LOCAL AUTHORITY

SOLID WASTE REDUCTION INITIATIVES

Report on Four Case Studies

August 1993

Office of the
Parliamentary Commissioner for the Environment
TE KAITIAKI TAIAO A TE WHARE PĀREMATA

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Preface

This investigation has indicated that local authority economic signals need to be improved to reduce waste and benefit the environment.

The move to accrual accounting by local government enables Councils to value their landfills and treat them as capital assets. The fact that landfills and particularly landfill capacity has not been valued in the past has meant that the proper value of waste reduction initiatives has not been recognised and in many cases has sent faulty signals to waste producers and led to inappropriate decisions by Councils.

Assigning landfill value strictly in terms of historical operations and industry and council expenditure fails to allow for the increasing value of landfill space over time. Until this is done the Government policy for integrated waste management (reduce, reuse, recover recycle, residue management) will be difficult to implement, and finding alternative landfill sites will continue to be a major headache for local government. Reducing volumes of waste particularly green waste and paper being sent to landfill extends the life of a landfill. The advent of generator pays charges should provide financial incentives for waste reduction but the accuracy, transparency, variability and actionability of such charges could be much improved.

Councils are generally very competent at documenting annual operating costs of traditional waste management services such as refuse collection and landfill management. However this study has confirmed that more work is required on accurate costing of landfill assets, aftercare costs, landfill space savings through waste reduction, and explicit consideration of intangible social and environmental costs and benefits.

If this work is done, I am convinced that a Council can send a consistent economic message from the landfill to those who generate waste and to those who strive to reduce waste. By so doing, management of solid waste will be greatly improved.

Helen R Hughes

Helen R Hughes
Parliamentary Commissioner for the Environment

IMPORTANT NOTE

This document reports on findings from four case studies of local authorities involved in solid waste reduction initiatives.

Resources were not available for a survey of all local authorities in New Zealand, or markets for recyclables, or industrial waste generators, or for addressing liquid wastes, cross-media waste issues, or hazardous wastes.

Any emphasis on the recycling portion of the integrated waste management hierarchy (Reduce, Reuse, Recover, Recycle, Residue management) or on the domestic waste stream reflects case study findings. As will be evident in the Conclusions and Recommendations section, the Commissioner believes that effective waste reduction of the solid waste stream requires a much greater emphasis on reduction at source, diversion of paper wastes, and composting of green wastes in all waste streams.

Glossary

Composting	Conversion of organic wastes to humus through natural processes. Classed in the waste hierarchy as 'recovery', sometimes also considered 'reuse' or 'recycling'. All references to composting in this document are in relation to source-separated organic wastes: composting of mixed solid waste produces a contaminated product and is not recommended.
Generator-pays	The principle that those who help to generate waste should pay for management of those wastes. Waste generators include not only individuals and companies that directly produce waste but also manufacturers that chose to promote single-trip packaging and limited-life products. Sometimes also referred to as 'polluter pays' or 'user pays'.
Green waste	Vegetative wastes; for example, household yard trimmings, landscape contractor wastes, supermarket and greengrocer trimmings, kitchen scraps of plant origin.
Intangibles	Environmental and social effects which cannot easily be evaluated in monetary or statistical terms, but which are nonetheless real and of significance to people and ecosystems.
Leachate	A solution of chemicals (possibly organic or toxic) draining from a landfill or other waste materials.
Precycling	Waste reduction at source by purchasers of goods: e.g. refusing to buy overpackaged goods, preferring packaging that can be refilled, products that can be reused, and products that have recycled content. Represented as 'reduce' in the waste hierarchy.
Recovery	Extraction of materials and energy from waste for further use or processing: for example creation of energy from landfill gas or incineration, generation of biogas or compost from organic wastes.
Recycling	Collecting and reprocessing of resources to create feedstock for new products for new uses: for example remelting of waste glass, resmelting of waste metals, repulping of waste paper, re-pelletising of waste plastic.
Reuse	Direct use of resources without reprocessing: for example refilling of packaging, exchange of second-hand goods, factory scrap used directly as feedstock by another industry, garden waste used as mulch.

Waste reduction As used in this report, synonymous with 'waste minimisation'; conscious reduction of the production of waste through 'reduce', 'reuse', 'recover' and 'recycle' methods.

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1 Introduction

1.1 Background to investigation

Solid waste and its management is an environmental issue for every country in the world. An increasingly accepted view internationally is that large volumes of waste represent a misuse of resources. Poorly managed and sited disposal facilities create environmental problems of pollution of land, water and air and are considered undesirable neighbours by communities.

Landfill siting is a prime example of the NIMBY (Not In My Back Yard) syndrome and is a focus of correspondence to this Office. While the environmental effects associated with the old 'tip' or 'dump' decrease with moves to modern sanitary landfills, still no-one wants a landfill as a neighbour and local communities will contest each step of the siting process.

Better waste management not only means appropriate management of the wastes already produced, but more importantly, aims to avoid or reduce the production of future wastes at their source.[1] In this sense better waste management, is good environmental management, as it means less wasting of resources and minimising the risk of pollution from wastes.

In New Zealand, territorial authorities are the main public authorities at the receiving end of 'rubbish' or solid waste. Under the Local Government Act 1974, they are given the power to collect and dispose of solid waste and, historically, have responded to a community desire to do so cheaply. These authorities now also have responsibilities under the Resource Management Act 1991, to control any adverse effects on the environment from land uses and there is increased public pressure for better waste management.

Authorities are faced with volumes of waste of about 2.1 kg/person/day and many authorities have ageing landfill sites with only a limited lifespan. Landfills which were, in the past, poorly sited and require significant upgrading to meet today's environmental requirements, are being closed. Yet landfilling as the solution for the final treatment of waste, is still seen as an integral part of the solid waste management strategies of most territorial authorities.

One response by councils to the problem of unsuitable tips is to dispose of rubbish in centralised, better-run sites while using satellite transfer stations for waste collection. In some instances this is being planned on a regional rather than district basis. However councils are aware that as landfills fill up, they must also find new sites. Despite the entry of the private sector into refuse disposal in some parts of the country, many councils will face the time and expense of establishing replacement landfills.

As an alternative to finding a new site, some councils have decided to extend the life of existing landfills, by reducing waste volumes and improving landfill management. Waste reduction is one of the important principles in integrated waste management.

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[1] Lumsden and Boshier, 1992, pp.32-39.

Central Government has endorsed waste reduction by formal adoption of the waste management hierarchy as government policy - Reduce, Reuse, Recover, Recycle, and dispose of Residue as a last resort. Government through the Ministry for the Environment is now working with industry to set targets for reduction of waste at source, in a Cleaner Production programme. Central Government policy has endorsed the principle of 'generator pays' - those who produce the waste should pay for its disposal. Local authorities are beginning to reflect Government policy in their plans.

This investigation focuses on local government initiatives to reduce waste. Improvements in landfill management have not been examined as this was addressed in the recently released Ministry for the Environment *Landfill Guidelines* (1992).

The emphasis is on territorial authorities as the operative arm for waste management. Most regional councils are however addressing the general issue of waste management through regional policy statements. Some regions are producing waste management plans as a regional framework and coordinating consideration of regional sanitary landfill facilities.

The terms 'waste minimisation' and 'waste reduction' are commonly used interchangeably to mean either part or the whole of the waste management hierarchy. In this report, waste reduction is used to encompass the waste minimisation practices of 'Reduce, Reuse, Recover, Recycle,' which aim to reduce the total volume or quantity, or toxicity of waste before disposal of the residue as a last resort.

1.2 Factors contributing to effective waste reduction

As an analytical framework for the investigation, the investigating team looked at the factors which contribute to the effectiveness of local authority waste reduction initiatives. These are summarised in Figure 1.1 and need to be considered by councils as they plan their waste management strategies. Resources were not available to cover all of these factors, and those focused on in this investigation were information, and methods of accounting for costs and benefits of waste reduction.

1.3 Terms of Reference

The Terms of Reference for the investigation were as follows:

1. To determine whether territorial local authorities are instituting waste reduction initiatives as part of their solid waste management responsibilities.

2. To determine whether the impacts of these waste reduction initiatives on the local waste stream are documented.

3. To determine what matters councils take into account when costing waste disposal and waste reduction programmes.

4. To identify how information on costs and benefits is provided to the community (including decision-makers, the public and commercial/ industrial groups).

5. To identify any constraints on implementation of waste reduction initiatives.

6. To advise on remedial actions if appropriate.

The investigation was undertaken under 16(1)(a) and 16(1)(b) of the Environment Act 1986. A case study approach is taken, using four local authorities as the examples.

Figure 1.1: Factors contributing to effectiveness of local authority waste reduction initiatives

Knowledge of existing waste stream
- source, type of material, volume
- whether separable at source
- waste management audits in major industries

Ability to measure reduction in waste stream
- baseline data before programmes
- ongoing diversion data (volumes or weight)
- ongoing in situ contours at landfill

Alternative destinations available for diverted waste
- markets/outlets exist or can be created locally
- transport costs to market/outlet not prohibitive

Practical information available
- cost-effective methods and technology (e.g. collection, processing)

Full accounting of costs and benefits
- value of extending life of present landfill includes foregone costs of opening replacement landfill
- consideration of non-market values (environmental impacts for both present and future generations)

Local 'microeconomic' incentives provided
- collection and disposal charges encourage waste reduction
- council contracts and purchasing supports waste diversion markets
- material bans at landfill where preferred diversion outlets available

Public support
- education on need for waste reduction and role of individual households
- benefits and costs to ratepayer "transparent"
- public involvement in decision-making
- practical and convenient opportunities for households to participate

"Political will"
- both short and long term benefits and costs for community made "transparent" to elected decision-makers
- politicians willing to take long-term community benefit into consideration as well as short-term election cycle constraints
- politicians willing to lead as well as follow public opinion

Waste diversion programmes tailored to users
- education on value to them
- convenience
- financial incentives
- ongoing information on how to participate

Implications of present methods and contracts understood
- whether contracts contain incentives to reduce or increase waste volumes
- impact of waste collection method on future incentives and options

Local authority structures and procedures supportive
- clear lines of advice, responsibility, accountability
- participating staff and decision-makers kept informed
- internal accounting mechanisms recognise long-run costs and savings
- adequate time and resources provided to waste reduction officers

Initiatives with private sector
- developing partnerships
- joint contracts
- information sharing

2 Legislation

2.1 Refuse collection and disposal

Section 538 of the Local Government Act 1974 empowers territorial authorities to undertake, or contract for, the removal, collection and disposal of refuse. Works undertaken are to be carried out promptly, efficiently, and regularly, to the satisfaction of the Medical Officer of Health.

Section 540 empowers territorial authorities to establish, construct, maintain and operate works for the disposal of refuse or any specified kind of refuse.

Acting under section 544, the authorities may make by-laws regulating the collection, transportation and disposal of refuse. For example, tip charges and material bans at council facilities may be dealt with by way of council by-law.

Local authorities have expressed the view that they were unable, legally, to prevent third parties removing the more valuable material left out for council recycling collection. The Ministry for the Environment has reminded councils of their by-law making power to regulate collection, and that material placed in council-marked bins for collection is legally the property of the council.[2]

Powers given under the Local Government Act 1974, are backed up by the Health Act 1956. Section 23 of the Health Act places a duty on local authorities to abate nuisances and conditions in their districts which may be injurious to health. Under section 25 the Minister of Health has power to require any local authority to provide for the collection and disposal of refuse for its district.

2.2 Waste reduction, recycling and composting

Local authorities perform functions under the Resource Management Act 1991 which has the purpose of promoting the sustainable management of natural and physical resources, but the Act makes no mention of waste management. Waste management functions of local authorities derive from the Local Government Act.

'Disposal' as defined in section 537 of the Local Government Act includes recycling, and under section 541, councils may dispose of refuse by a range of means of destroying or treating refuse which specifically include composting and shredding, and by separating or converting material out into useful marketable products.

The provisions of the Act encompass the establishment and operation of recycling depots, kerbside recycling collections and specified recycling bins. Local authorities have expressed the view to the Ministry for the Environment that the Local Government Act does not support the full range of waste

[2] Ministry for the Environment 1990, *Environment Update*, no. 18, p.4.

reduction initiatives that councils might consider within the waste management hierarchy. A draft amendment to the Act has been discussed with local authorities by Ministry staff. This would empower local authorities to encourage efficient waste management through the adoption of the waste management hierarchy of reduction, reuse, recovery, recycling, and residue management.

Since the focus of the Local Government Act, and the Health Act are the effective and efficient carrying out of their functions by local authorities and the abatement of nuisances and protection of the public health of the community, measures taken on the authority of these Acts arguably need to be justifiable in terms of these gains to the communities concerned, rather than for wider environmental objectives. However, providing services to local communities so that they may help alleviate national and global environmental problems is a valid local social benefit, even if beneficial physical effects may also be felt elsewhere.

This suggests not only a need for the amendments proposed by the Ministry in relation to the 'waste hierarchy', but also a need to identify and account for non-monetary and intangible benefits from recycling initiatives, as well as conventional cost considerations in measuring efficiency.

2.3 Waste management consents and strategies

Under the Resource Management Act, regional councils are responsible for achieving integrated management of the natural and physical resources of their region, and specifically for the control of the discharge of contaminants into or onto land, air or water. In this context, Part I of the Second Schedule, detailing matters which regions may address in their policy statements and plans, refers to the creation, minimisation, recycling, treatment, disposal, and containment of all forms of contaminants.

Districts are responsible for achieving the integrated management of the use of land and associated natural and physical resources of the district. In this context the use of land for tipping, and other waste management activities, and the control of adverse effects are issues likely to be addressed in district plans.

Both regional and district councils have responsibilities in regard to the storage, use, disposal, and transportation of hazardous substances.

The Act directs regional and district councils carrying out their functions under the Act to have particular regard to, among other matters, the efficient use and development of natural and physical resources.

It is to be expected that regional policy statements will identify waste management as an issue for the regions, and develop policies and identify methods to deal with the adverse effects that waste handling and disposal operations may have. Regional and district plans and rules should assist in implementing any policy which emerges, and resource consents and conditions imposed should reflect this. Effective reduction of adverse environmental effects through these processes will reply on accurate environmental data to underpin decisions and consent conditions.

While there appears to be considerable scope under the Resource Management Act for regions and districts to put in place measures to support waste reduction initiatives, this will be subject to regional and district circumstances and interpretations.

In order to ensure that waste management is addressed as an issue at regional and district levels, central government could issue a national policy statement under section 45 of the Resource Management Act. The statement might adopt as a policy the waste management hierarchy of 'Reduction, Reuse, Recovery, Recycling and Residue management', and identify practices which local authorities could adopt to implement the Act's purpose. Local authorities are obliged by section 55 to recognise national policy statements, and to take such action as may be necessary to implement the statement.

2.4 Cost-benefit analysis, accounting practice, and information 'transparency'

The purposes of local government, as expressed in the Local Government Act, include effective participation of members of the community in local government, and the efficient and effective carrying out by local authorities of their responsibilities.

Some measurement of costs and benefits and of performance is called for. Section 223F of the Act requires local authorities to apply accepted accounting practices as are appropriate to the public sector. It is arguable however whether current financial accounting practice is able to accommodate considerations of non-monetary, intangible costs, and costs and benefits to future generations.

Such information could be included in the non-financial reporting element of the annual report required under section 223D. Under the section councils are required to report annually as to their objectives and performance. Such reports are an appropriate place for councils to discuss progress made on waste reduction initiatives, general issues of and the costs and benefits of adopting various measures. The more detailed costing and discussion needed for decision making is perhaps better done through a separate forum with better opportunities for consultation and the results included in the annual report.

Section 32 of the Resource Management Act promotes efficiency and effectiveness in the preparation of policies, plans and measures under the Act. For example, before including a rule in its district plan, the council is required to carry out an evaluation of the likely costs and benefits of the proposal and the alternatives in order to assess its efficiency and effectiveness. 'Costs and benefits' would include costs and benefits of any kind whether monetary or non-monetary. A similar enlarging of the parameters of efficiency is needed for the Local Government Act.

Section 35 of the Resource Management Act places a duty on councils to gather such information as is necessary for them to effectively carry out their functions under the Act, and to monitor the effectiveness and suitability of policies and plans.

2.5 Economic incentives for waste reduction

Section 544 of the Local Government Act enables local authorities to prescribe charges for use of public refuse disposal works through by-laws, and 'refuse disposal works' includes recycling and composting (ss. 537, 540 and 541). Councils may also under section 538(2) sell or supply bags or other receptacles required for collection or disposal of refuse.

General provisions for prescribing fees by by-law or by resolution under section 690A require that fees should "be such as to recover no more than the reasonable costs incurred by the council" for the service, and by-laws setting charges relating to refuse collection are required to "not derogate from any of the provisions of the Health Act 1956". The Local Government Act does not provide such clear guidance as the Resource Management Act on the issue of sustainability and future generations.

As discussed above, waste reduction is supported by the Resource Management Act. Councils are also required to consider the provision of incentives and the levying of charges under section 32(1)(a)(ii).

Whether cross-subsidy of resource reduction by those producing waste can be justified depends on how one defines the service that is being provided by the council. If the service is defined as 'sustainable' or 'integrated' waste management (disposal is the last resort and least preferable outcome) then it may be argued that a council could charge those putting out refuse for collection and landfill users (contributors to waste) to subsidise recycling and composting (contributors to waste diversion), and ensure that waste generator charges reflect both present-day cost and their share of future costs they have helped to impose.

2.6 Controls on unauthorised dumping

One of the common arguments against levying waste generator charges is that illegal dumping may become widespread. Whether or not this is a valid argument against waste generator charges, the risk of unauthorised dumping is always present (whether in the wider community or interfering with recycling stations) and a means of control and enforcement is required.

Territorial authorities have a range of measures available to them under the Litter Act 1979 to deal with the dumping of refuse. For example, they have power to require the owner of private land to remove litter which the authority considers grossly defaces or defiles the area. The authority can adopt an infringement notice procedure which is much simpler than having to take court proceedings. When an offence has been committed and the council removes the litter, compensation for clean-up costs may be ordered by the court.

However, the maximum infringement fee is $100, and maximum fines under the Act are modest, and likely to be less than the council staff and court time costs of pursuing the matter. Among the case study councils the approach varies, for example council staff in Dunedin tend to just clean up the mess and consider prosecution not worthwhile, whereas in Hutt City about a dozen prosecutions are taken a year of which 80 percent are successful.[3]

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[3] E.g.: A McErlane, Dunedin City Council, and J. Palmer, Hutt City Council, pers. comm., 1993.

The abatement notice and enforcement order provisions of the Resource Management Act could be applied by local authorities where, for example, a case could be made that the refuse dumping was likely to have an adverse effect on the environment, or where a rule in a plan was being contravened. The District Court has the power to order a term of imprisonment of up to two years, and to fine up to $200,000 for contravening an abatement notice or enforcement order. The Court can also order that part of the fine be paid to the prosecuting local authority.

3 Case Studies – Background

In January 1993, the Office contacted a number of local authorities throughout the country to identify potential case studies for the investigation. These authorities were known to have started waste reduction practices, and were asked about the motivation for undertaking waste reduction and the range of initiatives being used. The following criteria were then used to select four case studies:

- range of different waste reduction techniques being used or considered
- geographical spread in North and South Islands
- examples of large urban and urban/rural communities
- range of population size
- motivation for waste reduction initiatives: environmental management, savings in landfill space.

Masterton District Council, Hutt City Council, Timaru District Council and Dunedin City Council were the four authorities chosen. Tables 3.1 and 3.2 give some basic background information on the solid waste management activities of these councils. The case studies do not include an example from the extremes of either the large urban populations of Auckland or the small population, large rural area district councils. Each authority will have to consider its particular circumstances when considering its waste management strategies and the general findings and recommendations of this report.

Unless otherwise identified all information in this report comes from councillors, staff or documentation supplied by the councils. During the course of the investigation additional information from other public authorities was also received.

3.1 Solid waste management plans

The four authorities are at different stages of a formal solid waste management planning process, considering waste reduction, collection and disposal. Three of the four authorities have specific goals or objectives covering some aspect of waste reduction in their annual plans. Hutt City and Masterton District have tied these waste reduction objectives to extending landfill life.

Both Dunedin and Hutt have released public discussion documents on waste management, including waste reduction, with the intention of producing a formal waste management strategy. Hutt Council adopted the objectives of the strategy and presented the key recommendations in their 1991-92 Annual Plan. In Dunedin, the discussion document has also provided for public input on the Council plans for a new landfill site, and reports to Council on both aspects have been presented.

Timaru Council's solid waste strategies have so far addressed the district's disposal requirements and the collection of waste. In 1988 there was a significant public information and participation programme around the establishment of a new landfill and associated waste management strategy. This resulted in a new sanitary landfill at Redruth being selected as the most appropriate option. Once the proposed Canterbury Regional Waste Management Plan is in place, they will address waste reduction through the preparation of a district waste plan.

Masterton District has worked with the Wellington Regional Council on a regional plan, and are particularly interested in the idea of a regional landfill site. In view of its shortage of landfill space, it has instituted a number of waste reduction initiatives through Council, which preceded the presentation in April 1993 of a draft strategy in a formal sense. This strategy has a specific objective on waste reduction.

The council attitudes to active participation or support for waste reduction initiatives varies. Following amalgamation, most councils are organised so that services provided by council are either contracted out or performed by separately identified groups within council. Within this framework, councils described themselves in relation to waste reduction as "facilitator" (Dunedin), "support and encourage" (Timaru), "provide incentives to encourage" (Hutt) and "assist with set up costs with private enterprise and consider direct involvement if private enterprise is not interested" (Masterton).

Councils can of course facilitate waste reduction initiatives without putting financial support into the proposal, for example by allowing the setting up of waste reduction facilities in council landfill sites.

3.2 Waste stream information

Information on actual components and percentages in the waste stream of the case study authorities were generally estimates by council staff, as only Hutt City had a weighbridge in place. Hutt has a very high proportion of industrial sourced waste, up to 60 percent by weight. The other councils consider that their waste stream is representative of the usual situation in New Zealand, with approximately 50 percent domestic sourced, and commercial and industrial more or less evenly splitting the remainder.

Table 3.1: Case studies: attributes and waste reduction initiatives

	Dunedin City Council	Timaru District Council	Hutt City Council	Masterton District Council
Geography				
South Island: urban	x[1]			
South Island: town/rural		x		
North Island: urban			x	
North Island: town/rural				x
Motivation for waste reduction				
Landfill space	+	++	++	++
Env. management	++	+	+	+
Initiatives				
Recycling depots	Yes	Limited	Yes	Yes
Kerbside collections	Trialled	Trialled	Yes	-
Composting: Council	-	-	-	Planned
Private	Yes	-	Planned	-
Gate charges	Yes	Yes	Yes	Planned

Key
+: Secondary Motivation
++: Primary Motivation

Note
1. Dunedin City has a large area and significant rural population; as do a number of urban authorities.

Table 3.2: Case studies - solid waste management background

	Dunedin City Council	Timaru District Council	Hutt District Council	Masterton District Council
Population	116,577	42,505	94,505	22,000
Tonnage of waste p.a.[1]	68,000[2]	27,000	125,000	25,000
Collection method	Bags and tins. Citiworks of Council and outside contractors	Wheelibins - private contracts Timaru urban. Outlying areas under consideration.	Bags - Private contract city-wide	Bags - Council Bus Unit contract
Disposal methods Council run				
Major landfill	Green Island	Redruth	Silverstream[3]	Masterton
* est. life (yrs)	3-5	1	6	4
* est. life with waste reduction	-	-	8	8 max
* with available extension[4]	25[5]	30[6]	25-30	N/A
* with extension and waste reduction	unquantified	36	30-35	N/A
Number of smaller landfills	3 plus 3 community skips	4	1	6
Number of transfer stations	1 private	1	-	-
Waste reduction as objective of annual plan	"...to promote waste reduction through minimisation, reuse and recycling."	"to actively encourage and support recycling." "to address the waste minimisation issues of reduce, reuse, recycle, recovery."	"maximum reuse and recycling of products so as to reduce waste volumes requiring disposal."	Objective of strategy to Council April 1993 to be included in Annual Plan 1994.
Staff resources in waste reduction	100% recycling advisory officer 10% engineering staff equivalent	20% full time equivalent	one full time equivalent	25% resources engineer

Notes

1. Estimated for major Council run landfill.
2. Dunedin City has a total tonnage of 100,000 with the balance going to a privately operated landfill.
3. Takes refuse from Upper Hutt as well.
4. Green Island and Silverstream would need resource consents for future development.
5. Based on current total disposal of 100,000 m^3 (compacted) p.a.
6. Includes closure of four smaller landfills, replacement by transfer stations.

4 Waste Reduction Initiatives

4.1 Types of initiatives

The councils in the investigation are undertaking or promoting a range of initiatives to reduce waste which are detailed in Table 4.1 (see page 22). Waste reduction achievements are summarised in Table 4.2 (see page 26). The emphasis of present activities is clearly on post consumer recycling, which is reported to be in response to public demand. The importance of green waste composting is now being acknowledged.

In the two larger councils with a larger industrial component, there is an evolving focus to activities at other stages of the waste hierarchy such as reduction at source and recovery.

Composting

Municipal composting operations

Green waste is a very significant proportion of the waste stream, with figures for garden waste estimated up to 20 percent of the total waste stream and kitchen wastes and garden wastes 40 percent of the domestic waste stream by weight. This is acknowledged by all four authorities, yet there is reluctance on the part of some councils to get actively involved in composting operations.

Experience of odour problems in the past with mixed waste composting (for example, fish wastes and green wastes) and the cost of setting up were given as two reasons, as well as the public demand for recycling rather than composting. The potential for odour problems is less with straight green waste compost, but both care in siting and appropriate management is required to prevent odour, dust and leachate problems.

Of the case study councils, Dunedin has a large-scale greenwaste composting operation at the Green Island landfill (operated by a council Local Authority Trading Enterprise – see Figure 4.1), and Masterton plans a large-scale greenwaste composting operation to be run for the Council at the landfill (on contract). Investment in machinery such as a shredder is seen as necessary by councils to speed up the processing and handling times, but attaining a basic level soil conditioner is able to be achieved relatively simply. This has the additional environmental benefit of returning humus to the soil. Councils including Dunedin, Masterton, Christchurch,, and Manukau acknowledge that, like recycling schemes, a self-supporting operation is not realistic, but if considered as a waste reduction measure then council support is appropriate. Some of this support may be infrastructural for example, roading, or non-financial in nature such as allowing use of land at the landfill.

In contrast, Wellington City Council has recently let a contract for composting at the landfill, expecting the operation to be fully self-supporting, and the Kapiti Coast District Council recently decided that long-term benefits of tip-space savings and water conservation through humus returned to porous soils did not justify the short-term cost of a shredder for a landfill greenwaste composting operation.

Problems have been encountered recently in the Auckland region, in the siting of greenwaste composting operations, in large part because of uncertainty among council officers and the neighbouring public about appropriate separation distances and operating conditions.[4] Although a properly operated aerobic and thermophilic composting plant will not create objectionable odours under normal conditions, a buffer zone to protect residential properties is desirable and consent conditions should require good composting practice. National guidelines on compost operation siting are advisable to promote effective waste reduction programmes.

Home composting

Home composting is encouraged by some councils such as Hutt City, Christchurch, Auckland City, Wellington and Kapiti District by publicity and 'How to' pamphlets. None of the councils in this study provided low cost compost bins or more active support, as does Nelson City Council with its subsidy scheme paying part of the cost of a compost bin back to the retailer.[5] Where there was an identified recycling advisory officer in Dunedin, but no active publicity programme as yet, there were few queries received on composting as compared to recyclables. None of the councils had tried to quantify amounts taken from the waste stream by home composting, though both Dunedin City and Hutt City have done surveys that indicate over 50 percent of the respondents were home composting. Timaru had done a waste stream analysis of wheelibin content which indicated high proportions of garden waste by weight in the higher volume receptacle, compared to a bag survey in Christchurch,[6] but much of this may previously been going to the landfill in private trailers rather than being home composted.

Recycling

Recycling depots

The familiar New Zealand concept of the bottle bank which is maintained and used as a fund-raising venture by community groups is extended in recycling depots to provide receptacles for a variety of recyclable materials. Market conditions influence the range of materials collected,[7] but in this study newspaper, cardboard, glass, aluminium cans and one or two types of plastic were common. Depots at landfills sometimes have a reuse component through sale or exchange of second hand goods. Separation of materials in the Hutt and Wellington area is not as good as in the kerbside collections, where use of stickers on unacceptable items provides a direct means of educating the public.

Recycling depots are well patronised with high public interest in the case study authorities. Demand for action on plastic recycling in particular is high, and public concern when such recycling efforts fail, as in Dunedin due to market conditions, is considerable. Costs of providing and maintaining

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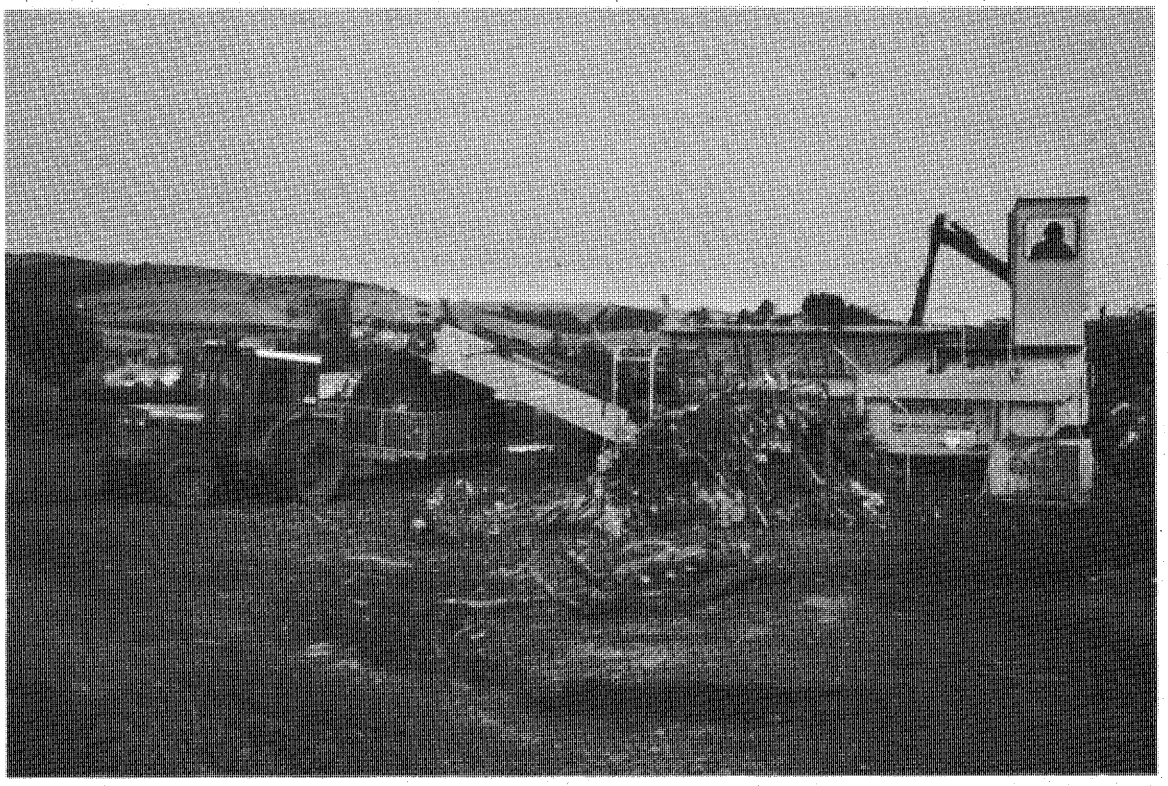
[4] R. Wark (Devonport), A. Holley (Manukau), C. Rupp (Franklin), pers. comm., 1993.

[5] Nelson City Council, 1993, paper to council on *Waste Minimisation*.

[6] Christchurch City Council, 1992a.

[7] In Dunedin plastics recycling has recently failed and kerbside collection of newspaper has stopped both due to financial problems in the recycling firms.

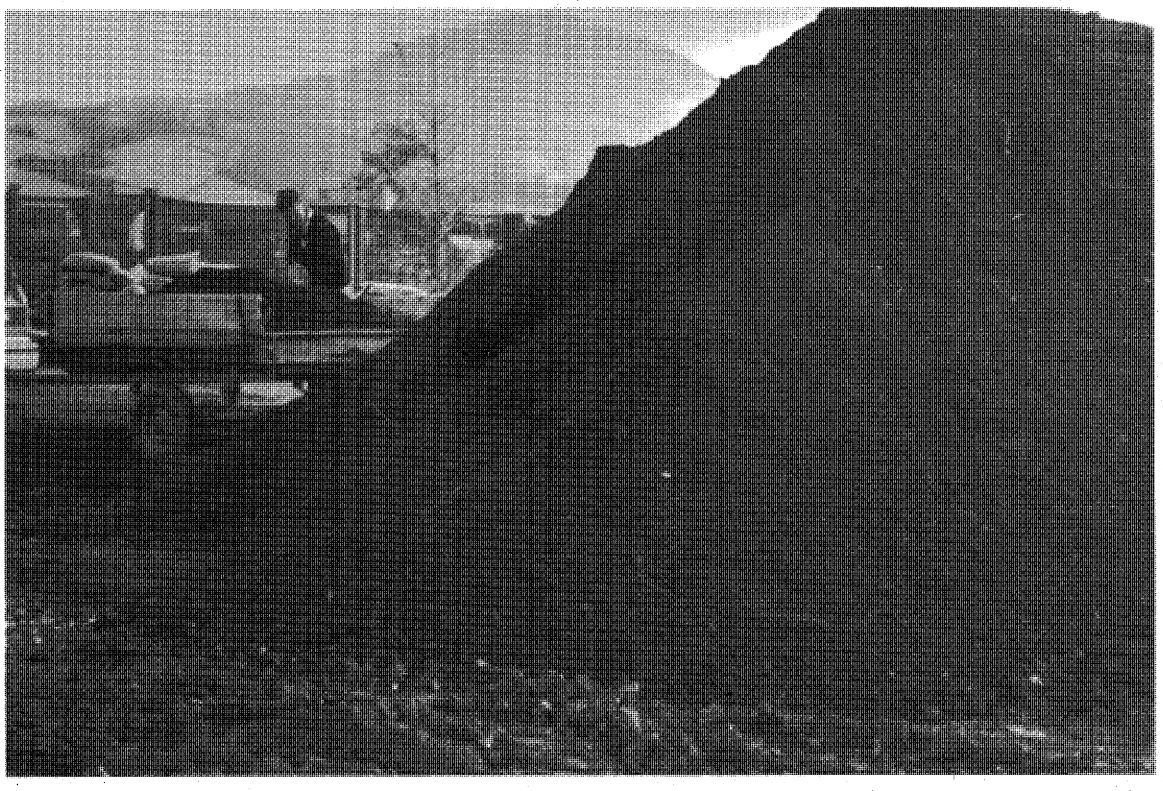
Unloading of greenwaste by landfill users (tipping fee discount of 50%).
Photo: Dunedin City Council



Shredding of greenwaste into trailer, which is taken to build windows. Shredder is electric, low speed and high torque. *Photo: H. Hughes*

Figure 4.1:Green waste composting, Green Island landfill, Dunedin, 1993.

Composting windrows: turned every 10 to 14 days by front-end loader; composting period in windrows three to four months. *Photo: H. Hughes*



Finished product: sold in bulk or in bags, and utilised in landscaping by operating Local Authority Trading Enterprise. *Photo: H. Hughes*

depots is relatively low compared to kerbside systems, on a per tonne collected basis, though amounts extracted from the waste stream will be less and more prone to contamination by non-recyclable refuse. A recent Christchurch study identified that costs per unit quantity of recyclables collected for a depot network and kerbside recycling would be $118/t and $153/t respectively.[8]

Positioning of depots in shopping areas and supermarket carparks was supported by local business in Masterton and Dunedin after initial concerns about tidiness. Where depots are still run by the community directly, there is an additional element of community education and involvement.

Kerbside collections

The basic level of kerbside collection found in this study was a newspaper collection on the same day as rubbish collection, which was either picked up by the council or a recycling operator. Kerbside schemes will extract a greater proportion of recyclables from the waste stream than depots, but at a cost which it is not possible to recover from sales in the present market conditions.

Public demand for recyclables collection is strong and in the Hutt with its kerbside scheme, 88 percent indicated in a survey they would use it if it was introduced.[9]

Hutt City fund their kerbside collection by fees gained through domestic vehicle gate charges at their landfills, introduced in September 1991. Support for kerbside recycling is such that a recent move to abolish the domestic gate charges attracted media attention and public submissions to the Council. These actively supported the charges and their use to fund the waste reduction programme, and led to the defeat of the motion to remove them.

Reduction at source

Industry audits

A waste audit identifies the source and components of the waste stream within a company as a technique for reducing the amount and toxicity of waste produced and improving use of resources. As such, industry will often obtain a financial advantage from undertaking the audit and carrying out the recommendations. Promotion of audits is considered in the case study waste strategies, as a local endorsement of the central government policy of reduction at source. How promotion would be done is generally not documented, with the exception of possible regulatory methods. Hutt City have expanded the position of trade waste officer to be wastes officer. This person promotes waste reduction to industry and provides a Council-industry link. They have also produced a "Pollution Solutions" package with a brochure on "Managing your Wastes better by reduction, reuse and

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[8] Christchurch City Council, 1992b.

[9] In comparison, 81 percent of the Manukau City public indicated support for kerbside collection in principle, but 71 percent objected to an increase in rates to pay for it (A. Holley, pers. comm., 1993).

recycling." Dunedin are planning a similar package with Otago Regional Council in 1993/4.

The first designated waste reduction officer in New Zealand was hired by Manukau City Council in February 1993. The job description emphasises encouraging waste reduction at the business planning level as well as encouraging specific projects such as waste audits.

Waste exchange directory

These directories list the type of waste produced by different companies with the intention of allowing one company or organisation to use another's waste as a resource for their use. This approach encourages a basic level of industry involvement, without requiring a commitment of resources. Dunedin's directory was published in December. Voluntary organisations are receiving materials, but there is no example yet of a business exchange. There was a nationally organised directory run by the Resource Conservation Unit of the Department of Trade and Industry (1978 to 1986). This was regionally coordinated with promotion by officers of the Department as they fulfilled other duties.[10]

'Green Business Challenge'

This is a promotional activity supported by Dunedin City Council to encourage Dunedin businesses to take action on environmental issues, including solid waste management. Participants may include in their plans audits, reduction and recycling initiatives, and purchase policies to buy environmentally sound products where possible. A similar waste reduction promotion, 'Workplace Pride Wellington' was launched by the Wellington City Council in May, 1993.

Regulatory

A reliance on voluntary initiatives is the approach to industrial waste reduction and audits being taken by both the Government and the case study councils to date.

Timaru however provided an example of how a resource consent can include a condition to require the return of waste to the manufacturer for disposal or reprocessing. Dunedin's recent waste strategy paper outlines the intention to require audits through the mechanism of the trade waste control system.

Other councils have discussed using the mechanism of the district plan or ordinances to require audits on new resource consents. Should local authorities decide to indicate such an approach through the planning process, recent developmental work by MFE/CAE gives model audits to follow.[11] Although none of the local authorities contacted were presently using by-laws under the Local Government Act as a regulatory tool for waste reduction, this is also a possibility.[12] The proposed measure would have to be shown to be in the public interest and of benefit to the community.

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[10] B. Williams, previously manager of Resource Conservation Unit, pers. comm.

[11] CAE, 1992.

[12] One method that has been suggested is to require waste management plans for new buildings or waste audits for existing buildings when issuing building permits.

Hazardous wastes manifest

Hutt City have a hazardous wastes manifest system which aims to both control and reduce toxicity of wastes being disposed of in the landfill. This assists landfill management and also provides an opportunity to advise where alternative treatment or reuse is possible and therefore reduce waste. Identifying the amount, and therefore the true costs of hazardous wastes disposal, provides an incentive for some companies to institute better waste reduction practices.

Hutt City's waste officer is in the regulatory section and advises on both trade and hazardous wastes. This provides a check that gains in solid waste management are not at the expense of trade waste management. Palmerston North City Council (which also runs a declaration system for special wastes) have commented on the usefulness of their integration of solid and trade waste management in one department for the same reason.

Material Bans

Any bans or criteria set on the dumping of material by councils in this study usually related to hazardous wastes or special wastes, such as medical wastes, and were undertaken primarily for landfill management purposes rather than waste reduction.

Timaru provides the one example of a non-hazardous material ban, which is for fish waste. This was imposed by regulation in Council, following odour problems at the landfill. Though intended to help landfill management practice rather than waste reduction, it has resulted in the offal being converted into fish meal at the plant instead of being landfilled.

Overseas material bans have promoted major reductions in material being landfilled, and made recycling and composting a more economic proposition. For example, at least partial bans on green waste are present in 21 states of the USA and this has led to an increase in the development of centralised composting operations from 650 in 1988 to over 2,500 in 1992.[13] Any recyclable material arriving at the Toronto landfill results in the hauler being banned for a period from the site. Hauling waste to a landfill further away imposes an additional cost on the hauler and encourages them to send recyclables to the recyclers.[14]

In house council actions

Most councils had paper and recyclables collection in council buildings. Though small scale, this was generally viewed as important as an education tool and as an example to the community.

Waste audit

Waste reduction audits of council operations or buildings had not as yet been undertaken by the councils in this study. Where this has been done, for example by Hamilton City Council, this too serves as a useful example to

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[13] Glenn, 1993.

[14] H. Hughes, from visit to Toronto, pers. comm.

the community and, as well as suggesting new initiatives, coordinates the activities such as office recycling of paper or glass collections which were already in practice.

Purchasing policy

Timaru has a policy when setting the contract for oil supplies to the Council, to require that the supplier provide a collection service for waste oil at the workshop sites, but re-refined oil is not preferred for purchase. Decisions on use of recycled paper are usually left to the individual departments of councils in this study, but use of recycled paper for publicity is increasingly common. The lack of good quality recycled general stationery paper at a competitive price was commented on.

Joint initiatives with other large local purchasers may be a way to lower prices available locally for recycled content goods.

Financial incentives

Gate charges

Differential gate charges at the landfill are or are about to be in place at each of the major landfills in the study. Councils believe this will encourage waste reduction by making the disposal costs more apparent. This move is also a local implementation of the generator responsibility policy of government. The differential is usually between commercial and domestic, and for domestic based on volume as indicated more or less by car/trailer size. Higher rates for special waste and hazardous waste, because of the additional management requirements were common. Rebates for recycling were present in Dunedin, at the Timaru District's transfer station (but not landfill), planned for Masterton, and not present at Hutt City's landfills. Placing the recycling centre after rather than before the charging station can work against providing financial incentives to drop off materials for recycling.

Initial response from the community is usually negative, at the imposition of another cost, and council concern as to whether the incidence of illegal dumping will increase. However once in place, gate fees have been quickly accepted, and the case study councils report no major increases in illegal dumping beyond an initial phase-in period. (See further discussion in section 7.6.)

The initial setting of charges, seems to be governed by a view of what will be acceptable by the community, rather than charges reflecting true disposal costs. As public awareness grows, charges increase to reflect costs more accurately. Hutt City, in particular, are now making it clear to commercial generators that costs will rise substantially in the future.

Domestic collection charges

Another example of the move to generator responsibility and incentives to reduce waste is the separation of charges for refuse collection in the rates demand and charging regimes for extra rubbish bags. The charges are set to recover costs of collection and disposal.

Table 4.1: Waste reduction initiatives by case study councils

	Dunedin City Council	Timaru District Council	Hutt City Council	Masterton District Council
Municipal composting operations	Citiworks[1] operation at landfill (Dec. 1991). Shredder leased from Council. Rent free use of land. Previous small compost operation closed by odour problems.	–	Encouraging private operation on closed landfill site. Parks Dept shreds and mulches waste.	Council providing facility by tender to private operator. Council infrastructure and assistance with shredder purchase.
Home composting	Brochure in production. Promotion planned for 1993/94.	–	Brochures produced 1990 and 1993. Survey March 1991: over 50% composting organic waste.	Will be encouraged and promoted.
Recycling depots	May 1992: 5 established plus 3 at the landfills. Planned 5 more June 1993.	1993: 1 at transfer station. Limited facility at present landfill. Planned for new landfill. Divans Road - scrap metal recycling.	7 including the landfill depot.	1991: 4 including landfill depot. 3 more planned and landfill depot substantially upgraded. Limited recovery from rural refuse sites planned.
Kerbside collection for recyclables	August 1992: Weekly newspaper 77% of city. Ceased June 1993. 1992-date: Full recyclables trial 400 households in cooperation with University of Otago.	1992: Weekly newspaper district wide. Collection costs paid by Council. July 1991-date: Full recyclables trial 500 households.	March 1992: 15% of city. May 1993: 65%; March 1994: 100%. May 1992: paper and cardboard from commercial business district.	–
Waste reduction at source - industry	Strategy to encourage waste audits. 1992 - published "Waste Exchange Directory" - trade waste users and producers. 1993 - Green Business challenge. Participating businesses make commitment to action on environmental issues including solid waste.	Council can encourage manufacturers re source reduction and reuse.	Folder of information available includes waste audit guidelines. Staff meetings with Manufacturers' Association. Hazardous wastes a major target: 'Manifest' system. Goal is controlled and reduced toxicity.	Strategy to encourage and promote waste audits. Minimise hazardous wastes. Primarily aimed at landfill management.

CONTINUED ...

	Dunedin City Council	Timaru District Council	Hutt City Council	Masterton District Council
Regulatory	Use of planning consents to require audits discussed in public strategy document.	Ban on fish offal at landfill.	–	–
Inhouse council actions Purchasing policy Office paper recycling Any others:	Use of recycled paper for publicity and business cards. Yes Glass and can collection	Contract for oil supply requires collection for recycling. Yes	Use of recycled paper for publicity. Yes Can collection	Some use of recycled paper dependent on price. Yes
Financial incentives Gate charges at landfill	1990: Commercial and industrial charge by volume. Domestic charge by vehicle. Higher rate for hazardous and special waste. Rebates for recycling/composting.	1985: Commercial and domestic charge by vehicle. Higher rate for hazardous and special waste. Rebate for recycling planned at new landfill.	1968: Commercial vehicles by vol. By nett weight since weighbridge (July 1992). Sept 1991 domestic charge by vehicles. Higher rate for hazardous waste.	To be in place by September 1993. Rebate for recycling planned.
Domestic rubbish bag charging	Refuse charge in rates.	Wheelibin charge in rates. Bag charge in rates for 52. 60c per bag for extra.	Refuse charge in rates for 52. 70c per bag for extra. Changing to full user pays system in 1994.	Planned Sept 1993 charges in rates for 52. $1 per bag for extra.

Notes

1. Citiworks is a local authority trading enterprise (LATE) of Dunedin City Council.

This approach still presumes a base level of waste and cost which the household has no discretion over and therefore no incentive to reduce. Hutt City is prepared to address this and is now adopting a system where there is no rates charge, no delivery of bags and the household purchase the number of bags they need. The household can then benefit directly from their waste reduction efforts.

Waste diversion options should be available if this is to be effective as a waste reduction measure, rather than a user pays exercise. Hutt City's publicity linked the proposal to the availability of full kerbside recycling. Most households have an opportunity to compost home green waste and the Council has distributed their 'how to' brochure widely.

The introduction of charges also expands the market for private collectors. In Christchurch, the combined effect of plastic bag collection (with charges for over 52) and the provision of convenient transfer stations did not reduce the weight of waste but shifted the source from Council collections to private trips or collection. This outcome could be a result of a combined effect of lack of convenience of the Council collection service, an economic decision by residents to use transfer stations in preference to additional plastic bags, and a lack of alternative destinations for recyclables.[15]

Collection methods and contracts

Collection methods and contracts are part of a council's solid waste management strategy, and their effects on waste reduction programmes should be considered.

A significant recent change in collection methods is the advent of MGBs or 'wheelibins'[16] for collection of domestic refuse. Use of these bins generally results in greater volumes of mixed waste collected through the refuse system and decreased private vehicle trips to the landfill. The implications for recycling initiatives are not clear, although indications from industry in Auckland are that the supply of newspaper for recycling and the supply of garden waste for composting has decreased since the partial introduction of wheelibins in the Auckland area.[17] A report on "The impact of mobile garbage bins (MGBs) on waste minimisation and recycling in New Zealand" is being prepared by a group called the Waste Minimisation Network in Auckland and will be available through Printpac UEB Auckland Office.

The contractor for collection does not usually have control over waste reduction initiatives and therefore it is difficult to negotiate contracts for collection that provide an incentive for the contractor to try and reduce waste volumes. Hutt and Dunedin Councils directly pay the costs of landfill disposal outside the contract, in order to gain the benefit of any waste reduction initiatives they have undertaken. The contractor has no financial incentive to encourage waste reduction, except possibly reduced collection times and less trips to the landfill.

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[15] Smith, 1993b.

[16] 'Wheelibins' are large (120 or 240 litre) plastic rubbish bins on wheels, designed for automated pickup by single driver collection trucks. Also referred to as MGBs (mobile garbage bins) and MPBs (mobile plastic bins).

[17] Chapman, Carter Holt Harvey, pers. comm., June 1993; and The Organic Collection and Recycling Association, 1992, para 2.4, Table 5.0.14.

Dunedin provided an example of a now expired contract that was volume based for payment and therefore not neutral to waste reduction efforts: e.g. greater volume of waste = greater payment. Though Council policy was to use only official containers and a set number per property, it was in the contractor's interest to pick up anything and everything which was left for collection.

In contrast Upper Hutt City's rubbish collection and kerbside recyclables collection is undertaken by one operator using a specialised truck. This contractor pays the tip fees so there is an incentive to increase the recyclables proportion, though at present the contractor has not taken advantage of this option. The contract prevents disposal of recyclables in the landfill; if returns on sorting and selling recyclables became very much lower than landfill disposal fees, landfilling the recyclables would be financially advantageous to the contractor.

Landfill management contracts

Landfill management contracts are outside the scope of this investigation except for consideration of whether the contract encourages or discourages waste reduction behaviour. Many landfills have recycling facilities, and staff activities and enthusiasm can have a major impact on the use of these facilities.

Dunedin has noted a major increase in recycling effort since it set up a direct contract with the gate charges operator. The Council can monitor changes in recycling numbers through takings at the till, ensure changes in information are promoted, and can respond quickly to any public complaints. If the recycling depot is separately contracted to the landfill management, the latter should at least be neutral to, if not actively encouraging, the recycling effort.

Hamilton City Council provided an example where the contract potentially counts against waste reduction, as it specifies a minimum tonnage to be paid for by the city. This type of 'take or pay' agreement can become restricting as circumstances change, and should be avoided. Contract clauses supporting waste reduction could provide for initiatives which may be introduced during the term of the contract.

4.2 Measuring waste reduction achievements

The significance of information on the achievements of the different programmes (Table 4.2) is fairly limited because of the relatively short time that most initiatives have been in place the differences in what is documented and the difficulties in measurement of effectiveness relative to the waste stream.

A direct comparison is not possible as the four councils include different items in the estimate or have access to different information. Dunedin City for example is unable to get data from some operators, who are treating results as commercially confidential. It is also difficult to relate these achievements to the total waste stream, as this will also be affected by changes in the economy and diversion of materials to other landfills or other uses such as reclamation. Whether licensing requirements could overcome this difficulty for councils is not clear.

However Table 4.2 combined with Table 4.1 show that the major emphasis has been and continues to be on recycling schemes, yet composting schemes achieve very significant reductions. Manukau City Council was the only Council contacted in this investigation which fully funded a compost scheme, with only limited recycling through depots at the landfill and transfer stations.[18]

Table 4.2: Waste reduction achievements by case study councils

Waste Reduction achievements by weight p.a.	Dunedin City Council	Timaru District Council	Hutt City Council	Masterton District Council
Recyclables	Recyclables 5,510 tonnes. 8.3% of total Council disposed waste stream.[1]	1,100 tonnes of newspaper/cardboard 4% of total waste stream (equivalent to 8% of volume of landfill p.a.[1])	Recyclables - 23% of domestic collection stream.[2] 9% of total waste stream.	Recyclables - 21/2% of waste stream at present. [2,3]
Green matter	Vegetation 5,000 tonnes. 7.7% of total waste stream.			
Car bodies, light swap, tonnes p.a.	1500 tonnes[4]	Not available[5]	1200 tonnes[4]	Not available

Notes
1. Includes commercial pickups of paper.
2. Doesn't include commercial pickup of paper.
3. Planned 10% reduction in tonnage of material buried in first year of Council's solid waste management strategy. Aim 40%, June 1996.
4. Source: receipts from Pacific Metals.
5. Nearly all car bodies in district, plus other metal scrap.

Hutt City have the most accurate and most systematically documented information, as they have direct contracts for recyclables collection, and a weighbridge and computer information system package at the landfill. However, even though the Council obtains monthly totals of recyclables collected and domestic tonnage at the landfill, it does not have access to returns from commercial recycling such as recycling cardboard and paper from commercial premises. In this case, the Council knows accurately what the effect of their own recycling initiatives are, but not the total impact of recycling in the community. Figures for changes in total tonnage received at the landfill are available but changes in these figures are attributable to many different factors, such as the state of the economy (which could lead to significant shifts over say a five year period) and changes in industry type.

Participation rates in different recycling operations are sometimes being used as indirect indicators of waste reduction achievements. Dunedin

[18] Manukau City Council, 1993.

Council includes in the draft Annual Plan a performance target of maintaining the proportion of clients who recycle at the landfill at a certain level, to meet the objective of monitoring the impact of waste disposal on the environment and promoting waste reduction. This information may be better used as an indicator of the effectiveness of public education and community acceptance and interest in waste reduction, rather than of waste reduction achieved (for example, amount recycled or composted).

For the majority of councils which do not have weighbridges, traffic counts are the simplest indicator of waste disposal practices, as used by Masterton and Timaru. Combined with annual surveys of landfill contours, they provide some information on the waste stream and any major changes, but it is difficult to separate out a single influence such as waste reduction. Wellington City tried vehicle counts as an indicator of the effect of gate charges on reduction of waste. However they acknowledge that this effect is difficult to separate out from other factors such as downturn in the economy and diversion of some waste to other sites, for example demolition rubble into estuary reclamation in Whangarei City. People may also be visiting less often, but taking the same amount of refuse in larger loads.

Information on the effect of household composting promotion is probably the most difficult to measure. Hutt City have a participation estimate from their 1991 survey. Their surveys of rubbish bag weight capture total changes in the domestic waste stream, but not any one factor. Surveys of content, such as completed by Timaru and Christchurch, if repeated at the same time of year, could indicate effects of composting, but also reflect other factors such as changes in lifestyle or a move to more pre-prepared food.

Waste stream analysis

A waste analysis protocol has been developed following practical trials with Christchurch City and Hurunui District.[19] Use of this will provide information on the waste stream for the local authority and eventually provide consistent base data for the whole country. It will be possible to deduce the effect of waste reduction on the community waste stream using the waste analysis protocol if it is combined with measurement of the individual waste reduction programmes.

A weighbridge is necessary for the method, or for any detailed track of local waste stream trends. For smaller councils with a number of landfill sites, this is beyond their resources, although any move to a centralised site makes the use of a weighbridge more easily justified. For councils without this facility, cooperation with the traffic section of the police could allow the use of portable facilities for a trial period or snapshot survey.

It must be remembered that to extend the life of a landfill by saving landfill space, it is the volume not the weight which is important. Correlations of weight to volume should be considered. Arrival of precompacted material at the landfill, as occurs with some transfer stations, makes a direct relationship between truck volume and landfill volume. Use of the protocol will also help local industry to be aware of their contribution to the waste problem and possible solutions. Hutt City Council found when undertaking

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[19] Ministry for the Environment, 1992b.

some trial waste audits that most local company managers were unaware of many of the materials they were disposing of, and whether they are reusable or recyclable.

In the interim, estimates of local waste stream components are made with the help of data from other areas, and are combined with *in situ* contours at the landfill to provide a cheap and relatively satisfactory method for determining the major targets for waste reduction. Combined with returns on waste reduction programmes, this gives smaller local authorities, in particular, a satisfactory basis for decisions, provided that the influence of other changes in the community is acknowledged.

5 Constraints on the Success of Waste Reduction Initiatives

Despite a local authority's best intentions to encourage waste reduction in their community, there are very real constraints they must face which work against changing traditional patterns of resource use and waste generation. This section reports on the main constraints which were identified by the local authorities, councillors, and private industry recyclers and waste haulers spoken to in the case study communities. These were **inadequate markets, low landfill charges, and inadequate information and coordination for public education.**

5.1 Inadequate markets

Without exception, councils and private waste haulers identified lack of adequate markets for recovered materials as an impediment to waste reduction. The scrap steel, aluminium and glass markets have remained fairly stable, but the same cannot be said for paper, plastics, or used lubricating oil. Compost finds a ready local market, but the return is insufficient to fully cover operational and machinery costs.

With regard to recycling markets such as for post-consumer plastics, paper and waste lubricating oil, there are a number of generic problems.

First, present demand for products with recycled content is insufficient to accommodate volumes extractable from the waste stream or to provide a price sufficient to cover costs of extraction and transport to market as well as a profit. This could be addressed to some extent by increasing consumer demand for recycled content products and covering extraction costs as part of local waste management services. However, the amount that can be accommodated will still be limited by population size and cost-competitive access to overseas markets. The sheer volume of resource flow needs to be constrained at source.

Second, the marketplace is at present unable to measure or accurately price environmental costs and benefits and impacts on future generations. The environment is treated as a zero-price resource, even though it serves essential economic functions. Pollution and resource depletion are only valued where environmental regulations require protective action to be taken (and paid for) or environmental levies such as a 'carbon tax' are imposed on the market to signal environmental costs. Economic decisions made by producers and consumers alike are based on artificially low prices, inadequate information, and a tendency to favour present over future goods ('high discount rates').

Third, costs that were once borne by manufacturers to collect, wash and refill reusable packaging within smaller catchments have in recent decades been transferred to consumers, who now pay to collect and landfill (or collect and recycle) single-trip packaging which is designed for one-way distribution over much larger areas. Collection of such widely dispersed material for

recycling is expensive, both in terms of financial costs and energy use impacts on the environment. In a true 'generator-pays' framework, disposal or recycling costs would be reflected in the material and packaging costs and hence product costs, leading to changes in industry decisions and choices available to the consumer.

Given these generic problems in the current market, the strong environmental and future generation benefits of waste reduction initiatives do not accrue to those who make the expenditure, and the activities cannot be made to 'pay for themselves'.

In 1989, Government proposed a target of 20 percent reduction in solid waste volumes between 1988 and 1993, to liaise with local authorities on measurement of waste volumes, to monitor outcomes, and introduce new measures if appropriate. A report on such additional measures, including mandatory deposit-refund schemes (to correct for market failures) was to be made by 1 July 1990 if progress on the 20 percent reduction goal was unsatisfactory.[20] However, the Waste Analysis Protocol to collect data on waste stream volumes and contents was not released until late 1992, so base data and progress on the 20 percent reduction goal could not be measured on a national basis.

In 1992, the Ministry for the Environment was directed to negotiate waste reduction targets with each business sector, and encourage voluntary initiatives in cleaner production, waste reduction and resource recovery, and to investigate regulatory and economic mechanisms to back up the voluntary initiatives should they fail to achieve targets.[21] The first case study identified was waste lubricating oil, and the Ministry has begun informal discussions with major oil companies to encourage a cooperative industry 'generator-pays' approach, and to address waste reduction targets.[22] The Parliamentary Commissioner for the Environment is monitoring this process.

A number of suggestions were received from the case study contacts on how markets could be improved, as follows.

Mandated recycled content

This approach was suggested by a number of recycling practitioners as a possible remedy to correct market failures for paper and plastic. For example members of the waste paper industry believed that mandating 20 percent recycled paper content in newsprint (as has been done overseas) would accommodate all the post-consumer mixed waste paper currently without a market in New Zealand. Another suggestion was establishment of central and local government policy mandating purchasing of stationery and other supplies with recycled content, even though this would be at an extra cost compared to virgin material.

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[20] Ministry for the Environment, 1989, p.33.

[21] MFE, *Environment Update*, September 1992, p.1.

[22] Letter from the Minister for the Environment to D. H. Ackerly of Ashburton, 5 May 1992, and to the Parliamentary Commissioner for the Environment, 28 September 1992.

Local price guarantees

South Canterbury Recyclers has been given what amounts to a minimum price for collected paper from Timaru Council, in recognition of the waste reduction benefits to the local landfills. Faced with a glut in the paper market which would have forced them out of business, the recyclers approached the Council and received support over a one year period. A contract specifies a minimum product price which is a baseline for survival of the company (arrived at through independent audit of company accounts) and Council will supplement the sale price up to that level. Thus the recycler can afford to sell at a lower price and still remain in business. This method still relies on a sale to a market, otherwise a warehouse of paper would eventually have to be dumped.

National coordination of marketing for recycled content products

Collectors and exporters of waste paper and plastic advise that there is no national coordination of collection, product development, or marketing of unprocessed or value-added recycled material, either for the domestic or overseas market.

Unlike other more lucrative exported commodities, the profit margins from recycled materials are small after transport costs are met. In addition, New Zealand competes with waste paper and plastics 'dumped' on the international market by European countries with such high landfill tipping fees that they can easily afford to undercut our prices.

Relying solely on market mechanisms means incentives for greater promotion are inadequate, as the primary benefits of waste reduction and recycling are not captured by the recycling company, but by the wider community and the environment. An argument can be made for the community at large supporting the promotion of our recycled products at home and overseas.

Tariffs or levies on virgin materials

During the course of this investigation, tariffs and levies on virgin materials were proposed by both councils and industry as a means to recognise the environmental benefits of waste reduction not otherwise recognised by the marketplace, improve the market for reused and recycled resources, and create a fund for promotion of recycled products. Of necessity, such 'corrections for market failure' would need to be done at a national level.

Such an approach is not dissimilar to the proposed 'carbon tax' for fossil fuels. It also has a precedent in New Zealand with previous levies on virgin lubricating oils.[23]

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[23] Following the 'oil shocks' of the 1970s, New Zealand had a tariff on virgin lubricating oil entering the country, which encouraged the development of an active re-refined oil industry. The tariff was advocated by the Resource Conservation Unit in the Department of Trade and Industry to recognise that the price of virgin oil did not adequately reflect the costs of depleting a valuable imported non-renewable resource, and without a price advantage re-refined oil could not compete on the open market. The virgin oil tariff was removed in 1986.

Inadequacy of recycled product marketing

A number of instances were noted where the marketing advantages of recycled content are not exploited by New Zealand manufacturers. Two examples are recycled plastic buckets and plant pots made from recycled polyethylene (no label or promotional material in store) and recycled paper packaging. To create markets for recovered materials, the consumer should be advised that there is a choice, and the products containing recovered materials clearly labelled to identify their recycled content.

Such an oversight should be able to be corrected by the companies involved, aided by the Environmental Choice logo where the product is eligible. However, it is not clear that the Environmental Choice programme is widely known or understood, either by producers or consumers, and the codes do not as yet cover a full range of products.

5.2 Low landfill charges

Generally the countries with more extensive recycling and composting operations than New Zealand have much higher tipping fees, which make waste reduction alternatives more attractive. Most tipping fees in New Zealand (where they exist) do not cover the actual monetary cost of collection and disposal, let alone the uncosted 'externalities'. In this sense, they do not send accurate financial incentives to waste producers; costs are inadequately 'transparent', and decisions are thus not fully informed.

Waste management industry representatives spoken to in Masterton, Hutt City and Dunedin all noted that tipping fees were far too low to encourage waste reduction by private industry, including waste haulers. One representative with prior experience in Auckland, which has comparatively higher tipping fees, noted that more active recycling was present in that city's industrial waste stream than in other New Zealand cities.

5.3 Information

The Ministry for the Environment has a statutory role to provide and disseminate information and services relating to environmental policies (Environment Act 1986, section 31 (e)), and as resources have allowed, has promoted the principles of integrated waste management. Local authorities are advised of the availability of publications, but it appears that information sharing between the staff in local authorities who receive information and colleagues, councillors, local business, schools and the general public is limited.

Educational materials

All the councils emphasised the lack of easily accessible educational materials on waste reduction principles and practices which could be incorporated into local information to educate the local public, business, councillors and staff.

In particular, it was noted that the public, and the councillors who represent them, are generally unaware of the following, which are common to any programme regardless of location:

- the principles of Integrated Waste Management (generator responsibility and the waste hierarchy) and why it is important;
- the full picture of environmental costs from a wasteful community (for example, leachate, inefficient resource use, loss of landfill space for future generations, impacts on air, land, and ecosystems);
- the likelihood that the money they pay in rates, tipping charges and bag charges does not cover all the true costs of their waste generation and disposal;
- their role in 'precycling': preferentially purchasing products with minimal or recyclable packaging and reusable or recyclable content;
- their role in demanding better choice from manufacturers where 'precycling' is not an option;
- the narrow range of materials that can actually be recycled, and the costs they impose on a recycling programme when they contribute non-recyclable materials;
- the relationship between consumer demand for products with recycled content, and ability to recycle materials;
- that recycling is not a cheap option, nor a creator of jobs where markets are inadequate, and that recycling, like traditional waste collection and disposal, is unlikely to 'pay for itself';
- effective waste reduction incentives and recycling market promotion options for councils;
- the large component of the household waste stream which is compostable, and the ability of most households to return those nutrients to the soil at home.

It was noted by councillors that such information needs to be seen by the public as from a reputable and 'independent' source, or it will be viewed as 'political' and not heeded. This is particularly true of any moves to generator-pays financial incentives which it was felt could be seen as revenue seeking by council or double charging.

Research, writing and publishing of this information by every council individually is seen as an unnecessary duplication of resources, and the need for a central agency to do this work was identified. The Ministry for the Environment has produced public information brochures which briefly addressed precycling, reuse, composting and recycling.[24]

Operational guidelines - waste reduction schemes

Councillors in particular commented that they do not have access to clear background information, nor the time to search it out themselves. With no centralised 'clearinghouse' of information on what recycling and composting

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[24] "You want to save the world, but where do you start?" (revised September 1990, now out of print), and "Helping the Environment begins at Home", co-sponsored with Foodtown (June 1993, limited distribution).

methods are affordable and effective, councils are each individually organising tours of other areas, setting up trial schemes, and rediscovering what other municipalities have already learned in this or previous decades. At an officer level there is some sharing of knowledge between councils, but generally the current approach is not an efficient use of resources.

Some helpful information has been published by the Ministry for the Environment: "Producing Less Waste" in 1991, and the Kaitaia Recycling Project information in the MFE *Landfill Guidelines* in 1992.

In contrast, from 1977-1986 the Resource Conservation Unit of the Department of Trade and Industry sponsored annual conferences of council staff and councillors and recycling industry representatives, distributed minutes of the meetings to all councils, and published reports containing practical information of interest to councils.

The newsletters and conferences of the Waste Management Institute are a valuable contribution, but the 'institutional memory' or what has worked and not worked could be much more effectively captured and shared with councils.

Agencies suggested for a national information coordinating role included the Local Government Association, the NZ Waste Management Institute, and the Ministry for the Environment.

6 Information Flow to Councillors and the Public

Under the Resource Management Act, district and regional councils now have a responsibility to encourage their communities to manage natural and physical resources sustainably. With limited information available on effective waste reduction measures, and the economic and environmental consequences of local consumption and waste production, council staff become involved in education in order to encourage sustainable resource management.

Under the Local Government Act and the Resource Management Act, councils have an obligation to involve the public in decision-making, to find out what their community wants and to provide accurate and 'transparent' information on council policies and actions. In order for waste reduction initiatives to be effective, householders and businesses need to be able to make fully informed choices, for which they require clear information on environmental and financial effects, options and incentives.

Reducing waste production requires a change in behaviour, and to change behaviour people need new information. The quality of the information people have will be reflected in the behaviour choices they make. Likewise, the quality of information councillors have on public preferences will improve the decisions on providing local services.

The information on waste reduction options that council staff have provided to councillors and the public in each of the four case studies is briefly summarised in this section and in Table 6.1.

6.1 Dunedin City Council

The Council's Recycling Advisory Officer is actively involved in continual public education, including response to public enquiries, speaking engagements, visits to schools, provision of resource material to groups on request, and liaison with the media. Landfill staff have been asked to help educate users about the recycling and composting options provided on site, and parties of schoolchildren are being shown resource wastage and resource recovery at the landfill.

Brochures have been provided to households advising on recycling depots and newspaper collection, a Waste Exchange Register provided to schools and business advising on some local reuse and recycling options, and feature articles published in the local media and the Council's own publications for households (*City Talk*) and ratepayers (*City News Update*). Overall these materials include mention of the principles of integrated waste management, household options for waste reduction (including 'precycling'), and environmental costs (leachate, resource depletion). The focus of public information is primarily on recycling, with some mention of practical 'precycling' and composting options. A periodical 'Review' distributed to local business houses as part of the Green Business Challenge Programme contains useful background information relating to waste reduction.

Papers to Council in 1991 and 1992 focused on recycling, but also recommended encouragement of large-scale composting to reduce landfill volumes and providing economic incentives to landfill users to use recycling/composting facilities on site.

Following the local failure of the plastics recycling market and a public outcry over loss of a plastic recycling option, the Council co-sponsored a letterbox drop by milk vendors encouraging households to purchase milk in recyclable glass rather than non-recyclable plastic. In response to this new information, some four to five households per milk round per week have requested a return to reusable glass.

A survey of residents was undertaken, and included questions on household waste reduction views and activities, including recycling, 'precycling', composting, financial incentives for waste reduction, and preferences for council policy. The public response was very supportive of establishing a strong waste reduction policy and provision of waste reduction options for residents.

The Council's first draft Annual Plan elicited some strong public criticism demanding more recycling opportunities. 'Environmental Liaison Group' meetings with staff have covered waste minimisation issues, and these interest groups have since been involved with other public interest representatives in the Refuse Working Party, which has actively participated in resolving landfill siting issues. A number of lengthy refuse management strategy and landfill siting documents have been prepared which contain some discussion of waste reduction options, and the documents have been summarised for councillors at briefing meetings. Publicity seeking public comment on new landfill options has briefly mentioned waste reduction policy, and leachate as a present environmental cost.

The 1993-94 draft Annual Plan contains a brief text on Council waste reduction policy, but no clear information on present or future costs of collection, recycling, composting, or burial of waste resources (detailed information is however available in-house).

The Council rates demand specifies a 'refuse disposal charge' and 'refuse collection charge' where relevant to the ratepayer. An explanation is given on the back of the rates demand, but the ratepayer is unable to lower this fixed charge by producing less refuse.

Overall assessment:
A good all-round initial effort.
Particularly good beginning on the reduce and precycling front and on waste reduction features in regular newsletters to households. Improvements particularly required in transparency and accuracy of information received via financial incentives for waste reduction, and in procurement policy information to councillors.

6.2 Timaru District Council

The 1992/93 Timaru District Council Annual Plan has a goal to actively encourage and support recycling. The draft 1993/94 plan proposes adding a goal to "address the waste minimisation issues of reduce, reuse, recycle and recovery" and a new objective to prepare a discussion document on waste minimisation for Council consideration by 31 March 1994.

In August 1990, a Works Committee briefing discussed recycling, but not in an integrated waste management context. In 1992, however, the brochure on integrated waste management produced by the Waste Management Institute of New Zealand was provided to all councillors and the 'five Rs' were summarised in a full-page advert in the community newspaper and Council's own community update publication.

In connection with the debate on whether to introduce high capacity wheelibins the Geraldine Community Board requested more information, and a paper was provided to the Board and other councillors by Council staff on 3 March 1993. This paper xplained the principles of integrated waste management and addressed issues of future landfill space, recycling markets, composting as a significant option in waste reduction, Council ability to support local recycling markets through purchasing policy, and the ability to encourage more recycling if people were willing to pay.

A household newspaper recycling programme has been supported, and the public advised in a widely distributed brochure of some of the local and global environmental advantages of participating. This brochure, published with local sponsorship, clearly explained the environmental benefits and how to participate. Households which participated in a 500-household multi-material kerbside recycling trial received a 'kit' containing good information on how and why to participate, and a follow-up on collection and participation rates. Both local and global benefits of recycling have been publicised in the newspaper and the Council's community update newsletter.

"Cleaner production" and integrated waste management information was sent by Council staff to the local chapter of the Chamber of Commerce in February 1993, requesting that they inform their members and refer them to the Ministry for the Environment for more information.

Information on home composting as a waste reduction measure has not been provided to the public; in fact in the Council's 'wheelibin' promotional brochure, both the text and a photo encouraged use of the bins to send green garden waste to the landfill. Large scale Council-initiated composting as a waste reduction option is under investigation, but has yet to be presented to the Council or the public.

A transfer station was built recently in Temuka, and explained to residents in letterbox drops and full page newspaper ads. A recycling centre was part of the station, but publicity did not mention the principles of integrated waste management, the financial and environmental costs of waste production, or the options for generator-pays incentives for waste reduction. An objective in the 1992/93 plan was to 'assess the viability' of user charges at the Temuka transfer station. Charges are not considered viable at present, based it seems on the responses from a public who have not as yet been informed about the true costs of managing their wastes.

Local waste composition data was collected in early 1993 and compared with Christchurch data to determine any impact from introduction of the wheelibins. Results were summarised for councillors in June 1993.

The Council rates demand specifies a 'refuse charge' where refuse services are received by the ratepayer. No explanation is given, and the ratepayer is unable to lower this fixed charge by producing less refuse.

Overall assessment:
A good initial effort, particularly with regard to newspaper recycling. Improvements are required in providing clear information to the public on the full impacts of local waste management (environmental and financial), to the public and local business on reduce/precycling, reuse and composting options for waste reduction, and on encouraging informed involvement of the public in waste reduction policy decisions.

6.3 Hutt City Council

In January 1992 kerbside collection was described to councillors on the Works and Services Committee as "the flagship of Council's waste reduction strategy [which] has the potential to impact on every household in the city". The 65% of households which now have this service have received very clear 'how to' brochures on what can be recycled and how to do their own home composting. These brochures are also available at Council public information counters. The launch of the programme was well covered in the local media, and updates including programme changes, reminders, and collection statistics are provided in the Council newsletter to all ratepayers.

In June 1992 a "Pollution Solutions" kit for industry was launched, containing a brochure on "managing your wastes better by reduction, reuse and recycling", with a clear explanation of the principles of integrated waste management. This has been distributed to the majority of local industries in the community, and smaller premises will receive a copy over the next six months.

Papers to councillors from 1990 through 1992 noted Government's 20 percent reduction target, explained the principles of integrated waste management, and set out some local options. The 1992/93 Annual Plan clearly sets out as a Council aim the provision of incentives for waste reduction.

Financial incentives for waste reduction have been consistently recommended to councillors, and in May 1991 Community Boards were advised that landfill and refuse bag charges were an ideal way to improve public awareness of refuse disposal costs and impacts. A public discussion document was made widely available in November 1990 and an opinion survey distributed to 2500 households in January 1991 to canvass views on waste disposal funding options. User charges on collection bags and landfill entrance fees have been put in place which fund the recycling collection programme. However, landfill users are not directly informed that their landfill fee helps to support the recycling programme, and funding issues are not a major feature of the recycling updates in the ratepayer's newsletter.

The 1992/93 Council rates demand has a uniform annual 'refuse charge' which cannot be reduced by the householder producing less rubbish. However, the 1993/94 Annual Plan contains a proposal to fund refuse collection and landfill disposal wholly through a direct charge on each official rubbish bag, which would allow each household to directly lower charges by lowering their refuse production. This proposed change has been advertised in the local media, explaining it as an incentive to "encourage recycling and waste reduction".

The 'how to' guide for recycling encourages households to purchase recycled products to help stimulate recycling markets. However, information on 'recycling' waste reduction options such as not buying excess packaging is not included.

The Council also imparts waste reduction information via their Recycling Hotline, and is developing a programme to take to local schools.

Overall assessment:
An excellent initial effort.
Attention has been given to the entire waste management hierarchy in both commercial/industrial and household waste streams, and on implementing generator-pays financial incentives with the involvement of the public. Improvements are required in transparency and accuracy of longer-term costs (environmental and financial) in financial incentive messages sent to the councillors and the public.

6.4 Masterton District Council

In April 1993 Council staff prepared a draft Solid Waste Management Strategy Paper, which was accepted by the Council without amendment. The Strategy follows the principles of integrated waste management, makes clear the need for a new landfill in four years without waste reduction (costs considered in general terms only), and proposes partial user charges as an incentive. It follows on from a public information brochure on the need for landfill user charges distributed to all households in April 1992 and followed by public meetings. A full page advert was placed by the Council in the local paper to explain the strategy; user charge incentives and the need for a replacement landfill were noted.

Environmental implications (either local or global) of waste creation behaviour were not addressed in the Strategy, but a few are mentioned in the 1992-93 Annual Plan (p.15). They have not been mentioned to the public generally, except for mention of leachate at the 1992 public meetings.

A flyer on recycling depot locations was distributed to the public through the local free newspaper in February 1991. The public has not as yet been provided with an update on the subsequent failure of mixed waste paper and plastics markets. Information on home composting and other household waste reduction options has not been provided.

The Council rates demand specifies a 'refuse charge' where the ratepayer receives refuse services. When first introduced, an explanation of what the charge paid for was provided. Information on waste reduction options has

not been provided in the Council newsletter which goes out with the rates demand, and the ratepayer is not able to lower this fixed charge by producing less refuse.

Overall assessment:
A good initial effort, particularly on public involvement in decisions on generator-pays financial incentives.
Improvements are required in informing the public of the costs of waste management (environmental and financial, especially in finding new landfill sites) and on reduce/precycling, reuse and composting options for waste reduction.

Table 6.1: Information provided to councillors and the public on waste reduction issues

	DUNEDIN		TIMARU		HUTT CITY		MASTERTON	
	Council	Public	Council	Public	Council	Public	Council	Public
Principles of Integrated Waste Management	✓	✓	✓	✓*	✓	✓*	✓	
Local impacts (e.g.: landfill space, leachate)	✓	✓	✓	✓	✓	✓*	✓	✓
Reg'l, nat'l, global impacts of wasting resources		✓		✓			✓	
Local diversion rates with recycling, composting	✓	✓		(✓)	✓		✓	
Reduce: public role, methods ('precycling')		✓*				(✓)		
Reduce: encourage industrial waste audits					✓			
Reuse and Recycle: local opportunities	✓	✓*		✓		✓*		✓
Economic incentives for waste reduction	✓				✓	✓	✓	✓
Composting: greater volume, household role	✓	✓				(✓)	✓	
Recycling markets: Council purchasing policy			✓		✓			
Recycling markets: local constraints	✓	✓	✓			(✓)		

Key

✓ = some information provided (not necessarily complete; may require reminders or updates).
(✓) = limited to households involved in kerbside recycling programmes or trials.
* = information also targeted to commercial/industrial waste producers.
Public = Media reports or documents conveniently accessible to a majority of households or ratepayers.
Council = Annual plans, reports for public comment (limited distribution), reports to council. Many of these are 'public' in the strict sense, but in a practical sense are of limited effectiveness in informing the general public.

7 Accurate Costing of Waste Management Services

Recent changes to internal local authority accounting procedures and the presentation of information in annual reports has increased the level of information flow in recent years. However, evidence collected in the course of this study suggests that full accounting for waste disposal costs or the benefits of savings on disposal from waste reduction schemes is not as yet being undertaken.

In economic terms the target is to make waste generators, with full knowledge of the costs and benefits involved, engage in waste reduction and minimisation, to the point where the marginal benefits equal the marginal costs of doing so. In order to give waste generators the correct economic signals, disposal costs should cover not only operation and maintenance costs, but a charge to reflect the costs of replacing landfill space and other assets used. A full accounting of all costs and benefits of such action is essential for such an approach to work.

7.1 Tangible costs of landfill disposal

There are studies which have examined the likely components of a costing study for a new landfill, including the guidelines resulting from the MFE/CAE project on waste management. Costs would include:

- investigation and design
- obtaining consents (including costs for appeals)
- land purchase
- site development
- mitigation (including leachate and gas control)
- operating costs, including monitoring
- transport costs
- aftercare.[25]

For the case study local authorities, significant omissions from costings included allowance for the costs of the land used, either historic or in opportunity cost terms, allowance for the future cost of aftercare and explicit acknowledgement of environmental costs (see Table 7.1). Some of these omitted costs are borne externally by the community and the environment, and some partially included in operational overheads.

In particular, the requirements of the Resource Management Act coupled with the type of sites chosen for landfills in the past (for example near waterways or in gullies with feeder streams) will mean that many councils face significant aftercare costs. Even where mitigation measures are taken during the life of the landfill, there will be ongoing monitoring and remedial programmes needed, which may have a significant cost to the disposal service.

[25] Ministry for the Environment, 1992a.

Aftercare costs which are likely to require attention for between twenty and thirty years include: construction and maintenance of cap, landscaping, planting and maintenance of landscaping, gas collection and treatment, maintenance of surface drainage works including sedimentation pond if required, leachate collection and treatment systems, groundwater monitoring and administration.

Table 7.1: Landfill disposal costings

COSTS	DUNEDIN		TIMARU		HUTT CITY		MASTERTON	
	past	present /future	past	present /future	past	present /future	past	present /future
Land purchase	-	✓[1]	-	-	-	-[2]	-	-
Consents	-	-	-	-	-	✓[3]	-	-
Design, orig. development	-	✓	-	-	-	✓	-	-
Ongoing development	-	✓	-	✓	-	✓	-	-
Transfer stations	-	✓	-	✓	-	n/a	-	n/a
Operating	✓	✓	✓	✓	✓	✓	✓	✓
Collection	✓	✓	✓	✓	✓	✓	✓	✓
Mitigation	-	✓[4]	-	[5]	-	[6]	-	-
After care	-	✓[7]	-	-	-	-	-	-
Intangibles	-	-	-	-	-	-	-	-

Notes
1 Included for new landfill at Smooth Hill, but not current one at Green Island.
2 Records untraceable.
3 Costs considered by Council to be negligible (renewal of existing discharge consent).
4 Mitigation of leachate is part of new costs at Green Island and new design at Smooth Hill.
5 Noted in cost/benefit analysis of Redruth and alternative sites, but not included in current costings.
6 Methane extraction for production of electricity under trial, but not part of landfill costing.
7 Aftercare at Green Island included, but not for Smooth Hill.

7.2 Valuation of the landfill asset

Changes in local authority accounting practice to accrual accounting mean that councils are now better accounting for the value of their capital assets. This involves calculating depreciation on all capital expenditure such as buildings, machinery and equipment (that is, the cost of the asset over the accounting period) and allowing for the cost of the use of capital including staff time and legal costs (that is, the opportunity cost of capital) at a chosen discount rate. Local authorities are completing these exercises as part of their register of assets, and are moving towards incorporating these factors into accounting for total disposal costs. This is developing a more accurate way of valuing the asset than was done historically when only operating costs were considered.

For the setting of accurate disposal costs, it is important that all the physical assets of the landfill are included in the exercise, yet a common omission is the value of the land occupied by the landfill, and the value of the disposal space within the landfill. Current landfills represent valuable assets and the suggestion that the cost of the land to the council represents a 'sunk cost' fails to address the issue satisfactorily.

In the absence of a 'market' for landfills, the **land value** could be assessed by the government valuation or the opportunity cost of land. For councils such as Hutt City and Masterton District where the land was purchased or acquired decades ago, the historical cost is insignificant in relation to other components of the exercise. In these cases it may be more appropriate to use the opportunity cost approach as an indicator of the value of the land being used for disposal purposes.

Landfill space is an asset that can actually *increase or appreciate* in value, for as long as the next landfill is more expensive for the prospective developer to establish than the existing one. Approximation of the value of landfill space needs to include an allowance for scarcity value of the asset itself, which is being consumed by the operation. While the profit-making opportunity (and hence the market value) of landfill space could reduce as the landfill is filled up, the value of that space will increase if replacement sites are unavailable or more expensive to develop and with improved landfill management standards this is likely to be the case.

A current landfill site could be assessed by viewing it as having an optimal filling rate, in much the same way as any exhaustible resource such as a quarry can be said to have an optimal extraction rate.[26] Sites for sanitary landfills, or the capacity of existing landfills, are a scarce resource no less than deposits of ore. Landfill sites and landfill space are no more a free good than is the environment's apparent ability to cope with waste from economic processes.

A faster rate of use brings closer the time when the community needs a new site, and therefore the disposal charges should come closer to those about to be incurred. The rise should be an incremental one starting from some true historic cost and rising over time to a rate sufficient to cover costs at the next site.

Officers at Timaru have started to address the issue of the changing value of landfill space over time by considering the one major landfill at Redruth

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[26] For such an approach see Pearce, 1990, p.53.

from the depreciating asset approach. Essentially costs are estimated based on the amount needed to replace the asset to its existing state of development, using a discount rate of 8 percent, although land costs (valuation of $220,000), monitoring and aftercare of current and closed landfills, and intangible costs have not been included in the basis of the calculations. Consequently, an extremely low value has been calculated for landfill costs, of the order of $6.25 per cubic metre.

Landfill costs for Hutt are estimated at $15 a tonne, and gate charges set accordingly. This includes some capitalised costs, but not land or aftercare. There is a political recognition that the next landfill will be much more expensive and there is a need for a contingency fund to be built up for the next landfill, but tipping fees do not yet appear to adequately reflect likely future costs.

Local authorities such as Masterton operating within or close to the minimum timeframe for setting up a replacement landfill (five to seven years) will readily grasp the idea that waste reduction is saving them not some low historically based cost of the present site, but one based on future costs of the next site. Avoided landfill costs should be moving towards those of future sites.[27]

The idea of allowing for landfill value changes over time has been relatively ignored in the economics literature and needs development. A preliminary hypothetical analysis has been prepared by Smith (1993, p.39), and such techniques need to be further developed as a practical measurement tool.

7.3 Waste reduction scheme costings

Economic factors which can be used in assessing the costs and benefits of a waste reduction initiative include:

- gross cost:
  - capital (trucks; collection equipment; processing facility; plant and equipment; land; buildings);
  - operating (running costs for vehicles and equipment; staff costs (including occupational health); containers; other collection costs; administration; publicity)
- revenue received
- net cost
- amount diverted from landfill (net volume or tonnage recycled or composted, less amounts rejected through contamination or failure of markets)
- tonnage not disposed in landfill - avoided disposal cost (collection costs; landfill charge (including asset value of landfill); administrative overheads)
- impact on or by other waste diversion schemes (school; service club fundraisers, private operators).

If the recycling/composting operation is put out to tender, gross cost and revenue received will be replaced by cost of contract.

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[27] This idea is inherent in the approach advocated in the report on Kaitaia's recycling efforts contained in Ministry for the Environment, 1992a; and in the Brisbane City Council solid waste management plan (H. Huges pers. comm.).

None of the case study councils had considered all the items in the above checklist. Especially notable is that none of the councils explicitly considered the intangibles, although Hutt and Dunedin cities did householder surveys which gave information on present public practice and preference.

Lack of allowance for the avoided landfill costs is also very significant, as this cost is an expression of the value of the landfill space to the community. The council staff had not initially included this cost in their calculation or presentations to council. This figure (and the disposal costs on which it is based) needs to be fully and accurately costed. If not, the benefits arising from waste reduction schemes will be undervalued.

The impact on or by existing schemes had generally not been considered but will be of more significance, once local authorities are in the position where there are a number of initiatives occurring in the same area. The effect of private enterprise operations on council schemes may be to remove a valuable part of the waste stream and render other initiatives less economic. An obvious example would be council consideration of a paper collection scheme in the commercial district, in competition with industry operators.

Funding of these initiatives is generally from the operational budget of the departments concerned; for example in Masterton generator-pays charges will be levied at the landfill, but waste reduction initiatives funded from rates. Hutt City is the exception in that the whole of the waste reduction programme, including kerbside collection, promotion and publicity, is funded by domestic vehicle charges at the landfills and a 15 cent levy on extra bag sales for domestic collection. This provided the only example encountered in this study where the revenue (that is, the 'benefit') from disposal was directly used against the cost of waste reduction. This approach to funding waste reduction was recently re-endorsed by the community of Hutt City.

A summary and comparison of waste reduction scheme costings in the four case studies has not been reported due to the wide variation in programme structure and the gaps in information.

7.4 Intangible costs and benefits

The costs of compliance with increasingly stringent regulatory requirements for landfills is not a reflection of new costs imposed on society. Previously the costs were borne externally through environmental damage of one sort or another. Regulations which internalise these costs are merely shifting the incidence of those costs and rendering them more transparent and explicit.

Even with this move to fuller accounting of true monetary costs, there still remains the question of the non-monetised or 'intangible' components. If the signals coming from the economic/market system are not reflecting the environmental position and mask the true costs of waste disposal, an inefficient outcome in economic terms will result in that waste reduction will be undervalued.

The fourth schedule to the Resource Management Act provides initial guidelines as to what is expected to be included in an environmental effects

assessment, as does the *Landfill Guidelines*.[28] These factors are difficult to quantify, but sustainable resource management is dependent on them being made as explicit as possible.

As an absolute minimum, environmental impact assessments of landfill costs would need to consider factors such as:

(a) emissions from tip sites, e.g. odour, methane and leachate
(b) loss or spoiling of aesthetic landscape features, e.g. views
(c) inconvenience to neighbouring residents, e.g. dust, traffic, litter
(d) effects on human health and wellbeing, e.g. noise, odour, vermin
(e) effects on fauna and flora.

To the extent that waste reduction schemes result in a reduction of area devoted to landfills and subjected to such costs, such schemes can include the prevention or reduction of these costs as benefits.

There are also environmental effects associated with waste reduction, such as pollution from paper recycling and energy usage. Without full life-cycle analysis, which is beyond the resources of most local authorities, the relative merits of single use plus landfilling and multiple use plus the impacts of the reuse process cannot be known with certainty.

Waste reduction can represent a saving of resources and once all costs and benefits are revealed this may be beneficial from an economic viewpoint. Predicted shortages in basic minerals and other natural resources, have not so far resulted in rapid real price rises. Prices have generally been found to follow changes in costs, produced in turn by changes in technology and ore grade.[29] However, part of the perfect information requirement for an efficient market demands that the appropriate signals be given as to the cost and benefits of using recycled as opposed to virgin materials. Encouraging waste minimisation by charging full disposal costs would help to achieve that goal. Using virgin materials because they appear cheaper as the result of any underpricing of landfill space is not efficient.

Other intangible benefits include social aspects such as the gratification people can obtain from believing they are 'helping the environment', and from knowing the community is being better educated on environmental issues. Creating opportunities for the local community to learn about and help solve regional, national and global environmental problems provides a very real although unquantifiable local benefit. Community perception of this as a benefit can manifest itself, for example, as ratepayers lobbying for council-sponsored recycling schemes.

Convenience of waste reduction schemes is an important factor in determining participation rates, and to maximise community benefits of waste reduction participation should be made as easy as possible.

Attempts have been made in recent years to place dollar values on intangible costs and benefits,[30] but these methods are problematic and incomplete. Rather than attempt to assign accurate dollar values, councils are advised to

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[28] Ministry for the Environment, 1992a.

[29] Slade, 1982.

[30] E.g.: Bureau of Transport Economics, 1977; Berry, 1992; Harrison, 1992.

explicitly acknowledge intangible costs and benefits and where they accrue. Intangible benefits are among the 'services' purchased by waste reduction schemes, and must be acknowledged as such.

Esstentially to make waste reduction attractive, we need to value environmental protection far more highly than we have done so far.

7.5 Implications of fixed present disposal costs to waste reduction initiatives

Provision of basic waste management services such as collection and landfill disposal generally have high fixed costs in land, equipment, buildings, staff, and administrative overheads. If fewer tonnes of waste are handled by this system, annual costs are seen to be averaged over less throughput, and waste reduction is seen to have increased costs. For example, at the Masterton landfill the cost per tonne to bury refuse has been estimated at $10-15 with the status quo and over $20 with active waste reduction. The costs to replace the landfill space filled or the natural resources buried are not part of the equation. An extension of this argument would imply that increasing throughput to the landfill will decrease disposal costs.

Fixed cost considerations will only affect the short term. The size of most councils' operations is currently determined by the present amount of waste handled. If the current level of operation actually results in increasing costs at the margin, then any reduction in waste would be beneficial.

Additionally there are the savings from slower filling of the landfill space and any net resource savings to be considered. Acknowledgement and inclusion of the increasing value of the landfill space will also change the disposal cost and the balance of the fixed costs to total cost.

If a council considers it is providing a total waste management service, these arguments against waste reduction initiatives lose their force. The community is buying intangible benefits for an extra disposal cost. It is only by starting the process of waste reduction that fixed costs will eventually decrease.

Another implication of fixed present costs relates to the appropriate avoided disposal cost to use when assessing waste reduction services. One argument is that councils should be willing to pay up to the disposal cost (in $/tonne) to schemes which prevent waste reaching the landfill. The counter argument by councils is that the real saving to them is only the variable cost above what they would have to pay in fixed costs; if these fixed costs are high there is little incentive to reduce, and additionally the fixed cost per tonne will increase with reduced throughput to the disposal system.

Therefore savings in disposal costs will not be directly proportional to volume reduced.

This emphasises once again the importance of accurately costing disposal costs, to give the right signals to the community including industry and the recycling industry. An opportunity cost approach to avoided disposal costs is appropriate as it is the community which will have to pay the replacement costs of a resource which is used too rapidly. Basing the avoided disposal costs on replacement costs indicates the true value to the community of the resource that waste reduction programmes are conserving.

7.6 Variable charging systems

The thrust of this section of the report is to stress that for a market solution to work satisfactorily adequate signals are needed in terms of full measurement of the costs and benefits of waste disposal and waste reduction. While the local authority is not there to make a profit, making disposers aware of these true costs and where possible requiring them to pay their full disposal costs, would be a major step forward.

The general economic approach is to promote the generator responsibility principle by use of economic instruments or financial incentives.[31] Such schemes are emerging in New Zealand with moves towards 'generator pays' for collection and disposal at the landfill and charges related to volume disposed as shown in Table 7.2. Typically they have appeared first as a switch from funding services solely out of general rating to including a separate, fixed charge per ratepayer for refuse disposal.

Table 7.2: Present charging systems for collection and disposal

Item	Dunedin City	Timaru District	Hutt City	Masterton District
Fixed Refuse Charges in Rates	yes	yes	no	yes
Variable Collection Charge	no	no	yes	no[1]
Gate charges	yes	yes	yes	no[1]

Notes
1. Planned for September 1994

The move to a separately identified charge in the rates makes the cost of collection and disposal transparent but offers no incentive for the community to decrease waste volume below a fixed level. Charging for extra bags, as was in place in Hutt and planned for in Masterton still does not address this issue. The Hutt decision to abandon the fixed charge and charge by the bag for refuse represents a further development towards an economic incentive system aimed at reducing the amount of waste disposed of.

The use of rates and standing charges for domestic refuse collected in 'wheelibins' in Timaru and bags in the outer areas, offers limited scope for variable rate charging. Larger councils in Auckland and elsewhere are investigating options to install computer chips in bins so that the weight of individual bins can be recorded and each property invoiced, as occurs in parts of Europe, North America and Australia.

Gate charges for landfill use are in existence or planned for all the case study authorities. Most have a variable disposal charge, but the usefulness of this charge as an economic instrument is lessened because disposal costs are not being fully assessed. As identified earlier in this section, not all components of disposal costs are being included, and there is no recognition of future costs. These cannot therefore be carried through to an accurate gate

[31] OECD, 1989.

charge. Hutt City is now starting to address future costs of a major landfill extension by increasing charges to industrial and commercial users from a disposal rate of $12 to $15 a tonne, but further increases will probably be required to set accurate charges.

Imposition of gate charges on council departments through changes in internal accounting procedures has directly influenced waste reduction initiatives in Hutt City and Wellington and Manukau City, where city parks departments bought shredders to create mulch from green wastes which were previously buried in the landfill.

The proposal by Masterton District to include a future cost in the planned gate charges unfortunately appears to have attracted resistance from commercial operators and some councillors. There have been no charges in the past, but a landfill with a life expectancy of only some four years at current rates of disposal and with no identified next disposal site requires a major policy rethink. The true disposal costs of the next landfill option appear to be significantly in excess of the currently proposed gate charges of $20 a tonne and would justify decisive action. Charges should probably be already very close to the 'market rate', that is, the costs of the next landfill option, since landfill space is at a premium.

The required gate charges to fully finance the design, development and management of future sites, (as well as the operation of the present site) may be as much as $30 to $50/tonne,[32] in some cases 500 percent more than is currently charged by local authorities. Essentially charges should be such as to fully compensate for the use of the asset and pay for related environmental protection services.

7.7 Gate charges and illegal tipping

A common objection to the imposition of accurate gate charges is that they will cause significant increases in illegal tipping.

Experience with this issue elsewhere in New Zealand was investigated by Hutt City Council staff prior to the imposition of gate charges at the Silverstream landfill, and the results in Hutt City monitored after gate charges were imposed. The findings are summarised below.

> *"Enquiries with other authorities concerning an increase in littering when user charges are introduced for domestic vehicles indicated that there should be no noticeable increase in the extent of illegal dumping provided the charges are seen by the public to be reasonable.*
>
> *"...Experience elsewhere suggests that while there may be some initial reaction this is likely to be a passing phase which will need to be managed by increased surveillance and enforcement. There is already an element of illegal dumping irrespective of any charges.*

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[32] Smith, 1993, p.38.

"...There was an increase in illegal dumping shortly after the introduction of the domestic charges [in Hutt City] but the situation has improved significantly and it is no longer an issue. Increased surveillance and detection has resulted in a number of prosecutions being laid, some of them involving commercial operators. None of those apprehended have used the tip charges as an explanation." [33]

The investigation team uncovered no evidence to the contrary.

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[33] Council papers to the Hutt Valley Services Committee on 28/3/91 (p.5), the Community Boards on 28/5/91 (p.2), and the Policy and Finance Committee on 5/2/93 (p.2).

8 Conclusions and Recommendations

8.1 Integrated waste management

The 'Five Rs' of the integrated waste management hierarchy can be summarised as – Reduce, Reuse, Recover, Recycle, and Residue management. Local authorities are emerging from an era which focused on the residue disposal end of this waste management hierarchy almost exclusively, and are making positive efforts to take up the challenge of encouraging waste reduction initiatives in their communities within an integrated waste management framework. The environmental effects of residue disposal itself are being decreased by modern sanitary landfill design operation and aftercare.

Both the public and the councils which act on their behalf tend to focus on post-consumer recycling, only one aspect of the integrated waste management hierarchy. Recycling is an effective means of providing households an option for direct waste reduction action and provide them with hands-on environmental education, but it is only one part of the full picture, and can divert only a limited portion of the waste stream from disposal. It can also encourage continuation of 'business as usual', avoiding necessary changes in consumer choice and inefficiency of resource use by producers. The essential problem is waste generation, and recycling only mitigates some effects at the consumer level rather than reduce waste production by manufacturers at source.

Proposed improvements to the Local Government Act to make explicit the principles of the integrated waste management hierarchy should proceed so as to provide clear guidance to local authorities. ***In the interim councils have adequate mandate and powers to encourage waste reduction initiatives at all stages of the waste hierarchy in their communities.*** Providing services to local communities so that they may help alleviate national and global environmental problems is a valid local social benefit.

However, industry-wide changes require national coordination, and proactive central government policies are essential. Government's policy framework is a sound beginning, but the allocation of resources and the investigation of industry incentives needs improvement (see also section 8.4).

Recommendation to the Minister for the Environment

1. Continue to promote changes to the Local Government Act making the integrated waste management hierarchy an explicit part of local government functions, powers and duties, and to provide guidance on inclusion of non-monetary costs and benefits in reporting procedures.

2. Continue and enhance the Cleaner Production programme, improving allocation of resources to ensure active industry-wide promotion.

Recommendation to the Minister of Internal Affairs

3. Amend the Local Government Act in consultation with the Minister for the Environment to make the integrated waste management hierarchy an explicit part of local government functions, powers and duties.

8.2 Evaluation of local authority initiatives

An evaluation of the adequacy of waste reduction initiatives by the case study authorities is summarised in Table 8.1. In drawing conclusions from this table, it is important to understand the influence that population size and rating base has on the adequacy of what has been done. Development of programmes or publicity requires the same resources for a small district like Masterton with a limited resource base, as for a large city such as Dunedin. Allowance for these restrictions has been made insofar as possible.

The two larger areas, Dunedin City and Hutt City, have taken up waste reduction issues and performed very well in some areas, with plans to increase their waste reduction efforts. Overall Hutt City is the most advanced in looking at all aspects of the waste hierarchy and providing opportunities, information and incentives to the community to reduce waste. It needs to concentrate on improving the accuracy of disposal costs, in particular by taking into account future costs and the present value of landfill space. Dunedin has made a special effort to provide a lot of information to the public on the practical household role in waste reduction, but more specifics, especially on environmental costs and benefits, would help their ratepayers make informed decisions.

For the smaller councils, Masterton with its more limited resources has very successfully promoted, supported and is about to put in place significant waste reduction initiatives. These have been prompted by acute shortage of landfill space, and the area in which it most needs to concentrate its efforts is the provision of another landfill and costings to reflect both this need and the importance of the existing space to the community. In contrast Timaru has secured its long-term disposal option, but the focus of its activities has remained at the collection and disposal end of the waste hierarchy. Waste reduction now needs the same degree of promotional effort to ensure that disposal space is treated as a valuable community asset .

8.3 Effective waste reduction

The analytical framework in Figure 1.1 provides a useful checklist for local authorities of factors contributing to the effectiveness of waste reduction initiatives.

It is essential that local authorities have a means to measure waste stream contents and the result of waste reduction initiatives as distinct from changes due to the state of the economy and diversion of material to other landfills. A Waste Analysis Protocol has been provided by Government, but this requires purchase of a weighbridge which will not be an option for many

Table 8.1: Summary evaluation of the case study councils

EVALUATION CRITERIA	Larger Councils		Smaller Councils	
	DUNEDIN	HUTT CITY	TIMARU	MASTERTON
Waste management hierarchy - level of emphasis Reduce/ 'Precycle	★	★	☹	☹
Commercial/industrial waste reduction	✓	★	☹	☹
Post-consumer recycling	★	★	✓[1]	✓
Composting (household and/or larger scale)	★	✓	☹	★[2]
Level of public participation Access to convenient and effective waste reduction programmes	★	★	☹	✓[2]
Ability to participate in decisions on waste reduction programmes	✓	★	☹	✓
Markets and financial incentives Effective 'generator pays' waste reduction financial incentives [3]	✓	★	☹	✓
Financial support from Council (not just 'leaving it to the market')	✓	★	★[4]	★
Council purchasing policy supports markets for waste reduction	☹	☹	☹[5]	☹
Material bans which encourage waste reduction	☹	☹	★[6]	☹
Effectiveness of waste reduction programmes Amount of waste diverted from landfill through Council programmes	★	✓	☹	☹
Planning and cost-benefit analysis Long-range planning for landfill space replacement	★	✓	★	☹
Landfill asset valuation [7]	☹	☹	☹	☹
Ability to measure waste reduction benefits and costs [8]	☹	✓	☹	☹
Environmental costs and benefits made explicit [9]	☹	☹	☹	☹
Information sharing (see also Table 5.1) Clear and complete information to the public	✓	★	✓	✓
Clear and complete information to councillors	✓	★	✓	✓

Key ★ = excellent ✓ = satisfactory ☹ = needs improvement

Notes

1. Newspaper recycling good; other initiatives could be improved.
2. Includes composting plant to commence at landfill September 1993.
3. As judged by degree of transparency and accuracy of charges, how variable they are with reductions in waste production, and how actionable are waste reduction options.
4. Excellent initiative in providing a minimum price for local paper recycling, in recognition of landfill space saved.
5. Contract for vehicle servicing requires waste oil to be taken away for recycling, but re-refined oil not preferentially purchased.
6. Ban of fish wastes at the landfill has resulted in conversion to fish meal rather than burial of resource in landfill (however, reasons for ban related to odour nuisance, not waste reduction and resource recovery).
7. The authorities are making improvements, but major omissions such as land value remain.
8. E.g. what diverted, cost to divert, future costs saved, completeness of costings.
9. In all cases councils have mentioned some costs and benefits in some contexts, but a more comprehensive approach is required.

smaller authorities. Attention to local surveys, landfill contours, and reporting by the waste diversion industry will assist these authorities to make adequate estimates for waste management purposes.

Local authorities and the public should be aware that though the present emphasis is on waste reduction through recycling, significant reduction of waste going to local landfills cannot be achieved without diversion of paper and green wastes. At the present time composting of green wastes (home composting and larger scale shredder/windrow operations) is an available option, but paper recycling markets are limited. An additional benefit to the local environment is that composting is an effective method to return humus and nutrients to the soil. The impact of composting on the magnitude of local authority waste reduction is illustrated in Table 8.2.

Evidence suggests that promotion of composting by local authorities as an effective waste reduction method may be hampered by uncertainty about appropriate siting criteria. Guidelines for consent authorities on separation distances and operating conditions are required.

Recommendations to councillors and staff of District Councils

4. Require provision of accurate and complete waste diversion data when drafting waste management contracts.

5. Encourage the establishment of centralised larger-scale greenwaste composting programmes, and home composting of kitchen and yard wastes by households, recognising that costs of centralised shredders and home composting instruction can be justified by long-term landfill space savings.

Recommendation to the Minister for the Environment

6. Urgently develop guidelines for local authorities on siting and consent conditions for large-scale greenwaste composting operations, including:

   (a) recommended separation distances and operating conditions so as to minimise odour nuisance;
   (b) measures to ensure leachate control; and
   (c) monitoring provisions.

8.4 Recycling markets

All case study contacts, both local authority and private industry, agreed that the most significant impediment to greater waste reduction is the inadequacy of markets for recyclables. Given generic problems in the current market, the strong environmental and future generation benefits of waste reduction initiatives do not accrue to those who make the expenditure, and the activities cannot be made to 'pay for themselves'.

Table 8.2 : Estimated reduction in total waste stream from selected New Zealand recycling and composting programmes, 1982 and 1992/93.

1992/93	Recycling depots	Kerbside collect *paper*	Kerbside collect *other*	Compost scheme	Est. waste reduction, by weight
Masterton	✓				21/2 %
Timaru	✓	✓			8 %
Hutt City	✓	✓	✓		9 %
Dunedin	✓	✓		✓	16 %

Source: Case studies for this report.

1982	Recycling depots	Kerbside collect *paper*	Kerbside collect *other*	Compost scheme	Est. waste reduction, by weight
Auckland Region	✓				< 1 %
Manukau	✓				< 2 %
Hamilton	✓				< 2 %
Nelson	✓	✓			3 %
Hawera	✓	✓			7 %
Taupo	✓			✓	**33 %**
Greytown	✓	✓	✓	✓	**33 %**
Devonport	✓	✓	✓	✓	**40-60 %**

Source: Peterson,1983, Tables 6.3 and 6.4.

Government policy has encouraged industry to take voluntary initiatives to internalise some of the waste management costs they impose on the community by their production, packaging and distribution choices, but with little significant progress to date. Government policy has been to consider other measures including correction of market failures if voluntary progress by industry is not sufficient. A number of suggestions were received on how markets may be improved (see section 5.1).

Until such time as government and industry take more effective action to influence macroeconomic signals, local authorities and consumers can still act to stimulate demand for reusable and recycled products, find alternative uses for waste resources, and lobby industry for better consumer choices that do not perpetrate resource wastage.

Recommendations to councillors and staff of District Councils

7. Institute preferential purchasing of recycled materials for council services to help encourage recycling markets, with particular emphasis on paper, plastic and lubricating oil, in cooperation with other large local users where possible (noting that until larger markets are developed through such action, this will often represent some additional cost).

8. Establish council policy to encourage the public to preferentially purchase reusable, recyclable and recycled content goods ('precycling'), and to lobby industry for improved choice of such materials in the marketplace.

8.5 Information sharing

Government waste management policy and the principles of integrated waste management require that both producers and consumers take 'ownership' for the waste they generate and act responsibly. To act responsibly, people need information and the ability to act.

The achievements of local authority waste reduction initiatives and the impact on the local waste stream are poorly documented, and limited information is provided to councillors and ratepayers about the impact from their expenditure and participation in local waste reduction programmes.

'Institutional memory' on waste reduction programme design is poor, with duplication of effort among local authorities. Lack of basic educational resources has also been identified as an impediment to public education, and research, writing and publishing of this information by every council individually is an unnecessary duplication of resources. Councillors have asked that such information be produced 'independently' so as not to be seen as 'political'.

Local authorities have made efforts to educate the public on waste reduction issues, but more comprehensive and continuous effort is required so that councillors and the public can make fully informed decisions on appropriate local action. The public needs better information on what local waste management options will cost and the benefits they will provide, and also where effort needs to be focussed on industry and central government action. Councillors and the public need to be aware that programmes such as recycling and composting will appear to cost more than traditional disposal if allowance is not made for the value of the landfill space. Waste reduction can also provide many intangible benefits, including an opportunity for local residents to contribute toward the solution of local, regional, national and global environmental problems. Given this information, the public should be given an opportunity to express their preference.

Recommendations to councillors and staff of District Councils

9. Tell the public on a regular basis how much is being diverted from the landfill through council's waste reduction initiatives.

10. Involve the public in decision-making on waste reduction initiatives and generator-pays incentives, providing them information on tangible and intangible costs and benefits of the status quo and alternative options, and an opportunity to express their preference.

11. Report full waste management costs (Recommendations 14 and 15) to councillors and the public on a regular basis.

12. Inform the public of waste reduction areas that are out of the control of the council (for example, national recycling markets, industry choices in packaging) and of appropriate actions for citizens who wish to promote change.

Recommendations to Local Government Association, Waste Management Institute, and Ministry for the Environment

13. Coordinate effort and provide more resources to develop and distribute materials to:

    (a) assist local authorities in designing waste reduction initiatives, and,
    (b) educate councillors and the public on waste reduction principles and practices.

8.6 Accurate costings of waste management services

Local authority calculation of landfill asset value has commonly omitted consideration of land value, environmental effects and aftercare. ***If the full monetised costs are not taken into account, let alone the non-monetised ones, then disposal will be made to look artificially cheap and the value of waste reduction undervalued.***

The present methods of valuing a landfill by the capitalised value (that is, past expenditure) do not value the *capacity* of the landfill and hence cannot allow for the increased value of that capacity over time as replacement landfills become more expensive and harder to obtain. Landfill sites could be re-evaluated annually for their total asset value (including all physical assets, for example land) and charges set so as to give a return on that asset value equivalent to current interest rates.

Further development is required of a methodology to assess the value of landfill capacity and use it to include an allowance for future disposal costs. Until then, it is suggested that local authorities which are within the planning horizon (five to seven years) of their next landfill should be reflecting future costs in their present disposal costs.

The true value to the community of savings in landfill volume capacity is the replacement cost, not the present cost, that is, an opportunity cost approach. Failure to recognise this value leads to an undervaluing of waste reduction. It is of particular importance to include the avoided disposal costs or landfill capacity savings and that allowance for future costs is included in the calculation of avoided disposal costs.

Such measures taken by district councils will not directly influence pricing of private landfills where they occur, but regional council resource consent procedures can help to ensure that the construction and operating standards for landfills, and hence their costs, are comparable.

Local authorities do not question the need to pay for collection and disposal of refuse, but tend to see waste reduction initiatives as 'luxuries' that must 'pay for themselves' in the marketplace even though the market does not value the social and environmental benefits which accrue. Waste management systems that provide greater community benefits will probably cost more in monetary terms, but provide more intangible benefits. Intangible environmental benefits must be made explicit and compared against the tangible waste reduction programme costs.

Recommendations to councillors and staff of District Councils

14. Include the following in the evaluation of waste management costs:

    (a) full capitalised landfill asset value (including land value through current Government Valuation or opportunity cost calculation);

    (b) estimated asset value for landfill space (for example, value per cubic metre of capacity);

    (c) estimated replacement landfill disposal costs, when approaching end of existing landfill life (five to seven years away as a minimum);

    (d) landfill 'aftercare' costs;

    (e) explicit documentation (and estimation of dollar cost where possible) of environmental and social costs and benefits; and,

    (f) all waste management services (collection, recycling, composting, landfill management).

15. Fully document costs and benefits of waste reduction initiatives, including landfill space savings and explicit identification of environmental and social effects and services.

Recommendation to the Minister for the Environment

16. Develop guidelines for valuation of landfill assets over time, with particular emphasis on means of including long-term future and environmental costs and benefits.

8.7 Generator-pays and other incentives

A major constraint to greater waste reduction is low charges for waste management services, particularly landfill charges. ***Most charges are still subsidised by rates and true waste management costs are not made transparent to the waste producer.***

Local authority moves to promote 'generator responsibility' by financial incentives needs to ensure such incentives are accurately costed, transparent, variable with the amount of waste disposed, and actionable in that people have access to waste reduction programmes. Use of direct charges at the landfill gate in place of rate income makes disposal costs apparent, and to be effective they need to be able to be acted on and able to deliver a financial benefit to waste reducers. A separate refuse charge for collection is a move towards making costs more explicit, but as an economic instrument it allows for no direct incentive to reduce, unless such a charge is related to the quantity of refuse disposed of.

Despite fears to the contrary, increased 'generator pays' landfill and collection fees have not led to significant increases in illegal tipping.

Incentives for waste reduction may also be provided in contracts for waste management services, whether they be in the form of performance measures or financial incentives. Likewise, disincentives may be inadvertently placed in contracts for related services. Waste management services contracts should not encourage increased tonnage or volume of waste taken to landfill.

Recommendation to councillors and staff of District Councils

17. Introduce, or improve, 'generator pays' waste management charges in consultation with your community, ensuring that as waste reduction incentives they are:
    (a) *Transparent:* that it is made very clear to the public what services are paid for by the charges, and what social and environmental benefits are anticipated;
    (b) *Accurate:* that waste management costings include all collection, disposal, recycling and composting services, accurate valuation of landfill space, anticipation of future landfill replacement and aftercare costs and explicitly identify intangible benefits obtained (see Recommendations 14 and 15);
    (c) *Variable:* that reduction in waste production is directly related to reduction in charges;
    (d) *Actionable:* that the community has access to effective waste reduction measures such as convenient recycling stations and collections, home composting, and municipal composting schemes.

18. That all waste management service contracts (for example, waste collection, landfill management, recycling collection, composting scheme, transfer station management) be drafted so as to not give incentives for increased volumes of waste to go to landfill and to actively support waste reduction.

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