physical waste may be a simple, graphic way of capturing public attention and galvanising action, but ensuring the community ends up better off from waste restraint requires a broader assessment of all consequences of such activity, of the sort provided by cost benefit analysis. Such analysis can illuminate implications for economic efficiency and point to ways of freeing up resources to be redeployed in other economically valuable activities. Economic value, encompassing both the value of marketable outputs and the non-market values relating to environmental quality, provides a basis for deciding how much effort to put into waste avoidance, recovery, reuse and disposal.

## 1.2 Scope of report

This report focuses on solid waste management as this occupies a prominent position in current waste policy in New Zealand. This is only one part of a spectrum of issues regarding unwanted materials and their effects on the environment and communities. This spectrum also includes wastewater management, the legacy of contaminated sites, discharges to air and special hazardous wastes with extreme toxicity. Each type of waste has its own characteristics requiring particular treatment, but the broad principles for economic assessment of solid waste management are also applicable across the other waste streams.

Waste is any material of no further value in its current use. The fact that policies have been enacted to encourage waste minimisation implies that current waste management is in some sense regarded as insufficient. So assessment of waste management policies needs to address questions such as:

- What is it about waste management activities that might prevent a socially optimal level of waste minimisation from emerging?
- What would a socially optimal pattern of waste minimisation look like?
- What is the most efficient way of correcting the current market to more closely approach the optimal level of waste avoidance?

## 1.3 Outline

This report proceeds by:

- Describing the principles to apply to economic assessment of solid waste management, the economics of waste discard choices, an economic framework for waste policy appraisal and review of some policy measures applied to wastes;
- Describing the waste management, disposal and recycling activities in New Zealand in the context of the national economy, and how they compare with overseas jurisdictions;
- Reviewing in light of the economic framework outlined above the current approaches embedded in the New Zealand Waste Strategy, government's recent pronouncements, and the activities of local government towards waste.

## 2. The economics of waste

This section outlines the principles and perspectives with which to view the economics of waste management, as a basis for framing policy. Waste is a problem if it leaves the community at large worse off than it would be if the community and its members were less wasteful, so an economic perspective is necessarily broad, spanning effects on both consumers and producers of waste management services, material using industries and activities more generally, and the natural environment which is the ultimate repository of solid wastes.

An economic perspective also requires looking at the effect of activities on the use and productivity of all resources available to the community – not just material resources but also others, such as energy, capital, labour and people’s “free” time, and resources derived from the quality of the natural environment. Many of these resource effects are essentially “off-budget” and hidden from the entities involved in waste management decisions, and making these hidden effects more apparent has an essential role in identifying the overall impacts of wastes and policies to redress them.

### 2.1 What is waste?

#### 2.1.1 Definition of waste

Material waste can be defined as any product or substance that has no further use or value in its current use, and which its owners would willingly discard (Productivity Commission 2006). This definition excludes products or substances that are reused or sold by the organisation that owns them, but it includes those that have no value for its current owners but may have value for others (e.g. recyclable materials). Thus consideration of waste management and policy centres on the choices, incentives and influences at the point where materials are discarded by their current owners.

Encouragement of less wasteful activity within material using entities – e.g. adoption of cleaner production techniques, more conscious design for environment – will come from the entities themselves in response to the incentives on their discard choices. This will generally be efficient, as each entity knows its own activities, and what is cost effective to improve them, better than external agencies directing such choices, incurring transaction costs in understanding different entities’ business and in monitoring their achievements. Identifying exceptions to this general expectation is a function of public policy.

#### 2.1.2 An optimal level of waste

In principal there is an economically optimal level of waste produced by a community that depends on comparison of the cost of waste abatement with

the cost of disposal. Optimal waste abatement would be achieved by avoiding waste to the point where the marginal cost of so doing just equals the cost of disposal, i.e. to the point where it costs as much to avoid a tonne of waste as it does to dispose of it. Waste avoidance includes both activities for recovery and reuse of discarded materials, and reducing material use at source. Cost in this sense is the full opportunity cost of resources used in waste abatement and disposal, including environmental costs, across the community, not just financial costs to any one party involved.

For most materials an optimal level of abatement will not result in zero waste, because not all waste is equally avoidable. For instance, recovering materials from the community is relatively easy and low cost when materials are concentrated and clean. But it will become successively more costly as it attempts to recover materials that are more dispersed or contaminated, requiring more transport and processing costs in making them fit for reuse. For materials with a very high value, and those which have a high risk of causing damage if left in the environment, it will be worthwhile incurring higher costs to recover or abate a higher proportion of waste, but across waste materials in general, optimal waste is not zero waste.

### **2.1.3 Implications for efficient use of resources**

The optimal level of waste is an application of economic efficiency, but this is different from the notion of resource use efficiency that appears in some writings on waste (including the New Zealand Waste Strategy). Resource use efficiency has an intuitive appeal – getting more from less material inputs – but it is an incomplete guide for policy direction as it focuses attention on visible material effects rather than the hidden effects on less visible resources, such as energy, capital and people’s time.

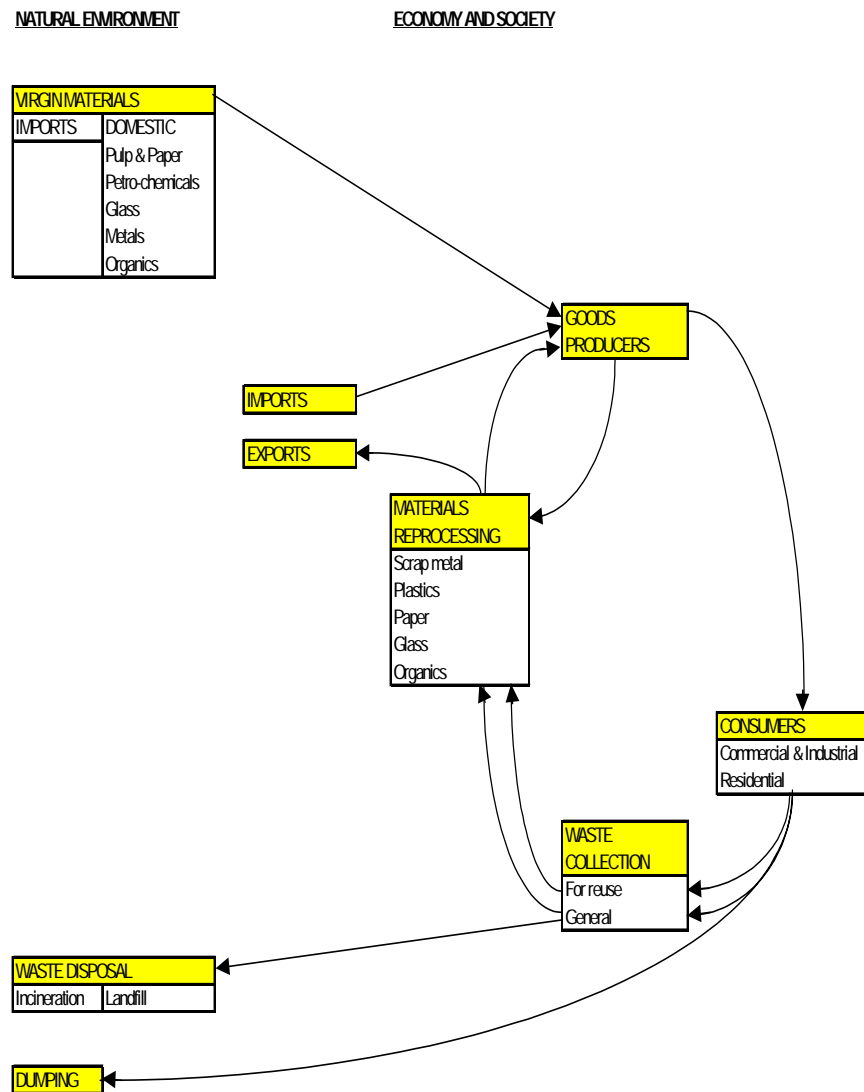
All materials can be recycled to avoid waste, but the question for economic efficiency is how much is worth recycling, taking account of all resources used up in the recycling process. As the marginal cost of recovery/recycling can be expected to rise with successive increases in the level of recovery, diminishing returns will apply to recovery/recycling activities. Pursuing improvements in resource use efficiency – for instance extending the average trip-life of reusable containers – without regard to non-material costs is likely to result in a technically efficient level of resource use that is greater than the economically efficient level. Pursuing a “benefit” worth less than the costs of achieving it is a waste of non-material resources as it diverts them from valuable alternative uses, and it detracts from community-wide economic well-being.

## 2.2 Discard choices and material use

### 2.2.1 Discarding in the material use cycle

From society's perspective, waste management does not act in isolation, but is part of the system of material utilisation in the economy. An overview of this cycle and the associated role of waste management and recycling are illustrated in Figure 1.

**Figure 1 The materials use cycle**



Source: NZIER

As the figure illustrates, materials:

- enter the New Zealand economy from virgin raw material production, recycled sources and imports (both materials and embedded in products);

- circulate through the production and consumption loop; and
- are then discarded and either sent to waste disposal or recovered and recycled in some form, either in domestic industries or exported.

When materials are discarded, three possible routes emerge. They may be collected for reuse or recycling; they may be collected for disposal at a legitimate facility (either landfill or incinerator) and hence returned to the environment through relatively controlled means; or they may be returned to the environment in an unregulated manner through illicit dumping or burning.

The viability of activity such as recycling both affects, and is affected by, arrangements upstream in the supply of virgin materials from primary sectors and imports, and also downstream arrangements for disposing or on-selling materials once they are discarded. Trade assures the materials use cycle is not a closed cycle. New materials may enter the cycle as raw materials imported from other countries, or as materials embedded in imported products. Conversely recovered materials may leave the economy as exports if the returns from so doing exceed those on the local market.

Waste management primarily concerns the stages at the bottom of the cycle as depicted in the diagram - consumers, waste collection, waste disposal and materials reprocessing. The stages at the top of the diagram are arguably not overtly concerned with what goes on at the bottom – but material choices made by importers or manufacturers can affect those who live with the consequences when these products are eventually discarded. In economic terms this is an “externality” effect that is borne by third parties without invitation or compensation as a result of others’ actions.

This was illustrated in the debate on the replacement of glass returnable milk bottles with cartons and plastic bottles in the mid 1980s. The system of doorstep deliveries with returnable bottles internalised to the consumer the cost of delivery, collection, cleansing and reuse of bottles, whereas retail carton sales did not and resulted in carton consumers receiving a partial subsidy from ratepayers who were the primary funders of the landfills in which the new containers ended up. Even though consumers and ratepayers may be the same people, consumers and manufacturers that supply them are not getting the correct price signal of the resource cost of their choices.

### **2.2.2 Economic discard choices**

In New Zealand, the predominant discard options for solid wastes are between various means of material recovery, reuse or recycling and disposal to landfill. Other countries also have incineration as a disposal option, but this is not currently used in New Zealand except for small volume specialist disposal services (e.g. of used medical materials). This means the discard options for someone with unwanted material fall simply into two categories: landfill disposal or reuse and recycling in some form (Figure 2).

**Figure 2 Costs of discarding unwanted material**

<u>Disposal costs</u>	<u>Recycling costs</u>
Cost of collection and transport to landfill	Cost of collection and transport to material recovery facility
Cost of disposal to landfill and on-going operation	Cost of cleaning, sorting and processing for reuse
	Cost of marketing and redistribution
	LESS value of material recovered

Source: NZIER

Discarding to landfill entails two broad categories of cost. Material has to be collected and transported to the landfill facility, which incurs real costs on transport vehicle operation and some less tangible costs on the transport networks on which they run. Then there is the cost of disposal itself, using up the “airspace” in the landfill and covering the on-going operation of the facility (e.g. for managing emissions).

Discarding to a recycling channel entails three broad categories of cost, and also a potential offsetting benefit. There are costs around the collection and transport of material to a recovery facility, further costs around sorting and preparing material for reuse, and yet further costs in bringing the recovered material to market and its point of reuse. The offsetting benefit is the value of material recovered, which varies with the condition of the recovered material and the market for alternative supplies it is facing.

From the viewpoint of the owner of material the discard choice is simple. If the cost of disposal to landfill is less than the cost of recycling (net of value of recovered material), it is more worthwhile to dispose to landfill. But if the net cost of recovering material is less than the cost of landfill disposal, there is a clear economic case for choosing material recycling as the discard option, providing there are commercially viable means of doing so.

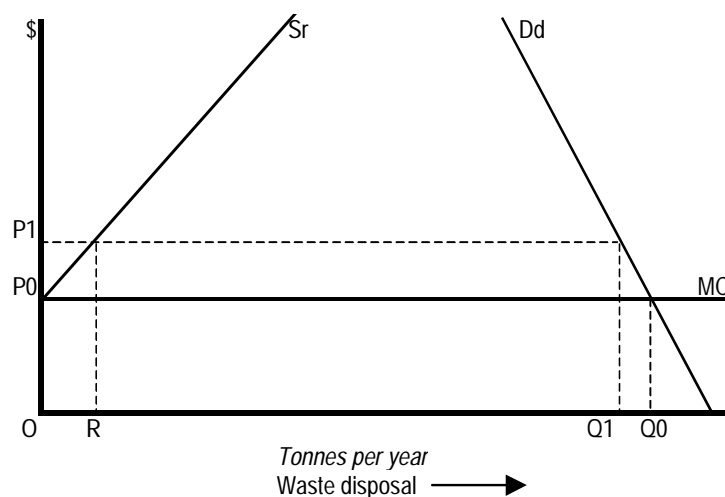
This is the comparison from a private perspective that influences the choices and behaviour of individuals. From the viewpoint of society a different choice might be preferred if there are significant effects with respect to waste management activities that fall outside private considerations, the extent of which, and their policy implications, are examined later.

### 2.2.3 The effect of mis-pricing on waste decisions

Various kinds of market failures may distort the choices made in the materials use cycle, and on the relative level of disposal and recycling. How significant these are is an empirical issue and open to question, but they may warrant intervention in some form to correct the distortion if that can be done without entailing excessive cost.

The effect of mis-pricing on discard choices is illustrated in Figure 3, which shows demand for waste disposal ( $D_d$ ) varying in response to its price, while waste disposal is supplied at a constant marginal cost ( $MC$ ). Standard supply and demand principles suggest this would result in waste disposal to the level of  $OQ_0$  with a price of  $P_0$ . If disposal is under-priced for any reason and is “corrected” by raising the price to  $P_1$ , use of disposal would shift back up the demand curve to a slightly smaller level of disposal at  $OQ_1$ . This would occur, for instance, if businesses decide to discard less by being more frugal in their use of materials.

**Figure 3 The effects of mis-pricing waste disposal**



Source: NZIER

The diagram also postulates that there may be a range of waste reduction, recovery or recycling activities which are not currently worthwhile because their cost, as depicted by the supply curve  $S_r$ , exceeds the current price of disposal<sup>1</sup>. The supply curve slopes upwards because recycling faces increasing marginal costs – the most readily recoverable material is recycled first, so successive increases in recycling face higher cost recovery and reuse. Raising the price of disposal to  $P_1$  will also bring some of these

<sup>1</sup> The shape of the demand curve also implicitly reflects the availability of alternative uses for parts of the waste stream, but it can be useful to separate out the waste diversion to these alternatives from the waste avoidance reflected in the demands of waste generators.

activities into production, further reducing the flows going into final disposal by OR, so the total disposal contracts from  $OQ_0$  to  $RQ_1$ .

Removing price distortions over the choices for waste discarding therefore has two effects simultaneously: increasing the “frugality” amongst waste generators, and improving the viability of reuse and recycling activities.

### **2.3 What is the problem with waste?**

Waste in general is perceived as a problem because it represents a lost opportunity to get more out of available resources – an economic inefficiency if waste can be (but isn't being) reduced at less cost than the value gained by so doing. For solid wastes there are specific public concerns because:

- Wastes detract from societal well-being if they have costly effects that harm the environment and human wealth, e.g. due to contamination of land and water, emissions into atmosphere, detractions from amenity;
- Space for landfills is perceived to be scarce and increasing the cost and difficulty of locating landfills accessible to the sources of waste;
- Some hold concerns over availability and conservation of raw materials, pressures on which might be relieved by less wasteful material use;
- Some have moral distaste at what they regard as a symptom of wasteful over-consumption.

There are clearly various adverse effects that waste disposal and waste management facilities can inflict on neighbouring communities – leachate contamination, combustion risk, greenhouse gas emissions, neighbourhood nuisances like littering, noise, odours and pest species – which derive from market failures and may be reduced by appropriate policy. The policy questions that arise are:

- How much waste abatement is worthwhile across the community?
- What tools or instruments best achieve this level of abatement, so as to maximise the net benefit to the community?
- Are such instruments most cost effectively applied through waste policy, or through some other channels of government policy?

It is not obvious that there is any market failure with respect to land availability for landfills. If land becomes scarce, prices rise and landfills become more costly and/or more remote from population centres that generate wastes, landfill disposal costs rise and alternative discard options become more competitive. Similarly international commodity markets anticipate scarcities with higher prices and greater activity in developing new sources or substitutes that relieve scarcity. The problem of solid waste is primarily about its adverse environmental effects and whether these are adequately taken account of in private decisions that generate waste.

Part of the concern over waste management stems from a long observed trend of waste volumes increasing over time. Drivers of this increase include growth in population, economic activity, incomes and consumption, increase in the number and decline in the average size of households, and changes in the consumption habits of the population (e.g. move to more convenient packaged foods). The residential sector is frequently identified as problematic on grounds that whereas commercial and industrial users have financial incentive to reduce the waste they create, incentives on householders are more muted and indirect because of the way in which waste management services are delivered. Policies also target businesses.

From an economic perspective, at least some of this increase in waste volumes is unavoidable, because of the correlation between rising activity, wealth and consumption levels, and the rising cost of successive increments of waste avoidance or material recovery above the easy pickings of the “low hanging fruit”. For most materials, as long as substitutes are available at low cost, total recovery and waste elimination will not be economically feasible and the optimal level of waste produced by a community will not be zero.

In practice, the economic optimum is difficult to determine and policies often revert to simpler concepts such as waste minimisation without explicit reference to their costs. The OECD defines waste minimisation as:

*“Preventing and/or reducing the generation of waste at the source; improving the quality of waste generated, such as reducing the hazard, and encouraging re-use, recycling, and recovery”.*<sup>2</sup>

Waste minimisation is broader than waste prevention, as it includes waste utilisation through recycling, and also (where appropriate) incineration with energy recovery. It has also been taken to include reduction at source or at the production stage, such as cleaner production initiatives and design for environment, reducing use (or imports) of virgin materials and extended producer responsibility for the post-consumer stage of a product’s life-cycle). There is a risk that waste minimisation becomes an end in itself, rather than oriented to reducing risks to societal well-being posed by wastes.

### **2.3.1 An economic framework for waste policy**

In line with long established practice in public policy formation, an economic direction for waste management policy would:

- Aim to improve societal well-being by reducing risks from waste, where:
  - Well-being reflects the value obtained from use of all resources, not just materials but also energy, capital, people’s time and labour;

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<sup>2</sup> *Strategic waste prevention: OECD reference manual* (OECD, July 2000), p.35.

- Value to the community includes both market values and the non-market values derived from the quality of the natural environment, and hence reflects all dimensions of sustainable development;
- Promote an economically efficient mix of waste disposal, material recovery, reuse and recycling.
- Intervene to address demonstrable market failures and distortions in waste management activities such as:
  - Environmental externalities not covered by other policies (e.g. general policy towards greenhouse gas emissions);
  - Market imperfections like local monopolies where it can be demonstrated that costs and prices are higher than they need be;
  - Information failures, where information is not produced because of the impossibility of those who create it obtaining value from it, or where information asymmetry between buyers and sellers distorts choices;
  - Regulatory failures – removing instances where regulatory policies are demonstrably counter-productive to economic efficiency;
  - Provision of economic public goods, which are indivisible collective goods and services with non-rival, non-excludable characteristics (for instance, some types of information provision/dissemination).
- Subject all public policy initiatives to rigorous and consistent economic analysis of costs and benefits to compare them against what is most likely to happen in the absence of the initiatives.

Another reason for policy intervention is distributional equity. There may be questions around the affordability of some minimum environmental standards for waste practices which may warrant redistribution of resources and effort. Where failure to meet the standard could have spillover impacts on neighbouring areas, such redistribution has implications for efficiency as well as equity.

The existence of market failure is a reason, but not in itself sufficient justification, for government intervention. Three further questions need to be asked:

- If market failure exists, is there an intervention that could rectify it efficiently, i.e. a remedy whose cost (net of benefits) is less than the cost of the market failure itself?
- If so, what agency is best placed to implement that remedy – central government, local government, a special purpose agency, or other, private entities?
- What change in the entitlements and rewards from activities is required to incentivise these agencies to implement the remedy?

### 2.3.2 Criteria for assessing potential waste measures

Having identified the problems with waste management that need to be addressed to reduce the risk to societal well-being, criteria are required for comparing different policy options for achieving the intended risk reductions. A framework for evaluation of environmental policies has been adapted to waste management issues (OECD 2005) in the following criteria:

- Environmental effectiveness – the extent to which the measure reduces the risk of environmental damage;
- Economic efficiency – the extent to which the measure reduces aggregate abatement costs by enabling a given level of abatement at lower cost;
- Administration and compliance costs – the extent to which those administering and complying with the measure absorb resources that would be potentially productive elsewhere in the economy;
- Revenues – the extent to which the measure generates revenue or makes demands on other sources of government revenue;
- Wider economic effects – the extent to which the measure impacts on macro-economic conditions in the economy, such as price levels, inflation, employment and economic growth, and on competitiveness and trade patterns and income distribution;
- “Soft” effects – the extent to which a measure changes attitudes and awareness of environmental effects being addressed;
- Dynamic effects and innovation – the extent to which measures stimulate innovation.

These criteria are additional, but related, to a social cost benefit analysis of the effects of a likely measure. A cost benefit analysis provides much of the information needed to consider economic efficiency, administrative and compliance costs, revenues and wider economic effects, and it would also draw on estimates of environmental effectiveness, soft behavioural effects and dynamics and innovation.

### 2.3.3 Economic analysis of waste initiatives

The economic analysis required to assess the community-wide net worth of a policy is a social cost benefit analysis. Such analysis is a central part of the multi-criteria assessment of new policy and regulatory impacts as set out in the Generic Policy Development Process issued by the Ministry of Commerce in 1996, the still current Guide to Regulatory Impact Statements (Ministry of Commerce 1999), and the Australian Best Practice Regulatory Handbook (Productivity Commission 2006). The term “social” in this context refers to the community-wide aspect of the analysis that includes effects on producers of affected services/activities, consumers of affected services/activities, and third parties indirectly bearing consequences of the policy, including those transmitted through changes in environmental quality (e.g. health risk, loss of local amenity).

Cost benefit analysis is basically a means of comparing alternative courses of action in terms of the consequences for all those affected. This usually means comparing various policy options against a “counter-factual” of what’s likely to happen in the absence of policy, to ensure against policy focusing on a “favoured” option to exclusion of others without full understanding of the alternatives and their consequences. The broader the set of alternatives considered, the more likely it is that analysis will find an efficient and equitable solution to the problem to be solved.

The generic form of cost benefit analysis involves a number of distinct steps which are outlined in Appendix B2 of this report.

The analysis involves weighing up the opportunity costs of additional resources used up by the policy, against benefits gained valued in comparable terms. Opportunity cost is the value of resources in their best alternative use. For instance, labour is valued at its value to additional production, unless it is unemployed in which case the opportunity cost is zero. Even unpaid leisure time has an opportunity cost that can be inferred from choices people make between how much work and leisure they take. Measures of gross output or jobs created that are sometimes presented as “benefits” of waste initiatives like recycling schemes are misleading, because they do not take account of the opportunity cost of resources used in achieving them.

Compliance costs and allocative costs from waste policies that fall on businesses such as manufacturers, wholesalers and retailers may be passed on to consumers in markets with limited competition. In that case, consumption will contract if consumers are price-responsive (see Figure 3), or if not they may maintain consumption of affected goods but have less disposable income to spend in other ways, which will detract from output and production (GDP) in sectors not directly affected by the new policy.

In more competitive markets businesses have less ability to pass on additional costs of new policy which are then borne as reduced profit by the business. This detracts from both current and future GDP (value added) as it reduces these businesses’ ability to reinvest for future production.

These adverse effects on GDP may accumulate to substantial impacts across the economy, and are the reason why it is important to have some assessment of the offsetting benefits expected from new proposed policies. It is also why the effects on consumers of waste services, both householders and businesses, need to be counted in policies that are intended to improve societal well-being.

#### **2.3.4 Cost benefit analysis – an example**

A specific task for cost benefit analysis in waste policy is to bring into account both effects on private decisions and those that fall outside of

private consideration to assess the net effect across the whole community. Table 1 shows a simple example of a cost benefit analysis of a hypothetical Extended Producer Responsibility scheme, which is co-ordinated by a Producer Responsibility Organisation that levies its industry members to cover the collection, recycling and residual disposal of material. The analysis encompasses both effects for scheme members and the offsetting savings for landfill suppliers and third parties in the wider environment.

The table shows the scheme costs the industry organisation \$118,000 a year, but saves municipal collection and disposal costs of \$120,000. If the industry members would otherwise face this full collection and disposal cost the collective scheme would be worthwhile for them. But it has a larger societal benefit if externalities around landfills and virgin material production are taken into account – valued in the table at \$48,000 per year.

In the example in the table, if the scheme costs were a little higher, or the benefits in disposal savings a little lower – say by \$3,000 a year – the scheme would not proceed as its private costs exceed its private benefits. External benefits to the environment would be forgone. In such circumstances the value of externalities is critical to the estimated net benefits. Subsidising the scheme by \$3,000 a year to ensure it proceeds would deliver the community much larger externality benefits.

**Table 1 Annual costs and benefits of a waste reduction initiative**

**Net Social Benefits of a Producer Responsibility Scheme**

Benefits	\$	Explanation
Savings in municipal collection and disposal cost	120,000	1000t @ \$100/t collection saving & \$20/t disposal saving
Reduced landfill external costs	32,000	800t @ \$32/t (1000t saved less 200t landfilled by PRO)
Reduced external costs of virgin material production	16,000	800t @ \$20/t externality cost on virgin material
Combined annual benefit	<u>168,000</u>	
<b>Costs</b>		
Administration cost of Producer Responsibility Organisation	110,000	Organisation accounts
Cost to PRO of recycling materials & disposal of residual	8,000	800t @ \$5/t subsidy + 200t @ \$20/t residual landfill
Combined annual cost	<u>118,000</u>	
<b>Total annual net social benefit</b>	<u><b>50,000</b></u>	

Source: NZIER, from data in OECD 2005

Valuing externalities requires both reliable estimates of the physical effects of the externality (e.g. health risk consequences) and a means of attaching dollar values to them. Benefits for both consumers and producers of marketed services are generally readily valued as some measure of

willingness to pay, but other benefits are more difficult to measure in monetary terms. However, starting from the premise that costs avoided are benefits, and benefits forgone are costs, economic values can be inferred for non-market effects by various means, as described in Appendix B3 of this report.

## 2.4 How can the waste problem be tackled?

There is a role for public policies to intervene to correct market failures and distortions if it can do so cost effectively. Government policy is generally about:

- Setting the rules within which activities take place across the community, striking a balance between responding to perceived problems and avoiding undue changes that create uncertainty and disincentive to invest;
- Correcting inefficiencies that arise from market distortions and failures, such as anti-competitive behaviour arising from monopoly or market dominance, and economic externalities (effects falling on third parties that are not taken into account by those whose actions cause them);
- Providing public goods that private suppliers cannot supply in sufficient quantities, because the indivisible nature of the goods creates a free-rider problem that prevents them from recovering their full costs or collecting an efficient price for use of the goods;
- Addressing equity and income distribution concerns.

While this economic approach that focuses on situations where markets are distorted or fail is oriented to reducing economic inefficiencies, it is equally appropriate to addressing concerns about sustainable development across economic, social and environmental dimensions (OECD 2001). Provided impacts on social and environmental outcomes are fully accounted for, an efficient activity is also a sustainable one.<sup>3</sup>

Economics also indicates the policy instruments to address these current distortions fall under a range of broad headings:

- “Moral suasion” through education and information campaigns to shift behavioural norms to voluntary restraint;
- Economic instruments to provide incentive for behavioural change:
  - Market adjustment through taxes and subsidies;
  - Market creation devices like tradable permits or quotas;
  - Market lubrication through measures to promote competition;

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<sup>3</sup> For further discussion on the interaction of economic efficiency and sustainable development in policy, see NZIER (2004) “Sustainable infrastructure: a policy framework”, Report to the Ministry of Economic Development, Wellington, [www.med.govt.nz/upload/18061/nzier.pdf](http://www.med.govt.nz/upload/18061/nzier.pdf)

- Self-regulation and co-management arrangements;
- Regulation and prescriptive direction:
  - Regulation to effect price adjustment;
  - Regulation to set standards and quantity controls;
  - Change in structure of suppliers and regulators;
- Direct public involvement in supplying services through ownership or joint venture, partnership and franchise arrangements.

The distinctions between categories are not clear cut, and most practical policy draws on a mix of measures: economic instruments are created by regulations, and prescriptive regulations often include elements of economic instrument (e.g. penalties for non-compliance). How effective and efficient these generic instruments are likely to be when applied to the characteristics of solid waste management in general, and to waste in New Zealand in particular, depends on the characteristics of the activities that generate and manage waste in different circumstances.

A wide range of measures and instruments have been proposed and applied in waste policy in different countries, and there is substantial overseas experience to inform policy development in New Zealand. However, as the externalities of waste, and the economics of proposed solutions to them, vary widely with local conditions, the optimal mix of policies is also likely to vary across countries. There is a risk that copying suites of measures that have been applied in other countries will not be efficient for use in New Zealand.

Choosing appropriate policy instruments is an important part of successful regulation that maximises the benefit for the community at large. Policy can employ directive regulation (with varying degrees of self-regulation by affected parties or prescriptive control) and/or economic instruments, and choose between setting correct prices or fixing quantities.

Economic instruments such as taxes and charges are generally considered more efficient than prescriptive controls, as they create a continuous incentive for each entity to choose the best solution for their circumstances – abate wastes or pay the charge, whichever is the least costly. A drawback for policy purposes is that the aggregate level of abatement achieved is uncertain, as it depends on price responsiveness to the economic instrument which is not usually known with any precision.

Quantity controls offer more certainty over aggregate reductions but are often less efficient. For instance, a uniform percentage reduction in waste disposal would be more costly for some than for others to meet, and it would be more efficient to vary the reductions expected from different entities according to their ease of making reductions. Tradable quotas or

permits on waste entitlements combine the certainty of the quantity restraints with the flexibility of economic instruments, creating tradable credits for abatement to incentivise more.

Prescriptive regulations have practical advantages where a regulator knows the cost structures of affected activities are relatively homogeneous and the required objective can be achieved by imposing similar requirements on all firms, as the inefficiencies from uniformity are offset by ease of implementation and monitoring. Economic instruments are especially useful where the required response varies across regulated firms, and the regulator does not have good information about the costs firms face, so flexibility of economic instruments allows more efficient distribution of response.

There are complexities in applying policy instruments to solid wastes that arise from how they affect the relative cost of the different discard options. A charge on wastes sent to landfill would be a straightforward means of dealing with landfill externalities, but it increases the incentive for illicit dumping. Charging products or input materials a product charge as a sort of “advance disposal fee” is inevitably inexact in reflecting discard decisions that may be some years in the future. Quantity controls are easier to apply but inefficient, particularly if they target volumes of waste rather than the externalities associated with them.

While international experience points to widespread use of physical targets in waste policy this approach and the instruments used to implement it depend on the economic and environmental conditions in which it is applied. Targets are quantitative measures that may become an end in themselves, rather than a means of reducing the risks posed by waste, giving rise to costly policy responses: waste levies are set higher than the externality cost to accelerate target achievement, and producer responsibility schemes are advocated as a direct mechanism for addressing targets.

However, producer responsibility schemes may violate a basic principle of good policy of placing incentives close to those who have control over the desired outcome, and are not effective for all waste problems. For instance, littering detracts from environmental amenity but may be more effectively tackled through moral suasion, greater provision of bins and enforcement of litter laws than by anything that producers can do.

Further discussion of policy instruments applied to wastes is presented in Appendix B4. The most effective and efficient instrument varies with the particular objectives of policy and the circumstances in which it is applied, but choosing the “correct” instrument will be pointless if the objective itself is ill-advised.

## 2.5 The essential economics of waste

Economics is concerned with how choices are made about the use of resources – why they get allocated to different activities, how they are used, and what they achieve in those different uses. Some fundamental considerations that arise from viewing waste as an economic issue include:

- The problem with waste depends on its adverse effects on community-wide (or societal) well-being, so the effectiveness of waste management depends on improving that well-being, rather than attainment of physical targets;
- Well-being depends on the value obtained from available resources across all different activities, both market values such as those of recovered materials and the non-market values derived from the quality of the natural environment;
- The full opportunity costs of *all* resources used (not just materials) in alternative waste management activities need to be taken into account when considering different options for waste management;
- Community well-being is maximised when all resources are allocated to their highest valued uses, and can readily be re-allocated to new uses as conditions and values change;
- All waste management activities are likely at some point to encounter increasing costs and diminishing returns from additional effort in waste abatement and material recovery, which means that zero waste, even if technically feasible, is rarely likely to be economically worthwhile;
- Taking account of the hidden consequences of actions is a primary consideration for policy aimed at improving well-being, including:
  - Correcting the distortions and failures in market operations and dealing with effects that fall outside of private considerations;
  - Designing policy to avoid undue impacts on business activities that can have widely felt consequences for investment and future well-being.

Responsiveness to incentives created is a key determinant of the likely effectiveness and efficiency of waste management and policy options.

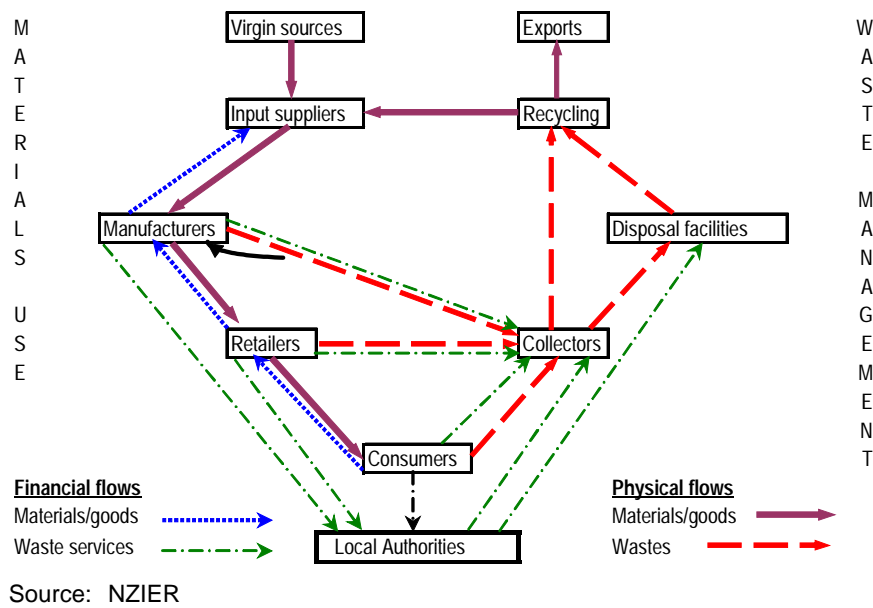
### 3. Waste management in New Zealand

This section describes waste management activities in New Zealand, recent trends in material disposal, and the characteristics of the externalities of waste that policy addresses. Comprehensive information is hard to come by, and the picture is necessarily a partial one. There is a large number of businesses listed in directories as involved in supplying waste collection, waste disposal, recycling and waste management consulting services. The number of consumers of waste services is larger still, including in one form or another every household, business and public agency in the country.

#### 3.1 Structure of waste management activities

The materials use cycle and solid waste management in New Zealand is illustrated in Figure 4, stylised and simplified for illustrative purposes. Waste generators can be divided between manufacturers, traders (retail and wholesale) and consumers (households), and waste managers are divided between waste collectors, disposal facility operators and recyclers.

**Figure 4 Waste and the material use cycle**



Materials flow from input suppliers to manufacturers, through retailers to consumers, generating waste at each stage of this progression. Apart from recycling at source by manufacturers, this waste is gathered by collectors who either sort the material for recycling or send it to disposal facilities, where further recovery and recycling may take place. Recycled material is either exported or returned to the cycle as input supplies. The diagram also shows principal revenue flows: from consumers to retailers, and from retailers to manufacturers for purchases of goods; from generators direct to waste collectors for private collection services; and from generators to local

authorities, who contract with collectors and disposal facilities for services on behalf of their constituents.

In New Zealand, territorial local authorities (TLAs) have long had involvement in a number of these stages. Waste management emerged as a public issue in the 19<sup>th</sup> century, largely in response to concerns about health risks and contamination, and it was local authorities who were at the forefront of collective measures to contain these risks, levying the community that benefited from the activity. Until recently TLAs commonly owned and operated landfills and collection services, funding them wholly or partly through their general rates.

This structure has changed, with increasing involvement of private companies both as operators of large-scale facilities and as contractors to local councils for collection services. The 1956 Health Act placed responsibility on local councils to ensure that waste was managed within their areas but did not require direct Council ownership or operation of services, so councils have been able to contract out these activities where it is worthwhile to do so. The low capital requirement and flexibility required in collection services has long offered opportunities for private sector involvement, and with the recent raising of standards for facilities operation the comparative advantage in landfill operation has also shifted to large, integrated companies that specialise in running such facilities.

### **3.2 Pricing of waste services**

Paralleling the increase in private involvement has been a move towards greater user charging for waste services. Many councils have abandoned payment via their general rates to apply “Pay per throw” to rubbish collection for disposal, whereby the cost of the official rubbish bag includes the cost of collection and disposal for the volume of waste collected. While this works with households and small commercial operations, larger commercial and industrial premises with less standard waste arisings usually arrange their own collection and disposal with commercial contractors. In most districts there are drop-off facilities at landfills or transfer stations where householders or businesses can deposit their wastes, and gate fees are usually charged for these facilities.

In recent years councils have been encouraging diversion of material from the waste stream for recycling. Biodegradable material has particularly been targeted as it comprises a large volume of solid waste and is “active”, giving rise to various externalities such as methane emissions and odours. A number of council and private composting businesses have emerged to turn greenwaste into compost for sale to gardeners. Other materials are also recovered from the waste stream for recycling through a mix of council-supported and private operations.

The move to contract out collection and disposal services to private parties can be expected to have provided savings for councils that have adopted it, but it has not been without its problems. Councils often now contract with separate companies for collection of waste for disposal and collection of waste for recycling, but apply different pricing to waste for disposal and material for recycling. Whereas waste collection is paid for by the bag, kerbside recycling is usually free to householders and paid from the general rate revenue (or defrayed in some cases by the revenue recovered from recycled materials).

This can lead to perverse outcomes, as householders have incentive to increase recycled volume, which increases the demands for general rate funding and may make councils disinclined to promote further recycling because of constraints on raising rates. Yet councils are also reluctant to charge for collections for recycling as this would dampen the incentive for recycling, so they have sought alternative revenue streams (such as waste levy proposals). That this is raised as a problem by councils is indication of the difficulty of setting an appropriate level of subsidy for recycling collections without knowing what is likely to be gained from savings on other activity like landfill operation or environmental remediation.

There are also reportedly issues around contracts that some councils have entered into with their suppliers. For instance, some councils have no provision to vary payment with the volume collected, so face a risk of recovering more material than can be economically disposed or stored for disposal later. Both the Ministry for the Environment and the Waste Management Institute of New Zealand have been developing best practice contracts between Councils and contractors to resolve this.

### **3.3 Recent trends in material discard behaviour**

Despite all the publicity around waste management and the New Zealand Waste Strategy, comprehensive information on the state of solid waste management in New Zealand is hard to come by. Information is spread across a variety of public and private organisations but not consolidated on a consistent basis. Progress reports from the Ministry for the Environment lack quantifiable information on waste streams and changing patterns (Ministry for the Environment 2005), and various reports on establishing waste indicators have yet to result in publication of improved statistics (Ministry for the Environment 2000b). Many national estimates are dated from the mid-1990s, and while some regional councils report waste flows in their regions, the information from these sources is patchy and inconsistent.

#### **3.3.1 Volumes of waste being disposed of in landfills**

In principle the volume of waste being discarded in different ways could be assembled from local authority records, but published detail varies across

councils, as does the volume of privately-contracted waste services outside the overview of the local authorities. In the absence of comprehensive information on volumes collected, disposed or recycled across the country, inferences can be made from partial figures that are publicly disclosed.

Table 2 presents data on volumes and composition of waste generated in Canterbury as an illustration of current waste uses. Taking out the hardfill, organics, recyclables and hazardous waste volumes, the amount of general solid waste going to landfill amounts to around 665 kilogram per head of population. If this is representative of the country as a whole, New Zealand would have sent 2.77 million tonnes to landfill in 2005.

**Table 2 Measured waste in Canterbury**

	<u>Population</u>	<u>Total</u>	<u>Residual</u>	<u>Hazardous</u>	<u>Recyclable</u>	<u>Reusable</u>	<u>Organics</u>	<u>Hardfill</u>
		<u>measured</u>						
		<u>waste</u>						
		<u>kg/hd/yr</u>	<u>kg/hd/yr</u>	<u>kg/hd/yr</u>	<u>kg/hd/yr</u>	<u>kg/hd/yr</u>	<u>kg/hd/yr</u>	<u>kg/hd/yr</u>
1999	427,231	810.5	661.4	0.0	29.4	0.0	80.1	39.6
2000	449,316	810.2	655.4	0.1	33.1	2.7	85.0	33.8
2001	450,851	777.7	624.8	0.1	37.1	7.1	76.5	32.0
2002	479,797	758.8	595.8	0.2	38.7	11.0	78.8	34.3
2003	486,347	768.7	598.7	0.3	45.0	15.1	87.8	20.6
2004	508,399	816.7	646.9	0.4	56.4	16.6	73.5	22.9
2005	515,759	852.0	664.8	0.6	66.7	19.4	77.4	23.2

Source: NZIER; Canterbury Region Waste Data Technical Report

Whether this justifies the claim that New Zealanders generate a lot of waste is difficult to determine because of differences in recording waste in other countries. Municipal solid waste disposed per head in Australia is estimated to be 425 kilograms per person, and for all OECD 540 kg per person (Productivity Commission 2006). But the residual landfill wastes in Canterbury will also include Industrial and Commercial waste that is recorded separately in the Australian figures. Combining Municipal with Commercial and Industrial Wastes gives a figure for Australia of 932 kilograms per person. Against this Canterbury's 665 kilograms per person does not look high, assuming the basis for the figures is strictly comparable.

There is, however, no economic reason why the waste per head should be the same in New Zealand as in any other country, because discard choices in each country should reflect local availability and costs of different options, which will vary with local conditions. The geographical context of each country, and each region, influences the economics of discard choices. For instance rural and urban and landfills are unlikely to pose the same risk to human well-being, even if similar in all respects other than location.

Households account for about 40% of total waste disposed at landfills, of which 54% is via kerbside collections and the rest from self-delivered drop-off at waste facilities. The balance is attributed to industry (MfE 2006b).

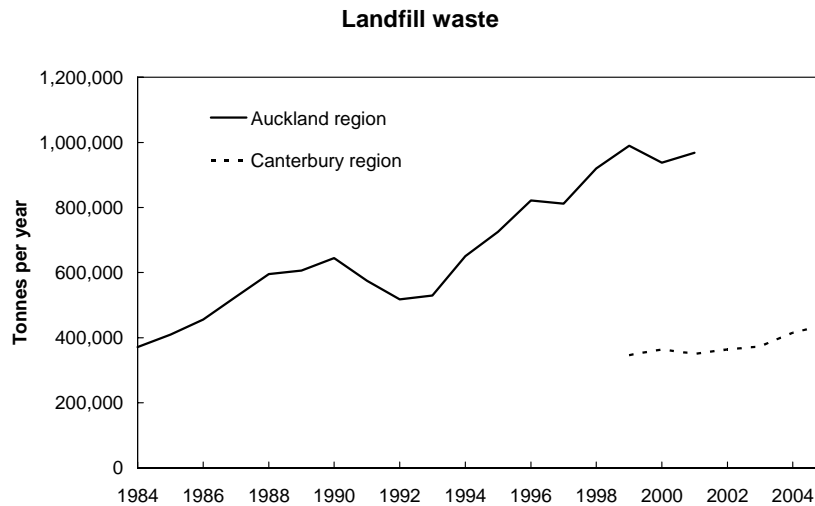
**Table 3 New Zealand Landfills and annual disposal**

	Sites	Tonnes
1995	327	3,182,120 State of Environment Report 1997
1999	221	2,765,020 Landfill Census 1998-1999 (53 non-reports)
2002	115	3,022,000 Landfill Census 2002
2005	95	2,767,400 Extrapolation from Canterbury Data

Source: NZIER

The number of operating landfills has certainly declined over the past decade, as shown in Table 3. The volume disposed in landfills also appears to have declined, although there is some uncertainty around how much because of non-responses in the 1999 Landfill Census and the lack of national data for 2005.<sup>4</sup>

Some decline in landfill volumes might be expected from other developments over this period, such as the promotion of recycling activities and the raising of landfill charges. However, Figure 5 presents trends in landfill disposal in the two regions with the most extensive data, Auckland and Canterbury, which imply a slight upward trend in total disposal in both regions in recent years.

**Figure 5 Disposal trends in Auckland and Canterbury**

Source: NZIER; Auckland Regional Council; Environment Canterbury

For the regions that have time series data there appears to be a close correlation between volumes of waste and levels of economic activity,

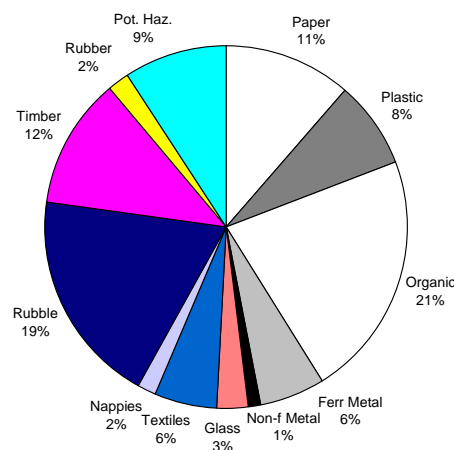
<sup>4</sup> Our landfill disposal estimate is lower than the commonly cited 3.2 million tonnes per annum, which would imply 777 kg/person/year. The 3.2 million tonne total is the same as the figure in the 1995 Landfill Census and in the State of the Environment Report, and has also been attributed (LGNZ 2006) to a 2004 estimate by Waste Not Consulting in an unpublished June 2005 Report to the Ministry for the Environment, but the latest landfill census total was lower (see Table 3).

which matches the general pattern in other developed countries. This has led some to call for “decoupling” of waste growth from economic growth, but as waste is associated with consumption which rises at times of high growth, it is unlikely that the correlation can be broken. What would be more feasible is reducing the waste-intensity of growth, either through more frugal use of materials or through structural shift in economic activity towards higher value added and service activities with a lower material input per unit value of economic production.

Figure 6 illustrates the composition recorded of waste disposed in landfills, drawn from the Ministry for the Environment’s Solid Waste Analysis Protocol data for a selection of 14 landfills. This indicates the largest share of volume disposal is made up of organic wastes which, being active and a source of decomposition gases also account for additional costs of landfill management compared to, for instance, the management of inactive cleanfill waste. The figure also shows that some of the waste issues that have captured public attention in recent years are not major contributors to landfill depletion or costs. For instance, disposable nappies account for just 2% of landfill volumes, glass for 3%, and plastic in all its forms for 8%.

**Figure 6 Composition of waste disposed in landfills**

**Landfill waste composition - 2004**



Source: NZIER; Ministry for the Environment

The paucity of data on waste generation and disposal raises questions about the basis for current and future policy development. Developing waste policy could be clearly justified in the 1990s by the existence of under-priced and low-standard landfills, but as the standards of landfills have improved and landfill charges have risen relative to those for recycling, it is more difficult to justify action to further encourage diversion from landfills

when the volumes going to them and their associated risk of externalities are unknown.

### 3.3.2 Economic activity associated with Waste Management

The recent involvement of large listed companies in waste management and the promotion of recycling have made waste activities more prominent in recent years, but it is hard to obtain firm data on its economic significance in New Zealand.

There is a waste disposal sector in Statistics New Zealand's national inter-industry tables at the 126 sector level. These tables were last updated in 1995-96 so the inter-industry interactions they show may be out of date, particularly in waste management where there has been a structural shift from council-run to more private commercial operations. Nevertheless, by apportioning national growth across sectors with some weighting for employment changes it is possible to infer the scale of activity in the sector and how it is likely to have changed over time.

On this basis the waste disposal sector in 1996 had gross output of \$187.5 million, around 0.15% of national gross output. By 2003 the gross output had grown to \$271.9 million, around 0.18% of national gross output. The corresponding figures for contribution to GDP show the sector's contribution rose from 0.16% of GDP in 1996 to 0.21% in 2003.

**Figure 7 Waste disposal in the New Zealand economy**

\$ Millions

Inter-industry transactions in basic prices	1996		2003	
	Waste disposal	Total Industry	Waste disposal	Total Industry
Total intermediate consumption in purchasers' prices	139	103,400	236	150,855
Total Value Added (Contribution to GDP)	132	84,120	254	121,110
Compensation of employees	46	39,450	88	55,200
Operating surplus	65	29,621	160	59,066
Consumption of fixed capital	17	12,407		
Other taxes on production	4	2,957	6	7,253
Subsidies		-315		-409
<b>Total gross output in basic prices</b>	<b>271</b>	<b>187,520</b>	<b>490</b>	<b>271,965</b>
Total intermediate consumption in purchasers' prices	0.13%		0.16%	
Total Value Added (Contribution to GDP)	0.16%		0.21%	
Compensation of employees	0.12%		0.16%	
Operating surplus	0.22%		0.27%	
Consumption of fixed capital	0.14%			
Other taxes on production	0.14%		0.08%	
Subsidies				
<b>Total gross output in basic prices</b>	<b>0.14%</b>		<b>0.18%</b>	

Source: NZIER

Waste management activities in total certainly account for a larger share of gross output, although how much this is cannot be ascertained without an extensive survey of the different activities within it – waste disposal, waste collection and recycling. Many of these activities do not appear in national inter-industry tables because they are subsumed within other activities – paper recycling, for instance, is an indistinguishable part of the larger pulp

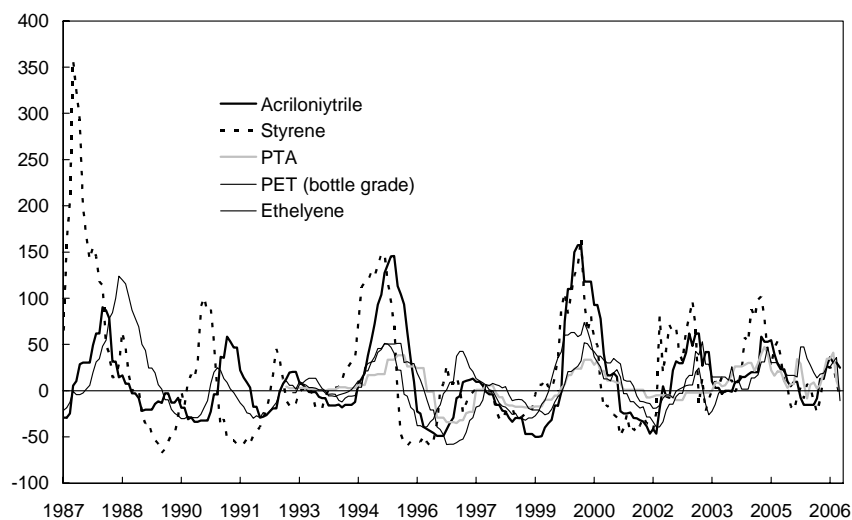
and paper sector. However, as residual disposal remains a larger activity than recycling activities according to apparent waste volumes, these other industries will not drastically increase the proportionate significance of waste management relative to the whole economy.

### 3.3.3 Influences on the economics of recycling

The characteristics of New Zealand present particular challenges for the viability of recycling materials. Population density is low and wastes dispersed over large areas of country, increasing the costs of material collection and precluding the realisation of economies of scale. Because of the size and concentrated structure of industries in New Zealand, for many materials there is only one plant capable of using substantial recovered material, generally located at one end of the country rather than centrally: in Auckland for glass, steel and paper, and in Bluff for aluminium. The country is elongated and internal transport costs are high, but the alternative of exporting recovered materials is subject to fluctuating commodity prices and exchange rates which may result in periodic losses on recycling.

The international trade for most commodities has strongly cyclical patterns in pricing, as illustrated for plastics in Figure 8. Recycling operations that rely on exporting face periods of low return when they may be faced with the choice of exporting at a loss, holding material in the expectation that prices will improve, or disposing of it. They may be reluctant to dispose of material even when it would be the lowest cost option if there is a public expectation that material will be recycled.

**Figure 8 International price of plastics**



Source: NZIER;

A further factor that is often claimed to inhibit recycling is the low cost of landfill disposal. Higher landfill charges would certainly assist diversion for recycling, but it is not obvious that landfills are currently under-priced, although they may have been in the past. The Parliamentary Commissioner for the Environment examined a selection of landfills and found their charges ranged from \$21/tonne (Taumarunui) to \$196/tonne (Kawerau) but the majority were in the range of \$45-\$100/tonne. By way of comparison average landfill gate fees in Australian state capitals range from A\$16 to A\$57 per tonne, and the cost of a modern “best practice” landfill has been estimated at around A\$25 per tonne (Productivity Commission 2006). Converted to New Zealand currency these Australian fees are approximately \$20, \$71 and \$31 respectively so New Zealand fees do not appear low by comparison. In some instances (such as Kawerau) landfill charges in New Zealand are much higher because of low waste volumes.

### 3.3.4 South Island glass recycling

An example of how location affects recycling possibilities is illustrated in Figure 9, which is drawn from a detailed study of glass recycling options for Otago.<sup>5</sup> The only major glass recycler in New Zealand at present is ACI-OI in Auckland, so recycling of glass within New Zealand faces the task of collecting glass cullet and transporting it to Auckland. The report cites public sources suggesting representative prices for clear and coloured cullet.

Figure 9 shows the cost of transporting a container capable of holding 16-20 tonnes of compacted glass cullet rises the further south the origin, with increasing distance to Auckland. It also presents an example of transport from Wanaka via Dunedin by rail, with a total transport cost of \$170 per tonne defrayed by a maximum payment on glass received of \$75 per tonne. The net cost of recycling is thus \$95 per tonne, which is just less than the \$100 cost of landfilling in Wanaka, suggesting that recycling would be a lower cost means of dealing with this discarded material. However, if the glass could be transported to Dunedin for \$20 and landfilled there for \$64/tonne, recycling would not be preferred on economic grounds.

There are risks and uncertainties around both sides of such a calculation. Glass loads may be rejected on delivery because they fail strict criteria for colour sorting and contamination, which creates a contingent liability for disposing of rejected loads in other ways. Such strict criteria increase the cost of sorting and quality control at collection points, so this is likely to increase the cost of collection for recycling relative to collection for landfilling. Crushing of glass into cullet varies from \$4 to \$37 per tonne depending on process used, but lower end processes result in low quality cullet so a higher cost process is required to decrease the probability of

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<sup>5</sup> Envision New Zealand Ltd (2005) “Glass mountains: Options for glass recycling in Otago”; Prepared for the Community Recyclers of Otago and the Otago Regional Council, December 2005

rejected loads. This also appears to add to the cost of recycling relative to the landfill option.

**Figure 9 Location and glass recycling**

<u>Place of origin</u>	<u>Container price</u>	<u>Cost/tonne</u>
Christchurch	\$1,600	\$80-\$100
Timaru	\$2,000	\$100-\$125
Invercargill	\$3,840	\$192-\$240
Representative prices		
	Clear cullet	\$10
	Green/Amber cullet	\$75
<b>Example: transport ex Wanaka</b>		
	Transport to Dunedin railhead	\$20
	Rail to Auckland	\$150
	<b>Total transport cost</b>	<b>\$170</b>
	Maximum payment from ACI-OI	\$75
	<b>Net cost per tonne</b>	<b>\$95</b>
<b>Cost of landfilling</b>	Wanaka	\$100
	Dunedin	\$64

Source: *Envision New Zealand Ltd (2005)*

Source: NZIER

Unaccounted for externalities from landfills could tilt the balance of costs in favour of recycling, but it is not obvious that the landfill options are under-priced at either \$64 or \$100 per tonne. Costs of between \$50 to \$100 per tonne appear common among modern landfills with systems in place to capture or contain environmental externalities.<sup>6</sup> In other words, many of the traditional externalities associated with landfills – leachate, odours, emissions etc – are likely to be internalised within the costs of landfilling that are charged to the users. The extent of residual environmental effects is a technical matter, but in its review of Waste Management the Australian Productivity Commission suggested the economic cost associated with such externalities from a modern, properly operated landfill are likely to be small, the principal externality being greenhouse gas emissions.<sup>7</sup>

This example illustrates how marginal are the economics of recycling bulky, low value materials when faced with substantial transport costs to point of recycling. Exporting via the nearest port may be an alternative, but this also

<sup>6</sup> Parliamentary Commissioner for the Environment (2006) “Changing behaviour: economic instruments in the management of waste”; Wellington

<sup>7</sup> Productivity Commission “Waste Management”; Draft report for consultation; Canberra (particularly Appendix B)

faces more directly the volatility of commodity prices and exchange rates which affect the long term returns of the recycling activity.

Glass recycling in New Zealand appears currently to be a victim of its own success, as volumes being collected exceed the capacity that can be used by ACI-OI, particularly among the clear glass categories. Accordingly ACI-OI has recently reduced the prices it offers for cullet, particularly clear. In such circumstances those who collect for recycling face the choice of storing glass until prices improve, or disposing of it in other ways. There are potential new uses, such as grinding down for adding to building aggregates, but the demand volumes are small and their economic viability is unproven.

### **3.4 The externalities of waste**

Waste externalities are primarily adverse environmental effects generated by landfills, the economic value of which will vary according to the condition of the landfill, the quality of its operation and the circumstance in which it is located – urban landfills, for instance, create a greater health exposure risk and neighbourhood nuisance than those in rural areas, other things held constant. There do not appear to be any estimates of the economic costs posed by such externalities in New Zealand in the public documents on solid waste policy.

It is difficult to determine how large the residual externality effect of landfills might be in light of recent changes in the industry and regulatory setting. Neighbourhood nuisance effects like odour and visual intrusion are location-dependent, and the externality on new landfills can be internalised by the processes for land use planning and consenting under the Resource Management Act. Leachates into soil and water have been problematic in the past but are largely contained within modern, lined landfills. Attraction of pests and vermin to landfills can also be reduced by improved operational practices.

The principal environmental externality not covered by other means at present is landfill gas emissions. These consist primarily of methane, growth of which entails a real economic cost in terms of New Zealand's obligations to reduce greenhouse gas emissions under the Kyoto Protocol. This can be recovered and flared off from landfills to reduce its greenhouse warming potential, which also reduces the risk of uncontrolled landfill fires or explosions. Gas capture also provides opportunities for energy generation.

Although there are no reliable estimates of the externality costs of landfills in New Zealand, they are not necessarily large in the case of modern landfills. The Australian Productivity Commission estimated the externality cost of different types of waste in modern, complying landfills would be less than A\$5/tonne deposited with landfill gas capture, or A\$25/tonne without it (Productivity Commission 2006). In the UK the initial landfill tax rates were

set at £2/tonne for inert materials and £7/tonne for active materials, based on average estimates of externalities across all landfills. In another approach to addressing externalities through the effect of proximity to landfills on property values in the UK, location within ¼ mile was estimated to reduce house values by 7% on average, equivalent to £1.52 to £2.18 (NZ\$4.34 – NZ\$6.23) per tonne of waste deposited (Cambridge Econometrics 2003).

Landfilling also involves ancillary activities with adverse effects, particularly waste transport. While trucks pay road user charges, the current system only recovers road maintenance and construction costs and collects no contribution towards the cost of environmental effects of road use. However, recycling also entails transport costs, often over longer distances than disposal, so under-pricing of transport would not provide a compelling reason for diverting waste from disposal to recycling.

Products with particularly hazardous properties – used batteries, tyres, hazardous wastes – may contaminate general waste and be more cost effectively diverted into separate waste streams. Such separation has been addressed by product take-back arrangements with specific industries, and with council initiatives to encourage separate collection, such as the HazMobile drop-off facility jointly provided by councils in Auckland. There is also general public concern about the high volume of greenwaste, paper, plastics, metal, and inert material – builders waste and cleanfill material – being disposed of. As indicated in Figure 6, some of these are not major contributors to depletion of landfill space, and as long as landfill pricing is reflecting the full costs of landfills such waste disposal is not inefficient.

A possible source of mis-pricing of disposal is the depletion of capacity in landfills. While landfill charges that follow the landfill full costing guidelines reflect costs of capital, maintenance and operating costs, including provision for post-closure care, it is unlikely that the current accounting approaches to depreciation accurately reflect the “user cost” of depleting landfill “airspace” – i.e. the contribution of each unit deposited to bringing forward the date when new capacity is required. This is part of the long run marginal cost of landfill use and in principle should be included in charges. In practice it is difficult to predict future costs of new landfills that would be needed to set such a charge. Because new capacity is some years in the future, the present value user cost of depleting airspace per tonne of waste need not be large or cause significant mis-pricing.

At present there appears to be little evidence of the economic value of the externalities of waste, or of what would be gained by reductions in waste. In view of recent changes that have occurred in waste management in New Zealand over the past 15 years, with closure of old landfills and improved standards in modern landfills, there is a risk that perceptions of waste are coloured by an outdated picture of the problems posed by waste to landfill.

There will be worthwhile opportunities for waste reduction in New Zealand in future as market conditions and technologies change, but without some cost benefit analysis of proposed market adjustments, backed up by sound estimates of the value of externalities, there is no way to ensure these opportunities are realised or that they contribute to improving societal well-being. There are also some waste-associated externalities that would be more effectively and efficiently dealt with through other policy measures – for instance, transport pricing or general greenhouse gas policy – than by adjusting waste volumes through policy measures.

## 4. Current New Zealand waste policy

New Zealand's current waste policy is governed by the New Zealand Waste Strategy 2002, a high level, non-statutory policy statement aimed at improved management of waste. Policy has also been strongly influenced by the Resource Management Act 1991, which through its requirement for consenting activities at waste management facilities has assisted in improving the performance standards and closure of substandard facilities. It has also been affected by changes in the Local Government Acts of 1974 and 2002, and by other legislative changes including the Civil Aviation Act 1990, the Maritime Transport Act 1994 and the Land Transport Act 1998, the Hazardous Substances and New Organisms Act 1996, the Health and Safety in Employment Act 1992, and the Ozone Layer Protection Act 1996 among others.

Government interest in waste pre-dates the current strategy. In 1992 a Waste Management Policy was issued which raised the prospect of comprehensive waste management programmes, generator pays policies and the implementation of the internationally recognised "5 R" hierarchy: reduction, reuse, recycling, recovery and residual management of waste materials. The policy directed the Ministry for the Environment to negotiate waste reduction targets with business sectors and encourage voluntary initiatives.

The Ministry for the Environment has prepared material to improve understanding of, and approaches to, waste management. In 1997 its *State of the Environment Report* indicated the paucity of data on waste management in New Zealand, prompting further preparation of a National Waste Data Report and a succession of National Landfill Censuses to improve knowledge of the state of activity. The *Waste Analysis Protocol* developed in 1992 provided a standardised methodology for collecting data on waste composition.

The Ministry issued a *Landfill Full Cost Accounting Guide* in 1996, revised in 2002 and again in 2005, to encourage landfill operators to assess the full costs of disposal and reflect them in the prices they charge. It also issued national environmental standards under the Resource Management Act governing ambient (outdoor) air quality and banning toxic discharges into the air, with the effect of shutting down many small scale incinerators that were once common in institutions such as schools and hospitals.

The Ministry has engaged various industry groups to seek agreement on improving management of specific classes of waste, with take-back arrangements for wastes such as used batteries, car tyres and electronic equipment. The Packaging Accord 2004 created targets for recycling of different types of material used in packaging and has been associated with recycling of an increasing proportion of packaging material.

The legislative and regulatory setting for waste management has been fundamentally revised over the past 15 years. The broad intention of this revision has been to improve standards of waste management, put waste disposal on a full cost recovery basis, and to reduce the waste stream.

#### **4.1.1 Components of the New Zealand Waste Strategy**

The New Zealand Waste Strategy (2002) contains a set of guiding principles and what it terms 5 core policies aimed at achieving sound legislation, high environmental standards, efficient pricing, adequate and accessible information and efficient use of materials. It also sets targets for waste minimisation, and for reducing the volumes sent to landfill of organic waste, construction and demolition materials, hazardous wastes, organochlorines and trade wastes, through partnership programmes with industries and councils. Details of the Strategy's current targets, which were reviewed and confirmed unchanged in 2004, are presented in Appendix D of this report.

The thrust of the strategy is sometimes summarised as *minimising* the generation of waste and *maximising* the amount of material recovered, reused or recycled. The purpose is reflected in its three stated goals:

- Lowering the social costs and risks of waste;
- Reducing damage to the environment from waste generation and disposal;
- Increasing economic benefit by more efficient use of materials.

It defines the problem of waste largely in terms of the externalities of landfilling, and its references to economic benefit and efficiency appear to place high importance on economic assessment of the policies and measures adopted in pursuit of those goals. However, rigorous economic analysis and justification of these measures is conspicuous by its absence in the public documentation surrounding the Strategy.

#### **4.1.2 Criteria for prioritising action**

The New Zealand Waste Strategy outlines the following criteria for prioritising government action on waste:

- Volume and harm (related to the expected value of risk);
- Achievability (related to transaction and implementation costs);
- Public concern;
- Cost effectiveness (i.e. the most cost effective receive highest priority).

The first two criteria, and the last one, fit well with the economic principles of reducing risks of waste externalities. The third, however, may be contradictory with the others, as public concern has often been focused on

wastes that are relatively inert and volumetrically insignificant in the waste stream (e.g. glass).

These are reasonable criteria to apply as guidelines in the absence of firm information on economic consequences, although the consequence depends on how they are used. The New Zealand Waste Strategy has a few targets for proportional reductions in waste going to landfill. There is intuitive appeal in the priority attached to reducing active organic wastes, sewage sludge and hazardous substances, although the specific target amounts are more debatable. However, the current Strategy does not provide much indication of how volume and harm, achievability and cost effectiveness are to be assessed, or much guidance for local authorities on how priority is to be determined to be consistent with the national strategy. There is a risk that councils will seize on “headline targets” (e.g. waste minimisation, diversion to beneficial use) to set quantitative targets at local level which have not been devised in light of assessment of the likely costs and benefits across businesses and others in the community.

Pursuing waste minimisation and recovery maximisation without a qualifying rider such as “*at reasonable cost*” is not conducive to economic efficiency. It creates a clear risk of the targets becoming ends in themselves rather than means to improved environmental quality and associated community well-being. This is evident in the policy documents of both government and councils that embrace “Zero waste” as a policy goal, which is neither technically nor economically feasible to achieve.

The New Zealand Waste Strategy provides a vision for moving “towards zero waste and a sustainable New Zealand”. While there is currently no statutory obligation for councils to adopt the strategy, many have done so, influenced in some cases by the Zero Waste New Zealand Trust vision of “zero waste to landfill by 2020”. For example, a grouping of WasteNet Councils in Southland have adopted “the philosophy of working towards Zero Waste through effective education, waste prevention, minimisation and recycling” in its Waste Management Plan (Waste Net Southland 2004).

The fundamental characteristics of waste in the material use cycle – materials are assembled into products, dispersed in use where they wear out and are costly to recover and disassemble – means that pursuing zero waste must at some point encounter diminishing returns to effort and steadily increasing costs per unit of waste averted. While a few materials may be sufficiently valuable, or have such a high potential for creating hazards and externalities, to justify incurring high costs in pursuing a high proportion of recovery after use, as a precept of general waste management policy zero waste is impractical and creates the risk of over-recovery of material, where the costs of recovery outweigh the benefits obtained by so doing.

The pursuit of zero waste by councils around the country without reference to the full costs and benefits of waste abatement risks imposing substantial undue costs on businesses and consumer activity. If the externalities of landfills are covered by other measures, such as appropriate standards for landfill operation or consent conditions imposed under the Resource Management Act processes, the efficient level of landfilling will emerge from the regulated market and physical targets are both superfluous and liable to induce higher cost (and inefficient) waste abatement. As every dollar invested in waste abatement forgoes potential investment in other activities, such as health, education, environmental remediation or business opportunities, excessive waste abatement detracts from community well-being both now and cumulatively into the long term future.

## 4.2 Current issues under consideration

Beyond the matters already covered in the Waste Strategy, two further issues are identified by the Ministry for the Environment as currently under consideration. These are the possibility of a waste levy and the extension of producer responsibility for wastes associated with more products.

### 4.2.1 A waste levy

Waste levies and landfill taxes are used in a number of other countries and have frequently been proposed for use in New Zealand. Some local authorities such as Christchurch City Council have long used levies on wastes being delivered to their own facilities as a means of raising revenue to cross-subsidise other initiatives in waste minimisation and material recovery. But the High Court in March 2006 declared *ultra vires* the attempt of a number of Auckland councils to use local by-laws to levy waste going to private disposal facilities as well.

This prompted a group of local government and waste and recycling industry representatives (not the collective view of all local government and industry) to issue a draft proposal for a waste levy in New Zealand in July 2006.<sup>8</sup> It also renewed calls for re-examination of uses of economic instruments to best advantage for waste management (Parliamentary Commissioner for the Environment 2006).

The purpose of the July 2006 levy proposal is stated as to provide a source of funds to support sustainable waste minimisation initiatives, and to create economic incentives and disincentives that reduce the amount of waste created. The justifications given include the need for funds to support waste minimisation activities, the legal challenge to councils' by-law powers, and concerns in the waste management and recycling industries about inconsistent approaches to levies distorting competition. The levy would be

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<sup>8</sup> Local Government New Zealand (2006) "Draft Proposal for a waste levy in New Zealand"

charged on the basis of the weight of waste going to final disposal, and the revenues would be collected by a special purpose Board for distribution to councils on the basis of their population and waste management needs.

The economic principles applying to waste levies have been extensively examined in New Zealand. The government-commissioned tax review in 2001 considered in detail the possible consequences of taxes levied nationally to achieve environmental benefits and concluded that they had practical disadvantages (MacLeod 2001). This is both because such national taxes are unlikely to reflect the actual externalities created in different locations, so a uniform tax could distort decisions in unintended ways; and also because of the risk that such taxes, if successful in changing behaviour and reducing the environmental externality, would destabilise the tax revenue stream. Such levies are unlikely to be positive for efficiency in the economy because of the uncertainty created over recurring levy rate changes required to maintain revenues, and the potential distortions created by applying a uniform levy irrespective of the local externalities.

Another report independently prepared for government was similarly cautious about waste levies (NZIER 2001). The aims of changing behaviour and raising revenue require different instruments. Behaviour-changing instruments need to be targeted on activities or effects giving rise to the externality, and to be large enough to be noticeable so as to encourage substitution away from damaging behaviour. Instruments for revenue raising need to be broadly spread, set at a low level and cheap to collect, so as not to encourage change in behaviour simply to avoid the instrument. While a single levy may affect behaviour and raise revenue, it is neither efficient nor sustainable for either purpose – one or other of these aims will predominate and unless the price sensitivity of those affected is well known, setting the rate would be a haphazard affair.

On a practical level, a levy on a waste stream of around 3 million tonnes a year is unlikely to be as efficient a means of raising public revenues as raising it through established tax instruments. A new levy requires a specific infrastructure for collection, incurring new costs for agencies administering the levy and also for those charged with collecting it (usually the levy-payers themselves, who face increased compliance cost in filing returns). If extra funding is required for waste minimisation initiatives, it would be more efficient to raise it through existing broad-based government revenue instruments such as income tax, GST or property rates.

It is also unlikely that the July 2006 levy proposal is set at an efficient level for dealing with externalities of waste sent to landfill. The proposed levy rate would start at \$10/tonne sent to landfill, rising to \$30 in the third year, with an expected revenue rising to \$96 million in the third year. The \$30 levy would represent a relatively large increase in disposal cost at most landfills, and may exceed by substantial margin the externality cost at

modern landfills. By comparison, the expected revenue would be around a third of estimated gross output of the waste disposal sector.

This proposal is not a low level levy, so it will create incentive for diverting waste to disposal options with lower private costs for those discarding, which not only creates the possibility of increased illegal dumping but also reduces the disposed volume on which the levy is payable – which does not appear to have been taken account in the proposal paper. While it is likely to still generate substantial revenue to support waste management initiatives in the short term, the additional costs on complying consumers of waste management services are not trivial, yet the proposal provides no basis for assessing the likely net benefits for societal well-being.

Neither does the proposal acknowledge the inefficiency of tying revenues to a particular activity, because of the likelihood of supply-generated demand for funding which can lead inefficient uses of funds. Tied charges can be efficient when used to gather revenue from users of a particular collective asset (as in the case of road user charges) but this is not how the proposal would work, as the contributors are different from and may get no use from the activities on which the funds are spent, and are in effect cross-subsidising activities for the benefit of others.

Experience in jurisdictions overseas illustrates the economic distortions that can be created by waste levies. The landfill tax in the UK was exceptional in that its initial rates were set on the basis of the estimated externality cost of different types of waste, but subsequently they have been raised above this to encourage greater diversion from landfills. The revenues raised were offset by a small reduction in national insurance contribution (a labour tax paid by businesses) and accompanied by extending tax deductibility to affected businesses for donations to environmental trusts. More usually, long-established levies in countries such as Denmark and Norway have been set high to encourage substitution behaviour (e.g. from landfilling to incineration with energy recovery) and reach waste reduction targets, without apparently explicit consideration of the net benefits.

#### **4.2.2 Extended Producer Responsibility**

The other issue that government identifies as a current priority is the role of extended producer responsibility and product stewardship schemes. There are already some voluntary government/industry agreements with characteristics of these schemes, and the current issue revolves around whether to extend these and make them more formal and mandatory.

One of the most prominent of these schemes is the Packaging Accord, which has its origins in a 1996 accord that aimed at understanding issues surrounding packaging in New Zealand and introduced a number of actions for industry on data reporting, educational materials and a self-regulatory

code of practice for packaging design. The latest Packaging Accord in 2004 broadened its scope to include among signatories packaging manufacturers, brand owners, recyclers and some retailers, and it instituted nine “Sector Action Plans” with targets for recovery and recycling of packaging material. These include, by 2008, recovery of 65% of aluminium, 55% of glass, 70% of paper, 43% of steel and 23% of plastic.

The Accord has had considerable success in increasing recovery and recycling in line with its targets – in 2006, 349,640 tonnes out of a total of 673,040 tonnes of packaging material were reported recycled (52%), and the rate of paper recycling at 72% is one of the highest in the world.<sup>9</sup> However, various questions surround its continuation as a voluntary scheme, not least the government’s stated position that if a voluntary approach does not provide sufficient improvements in reducing packaging waste per New Zealander, government is prepared to do so by regulation.

A national waste levy, if introduced, would create a double imposition on waste reduction efforts found within the Accord. Suggestions to make the Accord mandatory also raise issues over the equality of impact on domestic and overseas packaging production, and on whether the additional administrative and enforcement costs would result in a commensurate gain over the high rates that are being achieved in the voluntary scheme.

Beyond this, the Accord is a product of a policy oriented to quantitative waste reduction targets, and if made mandatory it has the same risks of over-stepping the efficient level of material recovery and recycling as that broader policy setting. The underlying aim of the Accord is reducing the volume of waste from packaging along with its impact on the environment, but other than noting that about 1/8<sup>th</sup> of rubbish in landfills is used packaging and that per capita disposal of packaging is 83 kg per year, the Accord presents no evidence of the externalities created by this disposal or how much it is worth trying to reduce it.

Packaging serves a number of functions, not least the preservation of perishable foodstuffs, the protection of fragile products, the ease of transport and storage of products, and the provision of information to consumers about the proper use (and disposal) of products. The packaging that exists today has evolved to reduce the waste in production and distribution of goods that would occur with less effective packaging, and businesses have incentives in their own operations to economise on excessive packaging.

While there will undoubtedly be further worthwhile opportunities to reduce the amount of packaging going to disposal as technologies of recovery change, it remains to be demonstrated how large are the externalities or

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<sup>9</sup> In 1994 130,000 tonnes of packaging was recycled, but this had risen to 340,000 tonnes by 2005.

market distortions of packaging disposal that warrant further intervention in this area.

### **4.3 New Zealand waste policy in a nutshell**

The New Zealand Waste Strategy defines the problem of waste largely in terms of the externalities of landfilling, and its references to economic benefit and efficiency appears to place high importance on economic assessment of the policies and measures adopted in pursuit of those goals. However, the public documentation surrounding the Strategy provides no evidence of the scale of externalities associated with landfills, how much it is worth trying to reduce them, or where priorities would be best directed.

Even basic up-to-date information about national trends in waste generation, diversion to recycling and disposal is difficult to find, and despite repeated calls for improved information on waste<sup>10</sup> and various proposed indicator frameworks from the Ministry for the Environment, public discussion on waste policy still reflects information from a decade ago. With such a dearth of information it would be unlikely that policy could be designed to be economically efficient.

#### **4.3.1 The progression of New Zealand waste policy**

There is a logic in the progression of New Zealand waste policy that can be explained by the concern with externalities of waste. Up to the early 1990s waste management was fragmented and variable across different organisations with blurred responsibilities, using facilities which ranged from the good to the indifferent and bad. The policy since then has evolved to address the worst sources of externality risk, raising standards to close down the worst facilities and encouraging the uptake of full cost pricing to increase the on-going incentives for diversion from landfill.

Clarifying the responsibilities of different organisations (particularly local government) will have reduced the likelihood of duplication or unnecessary gaps in coverage. There are practical reasons why landfill tax, product charges and subsidy schemes have been passed over in favour of voluntary EPR approaches to further waste minimisation and recycling maximisation. Such mandatory measures involve transaction costs in implementation, and geographical variability increases the likelihood of inefficient distortions and cross-subsidies between locations around the country.

The Achilles heel of this policy progression, however, is the paucity of firm and comprehensive data on volumes and economic costs of all the current activity, which would give a clear picture in quantitative terms of what is being achieved. There is no basis for assessing whether the targets being

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<sup>10</sup> See for instance Parliamentary Commissioner for the Environment (2006)

pursued are worth achieving when the waste volumes and their associated externalities are unknown.

There is substantial risk that without a better basis for assessing the costs and benefits of measured achievements, pursuing set targets will overshoot the efficient level of waste abatement and recycling and result in excessive costs imposed on the economy. These costs are not just felt by those directly affected by the targets, but flow on to all consumers of waste services and other products (such as packaging). These consumers include not only households but also businesses using material inputs into their own goods and services.

To the extent that waste policies increase costs of services such as waste disposal, packaging design and recovery, they put pressure on business profitability and competitiveness to the detriment of wealth (and job) creation across the economy, so it is important that policies be closely targeted to demonstrable market distortions and inefficiencies.

The risk of policy overshoot is increased if policy moves from voluntary engagement with affected industries to mandatory schemes for Extended Producer Responsibility or waste levies that generate substantial revenues for redistributing to preferred recycling activities. It is further compounded by the influence that those with interests in providing waste management services (both councils and businesses) have with the Ministry for the Environment, compared to the interests of consumers of those services (households and general businesses).

Some literature claims there is a community desire to be involved in reducing the material intensity of their consumption for the sake of the environment which is difficult to capture in economic approaches to valuation, and which may justify a greater degree of waste minimisation and recycling activity than appears warranted from quantified cost benefit analysis. “Towards zero waste”, although impractical, is described as an “aspirational” goal intended to spur a step-change in thinking about waste generation and disposal.

However, these “softer” attributes of waste management do not negate the need for economic analysis. Without doing such analysis there is no way of knowing how much economic resource is being expended in providing the warm glow of satisfaction from community involvement, or of assessing what are the consequences of achieving a change in mindset.

In practice, cost benefit analysis may not provide complete answers to waste policy questions but even incomplete cost benefit analysis is likely to leave the choices better informed. If such analysis shows the costs exceed the measurable benefits, the result indicates how large the immeasurable components (such as community desire) need to be to justify proceeding

with the policy, the likelihood of which can be tested against other public policy decisions. If cost benefit analysis makes the community more aware of the wider costs created for the economy and environment, it may awaken the realisation that, like food miles, some prescriptions for improving the environment are not what they seem.

#### **4.3.2 Perspectives from other countries**

New Zealand is not alone in losing sight of economic implications in its approach to waste management policy. Environmental impacts of waste management in OECD countries have diminished over the past 10 years in response to improved regulation and standards on incinerator emissions, landfill practices and new technologies for handling wastes. Yet current disposal capacities continue to be regarded as insufficient in many countries, and past poor practices have created a legacy of contaminated sites which exert undue influence over perceptions of the current industry. In response, local authorities set waste management charges that do not reflect environmental externalities and fail to provide a rational basis for choosing between potential measures for waste management (OECD 2004).

In its just completed review of waste management in Australia, the Productivity Commission (2006) has also identified areas where current waste policy should be refocused to the benefit of both the environment and the economy. It highlighted likely inefficiencies in the use of landfill levies to further waste diversion targets and raise revenue, the subsidy of waste recovery options at high cost and questionable environmental benefits, and the introduction of mandatory product stewardship or extended producer responsibility schemes where disposal problems have not been proven. It also queried the basis of the waste reduction targets widely used by state and local governments, the ambiguity of “resource use efficiency” as a practical policy goal, and the aspiration to “zero waste” found in many official plans.

Targets and objectives take on a life of their own, but need to be assessed and reviewed periodically to consider whether they are still appropriate. In New Zealand’s case review is particularly timely due to the limitations of information and evidence on the problem that is being addressed and the costs and consequences of tackling it in different ways.

In an inter-dependent, globalised world New Zealand policy cannot develop entirely in isolation from trends elsewhere. Where New Zealand is signatory to international agreements relating to materials or wastes, it must implement these agreements in its internal policies in the most cost effective way possible. This may not be the same as the socially efficient solution if the agreement commits the country to things which were either not foreseen, or not fully analysed from an economic perspective, at the time the agreement was signed.

There is also a “softer” influence on domestic policy caused by the expectations of those overseas (e.g. tourists) about how waste should be handled, which businesses and government agencies may want to meet to maintain New Zealand’s reputation as a clean green location and source of products. There may be economic justification for those from more densely populated countries in Europe, for instance, to expect greater restraints on landfill disposal in their own countries which they transfer to their perceptions of New Zealand without regard to how conditions differ here.

If New Zealand businesses, councils and the public aspire to higher waste restraints here as a result of these overseas influences, their decisions will still be informed by analysis of costs and benefits of so doing in New Zealand. Adoption of approaches and methods developed overseas in different circumstances will not be efficient, and comprehensive economic assessment is required to identify how much additional cost is being borne in the New Zealand community to meet overseas expectations. This then provides a means of deciding whether spending those extra resources on waste is worthwhile compared to the alternative uses they could be put to.

## 5. Future directions for waste management

While there is undoubtedly a widely held perception of a waste problem in New Zealand, there is little evidence of what that problem is or how big it might be. Volumes of waste do not appear excessive compared to other countries, and current policy documentation does not present any supporting evidence that waste management practices are worse, or that risk exposure is greater, than in countries that New Zealand commonly compares itself with. There is a risk that current waste policy is being influenced by outdated perceptions of the waste industry in New Zealand and by overseas trends in different contexts with different implied resource costs.

The value of recycled material and the viability of recycling operations in New Zealand is affected by low and dispersed material volumes, high internal transport costs, and the few plants capable of recycling many materials, which increases reliance in large parts of the country on export opportunities subject to commodity price variability. Add to this that land is cheap compared to many European countries leading the charge on waste reduction and it is very unlikely that New Zealand's optimal waste policy will resemble that in most other OECD countries.

Old landfills and dumps, often with low standards and demonstrable adverse environmental effects, have been upgraded or closed by consent requirements under the Resource Management Act. The legacy of old landfills is covered by policy towards remediation of contaminated sites. Under-priced waste services were formerly a problem, especially with council run landfills where costs were unclear and covered by rates; but newer landfills to higher standards, use of landfill full costing guidelines and increased involvement of private providers has largely eliminated this under-pricing – although arguably current pricing may still not be the efficient long run marginal cost that reflects the cost of future replacement facilities. These are positive achievements of waste policy in New Zealand.

However, there are aspects of the current Waste Strategy that could escalate to undue stringency in waste policy that will cost the community more than the benefits it delivers. These include:

- Adoption of impractical guiding concepts such as zero waste and resource use efficiency;
- Setting of proportional reduction targets for physical volumes disposed, without quantifiable evidence of the benefits expected or the costs of so doing;
- Floating of more stringent regulatory measures with the aim of increasing achievement of targets, such as imposing waste levies that bear no relation to waste externalities, or extending producer responsibility for waste recovery or disposal through mandatory schemes.

The role of local government and rate-funded services has been clarified by legislative changes that provide for more co-ordinated regulation of wastes, but this has also opened the door for greater activism and more calls for additional funding from levies and other means. Without more explicit and rigorous assessment of the costs and benefits of initiatives this is likely to lead to inefficient outcomes that leave communities worse off.

## **5.1 An economic direction for New Zealand waste policy**

A more economic direction for New Zealand waste policy needs to look beyond “Zero waste” and other slogans that create targets that are aspirational but not achievable at reasonable cost. A more rational approach to waste would focus on economic efficiency of all resource use, not just the physical resources recovered from the waste stream. This would enable policies to emerge that maximise community well-being, defined broadly to include economic, environmental and social aspects of sustainable development.

The New Zealand Waste Strategy has stated aims of efficient pricing, efficient material use, adequacy of information, environmental standards. Replacing “efficient material use” with “economic efficiency” would remove a misleading ambiguity in the meaning of the term efficiency. It would also imply greater attention to cost benefit principles when assessing initiatives taken in furtherance of the Strategy.

Beyond this, good regulatory practice requires establishing a rationale for prioritising intervention by new policy initiatives. Rectifying cases of regulatory and market failure that are tractable to correction by policy provides such a rationale. And wider use of cost benefit analysis would establish the most effective and efficient instruments to achieve such correction where it is likely to result in social net benefits.

High on the list of priorities is improving the information on waste volumes and the adverse effects associated with them. Without the means to define the problem to be solved, waste policy is like a ship without a compass, clearly pointing in a direction but with no gauge on where it is going.

## **5.2 Reasons for intervention in the waste cycle**

Apart from applying cost benefit assessments, a second component of an economic approach to waste management is having a clear framework for determining how and when intervention is necessary in waste activities. Intervention for things which will happen anyway is generally inefficient because of the transaction costs incurred, and markets can be efficient at allocating resources between activities given certain conditions. This means

that intervention is most likely to result in net social benefits when confined to specific cases where those market conditions are not present, e.g.:

- Government or regulatory failure: there is a clear role for governments (central and local) to correct their own policies if they impede economic and social activity for no demonstrable benefit;
- Market failure rationale: there is also a clear role for government to try to correct failures in market operations by changing the incentives acting on those in the market, e.g.:
  - Market imperfections such as monopoly, dominance etc which distort prices and choices for those in the market;
  - Externalities or missing markets such as various effects on quality of the shared environment (pollution, depletion etc);
  - Information failures caused by the inability of those creating information to appropriate its value, because free-riders can also share in the benefits without paying;
  - Economic public goods, for which it is inefficient to charge full costs, either because the goods are non-excludable at reasonable cost or non-rival in consumption (one person's consumption does not affect another's access to the goods or services), so suppliers are unable to recover their full costs and under-supply them without government support from taxation of the whole community that benefits;

While the market failure rationale is widely recognised and used around the world, it is not always consistently applied. In the context of waste management, the marginal viability of activities like recycling is sometimes described as a “market failure” but it is not – it can simply mean recycling is not worthwhile given prevailing costs and prices for materials received.

Arguments around waste management policy that are raised in connection with the market failure rationale include:

- Reducing (environmental) externalities associated with disposal to landfill, the efficiency of which depends on the extent and severity of the externalities and the efficacy of the policy option to affect that extent: there can be real market failures associated with landfills and other facilities (like transfer stations), but many are already covered by existing policy mechanisms (e.g. consenting requirements);
- Reducing the overall costs of waste management would improve efficiency, provided all costs are properly accounted for and the benefit (the reduction in waste management costs) is greater than the total costs incurred in implementing and complying with the policy;
- Providing separate channels for handling hazardous wastes may be the most cost effective way of dealing with small volume but high hazard

potential wastes that would unduly raise the risks and cost of management through general waste channels;

- Reducing the financial burden on municipalities is more an argument of distributional equity than efficiency, although there may be negative externalities on neighbouring communities if a municipality fails to uphold national standards which might justify support for smaller municipalities facing hardship, on both efficiency and equity grounds;<sup>11</sup>
- Reducing resource use and depletion both with respect to:
  - Scarcity and conservation of virgin raw materials may be presented as a “market failure” but availability of supply should be internalised by market processes that respond to scarcity with price rises which induce the search for new supplies or substitute materials;
  - Unaccounted for externalities in raw material production is a related, but separate, issue which would distort the market choices between virgin and recycled materials, but policy on waste disposal has only tenuous influence on material supply and these issues are more effectively and efficiently dealt with through other policy measures;
  - Scarcity in the availability of land for waste facilities is a common argument for waste minimisation,<sup>12</sup> particularly in densely populated regions, but it is not a market failure as scarcity of suitable sites will increase the cost of facilities like landfills, providing a self-adjusting incentive for finding alternatives to landfill disposal.

While there may be market failures around waste issues, they need to be demonstrated in particular circumstances to warrant intervention. This means examining whether market processes are in fact “failing”, the extent to which potential externalities are internalised in current pricing and regulatory structures, and the likelihood of intervention correcting the failure without incurring excessive cost.

An outline of an efficient waste policy is provided in Appendix C.

### 5.3 A fitting end for waste policy

The current direction of New Zealand waste policy is ostensibly aimed at reducing risks and externalities of waste, but there is little evidence of what those risks are, the effectiveness of policy in changing them, or the costs to the community of so doing. This creates substantial risk of inefficient policy consequences, as there are proposals for more stringent policy measures in

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<sup>11</sup> For instance, there may be adverse reputation effects for tourism if one locality suffers an outbreak of disease due to failure to maintain national standards, which may make it efficient to provide targeted assistance in meeting the basic standard across all areas.

<sup>12</sup> See for example [www.reducerubbish.govt.nz/problem/index.html](http://www.reducerubbish.govt.nz/problem/index.html) which defines the problem of rubbish as not having enough existing landfills to cope and resistance to developing new high standard facilities.

pursuit of targets whose economic benefit is unknown. It is timely to review and revise the current New Zealand Waste Strategy and refocus on those activities demonstrably likely to result in net community benefits:

- Make the maximisation of community well-being the explicit aim of the New Zealand Waste Strategy;
  - Replace references to “resource use efficiency” in all policy documents with “economic efficiency” which is more consistent with community-wide well-being;
  - Remove all references to “zero waste” from documents expounding serious waste policy;
- Require new waste initiatives that impact on private businesses and consumers to undertake cost benefit analyses from a national perspective;
  - A cost benefit approach would restore consumer welfare to the position it usually holds in public policy analysis;
  - Develop guidelines on how such analysis can address in a consistent manner all dimensions of interest for sustainable development (economic, social, environmental);
  - Demonstrate how to consistently deal with risk, uncertainty and potential hazards throughout the analysis period;
- Collect and analyse improved information on the generation of waste and their flows to disposal and recycling, and their associated externality effects:
  - Commission a detailed study of the externalities associated with different components of waste management in different circumstances (similar in scope to the Surface Transport Costs and Charges Study);
  - Establish guidelines on the priorities to be given to different types of waste according to the expected value of risk to societal well-being each type creates in different circumstances in New Zealand;
  - Replace physical targets for waste reduction with indicative targets of potential risk reduction from addressing different types of waste;
- Undertake comparative analysis of the costs and benefits of tackling different types of waste in different regions to establish where the greatest community net benefit is likely to be obtained.

Waste management has changed markedly over the past 16 years, reducing risks and providing benefits for the community at large. But further policy initiatives can be expected to face increasing costs and diminishing returns, making assessment against economic principles even more critical than formerly in making the most of both material and non-material resources.

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## Appendix B Economics of waste

### B.1 Role for a policy on waste materials

Private businesses and individuals using materials respond to economic influences that are largely determined by market conditions of supply and demand, such as the prices of competing virgin and recycled materials, the costs of using materials (cost of recovery, cleansing, remarketing), and the costs of discard options in landfills or recycling. From society's perspective, however, there are also questions of whether these influences are distorted by market failures, missing markets or mis-pricing, and is it feasible to reduce these distortions through policy changes?

### B.2 What would appear in a cost benefit analysis of waste initiatives?

Guidance on cost benefit analysis as part of a multi-criteria assessment of new policy and regulatory impacts sets out processes for assessing policy proposals, including:

- Identifying the nature, scale and source of problems;
- Intervening where market, legal and other institutions fail;
- Considering fully alternatives to regulation;
- Evaluating costs and benefits of regulation and alternatives;
- Examining other considerations (international, distributional).

Cost benefit analysis is basically a means of comparing alternative courses of action in terms of the consequences for all those affected. The generic form of cost benefit analysis involves a number of distinct steps:

- Identifying effects on *all* members of the affected community (consumers as well as producers) brought about by a policy change, relative to what would happen in the absence of the policy (the counter-factual);
- Quantifying effects and when they happen over the analysis timeframe;
- Valuing effects on a consistent basis in dollar terms;
- Discounting all values to arrive at a net present value over the analysis period;
- Testing the robustness of results to risks and uncertainty by examining the sensitivity of results to changes in future values.

Applied to waste management initiatives, such analysis would include:

- Estimates of the value of benefits expected from the intended effect;
- Administration costs for regulatory agencies implementing the change;

- Compliance costs for those directly or indirectly affected by the change, including all consumers of waste services (households and businesses) as well as service producers who may pass on costs to their customers);
- Allocative costs that arise because of incentives changed by the policy – for instance, increased material recycling may necessitate new costs in changing sources of supply, in addition to the strict compliance activities of sorting, storing and despatching for reuse.

The analysis involves weighing the opportunity costs of additional resources used up by the policy, against benefits gained valued in comparable terms. Opportunity cost is the value of resources in their best alternative use.

### B.3 Valuation and efficiency

Valuing externalities requires both reliable estimates of the physical effects of the externality (e.g. health risk consequences) and a means of attaching dollar values to them. Benefits in an economic sense are things which confer value on the community and include things with no observable market value (such as environmental quality). Benefits for both consumers and producers of marketed services are generally readily valued as some measure of willingness to pay, but other benefits are more difficult to measure in monetary terms. However, starting from the premise that costs avoided are benefits, and benefits forgone are costs, economic values can be inferred for non-market effects by various means. Approaches to valuation for waste management effects include:

- Market prices – observed value from market transactions for recovered materials, landfill gate fees, operational input costs etc;
- Cost-based techniques – values estimated from market-based indicators, for instance the value of leachate contamination of an aquifer can be inferred from:
  - The avoided cost of cleaning up and restoring the aquifer to use;
  - The cost of the next best alternative supply (i.e. providing alternative supplies if clean up proves prohibitively difficult);
  - The expected value of health risk increase from the contamination (days off work, treatment costs, number or people affected etc);
- Revealed preference techniques – values inferred from prices of associated activities or features. For example, comparison of prices of similar houses at different proximity to locally undesirable land uses like waste facilities may reveal an “aversion cost” of proximity to its effects, or analysis of travel cost to alternative facilities could reveal the value of having disposal facilities in a particular neighbourhood;<sup>13</sup>

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<sup>13</sup> See Anex (1995) “A travel cost method of evaluating household hazardous waste disposal services”; *Journal of Environmental Management* 45, 189-198

- Stated preference techniques – values inferred by surveying respondents on how much they would pay to secure an improved outcome (such as re-routed waste traffic), or how much compensation they would be willing to accept for an adverse outcome.<sup>14</sup>

Even where these non-market valuation techniques cannot practically be applied to all effects of waste management, because of data deficiencies or other factors, there are still ways of comparing policy options in economic terms. For instance, if risks to human health are a primary concern, options can be compared in a cost effectiveness sense to show which option achieves the greatest reduction in risk exposure per unit of cost.

Because it encompasses effects across the community cost benefit analysis is indicative of economic efficiency – getting more out of available resources. It can be informative of different types of economic efficiency:

- Productive efficiency: when resources are being used in the most cost-effective way, e.g. achieving minimum costs for a given output, or maximum output for a given cost.
- Allocative efficiency: when resources are allocated across all activities in the economy to their highest value usage so that nobody can produce more without someone producing less (also known as Pareto efficiency).
- Dynamic efficiency: maximising efficiency (either productive or allocative) over time, as resources are re-allocated from current patterns according to changes in relative prices, technologies and innovation.

Cost benefit analysis can also identify distributional impacts relevant to consideration of distributional equity. It focuses on effects on economic well-being so it is not confined to just readily-observed economic impacts: effects on consumers, producers and third parties (including the environment) can be brought into account provided there is a consistent way of quantifying and expressing the value of all these gains and losses.

The significance for waste policy assessment is that economic efficiency is not the same as “resource use efficiency” as it commonly appears in writings on waste management (including the New Zealand Waste Strategy). Resource use efficiency is intuitively appealing – getting more from less material resource – but is potentially misleading, because it focuses on only part of the picture, material resources, to the exclusion of the opportunity cost on all non-material resources (energy, capital, labour time). For instance, the use of materials or objects (such as increasing the trip-lives of returnable containers) could be extended indefinitely in a technical sense with increased care in handling, use and maintenance, but the opportunity costs of so doing mean there is an economic limit which is

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<sup>14</sup> Groothuis PA et al (1998) “Using contingent valuation to measure the compensation required to gain community acceptance of a LULU: the case of a hazardous waste disposal facility”; *Public Finance Review* 26(3), 231-249

different from the technical limit to the useful life of the material. Economic efficiency is consistent with maximising societal well-being, and is therefore a better criterion for waste policy than resource use efficiency, which is inconsistent.

## **B.4 What policy measures have been used on waste?**

A wide range of measures have been proposed and applied in waste policy in different countries, and there is substantial overseas experience to inform policy development in New Zealand. As the externalities of waste, and the economics of proposed solutions to them, vary widely with local conditions, there is a risk that copying measures applied in other countries will not be efficient for use in New Zealand.

Broadly the policy approaches can be divided between:

- “Moral suasion” through education and information campaigns to shift behavioural norms to voluntary restraint of wastes;
- Self-regulation and co-management – such as industry groups that jointly agree to reduce wastes amongst their members;
- Regulation and prescriptive direction;
  - Regulation to effect price adjustments;
  - Regulation to set performance standards and quantity controls;
  - Changes in the structure of suppliers and regulators;
- Direct public involvement in supplying services through ownership or partnerships with private entities.

Within the price adjusting regulations there is a broad distinction between:

- Market adjustment through taxes and subsidies, of which there are numerous international examples in waste policy;
- Market creation devices like tradable permits or quotas.

### **B.4.1 Moral suasion**

Moral suasion refers to a policy that changes social attitudes and norms of behaviour. It normally involves campaigns of education and exhortation to change perceptions about a problem and inspire action to address it, and is usually heavily dependent on collective funding from tax revenues.

Although public attitudes are reputedly hard to shift, moral suasion appears to have been influential on waste policies in many countries which focus on physical targets of waste reduction without reference to the economic consequences of achieving those targets. Because these campaigns are rooted in the public sector agencies with access to public revenue streams,

they may also be prone to rent-seeking behaviour and interest group capture by those who stand to gain from policies in their favour.

## **B.4.2 Regulation**

Regulation aims at restraining behaviours by imposing rules or guidelines on behaviour so that it more aligns with public preferences. This imposes some opportunity cost on those being regulated, and some administrative cost on those doing the regulation, and in the extreme can result in substantial costs being borne by the regulated few for the benefit of the unregulated.

### **B.4.2.1 Self-regulation**

Self-regulation is voluntarily restraint on behaviour adopted by individuals and companies alone or in association. Because it is voluntary those involved will often see a component of self-interest in adopting it, e.g. a marketing gain, or a limitation of potential future liabilities. This is not a costly means of regulation, but econometric analyses of voluntary measures applied to environmental improvements internationally also suggests the benefits achieved also tend to be modest (OECD 2003).

### **B.4.2.2 Regulation and prescriptive direction**

Regulation and prescriptive direction tends to be more heavy handed, with effectiveness dependent on the ease and ability to monitor and enforce, backed up with penalties for detected breaches. This will often involve establishing a regulatory agency of some substance, increasing the administrative costs compared to self-regulation. It may also impose compliance costs on those being regulated, and it can also restrict resource allocation by prohibiting certain choices.

Nevertheless, regulation such as standards and rules can be efficient for dealing with some types of environmental issue where the alternatives are subject to high transaction costs potentially costly consequences - for instance for handling hazardous wastes. They can be made even more efficient by making them performance based with flexibility over how to apply, such as applying the criterion of Best Available Technology Not Entailing Excessive Cost.

Regulation is a term that covers a broad range of intervention measures:

- Regulation to effect price adjustments by:
  - Economic instruments, such as market-adjusting taxes and charges or market creating tradable permit schemes, directly affect the price of an externality to reflect the full resource costs it creates;

- Command and control approaches, such as prescribing technologies, aim to curb externalities directly while indirectly affecting its price, by raising costs for producers that may be passed on to consumers;
- Command and control approaches, such as setting standards to meet or setting quantitative limits on activity, aim to curb the level of externality directly and indirectly affect its price, by raising costs for producers that may be passed on to consumers;
- Changing the regulatory structure of the market, by reconfiguring regulatory responsibilities or breaking up monopolies to encourage competition.

In general economic instruments which apply a financial cost to some activity or behaviour have the advantage of flexibility over command and control approaches, as those affected may choose to pay the economic instrument or change behaviour, depending on which is the least costly. A particular advantage of economic instruments is that they can be designed to influence marginal choices, so they exert a continuing pressure to economise on the affected activity, in contrast to command and control regulatory approaches where there is less incentive to achieve more than the prescribed standard.

Command and control approaches may require substantial administrative cost to ensure wide enforcement, and compliance costs can also be high for those subject to the regulation. They can also be expected to impede innovation and adaptive solutions, as to varying degree they impose a general solution to local circumstances that are different.

However, these distinctions in approach are not clear-cut as most interventions contain a mix of instruments: economic instruments like charges and tradable permits are created by regulations, while prescriptive approaches are often backed up by fines and penalties (an economic instrument).

Several instruments have been specifically applied to waste management issues, the effects of which are discussed below.

### **B.4.3 Waste and landfill taxes**

The purpose of a waste or landfill tax is to internalise an externality associated with a particular activity. Just as a carbon tax acts to restrain emissions that incur costs for the nation under its international obligations, a landfill tax set at the estimated cost of externalities per tonne of waste would have some impact on choices at the margin to restrain such wastes.

If the waste problem to be addressed is viewed as an externality problem, then applying a landfill tax could in principle incentivise recycling and change the material mix in products in use. Such a tax would be a pure

externality tax, with revenues used to offset reductions in other more distorting taxes elsewhere in the economy, rather than tied to specific waste initiatives. In practice there are three objections raised as to why this may not be socially efficient:

- Increasing landfill charges would create an incentive for increased illicit dumping, spreading the externality risks away from managed facilities;
- Efficient substitution may be thwarted by information failures or inability to access alternative channels for discarding materials;
- Split incentives between those who pay the charge (final consumers) and those who make the products (manufacturers, importers) mean the price signal may not be transmitted back to producers to make more use of recyclable components.

Although the prospect of increased dumping is frequently raised as an objection to increasing landfill charges, there is little empirical evidence of unauthorised dumping increasing in response to increased landfill charges, although it is unclear whether this means it does not occur or just has not been recorded or studied. In the New Zealand context, it depends on how large the externality charge would be, and the price responsiveness of those using waste disposal services.

Regarding price responsiveness of waste disposal services, there is evidence that increasing fees reduces volumes disposed in New Zealand (MfE 1997b). In European countries fee increases have been associated with 15-50% decreases in waste volumes disposed, and in US with decreases of 25-50% (Covec 2005). However, none of these reported cases provide a reliable guide to price response which would allow prediction of responses in New Zealand.

#### **B.4.3.1 Product charges**

Product charges are charged on products at their creation, in proportion to their expected impacts once they enter the waste stream. By internalising waste cost at the production stage, they aim to incentivise use of more recyclable materials and reduce the incentive for illegal dumping created by a landfill tax. However, the charge is an average that bears no relation to the actual external costs of a particular product disposed in a particular way some time in the future.

Such charges appear to have been applied rather selectively, such as a packaging tax in Sweden. However deposit-refund schemes are a more common variant combining a product charge with a subsidy on reuse.

#### **B.4.3.2 Subsidies**

A subsidy is any payment made in support of a particular activity out of funds collected from other activities. Recycling appears to have been

extensively subsidised in many countries, at least in its early stages, either directly through transfers of funds or indirectly through free use of council-owned facilities. Subsidies may be efficient if they are used judiciously to correct a market failure or a mis-pricing between recycled and virgin material, but they need to be carefully designed to retain marginal incentives and avoid the risk of creating dependency that attracts wasteful rent-seeking behaviour by those receiving the subsidy.

#### **B.4.3.3 Combined waste tax and subsidy schemes**

An alternative instrument that could avoid the objections to a landfill tax would be a combination of a product tax and a recycling subsidy. A product tax set at a level to internalise the externalities on its final disposal would not create any incentive for final consumers to discard irresponsibly, but would provide a direct incentive to producers to minimise the tax incurred by their choice of materials. The subsidy on recycling would provide incentive for final consumers to divert material from disposal. A deposit-refund scheme, as seen for beverage containers and other products with relatively simple materials, is a variant of such a combined measure.<sup>15</sup>

This approach is not without its problems, however. A product tax remains an inexact instrument for dealing with disposal externalities, the value and extent of which will depend on how the product is disposed some years in the future. It is unlikely that this disposal price signal will be transmitted clearly to products made overseas and imported into New Zealand, and trying to adjust prices at the border has serious implications for complying with WTO and other agreements governing international trade. The subsidy part of the measure also requires some process for determining what gets subsidy and by how much, because of the risk of rent-seeking behaviour.

#### **B.4.3.4 Overseas experience**

While a number of countries, particularly in Europe, and most states in Australia, apply taxes and levies to waste and landfills, these are usually not internalising taxes of the type described above. The levels at which they are set are not based on estimated externalities, but rather aimed to encourage diversion of wastes between different streams. Physical waste reduction targets are widely used and linked to waste taxes, but with little demonstrable link to efficiency or societal well-being.

A Danish waste tax was specifically designed to encourage diversion from landfills which were perceived as land-constrained to incinerators which provided opportunities for energy recovery. Norway also has a tax on final

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<sup>15</sup> Deposit refund schemes were once common in New Zealand on items such as bottles and car batteries but were withdrawn in the 1980s due to change in packaging (e.g. milk cartons) or increased imports outside the scheme. Similar schemes that remain include the Swap-A-Crate scheme for beer nationwide and localised bottle reuse schemes.

waste treatment with differential rates in favour of incineration with energy recovery. The landfill tax introduced in the UK in 1996 was originally designed as an externality tax, but subsequent rate changes on active wastes are more oriented to achieving target reductions in active wastes.

Some countries also operate waste levies which are primarily intended for revenue raising. These have symbolic value in being linked to the “polluter pays principle”, but they can be expected to be inefficient revenue raisers because of the narrowness of the tax base, the transaction costs of collection and the incentive for illegal dumping created if the rate is raised.

#### **B.4.4 Tradable permit schemes**

Tradable permit schemes create a market for a hitherto unmarketed commodity by defining an allowable quantity, unitising that quantity and making the units available for trade. Unlike a tax, in which the rate is set and the effects on quantity depend on the demand elasticities of those using the taxed item, permit schemes set the quantity sought with certainty and allow the market in traded units to determine the appropriate unit value.

Although long used with fish stocks and some types of emissions, traded permit schemes have only recently been applied to waste issues. The UK recently introduced a Landfill Allowance Trading Scheme, which limits the quantity of biodegradable municipal waste that can be sent to landfills in accordance with an EU directive, and establishes trading in individual entitlements to that allowance. For practical purposes this trading only occurs between waste disposal authorities (county councils).

#### **B.4.5 Extended producer responsibility and product stewardship**

Extended producer responsibility (EPR) and product stewardship schemes are means of addressing waste minimisation which have emerged recently and appear favoured in many countries. They encapsulate the notion that those who make products should bear some responsibility for the externalities they create on disposal, and thus have incentive to make products with less externality generation. Extended Producer Responsibility (EPR) schemes usually place responsibility on an industry body and incorporate a number of measures to support specific waste minimisation or recycling targets – take-back schemes, deposit refund schemes, revenue raising levies and subsidies to assist recycling.

Costs are internalised within the industry or sector grouping either by levying their member’s activities and using revenues to subsidise activities, or by strong voluntary agreements. They thus include both incentives to reduce outputs going to disposal and to substitute inputs to facilitate recovery and recycling. The effectiveness of EPR systems in achieving

targets is dependent on the penalties of non-compliance and the practical potential for developing markets for recycled material (Covec 2005).

To date, New Zealand has not enacted mandatory EPR, but it has a number of voluntary schemes, most prominent of which is the 2004 Packaging Accord. This appears to have been successful in increasing the amount of packaging material recovered for recycling and diverted from landfill: in 2006 349,640 of 673,090 tonnes (52%) of packaging was reported recovered, and in paper packaging the recovery rate at 72% is one of the highest in the world. There remains however some scepticism over whether voluntary schemes achieve much more than would be achieved anyway by profit-maximising firms as part of their marketing strategies or, more cynically, as short term measures to stave off government imposing regulation (OECD 2003).

EPR and stewardship schemes have advantages when other methods are likely to raise problems with illegal dumping, and when recycling markets function poorly, largely because they incorporate a package of measures and create a clear locus of responsibility. They also fit well with government styles that emphasise public-private partnerships. Having long been used for special wastes with hazardous or toxic properties, they are now being promoted for more general wastes. In practice such schemes predominantly focus on easily measured waste volumes, with little precision in specifying the environmental objective they are intended to achieve – waste volumes, toxic constituents or method of disposal (Walls 2003a) - or explicit checks to ensure these align with maximising societal well-being.

#### **B.4.6 Collective provision**

Collective provision can be economically efficient in the case of public goods which would not be adequately supplied by private suppliers because of difficulties in appropriating the output and recovering their costs. Public agencies can rectify this by identifying the community that benefits and using their coercive powers of taxation to recover their costs.

An example in the context of waste management lies in the provision of certain types of information which, once available to one is available to all and hence may be under-supplied. Collective agencies may put effort into disseminating information and promoting understanding that benefit individuals and industry but which they might not otherwise be aware of because of transaction costs or other impediments. Such collective bodies do not need to be public agencies, and industry associations perform such functions, but there can be an advantage in collective funding where “free-riders” would otherwise prevent the information from being generated at all. There is some risk that such activity may step over the boundary from providing public goods to promoting particular activities or technologies.

Historically public agencies have had a role in waste management operations such as landfills and waste collection. As landfills have become larger and more technically sophisticated operations, the comparative advantage in operation has shifted to private companies that specialise in such activities. Similarly, private operators offer flexibility and adaptability in waste collection that may give them competitive advantages over public sector bodies. As recourse to collective funding can impede adaptive behaviours needed for commercial viability, it is unlikely to be efficient for public agencies to have long-term involvement in running recycling or waste minimisation schemes.

#### **B.4.7 Structural reorganisation**

Incentives can be shifted by reorganising agencies or industries so that responsibilities and liabilities are more closely aligned on those whose behaviour affects the outcome.

## **Appendix C Outline of an economic waste policy**

### **Objective**

Reduce costs and risks to societal well-being caused by waste materials

### **Means**

Orient policy to maximising societal well-being from activities associated with waste materials

Intervene with policy to correct or reduce market failures and externalities associated with waste materials

Aim for an optimal mix of material reuse, recycling and residual waste disposal – which is assuredly not zero waste for most materials

Subject all policies to comprehensive analysis of all costs and benefits across the community, including those relating to environment and social outcomes that are relevant to sustainable development

### **What risks are posed by solid waste disposal?**

Contamination of water and soil by leachates from landfills

- Improve landfill design and operational standards
- Close landfills that cannot meet standards cost effectively
- Separate most hazardous materials for special treatment and containment, reducing contamination risk they pose to general waste

Landfill gas that creates risks of combustion and adds to greenhouse gas emissions

- Collect gas for flaring off, with or without energy recovery, to reduce combustion risks and lower the greenhouse warming potential
- Institute climate change policy that creates equal incentives for abating greenhouse emissions from all sources – energy, wastes, industry etc

Neighbourhood nuisances of odour, noise and attraction of pest species

- Improve operational practice management at waste facilities

Visual intrusion and disamenity impacts

- Improve design, screening and location decisions through guidelines on the operation of land use planning procedures

Transport externalities

- Apply full cost reflective pricing consistently to all transport modes (including externality costs)
- Observe protocols for waste handling and transport that reduce risks to safety, human health and environmental quality

### **Setting priorities for waste policy action**

Base priorities on what exacerbates externality risks for societal well-being

- Reduce or neutralise high volume bio-active wastes where cost effective to do so
- Separate or neutralise highly hazardous wastes where cost effective to do so
- Divert or reuse inert materials where cost effective (e.g. divert from landfill to lower cost cleanfill facilities) but cease activity on inert materials accounting for low volumes and with low recovered value
- Prepare indicative volume potentials for waste reduction or recycling for specific classes of materials based on marginal costs and marginal expected benefits, to inform councils and others of what may be worthwhile to encourage recycling and what is unlikely to be
- Review scope for improving prices to reflect actual externality risks around material discard choices and waste management activities, e.g.
  - Develop a schedule of representative externality costs that vary with specific locational circumstances to incorporate in waste facility charges
  - Re-examine the implicit subsidy to recycling from free kerbside collection and its effects on volumes of useful material collected
- Improve data collection and analysis of waste generation, recycling and disposal, to support the analysis of potentials and economic viability and improve monitoring of the effectiveness of policies
- To the extent that volume directives continue to be used (e.g. where direct pricing is impractical) voluntary producer responsibility schemes have a role to play, but mandatory schemes require demonstration that they would reduce a significant externality risk caused by free-riders

### **Relation of solid wastes to other waste issues**

Move towards a similar basis for charging discharges to water, based on the externality risks of additional discharges, to avoid creating incentive for wastes to migrate from solid to liquid streams

Develop policy on legacy contaminated sites (both old landfills and other sites) to facilitate clean-up or containment of sites if cost effective to do so, with priority for sites posing highest externality risk

## Appendix D Targets in the New Zealand Waste Strategy

The Ministry for the Environment's Review of Targets in the New Zealand Waste Strategy (2004) recommended no changes to the initial list of targets in the strategy. The full list is presented below.

### Waste minimisation

- 1.1 Local authorities will report their progress on waste minimisation and management for their annual report in 2000/02 and quantitatively on an annual basis from then onwards.
- 1.2 By December 2005, all regional councils will ensure that new or renewed industrial resource consents include a recognised waste minimisation and management programme and will report on the percentage of all consents under their jurisdiction that have such a clause.
- 1.3 By December 2005, at least 10 major businesses will be participating alongside central and local government in developing and promoting waste minimisation programmes within their sector.
- 1.4 Ninety-five percent of the population will have access to community recycling facilities by December 2005.
- 1.5 By December 2005, territorial local authorities will ensure that building regulations incorporate reference to space allocation for appropriate recycling facilities in multi-unit residential and commercial buildings.
- 1.6 By December 2005, all councils will ensure that procedures for waste minimisation have been addressed for all facilities and assets they manage and will have set target reductions based on public health, environmental and economic factors.
- 1.7 By December 2010, all regional councils will ensure that at least 25 percent of all existing industrial resource consent holders have in place a recognised waste minimisation and management programme.

### 2 Organic wastes

- 2.1 By December 2003, all territorial local authorities will have instituted a measurement programme to identify existing organic waste quantities, and set local targets for diversion from disposal.
- 2.2 By December 2005, 60 percent of garden wastes will be diverted from landfill and beneficially used, and by December 2010, the diversion of garden wastes from landfill to beneficial use will have exceeded 95 percent.
- 2.3 By December 2007, a clear quantitative understanding of other organic waste streams (such as kitchen wastes) will have been achieved through the measurement programme established by December 2003.
- 2.4 By December 2007, more than 95 percent of sewage sludge currently disposed of to landfill will be composted, beneficially used or appropriately treated to minimise the production of methane and leachate.

2.5 By December 2010, the diversion of commercial organic wastes from landfill to beneficial use will have exceeded 95 percent.

### **3 Special wastes**

3.1 By December 2005, businesses in at least eight different sectors will have introduced extended producer responsibility pilot programmes for the collection and reuse, recycling or appropriate treatment and disposal of at least eight categories of special wastes.

### **4 Construction and demolition wastes**

4.1 By December 2005, all territorial local authorities will have instituted a measurement programme to identify existing construction and demolition waste quantities and set local targets for diversion from landfills.

4.2 By December 2008, there will have been a reduction of construction and demolition waste to landfills of 50 percent of December 2005 levels measured by weight.

### **5 Hazardous wastes**

5.1 By December 2005, an integrated and comprehensive national hazardous waste management policy will be in place that covers the reduction, transport, treatment and disposal of hazardous wastes to effectively manage risks to people and the environment.

5.2 By December 2004, hazardous wastes will be appropriately treated before disposal at licensed facilities, and current recovery and recycling rates will be established for a list of priority hazardous wastes.

5.3 Recovery and recycling rates for priority hazardous waste will increase 20 percent by December 2012.

### **6 Contaminated sites**

6.1 By December 2008, all sites on the Hazardous Activities and Industry List will have been identified and 50 percent will have been subject to a rapid screening system in accordance with Ministry guidelines.

6.2 By December 2010, all sites on the Hazardous Activities and Industry List will have been subject to a rapid screening system in accordance with Ministry guidelines, and a remediation programme will have been developed for those that qualify as high risk.

6.3 By December 2015, all high risk contaminated sites will have been managed or remediated. A timeframe will also have been developed to address the management or remediation of remaining sites.

### **7 Organochlorines**

7.1 By December 2010, New Zealand will have met international obligations under the Stockholm Convention to collect and destroy PCBs and organochlorine pesticide wastes.

7.2 By December 2020, the average body burdens of dioxins will have been reduced to 10 percent of present day levels.

### **8 Trade wastes**

8.1 By December 2005, all territorial local authorities will have implemented and will be monitoring Model General Trade Waste By-laws based on the New

Zealand Standard Model General Bylaws, Part 23 – Trade Waste or its equivalent.

8.2 By December 2005, all territorial local authorities will ensure that all holders of new or renewed trade waste permits will have in place a recognised waste minimisation and management programme.

## **9 Waste disposal**

9.1 By December 2003, local authorities will have addressed their funding policy to ensure that full cost recovery can be achieved for all waste treatment and disposal processes.

9.2 By December 2005, operators of all landfills, cleanfills and wastewater treatment plants will have calculated user charges based on the full costs of providing and operating the facilities and established a programme to phase these charges in over a timeframe acceptable to the local community.

9.3 By December 2005, all cleanfills will comply with cleanfill disposal standards.

9.4 By December 2010, all substandard landfills will be upgraded or closed.

9.5 By December 2020, all substandard wastewater treatment facilities will be upgraded, closed or replaced with systems that comply with all relevant regional and coastal plans, standards and guidelines.