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# MUCK AND BRASS: THE PUBLIC POLICY OF SOLID WASTE RECYCLING

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# MUCK AND BRASS: THE PUBLIC POLICY OF SOLID WASTE RECYCLING

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# Chapter I. Introduction

Waste management is an environmental issue that regularly and persistently features on political agendas. It is highly visible and is a part of peoples' daily lives. Governments have historically had a significant role, primarily providing waste management services at the local government level. Over the last few decades this involvement has increased and broadened locally, nationally and internationally.

Waste issues have also been a persistent feature on New Zealand's political agendas, both at central and local government. In its latest initiative, Government agreed targets for waste reduction are to be developed in consultation with business sectors producing significant wastes. A voluntary approach is to be taken to achieve these targets, though the Ministry for the Environment is to investigate regulatory and economic mechanisms to back up voluntary initiatives, should these fail (Minister for the Environment, 1992). Many local government agencies are also involved or support various municipal recycling ventures.

These actions appear laudable, many people support waste minimisation and feel strongly about the merits of recycling. Also Government policy is consistent with those of other democracies and applies the recommendations of international organisations such as OECD and the 1992 Rio International Conference on Environment and Development. However, the government's involvement in this field has not been consistent and performance has been erratic in the past, marked by rhetoric with little corresponding action. Serious doubts can also be raised about the

performance of government sponsored waste minimisation regimes in the countries New Zealand seeks to emulate. The benefits of local government recycling initiatives in New Zealand can also be queried. Often these interventions appear neither efficient or effective. The resulting institutional arrangements also seem to favour particular interests at the expense of the wider community and environmental welfare.

This suggests the need for careful appraisal of the value and purpose of government intervention in waste management, and in municipal recycling in particular, to assess whether such policy initiatives are worthwhile. This research paper seeks first to establish whether government failure occurs and, if so, whether the observations can be adequately explained using public choice theory. It is suggested an assessment of how and why failure occurs and persists may give insights to the wider public policy process.

## A. Waste Minimisation as Public Policy

Waste management is perceived to be in a state of crisis in the Western World. Waste managers face increasing volumes of waste and landfill space shortages loom while at the same time authorities have difficulties in gaining new facilities to dispose of waste world-wide (UNCED, 1992, p354) and in New Zealand (MfE, 1987, 1992; Tong, 1989). Whereas the concerns in the 1970s were that the world would run short of resources to sustain its activities (Meadows *et al*, 1972), the world now seems to face a cornucopia of resources it does not want:

> In all likelihood it is not the running out of material and energy that will matter in the foreseeable future. It is another type of resource that is in scarce supply - the resource of the natural environment as a repository for all waste products associated with materials and energy use. It is the 'waste sink' characteristics of the environment that perhaps occasion the greatest concern. ...Recycling, product redesign, conservation and low-waste technology can interrupt the flow of wastes to these [waste sink] resources, and that is perhaps the major feature of a sustainable development path of economic progress" (David Pearce, quoted by Robinson, 1991).

At the "1992 Rio Earth Summit" countries agreed that as an integral part of developing a sustainable future for the world,

> a preventative waste management approach focused on changes in life styles and in production and consumption patterns offers the best chance for reversing these trends (UNCED, 1992, p350).

Waste reduction, and recycling in particular, have certainly caught the imagination and support of the public and receive considerable support. As well there is strong support for increased government support for recycling. The consequent scope of intervention is significant. Recycling schemes and legislation to support and mandate recycling are burgeoning around the world. Government agencies at all levels in the Western World, from local government to supra-national government such as the European Union, have devoted considerable resources advancing waste

minimisation and recycling.

The scale is impressive. Each state of the USA has some form of waste reduction legislation besides federal directives. As well, nearly 4,000 cities, serving 71 million people in the USA, collect rubbish from homes specifically for recycling. Three quarters of the schemes have begun since 1989 (Charles, 1992). Similar trends are apparent in other democratic countries. Western European countries are taking even more radical steps, attempting to establish new ways of resource management, including the "materials cycle economy" or perpetual recycling.

Recent surveys show New Zealanders, like their counterparts overseas, want to recycle. It is claimed surveys show over 90% of those surveyed favour recycling in the cities of North Shore and Hamilton, as well as smaller communities such as Murchison, Kaitaia and Paeroa (MfE, 1992a). Many people see recycling as a way they can do the right thing, or implement the Brundtland Commission's slogan for promoting sustainable development, "think globally, act locally" (Brundtland, 1987).

Individuals, environmental groups and organisations also press for greater government involvement. For example, about 30% of correspondence to the Office of the Minister for the Environment in 1989 focused on waste management (MfE & MERT, 1992, p70). Recent environmental group guidelines for community input into local government policy and planning documents encourage people to request regional councils to promote the reuse, repair and recycling of products and to support them through education and financial incentives. District Councils should be

encouraged to provide community reuse and recycling initiatives and to require provision for recycling when granting land-use consents fro developments such as supermarkets and tips (ECO, 1993). Many local government agencies have responded to these pressures and municipal recycling schemes of some sort are now part of contemporary New Zealand.

The implications of these demands and their response however, deserves consideration. Government intervention in any substantial way will:

- require public resources to support and implement policy initiatives;

- limit individuals' choices and impact on their freedom; and

- possibly distort existing markets for resources.

Accordingly, any intervention must be able to be justified in terms of increasing net social welfare. Indications are that recycling may not meet this criterion.

## B. Paper Outline

A possible mismatch between the political want for municipal waste reduction and recycling, manifested in municipal recycling schemes and in some countries, substantial legislation, resulting in apparent high implementation costs with little benefit, suggests government failure. This paper seeks first to establish whether

government failure, in the form of ineffective and inefficient waste management policy occurs. Second, it tries to explain why government failure exists in waste management policy and is allowed to persist. It focuses on New Zealand policy and practice in particular, though developments in other countries, particularly Europe, are also discussed. The widening of scope is important because New Zealand policy often is influenced by international trends.

Chapter II provides a general background to waste management to provide a context within which to understand waste management public policy. Chapter III examines the need for government intervention and Chapter IV assesses the value of municipal recycling initiatives overseas and in New Zealand. Chapter V identifies the reasons for government failure and Chapter VI seeks to assess the observations against prominent theories of government failure. Chapter VII presents the conclusions drawn from the paper and suggests matters any future waste management policy-makers in New Zealand need to consider, based on these findings.

# Chapter II. Waste Generation and Disposal

Waste reduction, reuse and recycling, or waste minimisation, are components of wider solid waste management activities. Recycling policy can better be understood when placed within this wider context.

## A. Defining Waste

Defining waste is difficult. It differs depending upon how different societies and individuals in those societies value particular resources. Waste is accordingly an anthropogenic concept rather than defining any intrinsic physical property.

It is a consequence of resource use in an environment where matter can neither be created or destroyed but can merely be transformed, stored and relocated within that environment. Natural and physical resources are taken from part of the environment

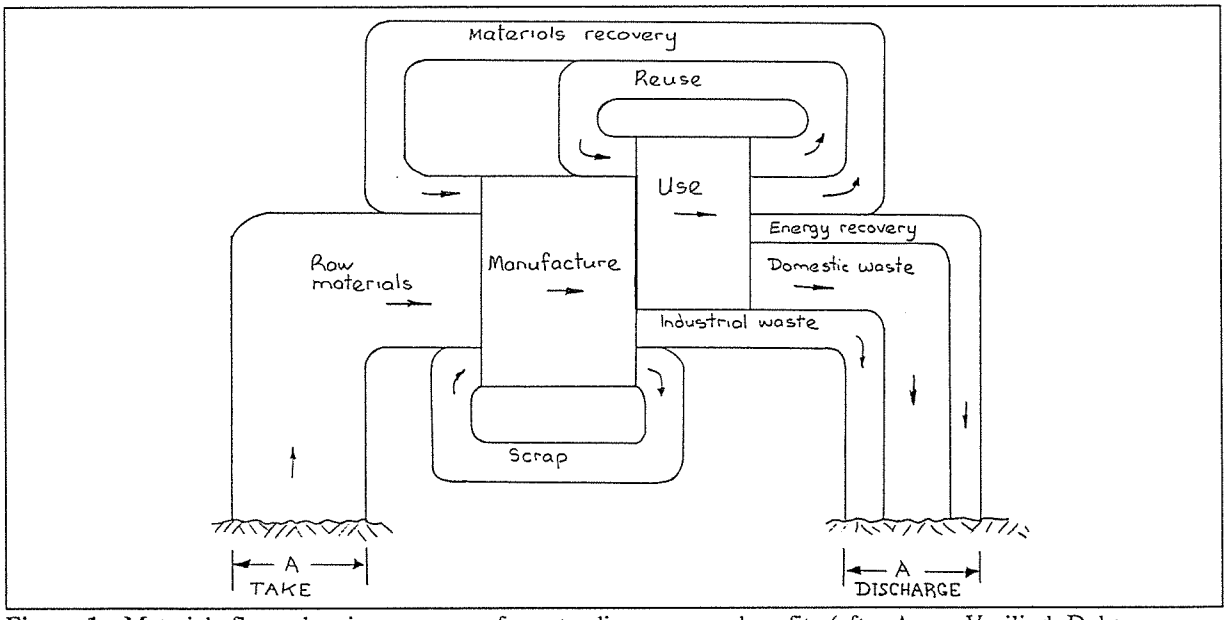


**Figure 1:** Materials flow, showing processes for extending resource benefits (after Aarne Vesilind, Duke University, pers comm., 1991).

for processing and manufacturing into products to provide utility or benefit to their holders. When the benefit stream to the holder is exhausted, the products are ultimately discarded, or returned to another part of the environment, often in a different form (figure 1).

Consuming resources creates waste. People produce wastes first because of processes that produce goods and secondly from discarding those goods when people no longer want or need them. Additional utility may be gained if these products are reused or reprocessed to form raw materials for making other products - recycling. However often no one needs them, or they are more expensive to process and use than virgin raw materials. These wastes are resources that provide no net benefit to the resource holder and need to be disposed of. From this a waste hierarchy has been recognised almost universally, of:

reduce

reuse

recycle

treat

dispose.

Within an economic framework, wastes are particular physical resources having zero or negative utility to resource holders at particular times and places. It is:

a resource that has no net positive value to the resource holder.

This encapsulates the socially derived value of the resource expressed through the market, while allowing for spatial and temporal differences in ascribing that value. Importantly, not everyone values particular resources and the form they are in the same way. Although waste resources may have a market value, the costs to those discarding them in terms of sorting, cleaning, transporting and selling these resources may outweigh them. For example, Richard Tong assessed the market value of recyclables contained in a tonne of domestic waste from Manakau City as $21 (MfE, 1992) or about $0.40 per week per person for Manakau City residents (using Tong's data of waste generation at

1 tonne/person/year).

Geographical location of the resources also affects their value. The friction of distance, expressed in transport costs can devalue any positive value of the waste resource. For example, haulage costs of $0.30/tonne/kilometre define a maximum collection limit of a 70 kilometre radius from the recyclables market before transport costs exceed their market value[1].

Although waste generators, such as the householders above, do not value the resources they discard, others may, creating a market for recyclables. Consequently a thriving recycling industry has existed over a long time, such as rag and bone merchants, scrap metal dealers and the like acting as intermediaries, to provide manufacturers with raw materials. Recyclers are essentially undertaking a form of

[1]The actual distance is often much less than this as other costs also need to be met. However, distance effects can be reduced in particular circumstances, for example by firms back-hauling recyclables.

arbitrage, taking resources from a market that does not value particular resources to another that does.

The value of waste resources also can change through time, as new uses are found for them as substitutes for virgin stocks and demand generated. Clearly, wastes are no different from other resources or commodities. These resources will be used in preference to equivalent virgin resources where they are cheaper or equivalent in price. Market driven recycling will occur when:

$$P_v \geq P_r$$

and:

$$P_r \geq L + C + S + T + K + R$$

where: $P_v$ = market price of virgin raw material

$P_r$ = market price of recycled material

L = labour costs

C = collection costs

S = sorting and processing costs

T = transport costs

K = capital costs of collection, sorting and processing

R = risk cost, reflecting risk of product failure from impurities in the recycled material (R = 0 for offcuts generated within a factory and

increases for post-consumer recyclables where little is known about the previous use of the materials, raising the possibility of contaminants being introduced).

Municipal solid waste (MSW), the subject of this study, is a subset of waste. It comprises primarily of three solid waste streams:

- residential solid waste; primarily from single family homes and multi-family residences. Historically, local government has collected this solid waste;

- commercial solid waste; solid wastes generated by commercial enterprises such as offices and government centres, shopping centres, central business districts and larger multi-family residences (such as apartment blocks). These generators are serviced most frequently by commercial haulers and the collected wastes are usually mixed with solid wastes from industrial enterprises; and

- industrial solid waste; solid wastes generated by industrial activities, principal sources include offices, cafeterias, warehousing/shipping and off-spec products (Hickman, 1992)[2].

Importantly, the exact definition and actual composition of MSW varies between

[2]It excludes liquid wastes such as sewage, effluent and trade-wastes, also air emissions, such as smoke and exhaust gases.

authorities, depending upon what individual authorities collect, and local customs. For example, some include construction and demolition wastes, street cleaning wastes, sludges, green waste from lawn services and other solid wastes. This variability in definition together with often poor data recording and analysis systems, means specific comparisons between waste management regimes, both within and between countries need to be treated with the greatest caution. General trends only should be read into data and comparisons therefore.

## B. Waste Disposal Problems

Three main problems are associated with solid waste disposal:

- pollution generated by wastes;

- shortage of space to construct or operate disposal facilities; and

- the impacts on overall resource conservation.

Although these problems feature internationally, they are also claimed to be significant in New Zealand (MfE & MERT, 1992, pp69-70).

### *1. Environmental Consequences of Waste Disposal*

Waste disposal is the return of unwanted resources to the environment. Waste is

disposed of in several different ways. The cheapest way is dumping the waste on unwanted land. Increasingly, it is disposed of in a landfill constructed and managed to contain the waste and any consequential mobile materials. Wastes also may first be incinerated to reduce the waste volume. Residual ashes and any smoke-stack filter wastes need to be disposed of to land. Several countries have disposed of considerable volumes of waste at sea. Problems arise in each case if the quantity of waste is greater than the receiving environment can assimilate.

The discharge of waste resources back to the environment after use can lead to environmental degradation where institutional arrangements allow rights of disposers to ride over other resource users. Small quantities of wastes are able to be assimilated into the surrounding environment. However, higher levels of discharge can overload the assimilative capacity of the environment, leading to the break-down of natural eco-systems and consequent environmental degradation.

Additionally, some wastes contain hazardous components, such as heavy metals, dioxins and elements of household and industrial wastes. Other wastes, can react or degrade with other wastes to form or mobilise hazardous substances. If not adequately contained in a properly built and managed facility such as a sanitary landfill, they can escape into the wider environment. In sufficient quantities these pollutants can contaminate ground-water and surface-water, leading to degradation of ecosystems and endangering human health.

Incinerated wastes can cause air pollution, especially with older equipment without

necessary filters to remove particulate and gases such as sulphur and nitrogen compounds. Concern is also expressed that carcinogenic compounds such as furans and dioxins may be formed during the incineration process. Additionally, hazardous substances, such as heavy metals, are extracted and concentrated in the residue when exhaust gases are scrubbed. These then need to be disposed of, creating new waste management problems.

Additionally, landfill gas is generated as organic matter in landfilled waste decomposes. This contains high quantities of methane (45-55% of total volume) which if not collected and flared or burnt for energy recovery can cause explosions near the disposal site. Methane is also a significant "greenhouse gas" implicated in anthropogenically induced global climate change.

Technical solutions exist to address these environmental impacts (see CAE, 1992), primarily by treating the wastes so they become stable and inert if released into the wider environment, rather than relying on the assimilative capacity of the environment to treat them. The present trend in New Zealand is towards the construction of sanitary landfills with sophisticated liner and leachate collection systems and comprehensive site management. Hazardous wastes can be incinerated under controlled conditions at high temperature or destroyed by other novel techniques such as plasma arc or base catalysis destruction. Landfill gas can be collected and flared or burnt for energy recovery.

## 2. *Social Consequences of Waste Disposal*

Concerns are raised throughout the western world that landfill space is running out. Simultaneously, waste managers are facing problems in gaining the necessary permits to develop new landfill and incineration facilities as the public objects to the location of the facilities near them.

Always, waste disposers have an incentive to dispose of their wastes in the cheapest possible manner. The waste by definition has zero or negative value to its owner. Any attempt to avoid or mitigate adverse environmental or social costs, i.e. internalising all the costs of disposal, will only reduce the value of the waste further. Some people at least will seek to avoid these costs, generating externalities. This can be as simple as littering, or fly-tipping. On a larger scale, disposers may not prevent the pollution of the environment generated from contaminants generated from the waste. The consequent environmental degradation and possible hazard to human health is then borne by the wider community. The nature and magnitude of these externalities depend upon how rights and duties of those disposing waste and those reaping the consequences of that disposal are allocated.

Individuals recognise these externalities regardless of prevailing institutional arrangements. People typically prefer to avoid the smells, heavy traffic, litter, vermin and general nuisance associated with poor disposal facilities. However, the true costs of disposal facilities are often not recognised by waste management regimes and environmental and social costs are usually ignored (Dunbar & Berkman

(1987), Gunnerson & Jones (1984)). This externality is reflected in the NIMBY syndrome - Not in My Backyard, an issue that is seen as a major obstacle to developing new disposal facilities. Hirshfeld *et al* (1992) found property prices in American cities are affected by proximity to new landfills. They found property prices are inversely related with distance to sites and the amount of depreciation is inversely proportional with distance within a radius of up to three kilometres. Further, more valuable properties are affected disproportionately more than less valuable properties up to five kilometres away. The consequence of the NIMBY syndrome is that people will utilise the institutional arrangements available to them to avoid having a facility sited near them. In concert, this can lead to a shortage of disposal capacity.

Overseas, institutional arrangements may distort market forces and decision-making. For example, the Toronto Metropolitan's recycling scheme and reduction rate is driven by the critical need to conserve landfill space in the face of near impossibility of obtaining a new landfill. This impossibility appears to stem from the Provincial Environmental Assessment Act. It requires municipalities proposing new landfill facilities to undertake a planning process to justify the need and rationale for the facilities through a comparative evaluation of all reasonable alternatives, including reduction, reuse and recycling, and energy from waste incineration and export. Since enactment in 1980, only one major landfill has been approved in the Province of Ontario and then only after an 11-year evaluation and approval process (Ferguson, 1992).

Additionally, international trade of waste has been a significant industry as first world countries try to find somewhere to dump their waste. This export of wastes and their accompanying externalities to third-world countries is now increasingly being controlled (Lang, 1991), as has dumping at sea, further reducing waste managers' disposal options.

Although people do not enjoy bearing externalities, they are also reluctant to internalise them. People traditionally have not had to pay the full costs of waste disposal and many are reluctant to start doing so now. Engineering solutions exist to allow waste managers to internalise the costs of waste disposal that have previously been borne by the environment. The important point is that these solutions have very high costs. For example, a modern sanitary landfill in New Zealand could have costs of $35-50/tonne at the gate. Disposal of hazardous waste by incineration has been quoted at up to $15,000/tonne. Also, prices are increasing as waste managers upgrade existing facilities to internalise externalities and to treat and transport waste over sometimes long distances for disposal.

These costs are significant when traditionally the public in New Zealand and overseas have had free or minimal costs of disposing of municipal wastes. Typically, the costs have been met by the environment or from tax-payers or ratepayers through general taxes and rates. Already some public resistance to paying these costs are becoming apparent, and have been the basis for some submissions against resource consent applications, such as Rangitikei District Council's 1993 Bonny Glen landfill proposal.

## 3. *Resource Conservation Issues*

Concern is also driven by increasing recognition that current resource use practices and rates of consumption are not sustainable. These concerns are reflected in part by concern at the rate of consumption of natural resources. This was first developed at the time of the 1972 Stockholm Conference and related scenario modelling (Meadows, *et al*, 1972) and has been recently restated (Meadows, *et al*, 1992).

| Material | Energy Consumption in Production (GJ/Mg) | | | |
|---|---|---|---|---|
| | Using 100% raw materials | Using 100% recycled materials | Savings from recycled materials | Relative savings (%) |
| Ferrous metals | 22 | 10 | 12 | 54.5 |
| Non-ferrous metals | | | | |
| aluminium | 250 | 20 | 230 | 92.0 |
| copper | 120 | 30 | 90 | 75.0 |
| lead | 28 | 10 | 18 | 64.0 |
| zinc | 60 | 18 | 50 | 83.0 |
| tin | 200 | 180 | 20 | 10.0 |
| Paper | | | | |
| newsprint | 32 | 20 | 12 | 37.5 |
| printing % writing | 65 | 37 | 28 | 43.0 |
| Glass | 12 | 10 | 2 | 16.7 |

**Table 1:** Recycling and energy savings from using recycled materials (Source: after MfE (1987), adapted from Lidgren (1986)). Note savings do not include collection and transport costs.

Although not a waste disposal problem *per se*, this aspect of resource use is closely linked. The use and disposal of resources can lead to consumption (i.e. use and disposal in a form that is not available for others to use) of scarce resources at a rate that prematurely exhausts stocks so future generations cannot enjoy them. Although exhaustion of finite stocks (eg minerals) is inevitable, maximising benefits of these

resources extends the life of the stock (see Denne *et al*, 1989). Scarce resources may include landfill space in crowded countries. Waste disposal is important as it helps drive resource throughput.Reducing waste generation and so delaying final disposal of resources enables more benefit to be derived and so reduces demand for taking new resources from the environment. For example, significant energy savings can be made if recycled materials are used as raw materials instead of virgin materials (table 1).

The validity of this approach is pivotal to much resource policy, with market optimists arguing strongly against any foreseeable crisis and so against any need for intervention to reduce resource throughput - see Tietenberg (1988) for an analysis of this. Both sides argue convincingly and any resolution is beyond the scope of this paper.

## C. A Waste Management Solution

Society expects several things of their waste. People want to have a service so that the wastes they generate as they go about their daily lives are disposed of. Waste managers are increasingly required by legislation to reduce the environmental impacts of the disposal of waste. There is however also pressure from waste generators to minimise the costs of waste disposal.

Recycling in this context appeals as a silver bullet policy tool, providing apparent solutions to a variety of problems. Essentially, recycling is seen to provide a means

for meeting society's immediate needs, of (cheap) waste disposal and employment, while providing for the resource needs of future generations.

Stated objectives are primarily to:

- ensure better use of (scarce) resources, by reducing resource throughput;

- reduce the environmental and economic costs of disposal of wastes, through reducing the amount of wastes needing disposal;

- raise environmental awareness of the public; and

- job creation (Alter, 1989).

### *1. Reducing Resource Throughput*

Resource conservation is a prominent goal for many environmentalists. Recycling is seen as a means to obtain greater utility from each quantum of resource. Instead of being used once and discarded, it can be continually reused. This reduces pressure on the environment both where it was taken from and returned to.

The concept is expanded to include a steady-state "resource-cycle economy" where resources continue to cycle within the social environment. This is the stated basis for the German resource management system, of which the Packaging Ordinance is

the first step intended to be extended to include electronic appliances and vehicles. Environmental and social consequences of resource take and discharge would then be reduced significantly.

### 2. *Reducing Environmental and Economic Costs of Waste Disposal*

Recycling and reuse can divert waste away from disposal facilities and so reduce the volumes needing disposal. This diversion would extend the life of existing landfills and so postpone expensive and protracted costs of developing new facilities. Simultaneously, less waste is deposited that can escape into and pollute the wider environment.

### 3. *Public Education*

Municipal solid waste is an immediate part of everyones' lives. We all generate it as part of our daily activities and we have to arrange for its disposal somehow. Recycling is a tangible means for ordinary people to participate in actions to conserve our environment's natural and physical resources. Participation makes us think about how each of us use our resources.

### 4. *Job Creation*

Environmental management is seen by many as a growth area in this decade. This is not surprising, given the increasing expenditure in remediating problems generated

in the past, in reducing pollution and addressing chemical contamination. Recycling in particular is seen as providing great opportunities for job creation. It requires considerable labour inputs in the collection, sorting and processing of wastes before they can be sold. The 1993 Labour Party Policy promoted it as part of its election campaign for example, as a means of addressing both environmental and social issues together.

## D. Conclusion

Waste generation is an integral part of peoples' lives. The wastes people produce require disposal, which if not managed properly may generate spatial and temporal environmental and social externalities. Waste managers have various options available to them to treat and dispose of these wastes. A widely accepted waste management hierarchy places some emphasis on recycling of wastes as a means of extracting extra value from resources and reducing environmental and economic costs of waste disposal. Recycling is also seen as a means for furthering other social and environmental goals. Some recycling will occur within a market economy where the costs of collection and processing the waste recyclables do not exceed the market value of equivalent virgin materials.

# Chapter III. Government Involvement

Public welfare rationales based on neo-classical economic theory for government intervention provide minimum criteria for state intervention. They are premised on the assumption that Government participation in the resource allocation processes of society can be justified on two grounds only:

1 *Equity*: A more desirable distribution of goods and services among the members of the society is fostered;

2 *Efficiency*: Efficiency is promoted in situations where the market has failed (Stokey & Zeckhauser, 1978, 293).

Although additional rationales for government intervention exist, such as preserving liberty or maintaining cultural identity, the existence of environmental and social externalities from the disposal of waste, with possible temporal externalities from excessive depletion of non-renewable resources provide *prima facie* reasons for government intervention. Intergenerational equity is claimed to be compromised, because of excessive use and waste generation. Contemporary environmental and social externalities generate equity issues as those near disposal facilities bear the costs of disposal as the market fails to recognise these costs.

## A. Need for Government Intervention

Although the private sector has substantial involvement in recycling, it only recycles materials it can make a profit with, such as some metals. These materials are therefore somewhat arbitrary in comparison with the total MSW stream. It cannot be relied on therefore to remove all the recyclable materials necessary to achieve the objectives identified above.

Intervention is seen as particularly necessary to support waste minimisation activities as the market encourages the collection of only some recyclable materials (for which markets exist), while others remain in the waste stream, including finite resources. Also markets for recyclables commonly found in the waste stream are weak and are unstable. For example, in Wellington the price for waste paper dropped from $20/tonne in mid 1992 to zero by the end of 1993 and now the dealer will not even take the paper free at the gate. Essentially, those interests seeking intervention to advance recycling consider the market does not value all materials in the waste stream sufficiently highly.

Governments can implement policy by:

- attempting to improve the working of the market;

- requiring individuals and firms to behave in specified ways;

- providing incentives that influence the decisions of private individuals and firms; and

- engaging directly in the provision of goods and services (Stokey & Zeckhauser, 1978, 310); and

- moral suasion.

Within the waste management context, several policy options exist.

i Improve market operations. Government can provide information to waste generators and markets. It can imply future coercive action should particular performance not be achieved. An example is setting an ultimatum to achieve a waste reduction rate for some parts or all of the waste stream by a particular date ("rate and date legislation"). It also can require institutional arrangements are changed so that waste generators pay the full costs of disposal, such as by charging full landfill costs to disposers.

ii Regulation. Government can restrict the use of particular media, control the management of disposal facilities to minimise off-site effects, and control how wastes are disposed of.

iii Provide incentives. Government can subsidise recycling operations and other waste reduction activities, for example through forming a recycling trust.

iv Provide services. Government can be involved directly in waste management activities, for example, in owning and operating disposal facilities and recycling ventures.

v Moral suasion. Government can seek to persuade individuals to participate in voluntary recycling or waste reduction schemes. This tool can be important for municipal recycling schemes as they rely on voluntary labour (householders) for cleaning and sorting recyclables in order to keep collection costs down.

## B. Government Involvement

Governments world-wide at national and subnational levels are involved in recycling activities. Waste collection and disposal is often a government function rather than private sector activity. But increasingly, governments involved in recycling, and source reduction initiatives. Actions vary, but tend to focus on regulation and service delivery.

### *1. International Activities*

Activities of international policy agencies, such as the OECD and the United Nations Environment Programme (UNEP) focus primarily on providing information. This can be quite strongly articulated however. Both these agencies promote the waste hierarchy and the polluter pays principle.

The OECD addressed packaging in the 1970s and 1980s and suggested eight measures that could be used by countries to address packaging, including recycling (see MfE, 1987). Also it has promoted the "polluter pays principle", requiring the polluter should bear the expenses of carrying out [pollution prevention and control] measures decided by public authorities to ensure that the environment is in an acceptable state (OECD, 1975).

Most recently, at the Rio Earth Conference, countries agreed to objectives for waste management that included:

> 21.17 (a) to strengthen and increase waste reuse and recycling systems; and
>
> 21.18 Governments... should
>
> > (a) by the year 2000, provide sufficient financial and technological capacities at the regional, national and local levels, as appropriate, to implement waste reuse and recycling policies and activities;
> >
> > (b) by the year 2000, in all industrialised countries, and by the year 2010 in all developing countries, have a national programme, including, to the extent possible, targets for efficient waste reuse and recycling (UNCED, 1992: 354).

The Australian and New Zealand Environment and Conservation Committee

(ANZECC), a committee of state government environment and conservation ministers, also has endorsed the waste hierarchy and has set rate and date targets, in consultation with Australian industry.

All these initiatives have no legally binding effect on New Zealand as they have not been ratified by legislation. They do however leave New Zealand open to moral pressure to comply.

## 2. *Central Government Initiatives*

### Overseas context

Many western countries have taken significant regulatory action. Legislation typically consists of "rate-and-date" legislation - requiring reductions of waste disposed of or recycling rates for particular materials by particular dates, and "bottle-bills", applying mandatory deposits on beverage containers (table 2).

| Country | Base year | Target year | General waste | Plastics | Aluminium | Glass | Paper |
|---|---|---|---|---|---|---|---|
| New Zealand | 1989 | 1993 | 20 | | | | |
| Australia | 1991 | 1995 | | 25 | 65 | 45 | 40 |
| Germany | 1991 | 1995 | | 64 | 72 | 72 | 64 |
| European Union | | 2005 | | 60 | 60 | 60 | 60 |
| Sweden | 1994 | 1997 | | 65 | 80+ | 70+ | 65 |
| Belgium | | 1995 | | 60 | 80 | 80 | - |

**Table 2:** Percentage reduction and recycling target dates and rates for municipal solid waste (Sources: various).

The most radical steps have occurred in western Europe, originating in Germany. After apparent procrastination by the EEC Commission in developing waste directives, Germany developed its own, radical, Packaging Ordinance[3] - the "Töpfer Decree", requiring packaging to be accepted back by retailers from consumers, and suppliers the packaging from retailers. The intention is to create a "cycle economy" for resources, analogous to the financial economy in which money continually circulates. The intention is to extend the coverage of the Act through other Ordinances to cover electronic appliances and vehicles.

The Ordinance allowed the private sector to respond by arranging for private collection of wastes if they are then to be recycled provided specified waste reduction targets decided by federal government are met. A private consortium of the major packaging firms formed the Duales System Deutschland (DSD) that now collects packaging (marked with the DSD logo) for which the manufacturer pays. The DSD now collects from some 96% of all German households.

Other European countries are consequently implementing their own versions of the Ordinance. They are however working with the private sector to develop mutually acceptable targets. The French Eco-Ballage and Dutch schemes are at the forefront.

[3]Verordnung über die Vermeidung von Verpackungsabfällen (Verpackungsordnung) to the Gesetz über die Vermeidung und Entsorgung von Abfällen, 1986.

## New Zealand

Central government has a long history of considering controls on particular elements of the waste stream, notably packaging, producing 10 major reports on packaging alone since 1975. However, it has not chosen to regulate to support directly or mandate recycling. Rather it has shown a certain ambivalence, preferring to suggest general direction only, though with veiled threats. Government waste policy is currently stated as:

1 adoption of the waste management hierarchy; and

2 waste generators should pay for the costs of disposal (Ministry for the Environment, 1992).

The policy is consistent with its international obligations. Additionally, the Government agreed targets for waste reduction are to be developed in consultation with business sectors which produce significant wastes. A voluntary approach is to be taken to achieve these targets, while the Ministry for the Environment is to investigate regulatory and economic mechanisms to back up voluntary initiatives, should these fail (Ministry for the Environment, 1992). Various areas were identified as appropriate for setting targets, including the packaging sector.

The previous government had also adopted the waste management hierarchy and had

set a target of 20% reduction target of waste by 1993[4]. This had a significant impact on the packaging industry, which the Minister advised would otherwise face mandatory recycling legislation. It developed several recycling/collection schemes, notably CHH-Industry's "RAP (Return all Plastics) Scheme", collecting plastics containers through schools, to counter the threat of future government intervention.

Regulatory action, despite calls by organisations and recommendations in various reports, has not addressed recycling directly. Rather, Government has addressed the wider resource management issues comprehensively with the Resource Management Act 1991 (RMA). Also it established an integrated administrative structure to manage resources and to provide services locally in an open and transparent way with reforms to local government with the Local Government Amendment Act 1989 (LGA). The RMA addresses effects of waste management operations, the LGA addresses the operations.

The environmental objectives established in the RMA have to be achieved within a political economy dominated by a relatively libertarian ideology. Environmental planning is seen as being essentially market-led, where collective decisions are only taken to cope with the consequences of private action (Memon, 1993, p105). In this policy environment recycling, and waste disposal matters generally are treated no differently than other resource use activities. The primary concerns are the environmental effects of taking and discharging resources to and from the

[4]This was a bluff as the 1988 base data were known by officials and the Minister to be unreliable and unable to be used in any rigorous way. Accordingly, no base to establish the rate of any reduction existed.

environment. Actual resource use decisions are left to individuals.

### 3. *Local Government in New Zealand*

Local government in New Zealand consists of two complementary parts under the Local Government Act. Regional Councils are responsible for policy and regulation of natural and physical resources under the RMA. District and city councils are responsible for social needs of their communities and are primarily responsible for service delivery activities for their communities.

Regional councils have all endorsed the waste hierarchy and many call for district councils to develop recycling regimes in their draft Regional Policy Statements prepared under the RMA. The full significance of this on district councils is yet unclear as regional and district councils are autonomous agencies.

Importantly, regional councils cannot undertake the activities themselves (under the LGA). Intervention by regional councils can therefore be little more than suasive. However, this has not stopped calls for them to be more proactive when they prepare regional plans (eg, ECO, 1993). Again, it is difficult to see how this can be achieved, for the same reasons. Also, regional councils do not have to prepare regional plans to address waste management issues, and some, such as Manawatu-Wanganui Regional Council do not intend to do so.

District and city councils remain responsible for waste management activities, which

can include recycling under the LGA. They are also required to manage their assets and activities in a manner comparable to the private sector, using accrual accounting instead of cash-accounting systems used before 1989. The full effects of these substantial changes to previous institutional arrangements have not yet been felt as existing waste management activities have been sheltered from the full effects of the RMA by its transitional provisions.

District and city councils have had a strong service delivery involvement in the discharge/disposal of waste and many are now increasing their involvement in resource use activities, such as waste reduction and recycling. The private sector has also been involved, though not with such a high profile, though the range of activities has been increasing. Several metropolitan cities undertake or are trialling kerbside recycling collection schemes and many district and nearly all city councils are involved in providing recycling centres or other initiatives for the recycling of their citizens' recyclable wastes. The full magnitude and cost of these initiatives are unknown.

These recycling schemes tend to be part of district waste management strategies and reflect strong demand for them from the community. Several, including the North Shore City, were introduced as part of strategies to meet impending waste crises caused by landfill shortages.

# Chapter IV. Assessing Recycling

An assessment of municipal recycling regimes, both in New Zealand and overseas, suggests they are flawed. This occurs for several reasons that together raise real doubts about the value of many waste reduction regimes and the benefit the wider public gains from them. First, performance at the central government level in New Zealand has been erratic and ineffectual. It has failed to change anything or provide any substantial lead, though this may not be such a bad thing disconcerting though it is. This is because it has avoided committing itself to flawed activities, unlike many other national governments.

Recycling in other countries and by local government in New Zealand are predicated on false underlying rationales and objectives of waste municipal waste minimisation regimes suffer from confused objectives and understanding of the waste stream. Therefore the regimes unlikely to be effective or efficient.

## A. New Zealand central government initiatives

National policy regarding waste minimisation and recycling is *ad hoc* and reactionary. It is issue driven and has primarily focused on peoples' concerns about the environmental consequences of one element of the waste stream, packaging. Successive Ministers for the Environment have received a steady stream of letters from the public regarding litter and packaging (see Bührs (1991) for a summary). On several occasions the packaging issue was triggered by specific industry

initiatives on beverage containers, such as no-deposit soft drink bottles, cartoned milk and the PET bottle. On each occasion considerable public uproar followed, propelling Ministers into action and leading to reports on these matters (Bührs, 1991, p337).

Ten major government studies have been prepared since 1975 on the environmental impacts of packaging alone. The Ministry for the Environment is currently working on a packaging initiative with industry, primarily driven by of the continual stream of ministerial correspondence on the matter. Various policy options have been proposed, including mandatory deposits, product charges and forming recycling trusts. All were quietly buried.

Government support for recycling and waste minimisation initiatives have been variable and commitment appears to fluctuate, depending upon the interest of individual ministers rather than showing any partisan support. Enthusiasm for recycling, unmatched when in office, by both the major parties is seen. The consequence is tacit support for and maintenance of the *status quo*.

In this regard packaging issues are little different from the major composting issues that arose in 1945, when a concern for shortages of farm fertilisers because of the war, combined with a strong concern about Auckland's proposed Browns Island sewage scheme led to establishing an Interdepartmental Committee in 1947 on composting municipal rubbish and sewage. It continued in existence with one hiatus until 1972, though without bringing about any change to the status quo.

## B. Revisiting the Rationale for Recycling

The rationale for local government recycling schemes in New Zealand and the national regimes in other countries do not stand close scrutiny. Although the market has responded to governmental initiatives where it has been forced to, the outcomes do not necessarily result in any environmental or economic benefit. Accordingly recycling is a blunt policy tool, trying to be all things to all people, and being successful at none.

### *1. Resource Conservation*

There is recognition that some resources are relatively scarce and have strategic importance, both now and in the future. These are typically rare-earth metals (table 3).

| USA (official) | | UK (official) | | Private analyst | | Private analyst |
|---|---|---|---|---|---|---|
| First tier | Second tier | First tier | Second tier | First tier | Second tier | First tier |
| chromium | diamonds | chromium | antimony | chromium | germanium | chromium |
| manganese | beryllium | manganese | cobalt | beryllium | cobalt | manganese |
| cobalt | vanadium | phosphate | molybdenum | columbium | manganese | cobalt |
| PGMs | graphite | rock | nickel | | PGMs | copper |
| | rutile | PGMs | niobium | | vanadium | PGMs |
| | bauxite | | tantalum | | | gold |
| | tin | | titanium | | | |
| | tantalum | | vanadium | | | |

**Table 3:** Officially Designated Strategic Resources (Sources: Deadman & Turner, (1988) - quoted in Denne, *et al.* (1989)). First and second tier resources are differentiated by the degree of substitution thought feasible; PGMs are platinum, iridium and palladium.

Although there is not full agreement on the strategic status of all these resources, a consensus does exist for at least seven of them (chromium, manganese, cobalt, platinum, iridium, palladium and vanadium).

How society maximises the benefits from these materials goes to the very heart of the debate between more market and more management schools of argument that have been a mark of environmental policy debate over the last twenty-five years. Pro-market arguments are succinctly summarised by Tietenberg (1988), who points out that past predictions of resource shortages have been based on faulty conception and analysis regarding how people and markets respond to diminishing resources. Importantly, in a market economy prices rise for commodities as they become more scarce, encouraging users to substitute other commodities that can provide the same needs.

The debate is long and beyond the scope of this paper. The important point regarding the public policy of waste, and of recycling in particular, is that recycling policy does not encourage collection of strategic materials. Typically, municipal recycling schemes collect glass, aluminium, steel, paper and plastics. These materials are not scarce; silicon (the raw constituent of glass), iron and aluminium are all very common. Paper is made from wood, a potentially renewable resource. Plastic is derived from oil, a non-renewable resource. However, plastics production uses only 4% of oil production world-wide. World-wide, one year's plastic production needs equal one day's flaring of oil-rig gas. Clearly, recycling will have little effect on conserving the hydrocarbon resource.

Recycling schemes also impose particular value judgements about particular resources and their uses, "picking winners". It implies government agencies are better able to identify important resources than the market. Although some materials have been identified as strategically important (see table 3), the values of other materials in either the short or long terms are less certain - witness the futures markets for various commodities. There therefore seems no justification that governments are in a better position to make such forecasts.

Many regimes seek to keep metals such as aluminium out of landfills so they can be recycled. An argument can be put that there is little difference in the actual benefit enjoyed in having a metal deposited in a landfill or, for gold, locked up in a bank vault[5] or kept in a museum. Melting down Cellini's famous salt-cellar (in the Kunsthistorisches Museum, Vienna) would provide the World's electronics industry with an ample supply of gold. Arguably the gold used to construct electronic components may yield a higher level of welfare to society than in its current form as a sculpture, depending upon what they were used for. People value the use of particular resources differently depending upon cultural and personal preferences - a concept in relative values reaching back to the Pharaohs' grave robbers who recycled their plunder. At the least, such a philistine act would avoid causing any environmental impact otherwise incurred in obtaining the gold necessary for the electronics industry as any environmental effects were felt over 450 years ago! Although facetious, such an example underlines the need for scrutiny of government

[5]The physical presence of the gold in the vault is not even necessary, so long as the golds' owners think it is there - viz the Goldcorp fraud of the late 1980s.

activities that impose values and limit individuals' freedom of choice.

Concern for governments' abilities to pick winners accurately is emphasised by government policies focusing on packaging and plastics. Despite being cast as the villain, a German life-cycle analysis showed that without plastics, waste volumes would rise 150% and the weight of packaging would increase 300% Also energy consumed by the packaging industry would increase 100% (DGFV, 1987). While caveats need to be applied, the analysis suggests imposing anti-plastic values may have overall detrimental effects, with the solution worse than the original problem.

In New Zealand the issue reached its nadir with the debate on the relative merits of glass as opposed to plastic or liquid-cardboard domestic milk containers resulting from deregulating the town milk supply industry in 1986. The various proponents of the different packaging media all gave convincing arguments why each was the best environmentally and economically in their submissions to the MfE packaging paper (1987).

The Ministry itself commissioned research on the subject (Tong, 1989), which found that it was impossible to make a conclusive finding as each medium came out best under certain conditions and worst under others. While an evaluation was possible at a given time, it would not necessarily hold true over time, as new technology, construction methods, consumer patterns and habits changed. Importantly, many members of the public, unaware of the various assessments, are clear in their opinions regarding the best milk container. The milk companies claim the market

reveals another preference. Interestingly, glass milk-bottles have made a come-back in Germany in response to this demand - though carrying a 50% price premium over cartoned milk (personal observation).

Since then various comparative studies, or life-cycle analyses, have been carried out overseas for a variety of packaging media (eg comparing glass with plastic, and consumer goods, including disposable versus cotton nappies). The conclusions have been difficult to reach and depend significantly on the various assumptions made in making the calculations including recycling rates and costs to the environment from second order effects. The findings have in each case been challenged by conflicting life-cycle analyses.

The failure of life-cycle analysis to reach any definite conclusion has some significant implications:

- the difference in environmental impacts between the different media are probably not significant, otherwise clear advantages would be identified easily; and

- regulating choice of media to control the composition of the waste stream, at least for packaging, is therefore unlikely to increase environmental quality.

Further it casts doubt upon the use of life-cycle analysis as a valid tool for regulators to use in controlling the use of particular media or products, despite claims to the

contrary (see Kirkpatrick, 1992, *The Economist,* 1993). It is time-consuming, expensive and likely to give ambiguous or at least challengeable results, for only a few of the many products being produced, and then only for a particular snap-shot in time.

### 2. *Reducing Environmental Costs*

Developing a recycling loop or economy is not necessarily the best means for reducing environmental impacts generated from resource extraction and materials production and use. For example, producing paper from recycled paper as opposed to virgin wood pulp is claimed to reduce water use by 60%, energy by 40%, air pollution by 74% and water pollution by 35% (TRC, 1993, p17). The net environmental saving may be less once recycling collection costs are added, such as energy and pollution from transporting the collected paper though these have not been quantified.

However, the real question is the appropriateness of using recycling to obtain these environmental savings. A different set of institutional arrangements applied to paper mills requiring cleaner air and water emissions, or an energy pricing regime that encouraged energy efficiency, may achieve particular environmental goals more efficiently. Firms and individuals then have the freedom to develop the most appropriate solutions for them to meet these requirements. For example, upgrading or modifying plant to use less raw materials and to produce less waste per unit output may achieve greater environmental savings.

Again, the environmental consequences of waste disposal result from the particular institutional arrangements governing how well waste disposal is managed overall rather than the qualities of particular constituents of the waste stream. It is less the volume of waste, but the content and the management of the disposal facility that will decide the nature and magnitude of any environmental impacts resulting from waste disposal. Not all components of the waste stream are toxic. Materials commonly collected in recycling schemes, such as glass, aluminium and steel are unlikely to be incinerated and are inert if buried in a landfill. They are not going to have any environmental impact. Some materials, such as cadmium and mercury are commonly found in small amounts in municipal waste in items such as batteries. However, these materials are not routinely collected in municipal recycling collections.

### 3. *Economic Benefits of Extending Landfill Life*

The economic benefits of extending landfill life claimed to come from diverting waste are suspect because a) in New Zealand at least no landfill crisis exists to justify expensive regimes, b) recycling is unlikely to extend significantly landfill life and c) the opportunity costs of recycling are unfavourable compared to landfilling waste.

#### Landfill crisis

The circumstantial evidence strongly supports the notion that any landfill space

shortage is a product of particular institutional arrangements rather than any physical limiting factor. The economic benefit of recycling is extending landfill life, especially, where landfill space is limited and costs, and considerable time and difficulty is involved in establishing new facilities. This may be significant in some countries, where planning procedures may mean delays of up to 10 years in Germany (Schnurer, 1993) or Canada (Ferguson, 1992) for example.

Any physical shortage of space in New Zealand however is intuitively suspect. Great Britain, with an area equivalent to New Zealand but a population of some 17 times greater than New Zealand's, still disposes of most of its waste in landfills. Never-the-less, some policy initiatives in New Zealand were predicated on such a shortage - such as the work by the Auckland Regional Council in the late 1980s and early 1990s. Central government officials also focused attention on a shortage (MfE, 1987), though the later packaging study (Denne *et al*, 1989) queried this.

Subsequent events reveal no shortage. The Auckland Regional Council invested considerable effort in the 1980s and early 1990s addressing the perceived landfill shortage in Auckland. It formed the basis for the Auckland Regional Council's recycling venture (Tong, 1989), also other efforts, such as seeking consents for three landfill sites and an assessment for the need for an incinerator. The landfill consents application processed were expensive with considerable opposition and legal appeals against the proposal; and the preferred landfill at Mount Wellington needed to be highly engineered and was going to be expensive to develop and operate.

However, the responsibility for waste management in the Auckland Region was transferred to the Auckland Regional Services Trust under the Local Government Amendment Act 1992 and undertaken by a Local Authority Trading Enterprise (LATE), Northern Disposal Systems (NDS), owned by the Trust. The NDS, as a LATE, is required by legislation to be profit motivated, promptly decided it did not need the Mount Wellington site. Instead, it redeveloped its Greenmount landfill to provide extra space.

Also, the private sector has entered the arena and developed privately owned landfills for the Region's wastes. Waste Management (NZ) Ltd developed a new landfill at Redvale, Albany, and Waste Care is developing an existing site in Manakau City. Although their resource consents were appealed, these were unsuccessful and were relatively few. The Redvale site was operational within five years of being initiated and can take 40% of Auckland's wastes. Auckland now has an estimated 30 year landfill space available to it. The NDS has had to drop its gate charges ($65 to $45) in response to the competition. Although a key factor in the success of the Redvale project was the insistence of very high standards by the proponent, Waste Management (NZ), its success emphasises there is no shortage of space or any impossibility in gaining the necessary consents provided the proposal is sufficiently rigorous.

Similarly, the King Country District Council and the Rangitikei District Council have had very little resistance to their proposals for new landfills at Te Kuiti and Bonny Glen, respectively. Both were able to obtain consents with very little

opposition. Bonny Glen had 24 submissions and Te Kuiti three submissions. The financial viability of these sites however, is another matter.

## Reducing demand for disposal

| Waste Category | Quantity (million tonnes/year) | Component of Total Waste Stream (%) |
|---|---|---|
| household | 90 | 8.7 |
| industrial | 160 | 15.4 |
| mining & power station | 400 | 38.4 |
| sewage sludge | 230 | 22.1 |
| construction debris | 160 | 15.4 |
| Total* | 1040 | 100 |

**Table 4:** Composition of the European Solid Waste Stream (Data: Schnurer (1993), from EP-Sitzungsdokument AZ-31/87.) *Excludes agricultural and forestry wastes of 1,108 million tonnes - that would more than double the size of the waste stream if included.

Rate and date action seeks to reduce the generation of waste and so reduce demand for disposal. Despite any shortage, the materials commonly taken out of the waste stream by municipal recycling schemes are based are unlikely to have any significant impact on the total waste volume needing disposal. This is because:

- recycling schemes focus on municipal waste which forms a small component of the total waste stream needing disposal; and

- the recyclable component of domestic waste is a small part of the domestic waste stream.