Government of South Australia
Zero Waste SA

BACKGROUND PAPER TO SOUTH AUSTRALIA'S WASTE STRATEGY 2005–2010

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This background paper accompanies *South Australia's Waste Strategy* and was originally released by Zero Waste SA as part of the statutory process of developing a waste strategy for the State. In particular, section 18(4) of the Zero Waste SA Act 2004 requires Zero Waste SA to gather views and submissions and to take into consideration the views and submissions gathered through the consultation process before developing and adopting a waste strategy for South Australia. It should be noted that the consultation waste strategy and background paper do not necessarily reflect the views of Zero Waste SA or of the South Australian Government.

Contents

Preface

In 1992, the Australian and New Zealand Environment and Conservation Council (ANZECC) endorsed the National Kerbside Recycling Strategy (National Kerbside Recycling Taskforce 1992) incorporating a set of targets to be achieved by the year 2000, which aimed for:

- a 50% reduction in the total quantity of solid waste going to landfill (based on weight per capita from the 1990 base)
- a 50% reduction in the quantity of domestic waste going to landfill (based on weight per capita from the 1990 base).

Although South Australia and other interstate jurisdictions did not achieve the 50% reduction target by the year 2000, the target figure provided the impetus for continued efforts towards waste reduction and recycling. Studies commissioned by Zero Waste SA in 2004 suggest that South Australia now recycles more material than is disposed to landfill.

As part of its commitment to establish a new legislative framework under which State and local government would work together to drive a new and integrated strategy for waste avoidance and reduction, waste reuse and recycling, and waste disposal, the Government established a new instrumentality, Zero Waste SA. This commitment arose from the recognition that waste management in South Australia was still fundamentally reliant upon landfill and that despite our efforts to date, we had not succeeded in meeting the national 50% reduction targets.

The objective of Zero Waste SA is to promote waste management practices that, as far as possible, eliminate waste or its consignment to landfill, advance the development of resource recovery and recycling, and are based on an integrated strategy for the State.

Specifically, section 18(1) of the *Zero Waste SA Act 2004* requires the preparation of a Waste Strategy for the State (*South Australia's Waste Strategy*).

This strategy builds upon a number of previous initiatives to tackle waste at both a State and national level. It builds on the *Integrated Waste Strategy for Metropolitan Adelaide 1996–2015* (the Metropolitan Strategy; Environment Protection Authority

1996) that was prepared during a period when a shortage of landfill sites and proper management of landfills was a significant issue. With new landfills approved to the north of Adelaide and improved environmental protection provision, the emphasis within the Metropolitan Strategy is in some areas now out of step with community attitudes on waste.

Although a number of the objectives and programs within the Metropolitan Strategy have been met, the rapidly changing nature of waste management since 1996 has diminished its usefulness.

In September 2000 a discussion paper, *Waste Management in South Australia,* and an accompanying background paper, were released for public comment. Following release of the discussion paper, the Environment Protection Authority began to prepare a new Environment Protection (Waste) Policy whose development, and other legislative options, is critical to the success of this current waste strategy for South Australia.

This new Waste Strategy for South Australia has had regard to many of the initiatives identified in the Metropolitan Strategy, the *Waste Management in South Australia* discussion paper, this background paper and comments received during consultation associated with those documents. It also builds on reference reports on various waste sectors, landfill audits and studies completed over recent years.

The strategy was developed by Zero Waste SA in accordance with section 18(1) of the *Zero Waste SA Act 2004* and is based on broad consultation with the South Australian community as required by section 18(4) of the Zero Waste SA Act.

The requirement to prepare *South Australia's Waste Strategy* is part of a range of waste reforms associated with the establishment of Zero Waste SA, announced by the Minister for Environment and Conservation in January 2003. Implementation of the goals and targets recommended in this strategy will fulfil the requirement to reduce waste to landfill set out in *South Australia's Strategic Plan* (Government of South Australia 2004) and the recommendations of the *State of the Environment Report* (Environment Protection Authority 2003).

1 Why is Waste Significant?

Waste presents our society with a two-fold challenge. All waste must be recovered or disposed of through operations which inevitably have environmental impacts and economic costs. Waste can also be a symptom of inefficient consumption and production patterns, in the sense that materials may be used unnecessarily. The materials not only create waste but also have different impacts during their production and use phase.

Commission of the European Communities 2003

Waste is significant for a number of fundamental reasons. It depletes resources, contributes to climate change and has issues associated with landfill.

1.1 Resource depletion

If we continue to degrade or over-use our environmental resources (natural capital) we will leave future generations with a serious and increasing environmental debt (Suzuki 2003). Improving the efficiency of resource use is therefore essential.

The impacts of resource use can arise at all stages in the lifecycle of the resource, including extraction and initial processing, transformation and manufacturing, consumption or use, and finally waste management. Measures to prevent waste generation and to re-incorporate waste in the economic cycle ('closing the materials loop') are therefore an important element of a comprehensive approach to resource management.

The Wuppertal Institute has calculated the 'ecological rucksack' (the amount of waste generated in producing everyday products) is 1.5 kg for a toothbrush, 75 kg for a mobile phone and 1500 kg for a personal computer. Use of substantial amounts of natural resources and the associated impacts on the environment can therefore be avoided by re-using or recycling these products in their waste phase and by designing them in a more eco-efficient way.

Commission of the European Communities 2003

This is where waste avoidance, reduction and recovery – whether energy recovery or material recovery – can make a specific contribution to reduce the environmental impact of resource use. Waste prevention includes cleaner production processes, better product design and generally more eco-efficient production and consumption patterns.

Despite the advent of more sustainable business practices, every material object placed on the market is likely, sooner or later, to become waste. In addition, every production process produces some waste.

However, by disposing waste to landfill we bury many useful resources, preventing ongoing use of the material(s) in one form or another. These materials can be remade but this requires large amounts of energy and the consumption of more resources. The disposal of waste to landfill removes the potential to derive a higher resource value from the waste materials through reuse, recycling and resource recovery. Producing unnecessary waste means we are not using resources sustainably.

South Australia's Waste Strategy must therefore promote a range of policy approaches so that only 'residual' waste that is not amenable to further recovery or recycling is ultimately destined for disposal.

1.2 Climate change

In landfills, the anaerobic (without oxygen) decomposition of organic matter leads to emissions, particularly methane, one of the principal greenhouse gases (alongside carbon dioxide and nitrous oxide) that contribute to global warming. Methane is, molecule for molecule, a significantly more effective greenhouse gas than carbon dioxide and has a much greater greenhouse effect.

The amount of methane created in landfills depends on the quantity and moisture content of the waste and the design and management practices at the landfill site.

Nationally, methane generated from this source accounted for 89.0% of total methane emissions from the waste sector in 2002. Estimated emissions from municipal solid waste disposal increased by 2.0 million tonnes (11.2%) during the period 1990–2002. This trend was due to population growth and an estimated increase in waste disposal per capita.

Australian Greenhouse Office 2004

Although the waste sector is a minor source of emissions compared with the energy and agricultural sectors, there is scope for reduction. Potential for climate change can be slowed by retaining the energy embodied in waste products by reuse and recycling.

A Victorian study based on the lifecycle assessment (LCA) of paper and packaging waste showed that every week, just one Melbourne household that undertakes recycling manages to save over three kilograms of greenhouse gases that would otherwise contribute to global warming (EcoRecycle Victoria n.d.). Reducing our demand on the processing and manufacturing of primary materials by reusing and recycling secondary materials (waste products) saves energy and the resulting emissions from production processes. The Victorian LCA report found that if a product was made from raw material rather than recycled material, more carbon dioxide and other greenhouse gases would be generated.

The waste degradation process is slow and methane emissions continue long after waste is placed in landfill. Estimates in any year include a large component of emissions resulting from waste disposal over the preceding 25 years. This means that changes in waste management practices will not have an immediate impact on reported methane emission levels (Australian Greenhouse Office 2004).

For the UK, the intensive diversion of waste from disposal has a striking impact on carbon dioxide (CO_2) emission reductions. One model that used US Environment Protection Agency data on relative CO_2 effects found that the reuse and recycling of 70% of the UK's municipal waste would lead to a saving of 14.8 million metric tonnes of carbon equivalent (MTCE), which would have a similar impact to taking 5.4 million cars off the road.

Murray 2002

Diversion of organic waste (such as food, garden wastes and commercial organic wastes) to aerobic composting systems in addition to the recovery of landfill gas for energy will reduce the methane emissions potential of landfilled waste.

Five power plants, located at the Wingfield (two plants), Tea Tree Gully, Highbury and Pedler Creek sites, recover landfill gas and convert this into electricity (Environment Protection Authority 2003) with a combined energy generating capacity of 12.7 megawatts. "The use of methane in this form saves the equivalent of 50,000 tonnes of carbon dioxide for every 1 megawatt generating capacity from being released into the atmosphere annually" (Department for Environment and Heritage 2000).

1.3 Landfill disposal

Waste disposal practices in South Australia have been fundamentally reliant on landfill as the lead technology. This technology based on burial has become the basis for an enormous multi-million dollar waste management industry over the last few decades. Adelaide City Council alone earned about $7 million net a year in revenue from its Wingfield landfill (Adelaide City Council 2003). As in all large industries, landfills must ensure an ongoing and continuous supply of feedstock to protect their future. "In the case of the waste

1 Why is Waste Significant?

management industry, this means protecting the flow of society's discarded resources and channelling as much as possible into landfills and incinerators" (Zero Waste New Zealand Trust n.d.).

In order to ensure the long-term financial viability of their facility, landfill operators encourage local government and businesses to enter into lengthy landfill-based disposal contracts. These long-term arrangements can counteract and block present-day initiatives to divert waste towards more beneficial uses (i.e. there is an environmental opportunity cost associated with disposal).

Although the past decade has seen marked improvements to landfill management and regulations, the current charges for disposal of waste to landfill in South Australia do not reflect external environmental costs and landfill operators are able to internalise the short-term profits while externalising the long-term liabilities.

Murray (2002) cited studies from both Europe and the United Kingdom that suggest there are health effects for those living in the neighbourhood of landfills. The United Kingdom study found some health risks for those living within 2 km of a landfill. Proper landfill siting, urban encroachment and landfill design, construction, operation and post-closure management are essential to control potential impacts such as:

- leachate
- dust and mud on the site and prevention of discharge off site
- odour emission on and off site
- noise emissions
- vermin, birds and other disease vectors
- storage and handling of dangerous substances
- storage, maintenance and fuelling of machinery and equipment on site
- litter management
- traffic management
- fire prevention, control and associated emissions
- landfill gas.

Leachate is produced when percolating water and other liquids pick up decomposing organic wastes, heavy metals and other substances. Include the thousands of chemicals now in use in modern production and found in various materials and products, and the additional risks from leachate generated from disposal of certain materials in landfill are compounded. At present there is no known means to completely detoxify and render harmless many of these substances. We have no idea how to place or recycle them back into the environment in such a way that they become harmless and safe. Leachate is usually re-circulated through the landfill, or treated off-site through chemical and other processes.

As these effects have been recognised, the response has been increased regulation and improved technology. Modern landfills are required to be lined, and to treat the leachate and burn (flare) or capture for energy the landfill gases emitted from the sites. Strict licence conditions are imposed on landfill operations and after operations have ceased (post closure). Notwithstanding modern engineering practices, the long-term performance of landfill liners over time remains a matter of conjecture. In addition, a large number of current and former landfill sites, particularly in non-metropolitan areas, lack leachate and gas treatment systems.

The short-term benefit of disposing waste to landfill was historically related to community health but this approach ignored a range of problematic issues. Ultimately, waste disposal incurs substantial economic, environmental and social costs.

2 The Current Situation

2.1 Where does the waste go?

Recent studies indicate that South Australia is one of the best performing jurisdictions around the world for diverting recyclables (65%) from landfill (Nolan-ITU 2004a). The remaining waste is primarily disposed of either directly or via a transfer station to landfill. Data on how South Australia performs in the areas of waste avoidance and reduction is not readily available and therefore has not been included.

2.2 Disposal capacity

2.2.1 Metropolitan

In accordance with the *Wingfield Waste Depot Closure Act 1999*, the Wingfield landfill ceased operation as a waste depot by 31 December 2004. With the closure of this facility, the annual intake of waste (about 700,000 tonnes per annum from households, some councils and businesses) needs to be redirected to other facilities.

Adelaide is currently served by six landfills licensed to receive metropolitan waste streams:

- Southern Waste Depot, Maslin Beach
- Southern Region Disposal Depot, McLaren Vale (Pedler Creek)
- Integrated Waste Services Balefill, Dublin
- Waste Management New Zealand, Inkerman
- Waste Management New Zealand, Nuriootpa
- Northern Adelaide Waste Management Authority Balefill, Uleybury.

The estimated total available landfill airspace provided by these facilities is approximately 60 million cubic metres. At current rates of disposal this capacity will meet Adelaide's requirements for several decades.

2.2.2 Rural

Most rural townships have either their own landfill or access to one nearby. The engineering and operational standard of rural landfills varies considerably. Many rural councils are struggling to fully meet landfill licence requirements set by the Environment Protection Authority (EPA) and are exploring regional approaches with other towns or councils.

Until the *Zero Waste SA Act 2004* came into effect on 7 May 2004, there had been no legislation that provided incentives for, or compelled, councils to deal with waste issues at the regional level. Nevertheless, with increasing costs and pressures associated with EPA landfill reform and increasing interest in the introduction of resource recovery programs in country areas, it is generally accepted that there are significant benefits to adopting a regional approach across much of South Australia.

The dispersed and generally low population base in many regional and rural areas of South Australia means councils operate on a relatively low revenue base. This poses an economic challenge for rural councils, for example infrastructure maintenance particularly requirements to maintain and upgrade extensive local road networks many of which are unsealed.

It is therefore important that waste management directions for regional South Australia are economically viable and take into account infrastructure influences such as the impact on unsealed roads on transporting waste and recyclable material.

2.3 How much waste is there?

Solid wastes are generally classified under three subcategories or material streams: municipal/domestic solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D). To date, limited information on the size and nature of our waste problems has hindered good policy making and target setting. We know more about waste disposal than we do about waste generation.

Production/manufacturing waste generated by C&I activity is generally managed at the source by the business or industry itself and information on the subject is regarded as confidential. This unfortunately means data is difficult to obtain.

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What we know about waste disposal has until recently been limited to tonnage and volume only. Information on the amount of waste disposed to landfill is reported to the EPA. Information on the composition of the waste is not yet required to be reported by landfill operators. Publicly available information on the composition of waste disposed to landfill has been obtained through specific studies commissioned in 1998 by the EPA (Environment Protection Authority 2000) and now by Zero Waste SA (Waste Audit and Consultancy Services 2004).

Around 681 kg of waste per household per year is collected from kerbside systems in the metropolitan area; 722 kg of waste per household per year is collected in non-metropolitan areas (Nolan-ITU, Waste Audit and Consultancy Services 2002).

The quantity of waste disposed of to landfill in metropolitan Adelaide increased from 860,000 tonnes in 1995–96 to 1,110,000 tonnes in 2001–02 (Figure 1). This included approximately 328,000 tonnes of kerbside domestic waste, 169,000 tonnes of commercial waste, and 509,000 tonnes of building and demolition waste and waste fill (Nolan-ITU 2003).

Data collected in 2004 (Waste Audit and Consultancy Services) found that 31.4% of the waste sent to landfill is generated from C&D activity, with the vast bulk of the material comprising soil/waste fill alongside other materials such as clay, rocks/bricks, rubble and concrete. The soil/waste fill material was used as immediate landfill cover or stockpiled for later use.

The C&D stream was significantly down in absolute quantities from a similar audit conducted in 1998 (Environment Protection Authority 2000). This difference is likely to be the result of annual differences in major construction projects. However, materials such as rubble, rocks/bricks, concrete and ferrous metals show significant decreases from the 1998 data and this is largely attributed to the expansion of material recovery efforts by companies working in the C&D resource recovery industry.

In addition, some small-scale landfills are licensed by the EPA to only receive C&D waste. These landfills are generally not highly engineered facilities and are thus able to provide cheaper disposal prices than recycling companies that handle this material or landfills with higher capital costs.

Figure 1. Metropolitan solid waste to landfill 1993-94 to 2002-03

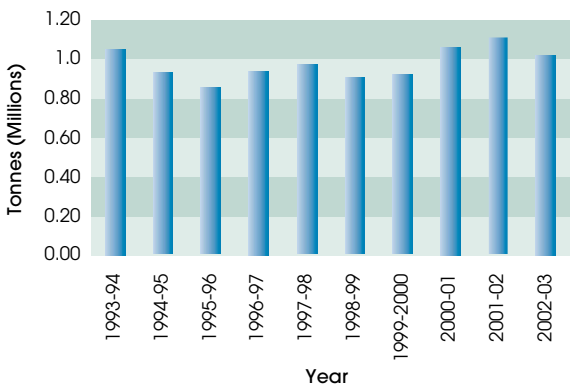
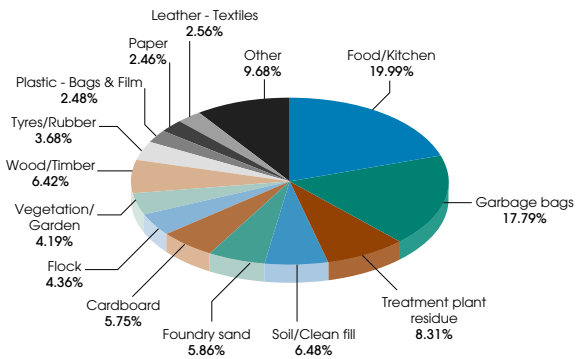


Figure 2: Commercial and industrial waste stream 2004



C&I waste comprised 29.5% of the waste stream in the 2004 audit compared with 16% in 1998. Additional C&I categories included in the 2004 study (e.g. foundry sands, shredder flock and treatment plant residue) accounted for some of this increase. Food and kitchen waste was again the largest percentage waste type for the C&I sector. Food waste from manufacturing accounted for 29% of total food waste. This material consisted largely of final product (typically from quality issues in manufacture), overruns and damaged product from storage and handling.

The most significant change was the fall in cardboard and paper to landfill as a percentage of the overall total – 5.8% and 2.5% respectively, compared to 1998 figures of 16.9% and 8.8%. This reduction is attributed to the expansion of activities by major companies working in the paper/cardboard recycling industry. Other C&I waste streams included garbage bags (expected to contain primarily paper and food waste), treatment plant residue, soil/clean fill, wood/timber (see Figure 2).

Manufacturing, retail trade, and mixed small to medium enterprises remain the three largest C&I industry sectors, accounting for 80.55% of the total C&I waste stream disposed of to landfill.

The composition of domestic waste was not analysed in the 2004 disposal based landfill audit; it was the subject of an EPA commissioned kerbside audit in 2002. However, the overall domestic waste stream (including municipal waste from transfer stations, parks and gardens) made up approximately 30% by weight of the material disposed to landfill, which is similar to the 1998 result.

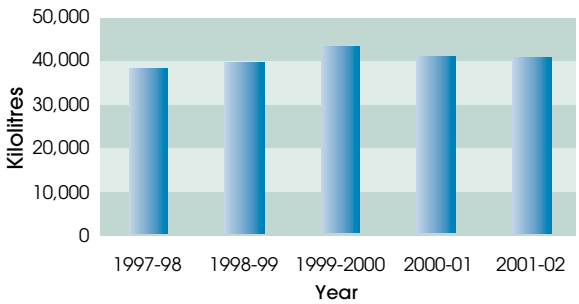
2.4 Liquid wastes

The transport, treatment and disposal of liquid wastes are subject to control through the *Environment Protection Act 1993*. The *State of the Environment Report for South Australia* (Environment Protection Authority 2003) indicated that liquid wastes received by treatment facilities included waste oil, oil/water mixtures, grease trap waste (generally sourced from restaurant waste), paint sludges and waste solvents. Levies are payable for liquid wastes that require treatment under the Environment Protection Act. Waste oils and waste solvents are normally recycled and so do not attract a levy payment.

Figure 3 shows the amount of liquid wastes collected and treated by facilities in South Australia, which are subject to levies payable under the Environment Protection Act.

Liquid waste is treated by a number of techniques including filtration and neutralisation. This waste may be recycled, composted, disposed of to landfill or incinerated (Environment Protection Authority 2003).

Figure 3: Liquid waste collected and treated in South Australia from 1997-98 to 2001-02 subject to levies payable under the *Environment Protection Act 1993*



2 The Current Situation

2.5 Where does the recyclable material go?

Recycling Activity in South Australia, commissioned by Zero Waste SA, outlined the destination of South Australia's recyclable material (Nolan-ITU 2004a). In summary, some materials such as C&D waste and organic waste are recycled by processors within the metropolitan Adelaide region. Other recycled materials such as paper and steel are primarily exported interstate or to overseas processing facilities.

2.6 How much recycling is there?

There has always been some measure of recycling in South Australia. Historically, it has been a residual function commonly carried out by processing industries or marine stores (container deposit legislation collection depots). In industries where there were relatively homogenous waste flows and materials with good resale value (like metals and paper), the waste was either recycled within the plant or transferred through to businesses that could process the material. The problem came with low value waste and with mixed waste streams from which it was difficult to recover usable materials. This material was usually bulked up and disposed of in the cheapest way possible – that is, to landfill.

The study of recycling activity commissioned by Zero Waste SA in partnership with the South Australian Jurisdictional Recycling Group and undertaken on its behalf by Nolan-ITU was the first ever conducted in South Australia. The Nolan-ITU study (2004a) indicates that South Australia is achieving some remarkable recycling rates. In 2003 over 2.1 million tonnes of material, ranging from asphalt to textiles, was recycled in South Australia. This shows that recycling volumes outstrip the volume of material sent to landfill, which was 1.332 million tonnes in 2001–02 – a total diversion rate of 65%. This exceeds the diversion rate for Victoria, the only other state currently measuring total recycling activity. The figure is likely to be comparable to the best performing jurisdictions around the world.

The Nolan-ITU study showed that the recycling tonnages for concrete, bricks and rubble, steel and paper were the highest. Garden organics material was also recovered in very significant volumes. Although smaller in volume, the recycling rates for packaging materials – glass, aluminium, steel and plastics – were at levels among the highest in Australia. The study found a broad range of opportunities to reduce waste levels through expanding recycling activity and other waste minimisation efforts. It identified priorities for improving waste diversion in the short and medium term.

The estimated recycling activity in South Australia in 2003 across all material types is presented in Table 1.

Table 1: Estimated 2003 recycling activity in South Australia

Material	Type	Quantity (tonnes)	Total quantity (tonnes)
Paper	Packaging & industrial	91,000	
	Printing & writing	12,300	
	Newsprint	31,300	
	Directory	1,300	135,900
Steel	Packaging	3,800	
	Other	300,000	303,800
Aluminium	Packaging	4,000	
	Other	15,000	19,000
Garden organics		118,000	
Food organics	Meat waste	74,000	192,000
Plastics	All polymers		15,000
Non ferrous metals (excluding alum)			13,000
Glass	Packaging		46,000
Concrete			875,000
Brick & tile / rubble & soil			327,000
Asphalt			100,000
Timber	Structural and sawdust		116,000
Textiles	Clothing / offcuts		4,000
Rubber	Tyres		100
Total quantity			2,147,000

2 The Current Situation

2.7 Packaging

Launched in 1999, the National Packaging Covenant (the covenant) is an agreement for the management of the lifecycle environmental impacts of consumer packaging, including the sustainability of kerbside recycling collection systems. It is currently the leading instrument for managing packaging waste in Australia.

The covenant forms the voluntary component of a co-regulatory arrangement involving all tiers of government and industry in the packaging supply chain, and is based on the principles of product stewardship and shared responsibility. Essentially it intends for all those who benefit from the production of packaging to assume some responsibility for it over its life.

The covenant is underpinned by the National Environment Protection (Used Packaging Materials) Measure (NEPM) to ensure covenant signatories are protected from any disadvantage from competitors who do not sign it, and that all businesses in Australia assume responsibility for reducing packaging wastes. In South Australia the NEPM is being implemented as the Environment Protection (Used Packaging Materials) Policy 2001 under the Environment Protection Act.

Companies that have signed the covenant are required to prepare and implement action plans to take responsibility for the environmental impact, and the ultimate disposal of, their packaging.

As a signatory, the State Government raised the necessary funding to underpin its commitment to the covenant and, as required under the covenant process, prepared an action plan addressing the issue of packaging waste for whole-of-government implementation. The Government also established its Jurisdictional Recycling Group which develops and delivers projects that will improve kerbside collection efficiencies.

Following a review in early 2004, the performance and effectiveness of the existing covenant–NEPM arrangement have been questioned. Both were due to expire in July 2004 but state and territory governments agreed to extend the term of the covenant on an interim basis to 30 April 2005, to enable the packaging industry body (the National Packaging Covenant Council) to develop a detailed proposal for future arrangements that improves upon the operational elements of the arrangement and focuses on achieving measurable quantitative outcomes. The NEPM has been extended to 14 June 2005.

The increasing variety of packaging materials is of concern to recycling infrastructure operators. Some materials are not compatible with existing recovery and recycling processes and increase the difficulty and cost effectiveness of recycling.

2.8 Container deposit legislation

South Australia's unique container deposit legislation (CDL) has existed since 1975.

CDL not only reduces the incidence of beverage container litter but also achieves the highest national rate of recycling for the containers covered by this legislation.

Approximately 110 collection depots across South Australia refund the five cent deposit on containers to which the legislation applies. Many of these depots receive and recycle other materials such as cardboard, newspaper, used lead-acid batteries, and may have the potential to fulfil an expanded role for recycling of other materials, an additional service that needs to be recognised and improved. The flip side to this is that many of the depots are not operated efficiently, are run-down, and are not as effective as they could be.

Studies indicate (Nolan-ITU, Waste Audit and Consultancy Services 2002) that a total of approximately 32,000 tonnes of recyclable deposit containers was recorded as being diverted through the CDL system and licensed depots in 2001. The total was made up of approximately 159 million aluminium cans, 125 million glass bottles and 87 million PET bottles. A further 3300 tonnes/year (approx.) of CDL material was also collected from kerbside recycling systems in 2001.

However, not all CDL containers are easily recycled. Some plastics and aseptic liquid paper board currently have limited recycling options.

CDL was further expanded in January 2003 and now captures a broader range of beverage containers that contribute to the litter stream – particularly flavoured milk and pure fruit juice in containers with a capacity of less than one litre. The regulations now also embrace non-carbonated soft (non-alcoholic) drinks such as vitamin drinks, sports drinks, iced teas, fruit drinks, and other soft beverages in containers with a capacity up to and including three litres. Plain milk remains outside the scope of the legislation, which also specifically exempts pure fruit juice and flavoured milk in containers with a capacity of one litre or greater.

CDL remains a highly effective tool to reduce beverage litter and promote recycling of beverage containers.

2.9 Waste streams of concern

A number of specific waste streams that need to be addressed in the waste strategy are of concern for the following reasons:

- the large quantity or volume disposed to landfill (including future potential)
- adverse environmental and/or public health impacts arising from the recovery and/or disposal of the product
- potential for waste avoidance, reduction, reuse and recycling
- level of community concern about the waste
- likelihood of illegal disposal through dumping or littering.

Some wastes of concern (see Table 2) will require cooperation to resolve issues at a national level between the Commonwealth and state governments, and relevant industry sectors.

2.10 Where are our strengths?

The general overview of waste management in South Australia reveals some major strengths:

- There is thriving recycling activity for some materials that have ready markets, in particular metals, glass, paper and cardboard. The strong market for wine bottles and the high international prices for paper (fibre) and metals have contributed to this outcome.
- Recycling of C&D material continues to improve and there has been considerable investment by some recycling firms. Factors such as the waste depot levy, increased market acceptance of recycled products and establishment of product standards and specifications have contributed to this outcome.
- The organic waste treatment and processing industry seems poised to divert increasing quantities of garden organics and other organic materials away from landfill toward more beneficial uses such as mulches, composts and soil conditioners. Increasing recognition by the horticultural and viticultural sector of the benefits of these products to increase crop yield, save water and revitalise depleted soils has contributed.
- Certain sectors of the waste management industry are able to operate successfully with limited intervention measures, in particular waste collection operations in which there are many private sector entities.
- The beverage container deposit system continues to enjoy widespread support by South Australians. This financial instrument provides an ongoing incentive to the community to return the containers and collect the refund.
- The completion of the Adelaide to Darwin rail link may open up additional export opportunities for many recycled products (e.g. plastics) in particular for those materials looking to access Asian markets.

2 The Current Situation

- South Australians have proven to be highly responsive to particular waste issues such as reduced plastic bag use.
- In his report *Creating a Sustainable Adelaide*, Herbert Giradet (2003) referred to the tremendous opportunity for Adelaide to re-invent itself as a sustainable city. Giradet noted that Adelaide's excellent climate, its relatively limited population size, its cosmopolitan cultural diversity and its intellectual vibrancy make it particularly suited to implement a vigorous sustainable development program. Many of the benefits recognised by Giradet apply more widely across our State and place South Australia in a strong position to progress towards zero waste.

Table 2: Wastes of concern

	Contribution (or potential future contribution) to landfill	Adverse environmental and/or public health impacts	Potential for waste avoidance, reduction, reuse, and recycling	Level of community concern /interest about the waste	Likelihood of illegal disposal through dumping or littering
Construction and demolition waste	High	Nil	High	Low	High
Organic waste	High	Moderate	High	Moderate	High
Paper and cardboard (inc. newsprint and office paper)	Moderate	Nil	High	Moderate	Low
Computers and peripherals	Moderate	Moderate	Moderate	Moderate	Nil
Televisions	Low	Moderate	Low	Low	Low
Electrical products (other)	Moderate	Moderate	Low	Low	Nil
Treated timber	Low	High	Low	Moderate	Low
Packaging waste (kerbside)	Low	Low	High	Moderate	Moderate
Plastic bags	High	Moderate	High	High	Moderate
Cigarette butts	Nil	Low	Nil	Moderate	High
Used tyres	Moderate	Moderate	Moderate	Low	High
Household hazardous and chemical wastes	Nil	High	Low	Moderate	Moderate
Batteries (excludes lead acid batteries)	Nil	Low	Low	Low	Nil

3 Roles and Responsibilities

The flow of materials, goods, services and products through the economy creates waste at a number of different stages. This waste consists of everything from paper to plastics, from hazardous wastes to organic waste, from packaging material to building rubble. Not surprisingly then, many people from many sectors deal with waste – from waste generators to recycling operators, from regulators to educators, and consumers of goods and services. Each sector has particular skills and responsibilities and will play a part in moving towards zero waste in South Australia (Ministry for the Environment 2002).

Businesses, industries and governments take natural resources, apply their skills, capital and resources, and make products or provide services. Waste is generated in the process. We operate a business and pay another company to take our waste away.

This approach has created and perpetuated the need for waste management systems such as landfills and other measures.

We all generate waste, and we can all play a part in reducing it. It's our waste and our responsibility.

3.1 Community

Substantial quantities of waste are generated from human consumption and activities related to the construction, operation, maintenance and renewal of human settlements (Newton 2001). South Australians consume resources and in the process generate waste; high levels of waste disposal indicate a failure to effectively recycle materials that we consume.

For many South Australians the household rubbish they present at the kerbside each week is their only involvement in waste management. Their bin is emptied into a truck and ready for use again within a few seconds. What happens to the waste once it has been collected 'is someone else's responsibility'. Their purchasing habits remain largely unconnected to their waste disposal behaviour.

An independent benchmark survey of community attitudes in 2000 (McGregor Tan Research 2000) indicated that the community has high expectations for recycling and waste management. Community awareness and concern about environmental issues remains high, with strong participation and strong support for kerbside recycling, CDL and specific issues such as reducing our reliance on plastic bags.

However the Victorian Waste Strategy (EcoRecycle Victoria 2003) suggests that while many people are concerned about the environmental impacts of the goods and services they purchase, only the most committed take action to reduce the amount and/or impact of the goods and services they buy. For many consumers cost, lifestyle and convenience are the key factors in their purchasing decisions.

The South Australian community, as a significant contributor of waste, must realise that individuals have a responsibility for avoiding, reducing and recycling materials and properly managing any remaining waste. "Successful recycling depends critically on the voluntary labour of the household. Whereas in the past householders had merely to put out their bin once a week, now they are asked to separate their waste and supply recyclables. They come to play a central role in production" (Murray 2002).

This role is also important in public places, such as parks, reserves, beachside locations, where recycling and responsible waste disposal is reliant upon a continuation of appropriate individual and community behaviour away from the household.

Engendering a greater sense of responsibility for avoiding, reducing, reusing, recycling and managing waste will require considerable focus on fostering sustainable behaviour.

3 Roles and Responsibilities

3.2 Business and industry

South Australian business is a significant contributor to waste generation, recycling, collection and handling of waste. However, good waste management begins with preventing waste being generated in the first place – after all, what is not produced does not have to be collected, handled or disposed of. Hence waste avoidance and minimisation should have top priority in any waste strategy. Zero waste is not only about recycling and diverting waste from landfills; it ultimately envisions the restructuring of production and distribution systems to prevent waste from being manufactured from the outset. Industry designers and product manufacturers therefore have a significant role in avoiding and reducing waste generation.

Business and industry respond primarily to economic or price signals in the marketplace and compliance with applicable legislation or approval conditions.

For most industries and business enterprises the removal, treatment or management of waste represents a financial cost. Cheap collection/disposal arrangements are a more cost effective option for the 'bottom line' than more expensive recycling or resource recovery alternatives and this cost factor is a considerable barrier to increased waste diversion. It is not that business or industry does not want to recycle; rather that the price difference between disposal and recycling must be such that it is worth their while to make necessary changes. Levelling the playing field between recycling and disposal is therefore an important part of this waste strategy.

As Suzuki (2003) suggests, it doesn't make sense to recycle only if it is economically profitable: we live on a finite planet where all life is interconnected.

3.3 Waste management and recycling industry

In the past, waste management has been an activity conducted in the background. The waste industry's task was to remove the waste material from the 'back door' and away from the main focus of our daily activity. Some material had value and was recycled; most was disposed to landfill.

The private waste management industry sector provides waste collection, transport, processing, treatment and disposal services to the business sector and/or local government. For private and public waste management businesses in 2002–03, the collection and transport of waste generated the major source (59.4%) of income followed by treatment/processing and/or disposal of waste (19.9%) with income from recyclables generating 8.4% of the total income (Australian Bureau of Statistics 2004). The industry is highly competitive, mostly works on small margins and is very efficient.

Waste industry associations including the Waste Management Association of Australia (WMAA), the Waste Disposal Association, Recyclers of South Australia, Compost SA (a working group of the WMAA), and Business SA are all active in representing industry's views on waste management.

The challenges for the future lie in reverse logistics, alternative technologies and processes to landfill, and diversification into new waste streams and technology.

3.4 Government

A number of general partnership arrangements and/or agreements between the public sector at the local, state and national level aim to progress towards sustainability. Many of these arrangements are concerned with or influence waste management.

For example, the Environment Protection and Heritage Council of Australia and New Zealand (EPHC) is established to ensure the protection of environment and heritage of Australia and New Zealand. Members of the council are ministers, not necessarily environment ministers, appointed by the first ministers from participating jurisdictions (i.e. Commonwealth, state and territory governments, the New Zealand Government, the Papua New Guinea Government) and a representative of the Australian Local Government Association. The EPHC was created by amalgamating several environmental bodies (see below).

Waste management is a priority issue for the EPHC, specifically promoting waste avoidance and

better waste management through national approaches to encourage and ensure product stewardship and cleaner production.

South Australia's Waste Strategy also relies upon a range of partnerships to realise its goals and objectives. It takes account of a number of important guiding documents such as *South Australia's Strategic Plan*, the *State Planning Strategy*, the State Infrastructure Plan, and the *State of the Environment Report*.

Closer to home, the *State–Local Government Relations Agreement* signed in March 2004 between the South Australian Local Government Association (LGA) and the State Government ensures a close relationship between the two tiers of government. A key area of interest to local government is waste management.

3.4.1 Commonwealth

While constitutional responsibility for environmental controls and waste management rests with states and territories, the Commonwealth Government has the role of providing a forum to assist in ensuring consistency between jurisdictions. It is involved in developing and negotiating international treaties, particularly international treaties dealing with the movement of hazardous wastes, such as the Basel Convention and the legislation giving this effect in Australia, the *Hazardous Wastes* (*Regulation of Exports and Imports*) Act 1989.

The Commonwealth facilitates national approaches to achieve reduction of environmental impacts of some waste generating activities through the EPHC. The EPHC was created by amalgamating the National Environment Protection Council (NEPC), the environment protection components of the Australian and New Zealand Environment and Conservation Council (ANZECC), and heritage ministers' meetings. The NEPC is a statutory body that operates under the umbrella of EPHC and is responsible for making NEPMs.

NEPMs are broad framework-setting statutory instruments defined in the *National Environment Protection Council Act 1994*. They outline agreed national objectives for protecting or managing particular aspects of the environment. In relation to waste issues, there is the Used Packaging NEPM and the Movement of Controlled Waste between States and Territories NEPM. The South Australian Government is a signatory to both these NEPMs and implements them through the Environment Protection Act[1].

3.4.2 State Government

Within South Australia, the Greening of Government Operations (GoGO) Framework, developed and coordinated by the Office of Sustainability, is the first state-wide initiative in Australia to encourage and support good environmentally sustainable and eco-efficient practice in the operations of government. The GoGO Framework is one of the key opportunities for the Government to 'walk the talk' in terms of committing to sustainability by changing in its own practices to minimise environmental impact. Waste management is a key priority area within the GoGO Framework.

- **Department of Primary Industries and Resources – Planning SA**

The Minister for Urban Development and Planning has a significant influence on waste management through key responsibilities for the *Planning Strategy of South Australia* and other planning and development assessment controls under the *Development Act 1993*, which has strong links to the Environment Protection Act.

- **Environment Protection Authority**

The EPA has the statutory responsibility to manage the environmental impacts of waste in South Australia and to minimise adverse effects on human health and the environment. Tools are available to the EPA to manage environmental impacts through provisions within the Environment Protection Act.

The EPA has started the process of seeking amendments to the Environment Protection Act to strengthen some waste management and other non-waste management provisions. It has also

[1] When a NEPM comes into operation under the prescribed national scheme laws, the measure comes into operation as an EPP under the SA Environment Protection Act (section 28(A)).

been developing a draft Environment Protection (Waste) Policy (Waste EPP) to review and extend a greater level of statutory underpinning to a range of waste management issues.

Other statutory measures such as developing or strengthening regulations are also being considered by the EPA to achieve increased compliance in the area of waste management.

- **Zero Waste SA**

Zero Waste SA (ZWSA) is a new government instrumentality established under the Environment and Conservation Portfolio. The primary objective for ZWSA is to promote waste management practices that, as far as possible, eliminate waste or its consignment to landfill, advance the development of resource recovery and recycling, and are based on an integrated strategy for the State.

South Australia's Strategic Plan targets waste reduction with the goal: reduce waste to landfill by 25% within 10 years. ZWSA is the key to achieving that goal.

- **Department for Administrative and Information Services**

The Department for Administrative and Information Services (DAIS) has considerable capacity to be a leader and exemplar in introducing and applying zero waste policies and practices. DAIS Building Management can influence the C&D sector involved in Government-related building project procurement to adopt more sustainable practices. DAIS Contract Services has an important role in across-government procurement policies and contracts for goods and services.

3.4.3 Local government

Although municipal waste represents only about one-third of the total waste stream, it is an important focal point for this strategy for the following reasons:

- In addition to its significant role as a local community leader and policy maker, local government is also an important service provider. Household waste and recycling collection is one of many key services provided by local government. Councils either directly, through local and regional waste management groups or through the engagement of contractors, provide for the collection, transport and disposal of domestic and municipal waste. Some local government infrastructure (e.g. transfer stations, landfills) is also commercially available for use by other sectors such as C&I waste streams.
- Household waste is the interface between residents and the waste problem. It affects everyone. Householders make daily choices about what goes in the waste bin (to landfill) and what gets recycled or composted. Recycling provides a way for everyone to contribute to alternative environmental policies.
- There is a strong correlation between household participation in recycling and the frequency of the collection service and the type of container provided by the council for collecting recyclables. If there is an easy and convenient method to recycle then householders will participate at very high rates.
- A South Australian survey and audit of kerbside waste and recycling practices (Nolan ITU, Waste Audit and Consultancy Services 2002) found that reduced waste yields, high recycling yields and high diversion rates at the kerbside are influenced by the size (capacity) of the waste container, the size (capacity) of the recycling container, the recycling collection frequency; and the provision of a recycling collection container for all materials.
- Local government is the third tier of responsible government. The State Government is able to work in partnership with the LGA and regional groups of councils to influence the way waste is managed in the municipal sector.

For these reasons, an important step towards zero waste is to improve the way in which municipal waste is managed. *South Australia's Waste Strategy* therefore proposes a number of changes to the management of municipal solid waste.

4 Drivers for Change

Governments across Australia, including South Australia, have introduced a number of measures and policies in an attempt to reduce the environmental impacts connected with increasing waste generation. Legislative measures are developed to restrict the options legally available for waste management and generally include systems for site licensing or permits for transport, storage, treatment and disposal for a wide variety of waste types. Increasing the legislative and compliance requirements for waste management exerts considerable influence and is an important driver for change.

However, in practice governments use a range of integrated approaches including the use of economic measures (e.g. landfill levies), voluntary agreements (e.g. National Packaging Covenant), financial incentive arrangements (e.g. ZWSA programs and activities), and information dissemination to achieve waste reduction and recycling objectives.

The following sections include some key drivers for change.

4.1 Community expectations and behaviours

Communities worldwide, particularly in developed countries, are challenging and questioning issues associated with the waste we generate and how best to deal with it. Awareness is growing that developing new and better landfill sites or other technical solutions to waste disposal does not really treat the solid waste problem, it only treats the symptoms of the problem. Issues such as sustainable use of resources, hazardous wastes and toxicity of waste, problems with landfill and other waste treatment technology (e.g. landfill gas migration, pollution of surface and groundwater by leachate, odours, litter, air emissions and residues associated with new technologies) have become increasingly important community issues.

South Australia does not have the problem of high population densities and limited space for landfills that create difficulties for some cities interstate (e.g. Sydney) and many other cities and countries throughout the world. Yet despite this, environmentally and socially acceptable locations for landfill facilities and other treatment technologies (e.g. composting, crushing) are limited. Communities have become intolerant of this sort of development near households and other sensitive premises. This intolerance has created difficulties for the planning system, which struggles to locate new developments for resource recovery and materials reprocessing facilities within the metropolitan area, and adjoining urban–rural interface.

Waste is an important community issue that has moved from the margins to the political mainstream.

4.2 State Government policy

The Government of South Australia is committed to a new legislative framework under which it can work with local government and the private sector to drive a new and integrated strategy for waste reduction, waste minimisation, recycling and waste disposal.

The establishment of ZWSA, strengthening of the regulatory focus of the EPA, preparation of a new EPP for waste, and development of this strategy are key components in meeting Government policy requirements.

The State Government supports ecologically sustainable development and has indicated its intention to provide increased leadership and direction to facilitate a more sustainable approach to waste management. In March 2004, the Government announced its intention to adopt many of the inspirational ideas of the State's first 'Thinker in Residence', Herbert Girardet, aimed at making South Australia a leader in environmental reforms. Girardet (2003) recommended that a zero waste policy be implemented.

South Australia's Strategic Plan released by the Government in March 2004 provides a target of reducing waste to landfill by 25% within 10 years. Implementation of *South Australia's Waste Strategy* will aim help meet that and other targets outlined in the Strategic Plan such as increasing jobs (Objective 1 Growing Prosperity – Jobs).

4 Drivers for Change

4.3 National waste issues

The EPHC has identified a number of national environment protection and heritage priorities for the next decade. Waste management, and eco-efficiency and sustainability are two of the key priority issues for immediate attention. Current waste-related priority projects include packaging waste, plastic bags and waste tyres. The EPHC also has an interest in electronic and electrical waste, waste to energy, end-of-life vehicles, waste oil and motor vehicles.

4.4 International trends

In 1987, the United Nations published a document that challenged the economic orthodoxy of the relationship between development and environmental degradation. Called *Our Common Future* (World Commission on Environment and Development 1987), it emphasised the concept of sustainable development.

> *Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.*
>
> World Commission on Environment and Development 1987

Schramer and Sedlacek (2003) suggest the report *Our Common Future* is perhaps the most important landmark in the history of environmental policy as it not only evoked a sense of urgency all around the world, it also changed our concept of the environment. This report was followed in 1992 by the Earth Summit in Rio de Janeiro, which acknowledged that sustainable development requires an integrated approach to economic development that includes all the environmental and social issues.

In August–September 2002 the United Nations held the World Summit on Sustainable Development in Johannesburg, South Africa. It was an opportunity for thousands of participants, including heads of state and government, national delegates and leaders from non-governmental organisations, businesses and other major groups to reflect on achievements since the 1992 Earth Summit and commit to ongoing sustainable action. Sustainable cities and urbanisation was a key theme at a number of the parallel information events at the summit.

In addition to growing community concern and other factors, these events have strongly influenced international policy development and trends in waste management, particularly in the Organisation for Economic Cooperation and Development (OECD).

De Tilly (n.d.) points out that governments in OECD countries have introduced a range of measures and policies to reduce the environmental impacts and costs connected with rising waste generation. This includes applying principles such as extended producer responsibility for specific products that pose end-of-life problems either because of their volume or because they contain dangerous substances. Economic instruments are increasingly being used to internalise the costs of waste management and the environmental impacts of waste. Waste management planning, the control and monitoring of hazardous waste and other measures are being introduced or improved.

As a signatory to the National Strategy for Ecologically Sustainable Development, the Government supports ecologically sustainable development and has stated its intention to provide increased leadership and direction to facilitate a more sustainable approach to waste management.

4.5 Industry initiatives

For many industries, the financial costs associated with buying materials, processing them, then removing, treating or otherwise dealing with waste are large; and the potential to lead to improved business practices to reduce or avoid these costs is high. International and national business sustainability practices and initiatives such as cleaner production, eco-efficiency, eco-design, design for environment, industry sector waste minimisation plans, greater lifecycle responsibility for products and others are all directed at industry operating in a more sustainable way. Such

practices have been demonstrated to lead to improved efficiency and productivity for industry as well as reduced energy, water and natural resource use, reduced environmental impacts, decreased waste generation and a number of other benefits.

4.6 Market instruments[2]

According to economic theory, an excessive amount of waste will be produced in an economy where the environmental damage caused by disposed products is not reflected either in the price of the products or in specific disposal costs.

Market instruments generally operate as either a price or quantity based instrument. Price based instruments assign a price to environmental impacts within existing markets through the imposition of charges, taxes or subsidies. Firms then respond to the modified market signals and adopt the resource use or management practice that offers them the greatest benefit and, if the policy is effective, leads to a better environmental outcome.

Price based instruments are polluter pays charges and fees that provide direct monetary incentives to reduce waste or increase the level of recycling. They include advance disposal fees, deposit refund schemes, performance bonds, variable rate charging systems and landfill levies.

Market instruments also include quantity based instruments that create a market in the rights to engage in an activity (that may be associated with environmental damage) by restricting the total level of activity and allocating rights to participate in that activity (e.g. tradeable landfill quota schemes are used in the United Kingdom).

Market instruments are being increasingly applied to the management of wastes internationally and in Australia. A range of instruments, including firstly advance disposal fees and deposit-refund schemes, and secondly performance bonds, have been used internationally with some success to respectively increase recovery rates of problematic wastes and manage post-closure environmental impacts associated with landfills.

The use of these instruments in Australia has been more limited.

The use of landfill levies is the most prominent economic instrument being used in Australia. In South Australia, the waste depot levy (landfill levy) is collected under the Fees and Levies Regulations of the Environment Protection Act and currently stands at $10.50 per tonne of waste arising from the metropolitan area and $5.25 for non-metropolitan waste. Of the income from this levy, 50% is used to fund programs and activities by Zero Waste SA to avoid, reduce, reuse and recycle waste. The remaining 50% is used to fund EPA functions and activities. It can be argued that increasing the levy (depending on its magnitude) will further increase recycling activity as well as provide a revenue base for waste reduction programs.

It should be noted that the landfill levy is a small component of the overall disposal fee charged by landfill operators. The levy is passed on by landfill operators to users of the landfill facility (waste generators) as part of the total price charged for disposal.

Subject to appropriate and detailed investigation, financial instruments can play an increasing role in assisting Zero Waste SA to realise its waste management goals, targets and strategies.

4.7 Closure of Wingfield landfill

The legislated closure of Adelaide City Council Wingfield Waste Depot (Wingfield landfill) in December 2004 has had a significant impact on the future management arrangements for metropolitan Adelaide's waste. The Wingfield landfill accepted 700,000 tonnes of waste per annum and 700,000 tonnes of fill material – three-quarters of Adelaide's total waste stream.

Three landfills located north of Adelaide are operational and another near-city rural-based landfill at Nuriootpa may be expanded or look to source greater quantities of waste from metropolitan Adelaide. The situation has created considerable competition between the landfill operators and recyclers for a share of Adelaide's waste supply.

[2] Information sourced from a study commissioned by Zero Waste SA (BDA Group, EconSearch 2004)

5 What's Blocking the Path to Zero Waste?

Waste generation continued to rise in OECD countries between 1990 and 2000, not only in absolute terms but also on a per capita basis. This means that population growth is not the only cause of increased waste (de Tilly n.d.).

The amount of waste we produce is directly linked to how many goods and services we consume – the greater our wealth, the more we waste. This link between material wellbeing and waste generation is recognised internationally. The New Zealand Ministry for the Environment in its waste strategy (2002) cited information from the OECD:

> *Despite nearly 30 years of environmental and waste policy efforts in OECD countries, the OECD-wide increase in waste generation is in direct proportion to economic growth. A 40 percent increase in OECD GDP since 1980 has been accompanied by a 40 percent increase in municipal waste[3] during the same period.*
>
> www.oecd.org/env/efficiency/wastemini.htm

Like New Zealand, other states in Australia and other OECD countries, South Australia has a continuing and growing waste problem. The 2003 *State of the Environment Report for South Australia* found "Despite an increase in the number of people recycling, the amount of waste going to landfill is increasing".

In South Australia a number of barriers and issues impede progress toward more sustainable waste management. Some of these barriers are being addressed; others are not. The following priority areas identify where Government (and this strategy) should focus attention.

5.1 Per capita consumption

The *State of Environment Report for South Australia* (Environment Protection Authority 2003) indicates a growing economy and increasing population create a rising demand for goods and services provided by businesses, industries and governments. The main drivers of waste generation in South Australia are economic growth, urban consolidation, household formation trends with fewer people in more dwellings, under-provision of garden waste and other recycling services, and community attitudes. Our consumption patterns tend to be linear: we consume natural resources to make products or provide services, and waste is generated as a result.

Local data on consumption trends is difficult to source. A study in France, however, examined the period 1979–99 and found that consumption of non-food products had increased by 28% (Glachant n.d.). Perhaps not unexpectedly, products on the rise were whitegoods (refrigerators, washing machines, dish washers, stoves, ovens, microwaves), brown goods (television sets, video cameras, DVD players and other home entertainment equipment), tyres, car batteries, telephone equipment and drugs. The consumption of brown goods increased by 140% and telephone equipment by 2260%. Notwithstanding such increases in consumption, the study found the quantities of waste generated by non-food products were almost stable over the period due to lightening (reduced unit weight) of durable goods.

The study concluded that the overall trends were characterised by:

- a dramatic increase in packaging associated with non-durable goods
- a very important weight reduction of durable goods, associated with:
  - an increasing product complexity
  - an increasing diversity of the embodied materials
  - a decreasing 'recycle-ability' due to the substitution of metal by plastics.

Waste generation trends are driven by several factors, including levels of economic activity, demographic changes, technological innovations, lifestyle and, more generally, patterns of production and consumption. The complex interrelationship between these factors means that goals and targets for achieving waste avoidance and reduction must also consider resource management and product policy.

[3]There is no internationally agreed definition of municipal waste but it generally refers to household wastes, and similar wastes collected from commercial and industrial sectors.

A range of policy measures will ultimately be required to influence consumer behaviour to ensure that less waste is destined for landfill.

5.2 Capacity to change current practice

There is no longer any dispute about the need for a new waste order and for industrial processes that radically cut down on their use of fossil fuels and non-renewable resources (Murray 2002). Nor is the feasibility of the alternative any more in question.

> *Zero waste strategies are being adopted by businesses all over the world – driven by legislation as well as voluntary action. They have led to significant cost savings, increased profits and improved environmental performance.*
>
> Girardet 2003

Herbert Girardet (2003) cites the following United States companies as examples of the movement towards zero waste:

- Interface Inc., Atlanta, Georgia, eliminated over $165 million in waste a year by designing new 'industrial ecology' methods for making carpets.
- Xerox Corp., Rochester, New York, had savings of $45 million in 1998 by minimising wastes, emissions and energy consumption, and by maximising recycling.
- Hewlett Packard, Roseville, California, saved $870,000 in 1998 by reducing its waste by 95%.
- Epson, Portland, Oregon, saved $300,000 in 2000 by moving toward zero waste.

Closer to home and on a much smaller scale, the Pollution Prevention Fund (PPF) in South Australia achieved similar outcomes with environmental benefits, reduced waste and resource savings in many areas (see Case Study page 30).

Yet it is one thing to show the technical and economic feasibility of a new way of doing things but quite another to diffuse it beyond the pathbreakers (Murray 2002).

Why, in the face of compelling evidence, don't business and industry embrace waste reduction and avoidance practices such as eco-efficiency or cleaner production systems that not only save costs but also create less waste and provide other benefits?

The answer to this question is complex and involves a number of significant factors associated with managing a business in a highly competitive and increasingly global economy. This is probably one area where size does count. While large companies may be able to implement arrangements to avoid or reduce the creation of waste, the greatest pressure may come from small and medium sized enterprises (SMEs) that do not have the resources, staff or expertise to commit to the changes required.

SMEs in particular suffer from lack of resources and expertise to devote to investigating waste avoidance measures for their business.

A new fiscal and regulatory regime is necessary for the environmental economic dynamic to move from the margin to the mainstream. 'Green restructuring' is a politics-led, not market-led, process even if it is carried through by a market that has been reshaped by economic instruments and regulations.

5.3 Financial cost

5.3.1 Disposal costs

Waste disposal in South Australia has been dominated by landfills. In order to meet increasingly stringent planning and environmental requirements, modern landfills have high fixed costs sunk in site establishment (e.g. land purchase/lease, cell construction, leachate and landfill gas management, exclusion fencing, utilities) and associated with fixed installations. As with any investment, these sunk costs need to be offset and the facility run on a profitable basis. This is achieved by attracting a minimum supply of waste and therefore revenue to the site.

To guard against possible shortfalls in the supply of waste for the landfill, owners and operators often

include minimum tonnage contracts and a guaranteed gate fee, with contracts often spanning several years or more. Gate fees are also set low to attract non-contracted waste supply.

Waste generation and disposal has social, environmental and economic costs but these are not all covered by the price of waste treatment or disposal. As a market-based instrument in a highly competitive marketplace, gate fees do not seek to modify waste management behaviour by charging the 'real costs' of disposal (including social, environmental and landfill replacement costs). Instead, the converse seems to apply. Gate fees in South Australia are set to maximise the amount of waste taken to a waste disposal facility at the expense of a competitor. This tends to drive gate fees down and acts directly contrary to waste minimisation and recycling objectives.

The issues that arise from low landfill costs include the following:

- It is more cost-effective to dump rather than recycle, thus potential resources continue to be disposed to landfill.
- Existing and new recycling, reuse and resource recovery technologies struggle to compete for a viable share of the waste stream (raw material).
- Low landfill costs constrain development and expansion of recycling, reuse and resource recovery industries and new technologies. Technological developments in resource recovery will greatly enhance recovery from the commercial and industry sector but, where broad economic drivers such as landfill costs are limiting, the capital costs associated with technological development are often prohibitive compared with standard rates of return on investment.
- Low costs do not send signals to community to change waste management behaviour and accept responsibility for 'polluter pays'.
- As landfill capacity is depleted, the pressure for extensions to existing landfills or for development of new landfills arises.

5.3.2 Collection costs

In South Australia, a number of organisations collect waste materials:

- local government
- privately operated waste collection and disposal companies
- privately operated recycling collection companies
- producers and manufacturers
- community groups and charity organisations.

All metropolitan councils provide weekly domestic waste collection services and regular domestic recycling collection services, with a number also providing garden organics kerbside collection services (Nolan-ITU, Waste Audit and Consultancy Services 2002).

Most non-metropolitan councils provide a weekly waste collection service and 17 (one-third) provide kerbside bottle, can, paper and cardboard recycling services.

The cost of providing both kerbside waste collection and recycling services is significantly higher in non-metropolitan areas than metropolitan areas. Nolan-ITU, and Waste Audit Consultancy Services (2002) indicated that waste collection costs are greater than the disposal costs in both metropolitan and non-metropolitan areas.

Due to commercial-in-confidence issues, actual cost data is often difficult to obtain. A publication released by the NSW Government in March 2004 (Nolan-ITU 2004b) provided a financial assessment of the costs for collection, sorting and material delivery for various container (bin) systems. The report identified that the average domestic waste management charge for Sydney metropolitan councils for 2001–02 was $219 per household per year, or $4.21 per household per week. This includes kerbside garbage and recyclables collections as well as administration, education and other waste management services offered by councils (e.g. garden organics collections, clean up collections, drop-off, street sweeping and litter).

Recent South Australian studies (Nolan-ITU, Waste Audit and Consultancy Services 2002; Nolan-ITU 2003) suggest the cost for metropolitan waste services (including collection and disposal) at the uppermost range were $86 per household per year (140-litre bin collected weekly), recycling at the uppermost range (a 240-litre co-mingled container collected fortnightly) was $27 per household per year and garden organics (a 240-litre container collected fortnightly) was $25 per household per year. This equates to a yearly waste management charge for a three-bin service of $138 per household per year or $2.65 per household per week.

Existing pricing practices for household waste collection and disposal generally involve a set charge irrespective of the quantity or type of waste deposited. "…as household waste disposal charges are commonly included in general rates, many householders do not even know that they are being charged for garbage disposal, let alone know the magnitude of the charge" (BDA Group, EconSearch 2004). A householder who generates little waste, recycles diligently and composts their food and garden waste pays the same council waste charges as a household that doesn't. There is little incentive to reduce the waste they dispose of.

Within the commercial and industrial sector, South Australia needs to greatly lift material collection and recovery rates to foster highest value resource recovery and encourage local reprocessing. Projects such as paper recycling mills that require large amounts of recyclables locally are obstructed by fragmented commercial and industrial waste collection and recovery systems. This waste sector provides the most significant opportunity to develop long-term and sustainable local end markets.

5.4 Planning and environmental approvals – landfills

The planning system in South Australia centres on the Planning Strategy. It presents current Government policy for development, and contains development plans which apply to the whole of the State and contain all policies against which development is assessed by the relevant planning authority (councils or the Development Assessment Commission). In particular, the Planning Strategy seeks to guide and coordinate Government activity in providing infrastructure and indicates directions for future development to the community.

Landfill infrastructure and sites are not identified by the Government in its future planning requirements nor on the basis of projected landfill capacity and needs. Consequently the opportunity remains for more landfills than South Australia needs.

For development proposals involving activities of major environmental significance, as described in schedule 22 of the Development Regulations 1993, the EPA has the power of direction. Waste landfills are designated as activities of major environmental significance.

For waste landfill proposals, the EPA has the power to direct the planning authorities to either attach specific conditions to an approval it may give, or to refuse the application. However, as the refusal may be subject to legal challenge in the Environment, Resources and Development Court, the EPA's decision must be based on grounds consistent with its powers under the Environment Protection Act. Those powers are fundamentally premised on risk of environmental harm. Also, the Development Act does not hinder competition through seeking to control the supply and demand of facilities. Consequently, it would be very difficult for the EPA to win a legal challenge using the argument of there already being a sufficient number of waste landfills to meet demand.

This situation also reflects the pro-competitive thrust of development plan provisions introduced by a ministerial waste disposal (landfill) plan amendment report in August 1999, in that landfills were not listed as non-complying development in a large number of peri-urban or rural zones in areas surrounding Adelaide (including the Hills Face Zone). An option might be to reverse this

approach and introduce (or re-introduce) blanket 'no-go' zones for landfills.

Following the statutory process of consultation and assessment, if planning approval is granted the EPA must then license the waste landfill. The EPA is required to make this decision irrespective of any concerns it may have about the supply or availability of landfill space. An oversupply of landfills (that exceeds demand) is likely to have a detrimental influence on the rapid take up of waste minimisation initiatives, resource recovery, recycling practices and the introduction of new technologies.

The EPA is also involved in providing input into the major developments or projects requirements (commonly referred to as environmental impact statement) under section 46 of the Development Act.

Landfills can be declared a major development by the Minister for Urban Development and Planning. Once a proposal is declared a major development, the EPA's role is advisory only and it cannot direct refusal. A Major Developments Panel produces guidelines to guide the preparation of the proponent's impact assessment documentation, and decides the level of assessment. A member of the EPA is on the Major Developments Panel to ensure there is a link between the requirements of the Environment Protection Act and the Development Act.

The Governor of South Australia makes the approval decisions on major developments. In the case of a major development, the Governor can refuse an application for a major development at any stage in the process.

There is no right of appeal against a decision by the Governor under the major developments or projects division of the planning legislation. Similarly, there is 'no judicial review provision' in the major developments or projects division with respect to a decision of the governor, the Minister or the major developments panel.

5.5 Other factors

A number of additional factors in South Australia impede progress towards more sustainable waste management. These are summarised below.

a) Reliance on landfill and disposal as the leading waste management technology

Maintaining the status quo for landfills as the primary solution to managing waste has:

- encouraged more landfill proposals
- not encouraged avoidance, reduction, recycling, reuse and recovery of waste
- continued public agitation about the social and environmental impacts of operations and sites
- restrained approaches for innovation and new technologies.

b) Inconsistent service provision to households by councils

The lack of consistent service provision across local government in delivery of waste management services has resulted in:

- financial inequities across councils (between good and poor service providers)
- low household participation rates in councils not providing high performance kerbside systems
- uncoordinated educational efforts (no clear message)
- poor economies of scale for both recyclates (collection and sale into market) and for waste disposal (collection, transport, disposal costs)
- poorly developed infrastructure (collection disposal and treatment)
- householder scepticism/mistrust
- poorly sorted recyclables with low value and contamination of recyclable streams.

c) Lack of accessible waste processing, sorting and treatment infrastructure

The lack of accessible or poorly designed infrastructure:

- does not encourage establishment of recycling systems
- blocks waste diversion from landfill
- leads to generation of low value recyclates (i.e. unsorted/mixed)
- can lead to distorted price structures where sole supplier waste treatment companies are in place
- results in high value recyclates being transported interstate or overseas to secondary processing plants.

d) Difficulty in obtaining long-term secure sites for resource recovery (e.g. composting, building and demolition), recycling and reuse infrastructure

The difficulty in obtaining long-term secure sites:

- restricts planning and development of beneficial infrastructure
- restricts capacity at existing (constrained) sites leading to non-compliance issues and increased waste to landfill
- creates antagonism with neighbours
- does not meet market demand and community expectations.

e) Legislative deficiencies

Current legislative deficiencies include:

- no statutory obligations to avoid, reduce, reuse, recycle or recover waste for any community sector (municipal, C&I, C&D)
- no mandated minimum service standards for collection of household waste
- lack of ability to ensure bonds and assurances are in place to monitor closed landfills
- no provisions to discourage the proliferation of more landfills
- an obligation for the EPA to license landfills approved under the Development Act.

f) Market development for recycled products

Support for market development needs to understand the difference between low-value and high-value resource recovery. Low-value activities (such as exporting) are more subject to commodity and foreign rate fluctuations and have issues for long-term sustainability. Secure markets for domestic reprocessing are more sustainable but they need different support. The capital investment required to build infrastructure and processing capacity means addressing issues such as security of supply, quality, regulation and legislation.

The absence of, or limited markets for, products made from recycled materials and restrained purchasing of these products is associated with:

- barriers preventing the use of recycled products (e.g. due to lack of performance specifications/standards)
- fluctuating or low commodity prices
- foreign exchange rates
- low landfill costs encouraging disposal rather than recycling (affects supply of recyclable materials)
- disincentive to infrastructure development, innovation and new product development.

CASE STUDY

(S Gabrynowicz, environmental economist, Department for Environment and Heritage)

The economic benefits to industry of improved environmental performance have been clearly identified by an assessment of the impacts of the South Australian EPA's Pollution Prevention Fund (PPF) conducted for the EPA by independent consultants. The PPF in various forms was used between 1994 and 1998 to provide assistance for the implementation of cleaner production and waste management projects by local industry. Over 50 businesses and industry associations received about $1.5 million in funding.

Assistance was provided in the form of consultancy grants to individual businesses and industry associations, or as interest free loans to businesses for purchase of new technology and equipment. Consultancy grants were normally limited to a maximum of $15,000 and interest-free loans to a maximum of $50,000.

A total of 40 projects that accounted for $1.15 million in funding assistance and $1.6 million in additional private sector investment were selected for assessment. The remaining projects were excluded from the assessment, as they were not sufficiently advanced at the time of the study to warrant scrutiny.

The economic impacts of the assessed projects are impressive:

- A 'one off' outlay of $2.75 million is resulting in annual value-added benefits to the local economy in excess of $2 million per annum (including both direct and flow-on impacts).
- The overall benefit–cost ratio for these projects, including both the public and private sector investments, is 15:1.
- The value-added benefits were generated by reductions in a range of operating costs facing businesses such as energy, water, raw materials and waste management, and also increased exports and import replacement.
- The actual value-added benefits and benefit–cost ratio of these projects is likely to be significantly higher given the substantial difficulties encountered by businesses and industry associations in quantifying and valuing the range of environmental benefits generated by these projects.
- The projects supported by the PPF generated 94 jobs (both direct and flow-on impacts).

The full report on the assessment of the PPF, and detailed information in the form of case studies about a number of projects funded by the PPF, are available at www.environment.sa.gov.au/epa/pub.html

Abbreviations

ANZECC	Australia and New Zealand Environment and Conservation Council (has been superseded by EPHC – see below)
BATEA	best available technology economically achievable
C&D	construction and demolition
C&I	commercial and industrial
CDL	container deposit legislation
DAIS	Department for Administrative and Information Services (South Australia)
DTUP	Department of Transport and Urban Planning
EPA	Environment Protection Authority (South Australia)
EPP	Environment Protection Policy
GDP	gross domestic product
GoGO	Greening of Government Operations
GIS	geographic information system
JRG	jurisdictional recycling group
KESAB	Keep South Australia Beautiful
LCA	lifecycle assessment
LGA	Local Government Association
MSW	municipal solid waste
MTCE	metric tonnes of carbon equivalent
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OECD	Organisation for Economic Co-operation and Development
PET	polyethylene terephthalate
PPF	Pollution Prevention Fund
SME	small and medium enterprises
WMAA	Waste Management Association of Australia
ZWSA	Zero Waste SA

Glossary

Buy Recycled Business Alliance	An alliance of businesses committed to the purchase and use of recycled content products and materials (www.brba.com.au)
C&D waste	Waste resulting from the construction and demolition industry
C&I waste	Waste resulting from commercial and industrial activities
Cleaner production	An approach to business management that reduces the use of energy, water, mineral resources and minimises waste and pollution (EcoRecycle Victoria 2003)
Container deposit legislation	A generic term for the container deposit requirements under the *Environment Protection Act 1993*
Eco-efficiency	A practical and systematic approach aiming to 'do more with less' that focuses on innovation, quality and value, while reducing resource use, waste and pollution (EcoRecycle Victoria 2003)
Ecologically sustainable development	Development that meets the needs of the present generation without compromising the needs of future generations
Environment Protection and Heritage Council	A council of state and Commonwealth ministers of Australia, New Zealand and Papua New Guinea appointed by the first ministers from participating jurisdictions, and a representative of the Australian Local Government Association
Environment Protection Policy	Policy under the *Environment Protection Act 1993*
Extended producer responsibility	Shared responsibility for the lifecycle of products including the environmental impact of the product from extraction of virgin materials through manufacturing and consumption, to and including ultimate disposal and post-disposal consequences (Resource NSW 2003)
Garden organics	Organic waste from gardens including grass, leaves, mulch, plants, branches and twigs, tree poles and stumps, and tree loppings
Geographic information system	A system for capturing and manipulating data relating to the Earth, commonly used to overlay several types of maps (e.g. roads, elevation data, landfill locations) to determine useful data about a given geographical area
Greening of Government	The South Australian Government's commitment of striving for best practice in managing the environmental impacts of its own operations
Greening the Supply Chain	A way of reducing the effects of business activities on the environment and bringing benefits to both customers and suppliers (Environment Protection Authority program)
GreenSmart	A Housing Industry Association program (www.greensmart.com.au)
High density polyethylene	A plastic commonly used for containers for motor oil and fruit juice; also used for dishwasher safe domestic plasticware
High performance systems	Systems for municipal solid waste that maximise the yield and further beneficial use of recyclable and other materials collected from households and minimise the disposal of waste to landfill; the systems are based on the principle of continuous improvement and are characterised but not limited to:

	o achieving a minimum recycling yield of 3 kg per household per week o limiting the maximum weekly residual waste bin capacity to 140 L o providing mobile bin containers for all materials (recyclables, garden organics, waste) o collecting a minimum range of recyclable materials including glass bottles and jars, steel cans and aerosols, aluminium cans, aerosols, plastics, liquid paperboard, newspaper, magazine, printing and writing paper, phonebooks, and cardboard o providing garden organics collection services to residents (metropolitan councils) o providing hard waste collection and recovery services to residents (metropolitan councils) o encouraging adoption of standard colours for recycling, garbage and green waste containers consistent with Australian Standards (in prep) o providing community drop-off facilities for high volume, low hazard household products such as waste oil and paint o providing ongoing information and education to residents. The capacity to provide high performance systems in non-metropolitan areas will be guided by regional waste management requirements, be generally restricted to towns and not the entire council area, will vary according to population size and regional differences, and will include a mix of kerbside/drop-off or equivalent arrangements subject to transport distances and economies of scale.
Jurisdictional recycling groups	State based groups established in a number of states including South Australia under the National Packaging Covenant to develop and deliver projects that will improve kerbside collection efficiencies with particular emphasis on packaging and paper products
Kerbside recycling groups	Groups set up under the National Packaging Covenant, with equal representation from industry, state and local government, and the role of coordinating development of agreed projects under transitional funds
Landfill airspace	The (remaining) capacity of a landfill site for waste disposal
Liquid paperboard	Material used to contain, for example, milk, flavoured milk and fruit juices
Lifecycle environmental impacts	The environmental impacts associated with a product, process or activity, including energy and materials used and wastes released to the environment
Material recovery facility	Facility at which kerbside collected waste is sorted for recycling and reuse, and residual materials prepared for disposal or further processing (e.g. waste to energy)
Municipal solid waste	Typically waste collected at kerbside by or for councils
National Packaging Council	A national association of raw material suppliers, packaging users, packaging manufacturers, retailers and packaging designers/consultants

National Packaging Covenant	A self-regulatory agreement between industries in the packaging chain and all spheres of government launched in August 1999 with the aim of providing more effective management of used packaging based on the principles of shared responsibility and product stewardship and applied throughout the packaging chain, from raw material suppliers to retailers, and the ultimate disposal of waste packaging. It is supported by legislative arrangements under the National Environment Protection (Used Packaging Materials) Measure whereby those not signatories to the Covenant are required to make financial contributions to kerbside collection schemes.
Organic waste/organics	Plant or animal matter originating from domestic or industrial sources e.g. grass clippings, tree prunings, food waste
Polyethylene terephthalate	A plastic commonly used for beverage containers
Post-consumer waste	Material that has been recovered and recycled at the end of its life as a consumer item, and which would otherwise have been disposed of as solid waste; does not include the reuse of manufacturing wastes – it is generally any product that was bought by the consumer, used and then recycled into another product
Product stewardship	A concept of shared responsibility by all sectors involved in the manufacture, distribution, use and disposal of products (EcoRecycle Victoria 2003)
Recycle/recycling	Collection and processing of waste materials for use as a raw material (input) in the manufacture of the same product or another product
Resource recovery	Process that extracts material or energy from the waste stream
Reuse	The third highest option in the waste hierarchy – recovering value from a discarded resource without re-processing or remanufacture e.g. refillable drink bottles, clothing
Waste avoidance	Eliminating the generation of waste at its source. Avoidance encourages the community to reduce the amount of waste it generates and to be more efficient in its use of raw materials (Resource NSW 2003)
Waste fill	Waste consisting of clay, concrete, rock, sand, soil or other inert mineralogical matter in pieces not exceeding 100 mm in length and containing chemical substances in concentrations (calculated in a manner determined by the Authority) less than the concentrations for those substances set out in Schedule 6, but does not include waste consisting of or containing asbestos or bitumen (Environment Protection (Fees and Levy) Regulations 1994 under the *Environment Protection Act 1993*)
Waste reduction	The second option in the waste hierarchy after avoidance; requires limiting the generation of waste through product design, material selection, policy and management

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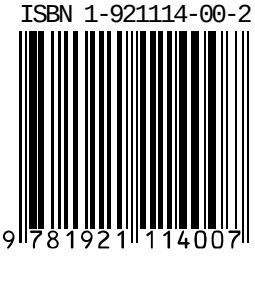

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