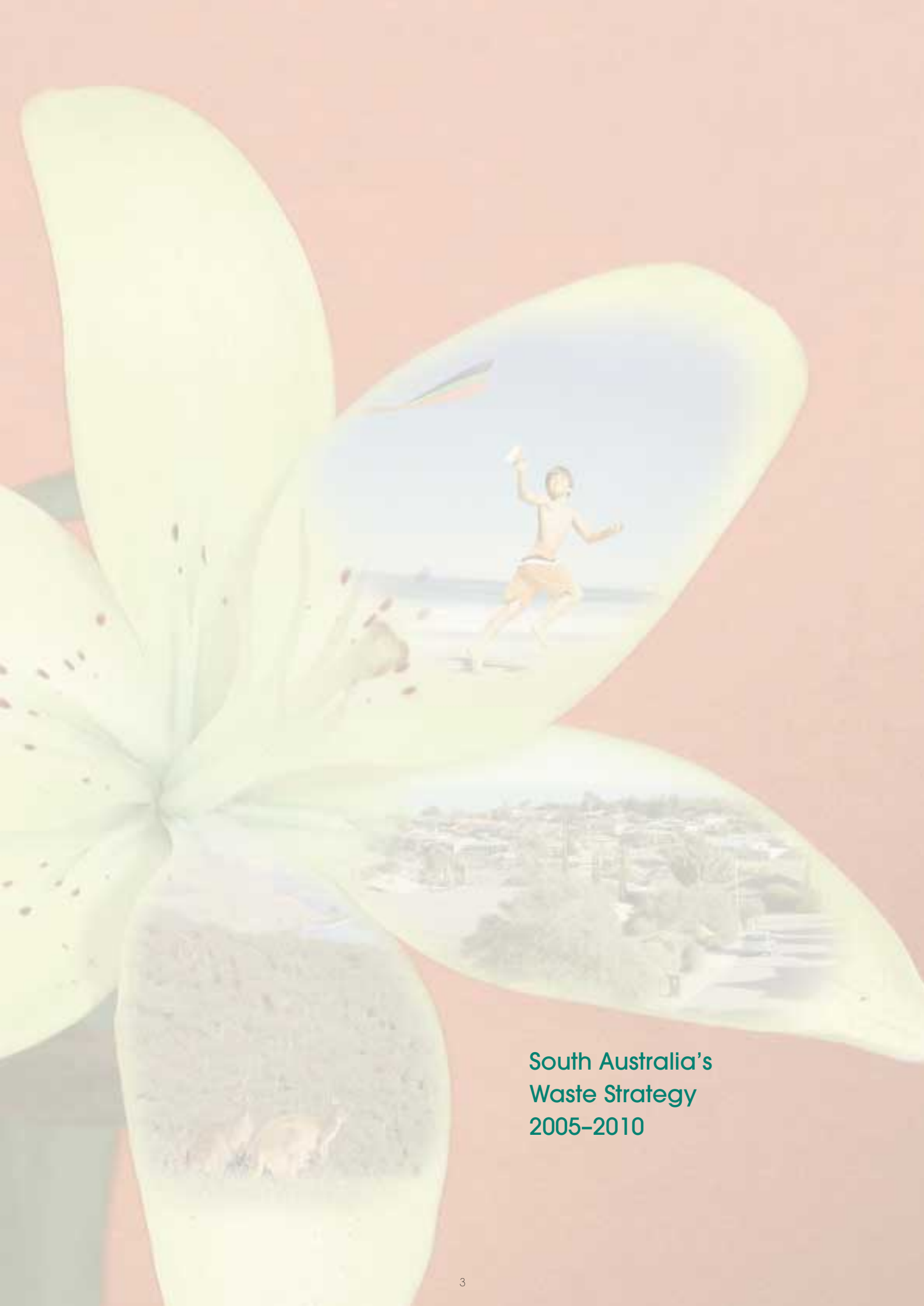


South Australia's
Waste Strategy
2005-2010



**South Australia's
Waste Strategy
2005-2010**

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This Waste Strategy has been released by ZWSA as part of the statutory process of developing a waste strategy for South Australia under section 18 of the *Zero Waste SA Act 2004*.

A Background Paper accompanies the Waste Strategy.



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Foreword



There are some stark realities and some simple truths that should be regarded as beyond dispute. The Premier's Round Table on Sustainability gave such a message in its report to the Government of South Australia. That simple message is, *"Our society and economy are dependent on a healthy environment. The future of South Australia is threatened by climate change and biodiversity collapse."*

We know that wasteful consumption habits are not sustainable because of global limits to the availability and accessibility of the earth's natural resources. We also know that there are limits to the amount of man made waste and pollution the earth can absorb or contain.

South Australia's Strategic Plan intends to make South Australia world renowned for being clean, green and sustainable. It is about embracing change, improving our current ways and finding better ways to do things in order to meet the challenges confronting us as a community.

In the area of waste management, the South Australian Government has acted decisively to establish Zero Waste SA as the organisation to bring about the necessary transformation. Using the framework provided by South Australia's Strategic Plan and the *Zero Waste SA Act 2004*, Zero Waste SA has developed South Australia's first State-wide waste strategy.

South Australia's Waste Strategy 2005 – 2010 provides direction and is a call to action. Importantly, it recognises that changing people's awareness, values, attitudes and behaviour to a sustainable course is critical for achieving many of its strategies, goals and targets. Changing the hearts and minds of businesses, industry, Governments,

communities and individuals is a key feature of South Australia's first Waste Strategy.

'Zero Waste' is a new way of thinking about an age-old problem. It is part of a worldwide movement that recognises the need for change in the way that society manages its waste. Some countries have always reused and recycled materials because of limited access to resources. Now, countries such as Australia, with its ample resources, are recycling more because Governments, businesses, communities and individuals consider it increasingly important to do so.

Recycling is only a staging post on the road to 'zero waste' and nothing is more fundamental to this Waste Strategy than the recognition that there is an urgent need to examine ways to avoid and reduce the creation of waste in the first instance.

The Strategy is an invitation to all South Australians to seize the opportunity it presents for active participation in actions as diverse as green purchasing decisions through to changes in manufacturing and processing, from redesigning products to recycling them.

This is our State's first Waste Strategy and others will follow to ensure a healthy environment for South Australian's now and into the future.



John Hill
Minister for Environment
and Conservation

Executive Summary



The way South Australians deal with waste generated through consumption, manufacturing and processing patterns will have a direct bearing on our capacity, and that of future South Australians, to live sustainably.

South Australia's waste disposal practices have fundamentally relied on landfill as the lead disposal technology. Several major landfills service metropolitan Adelaide and a large number of smaller rural and regional landfills collectively receive about 1.28 million tonnes of solid waste every year. By disposing waste to landfill we bury many useful resources, preventing ongoing use of the material(s) in one form or another. However, recent studies show cause for optimism. South Australia is one of the best performing jurisdictions around the world for diverting recyclables from landfill.

Zero Waste SA, a State Government agency created in July 2003, is championing a new approach to waste management and has developed *South Australia's Waste Strategy 2005-2010* to guide and inform the necessary changes. The Waste Strategy builds upon a number of previous initiatives to tackle waste at both the State and national level.

The waste management hierarchy is a nationally and internationally accepted philosophy for prioritising and guiding efforts to manage waste. It is a guiding principle of the *Zero Waste SA Act 2004* and the foundation upon which South Australia's Waste Strategy has been developed. The waste management hierarchy establishes approaches to waste management according to their importance and preference in descending order. Waste avoidance and reduction are regarded as the most optimal approach and, to the extent that this cannot be achieved, reuse, recycling and recovery of waste is preferred, with treatment and disposal the least preferred approach.

This is the first Waste Strategy for South Australia. A new waste strategy will be produced at least every five years, each progressively building upon previous gains.

The direction for this first strategy is focused around five key objectives.

- 1 Fostering sustainable behaviour:** Simply providing information will not influence people to adopt more sustainable waste behaviours. The Waste Strategy recognises that considerable effort and innovation must be devoted towards fostering attitudes and behaviours that encourage people to change and adopt resource efficient behaviours.
- 2 Reduce waste:** Achieving significant progress towards waste avoidance means changing the way resources are used in production processes and in products. This requires modifying behaviours, of households, producers and other participants in the economy. Resources must also be redirected towards more beneficial uses if substantially less waste is to go to landfill in South Australia. Reducing waste is about establishing markets for recyclable products – and designing products to last longer, to be disassembled, reused and repaired. Reducing waste is also about eliminating barriers, providing incentives to reduce, reuse and recycle waste, and about building our knowledge and data on waste and recycling.
- 3 Implement effective systems:** South Australia needs to establish, maintain and increase the capacity of recycling systems and re-processing infrastructure in metropolitan and regional areas. Effective systems are essential for collecting, transporting, sorting, consolidating, transferring and re-processing recyclable and recoverable resources.

Executive Summary



4 Implement effective policy instruments:

Economic, regulatory and other policy measures must be introduced to give the necessary traction in the marketplace to encourage avoidance, reduction, reuse and recycling of waste. These instruments must also be effective to enable industry to make long-term investment decisions based on the knowledge that there will be consistent application of principles, approaches and standards.

5 Cooperate successfully:

The goals and targets of this and future strategies will only be reached with the successful cooperation of a range of stakeholders.

Within each of the five objectives, specific steps are outlined for meeting waste reduction targets and goals across the three broad waste-generating sectors of the community: municipal solid waste, commercial and industrial waste, and construction and demolition waste.

Table 1: Key material recovery and recycling targets

| Waste stream | By 2006 | By 2008 | By 2010 | By 2014 |
|--------------|--|---|---|---|
| MSW | At least 25% of all material presented at the kerbside is recycled | 50% of all material presented at the kerbside is recycled | 75% of all material presented at the kerbside is recycled (if food waste is included) | Reduce waste to landfill by 25% (as required by <i>South Australia's Strategic Plan</i>) |
| C&I | 5% increase in recovery and use of C&I materials | 15% increase in recovery and use of C&I materials | 30% increase in recovery and use of C&I materials | |
| C&D | 20% increase in recovery and use of C&D materials | 35% increase in recovery and use of C&D materials | 50% increase in recovery and use of C&D materials | |



Specific goals/targets for material recovery and recycling in these sectors have been established. (See Table 1).

In addition, the strategy recognises special issues that arise from litter and illegal dumping, and from hazardous waste.

The Waste Strategy outlines the steps needed to move towards zero waste. Some steps will be achieved sooner than others and the strategy has identified priorities that are ongoing, those that are important in the first three years of the strategy, those that are likely to take more time, and those that may be the subject of future waste strategies.

Annual reporting on the Waste Strategy will be complemented by a review every two years to assess its adequacy and implementation.

Municipal solid waste presents the most likely resource stream for gains to be quickly realised.

This is in large part because local government plays a key role in waste management, particularly in regional areas where the local council often controls the collection and disposal of waste, and in metropolitan and rural areas through councils working collectively in waste management groups.

The commercial and industrial sector and the construction and demolition sector are highly fragmented with a large number of very competitive small, medium and large-scale enterprises. The huge diversity of waste generating activities and waste materials produced by these sectors requires a range of complementary approaches, including increased responsibility being placed on producers and manufacturers for managing their products beyond the point of manufacture or sale, through to the imposition of strict waste management regulations by government. This strategy and future strategies will require sustained emphasis across these business sectors.

A final component of the strategy relates to transfer, disposal and storage of waste. The strategic actions and steps proposed in this section seek to prevent development of further landfills servicing metropolitan Adelaide, and require metropolitan generated waste to be pre-processed through a transfer station or resource recovery facility, and not disposed direct to landfill.

International and interstate analysis provides some reassurance that the South Australian Waste Strategy – which seeks to maximise the beneficial use of waste materials, decrease the generation of greenhouse gas and reduce the disposal of waste to landfill – makes good economic, social and environmental sense. However, detailed benefit-cost analysis of the Waste Strategy will provide greater certainty and information about the real and total costs (including social and environmental externalities) of implementing its range of strategies, next steps and other measures. A comprehensive benefit-cost analysis of South Australia's Waste Strategy using a full cost accounting analysis will be initiated within the Waste Strategy's first year of life and will be used to optimise its economic, social and environmental efficiency.

The South Australian Context



The primary objective of Zero Waste SA (ZWSA), as stipulated in the *Zero Waste SA Act 2004*, is to eliminate waste or its consignment to landfill and advance the development of resource recovery and recycling.

The requirement to prepare a Waste Strategy for South Australia was part of a range of waste reforms associated with the establishment of ZWSA announced by the Minister for Environment and Conservation in January 2003.

ZWSA intends to change the direction of waste management in South Australia to one that meets both the preferred approach of the waste management hierarchy and the principles of sustainability. A lot can be done to redirect our waste management efforts to more closely reflect the guiding principles of the waste hierarchy. A major challenge – to break the strong link between waste generation and economic development – will only be met by a range of policy measures.

ZWSA received 48 submissions (listed in the Appendix) on a draft version of the Waste Strategy released for 12 weeks consultation on 29 November 2004.

Copies of the draft Waste Strategy were widely distributed to relevant stakeholders in hard copy and electronic form, notification advertisements appeared in state-based and

regional newspapers both at the beginning of the process and again early in 2005, and several presentations, briefings and a workshop were conducted with various groups.

The general commentary, opinion, issues and statements in the submissions have been used to further develop and finalise *South Australia's Waste Strategy 2005–2010*.

This strategy will guide policy development and has been produced by ZWSA as required by section 18 of the Zero Waste SA Act.

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 latest State of the Environment Report (Environment Protection Authority 2003a).

South Australia's Strategic Plan released by the State Government in March 2004 is about embracing change – improving our current ways and finding better ways to do things – to meet the challenges confronting us as a community. The Strategic Plan is structured around six key strategic objectives: growing prosperity, improving wellbeing, attaining sustainability, fostering creativity and innovation, building communities and expanding opportunity. A number of targets across each of the objectives will be used to evaluate progress.

Zero waste is a key part of the objective 'attaining sustainability' and a target of reducing waste to landfill by 25% within 10 years has been established.

South Australia's Waste Strategy 2005–2010 provides a comprehensive blueprint for achieving the outcomes and targets for zero waste set out in the Strategic Plan and is supported by the South Australian Government. It will also play its part in achieving outcomes across the other objectives articulated in the Strategic Plan.



The long-term vision of the new organisation is to achieve zero waste and subsequent waste strategies will be developed at intervals of not more than five years.

Looking to the future, South Australia will require a diverse and flexible range of policies, technologies and actions. They will include a range of business sustainability practices (industrial ecology, cleaner production, extended producer responsibility), responsible consumption, public education and local economic development, waste reduction, resource recovery and recycling. The transition to zero waste will take a number of stages and not all will be achieved at once.

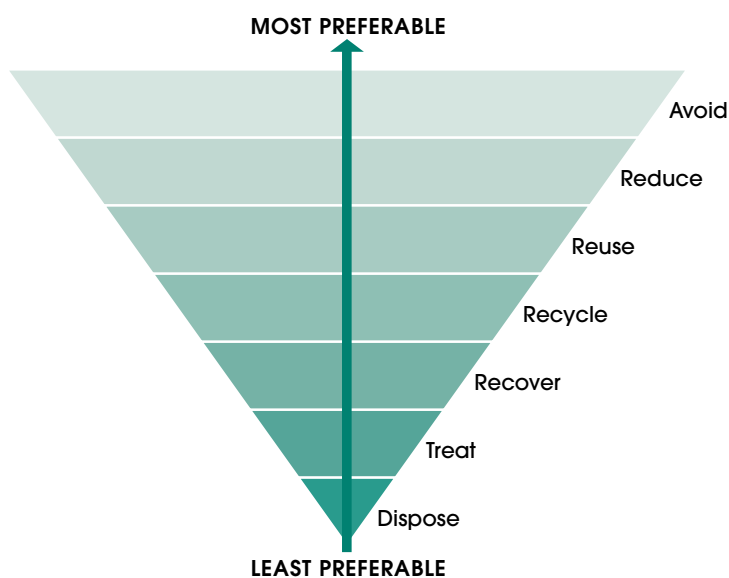
If our long-term strategy is to make serious progress towards a more sustainable approach to managing waste, it must do more than set minimum recycling targets. Simply providing grants to industry or relying upon voluntary industry, local government or community action will not turn things around. Economic and regulatory measures must be introduced to encourage the marketplace to avoid, reduce, reuse and recycle waste. However, we must build the necessary traction and our early efforts will focus considerably on recycling and funding incentives.

The waste hierarchy

The waste hierarchy (Figure 1) is a nationally and internationally accepted guide for prioritising waste management practices with the objective of achieving the optimal environmental outcome. It sets out the preferred order of waste management practices from the most preferred to least preferred.

Although the waste hierarchy provides an effective framework for dealing with waste, the accepted wisdom that it contains is not being implemented in a holistic, coordinated or effective manner in South Australia. The waste management hierarchy is one of the guiding principles of the Zero Waste SA Act and this Waste Strategy regards the hierarchy as a key element for guiding waste management practices in South Australia while still recognising the need for flexibility based on local and regional, economic, social and environmental conditions.

Figure 1: The waste hierarchy



The South Australian Context



When combining the financial costs of kerbside systems with the environmental benefits (which have been estimated using conservative environmental values) it is clear that practically all current (kerbside recycling) systems provide a significant benefit to Australian communities.

Nolan-ITU and Sinclair Knight
Merz 2001, p.16

Bridging the gap from recycling to avoidance

The ultimate goal of most modern waste strategies is to achieve zero waste through maximising waste avoidance, waste reduction, reuse and recycling at the top of the hierarchy. Recognising that significant amounts of potentially reusable, recyclable, recoverable and compostable resources continue to be disposed of to landfill in South Australia, the emphasis over the next few years is to improve these areas to reduce waste to landfill. Thus intensive recycling and composting remain a key component of this first strategy.

An Australia-wide study commissioned by the National Packaging Covenant Council in 2000 concluded:

When combining the financial costs of kerbside systems with the environmental benefits (which have been estimated using conservative environmental values) it is clear that practically all current (kerbside recycling) systems provide a significant benefit to Australian communities.

Nolan-ITU and Sinclair Knight
Merz 2001, p.16

However, recycling is only a staging post along the way. Implementing the strategies and steps contained in this Waste Strategy and the strategies that follow will progressively shift the emphasis from recycling toward a culture where waste avoidance and reduction are an accepted lifestyle choice and the usual way of doing business for South Australians. ZWSA recognises that this will take changes in attitudes and behaviour, and will require a substantial and sustained effort. Future strategies will need to move from a recycling focus to one that emphasises education and feedback to the community about purchasing choices and consumption of resources.

Current international perspectives on waste avoidance provide a useful point of reference



for determining South Australia's efforts in this key area of waste management. European communities are often regarded as international leaders in waste management reforms and policy development.

Achieving significant progress towards waste avoidance means changing the way resources are used in production processes and in products. This requires modifying behaviours, of households, producers and other participants in the economy. Although traditional regulatory measures can play a role, they are rarely effective in isolation in such a complex context. As all materials used in an economy sooner or later become waste, major changes in waste generation require changes in production and consumption patterns. This requires policy approaches which go beyond waste policy in its strict sense and enter into fields such as resource management and Integrated Product Policy.

There are a number of options to address waste avoidance from a waste management perspective. Often, such measures take the form of economic instruments or information campaigns and can have an effect both in encouraging waste avoidance and directing waste to preferable treatment options such as recycling. However, in general there are not many practical experiences for instruments which could lead to significant quantitative reductions of waste generation.

Commission of the European Communities 2003, p.28

It is evident from the considerable experience of the European communities that although waste avoidance has been the paramount objective of waste management policies for many years, limited progress has been made so far in turning the objective of waste avoidance into practice.

To make progress in the areas of both waste avoidance and reduction, *South Australia's Waste Strategy 2005-2010* considers the following areas are likely to be influential and includes them within the document:

- added value in the coordination of national approaches with other State jurisdictions for particular waste types, industry sectors, products etc
- extended producer/product responsibility – particularly where it leads to beneficial changes in product design
- the influence of State and local government as significant consumers of goods and services (purchasing preference can be a powerful signal for the development of greener products, including products which, in their production, use and consumption, generate less waste) – an important role in the State Government's Greening of Government program
- consumer choice through information, education and awareness
- waste prevention plans – for business sectors or individual enterprises.

This Waste Strategy also recognises the indirect effect on consumer behaviour of separate collection schemes at the municipal level.

Separate collection, especially if carried out through kerb-side schemes, requires the active involvement of citizens in waste management issues. This involvement may be a spur for a more general awareness of the environmental dimension of waste, thus promoting changes in consumer behaviour.

Commission of the European Communities 2003, p.15

Considerable emphasis is being placed on improving kerbside services in this first Waste Strategy to maximise public involvement.

The South Australian Context

Separate collection, especially if carried out through kerb-side schemes, requires the active involvement of citizens in waste management issues. This involvement may be a spur for a more general awareness of the environmental dimension of waste, thus promoting changes in consumer behaviour.

Commission of the European Communities 2003, p.15

Roles and relationships

Effective partnerships between State Government, industry, local government and the community are required to achieve the Waste Strategy's goals and targets. The roles and responsibilities of these sectors (Figure 2) are explained in greater detail in the background paper that accompanies this strategy.

The Waste Strategy is the lead policy-setting document for waste management in South Australia and an important step towards attaining sustainability outcomes for waste identified by the Government in *South Australia's Strategic Plan*. The Waste Strategy will help guide the development of a range of other key documents that will ultimately form part of an integrated framework of policies, strategies and plans to guide waste management activities in South Australia. This framework includes:

- South Australia's Waste Strategy
- the proposed Environment Protection Authority (EPA) Environment Protection (Waste) Policy (Waste EPP)
- Greening of Government Operations Framework (State Government)
- Draft EPA Hazardous Waste Strategy (in preparation)
- ZWSA's Business Plan
- regional waste management plans developed by councils¹
- industry waste management plans/agreements/covenants.

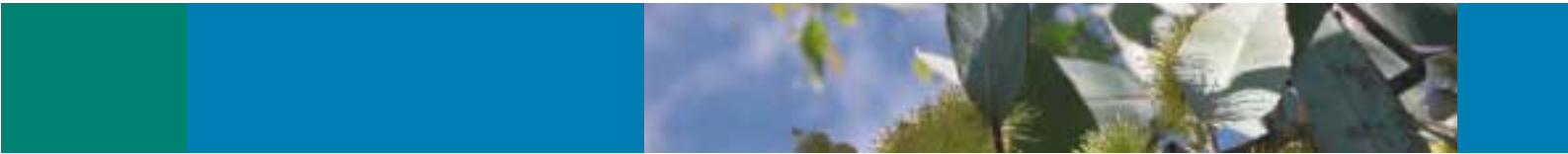
In establishing ZWSA, the Government has recognised the distinct advantages in separating some elements of waste management away from the predominantly regulatory role of the EPA. For some waste related matters, however, the EPA may also choose to encourage more sustainable behaviour by non-mandatory approaches (e.g. non-mandatory provisions within an EPP).

State Government

South Australia's Strategic Plan provides key directions and strategies for South Australia. It provides a framework for agencies to work together to achieve its objectives. This Waste Strategy is aligned with *South Australia's Strategic Plan*, with particular emphasis on reducing waste to landfill. The Waste Strategy will help meet other targets outlined in the Strategic Plan such as increasing jobs and encouraging or expanding investment in infrastructure.

The planning system in South Australia centres on the Planning Strategy. The Planning Strategy presents current Government policy for development, and development plans that apply to the whole of the State and contain all of the policies against which development is assessed by the relevant planning authorities (councils or the Development Assessment Commission). The Planning Strategy guides development plans and is therefore the appropriate mechanism to ensure direction from the Waste Strategy is incorporated into the planning system.

¹ It is anticipated that the requirement to prepare and implement waste management plans will be specified in the proposed Environment Protection (Waste) Policy.



The Waste Strategy supports a number of waste management priorities and project areas identified in the State Government’s Strategic Infrastructure Plan, *Building South Australia*, such as developing regional waste management strategies, and establishing waste management, recycling and composting facilities.

The Waste Strategy is also supportive of other current and emerging State Government initiatives such as the Greenhouse Strategy, the Greening of Government Operations Framework, and the State–Local Government Relations Agreement.

Zero Waste SA

ZWSA’s role 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 State². The key role of ZWSA in setting the future waste management ‘policy landscape’ for South Australia has been established in developing the Waste Strategy and running its consultative processes.

Environment Protection Authority

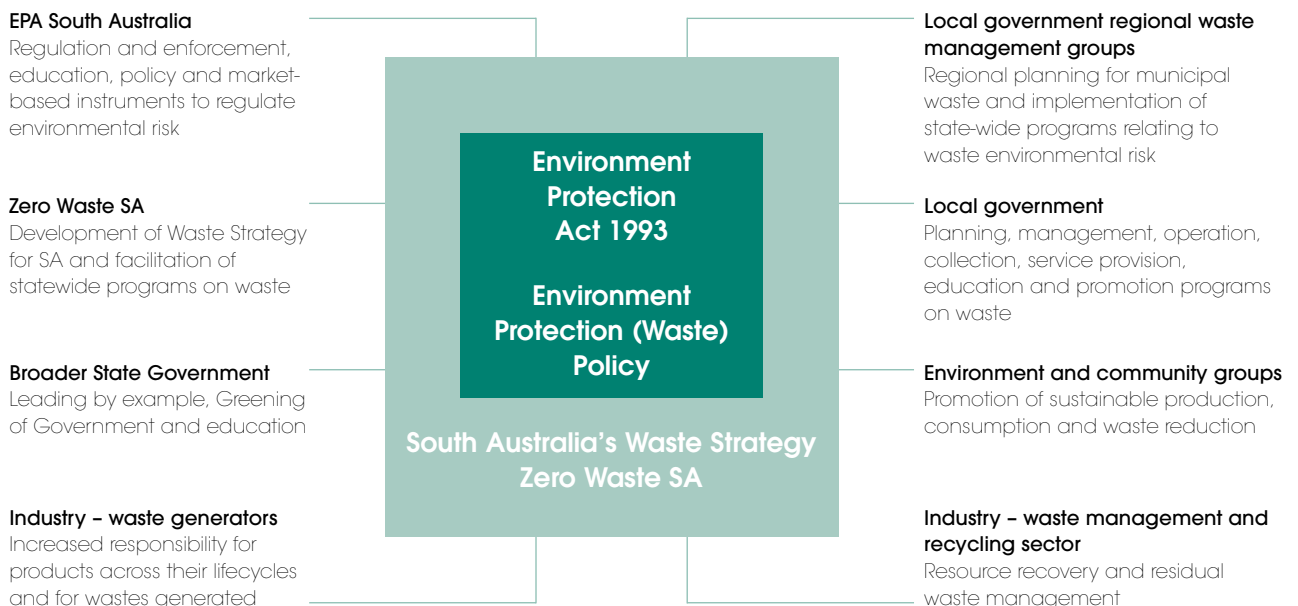
The EPA administers the *Environment Protection Act 1993* and its instruments, including EPPs, codes of practice, licences, environment improvement plans, guidelines and enforcement tools. The EPA has statutory responsibility to manage the environmental impacts of waste in SA and minimise adverse effects on human health and the environment. This is the role that is most generally accepted and for which it has a high level of expertise.

Local government

Local government assumes responsibility for planning and management of municipal solid waste, including operation of systems for solid waste, recyclables, green organics and transfer stations. It has a key role in planning for infrastructure needs for waste, including consideration of needs for industrial waste where facilities are used for both municipal and industrial waste. Some groups of councils work cooperatively to develop and implement regional waste management plans, which seek to coordinate the waste management activities of member councils.

Figure 2: Roles and relationships for waste management in South Australia

(adapted by Zero Waste SA from the Victorian Environment Protection Authority)



² Section 5(1) *Zero Waste SA Act 2004*

The Way Forward – A Practical Strategy for South Australia



Courtesy Charles Sturt Council

Which wastes does this strategy cover?

This strategy is about products and materials commonly called 'waste' by the community but which we must see in a new light – as resources which we can continue to reuse (Resource NSW 2003). Under the Zero Waste SA Act and the Environment Protection Act 'waste' means –

- (a) any discarded, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; or
- (b) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be waste, whether of value or not.

This first Waste Strategy covers waste in its solid and liquid forms but does not include gaseous wastes (e.g. industrial gaseous emissions). Existing arrangements were considered in deciding the scope of wastes to which this strategy will apply.

Which wastes are not included in this initial strategy?

This first Waste Strategy does not directly apply to agricultural manures, sewage, sewage sludge and trade waste. However, these resources have potentially beneficial uses and future strategies may incorporate relevant aspects of these waste streams. Wastes to

which this strategy does not directly apply include:

- radioactive waste: controlled by separate legislation, the *Radiation Protection and Control Act 1982*, administered by the EPA
- waste from petroleum or mining activity: controlled by separate legislation under the *Petroleum Act 2000*, *Mining Act 1971* or *Roxby Downs (Indenture Ratification) Act 1982*
- discharge of trade waste to sewer: controlled by SA Water which permits trade waste (wastewater) to be discharged from industries, businesses, trade and manufacturing processes to the sewerage system in compliance with the *Sewerage Act 1929*; not covered extensively in this strategy but many of the actions identified will have a positive impact on industrial discharges to sewer and to landfill
- wastes of an explosive nature: addressed under the *Explosives Act 1936* administered by the Department for Administrative and Information Services (DAIS), and therefore excluded from the strategy
- sewage, sewage sludge and residues³ (including nightsoil and septic tank sludge): managed by SA Water and excluded as it is considered to be managed under the *South Australian Biosolids Guidelines* (Environment Protection Authority 1997) and EPA conditions of licence; opportunities arise as a result of actions in the Waste Strategy to address this waste stream as it may augment other resources treatment such as compost and fertiliser production
- agricultural manures³: generally controlled or guided by the EPA (which has developed a Code of Practice for Milking Shed Effluent and guidelines for establishing cattle feedlots (Environment Protection Authority 2003b, 1994)) and other relevant agencies (e.g. Primary Industries and Resources SA, catchment water management boards or their replacement natural resource

³ This strategy does have an interest in sewage and agricultural waste streams used in composting and proposed waste to energy technologies.



management boards); opportunities will arise through implementation of the strategy which will allow better use of these resources.

Objectives

ZWSA has identified five strategic objectives for reforming waste management in South Australia over the next five years and beyond: foster sustainable behaviour; reduce waste; implement effective systems; implement effective policy instruments; and cooperate successfully.

Objective 1: foster sustainable behaviour

Avoiding the production of waste is a key driver for overall waste-related sustainability efforts in South Australia.

The concept of achieving zero waste guides the efforts and behaviour of all South Australians in all aspects of their lives through a positive change in favour of waste avoidance, reduction, reuse and recycling.

Objective 2: reduce waste

Substantially less material goes to landfill disposal in SA – at least 25% reduction by 2010 based on a 2004 baseline.⁴

A reduction in per capita consumption leads to a reduction in per capita waste produced in SA based on a 2004 baseline.

Objective 3: implement effective systems

Throughout SA society, there are accessible 'best practice'⁵ systems in place for the public to avoid, reduce, reuse and/or recycle in all aspects of their lives, including:

- accessible 'best practice' systems in place for household hazardous waste management
- identified and established alternatives to landfill disposal for effectively managing residual waste.

Objective 4: implement effective policy instruments

A policy and regulatory framework that reflects the principles of the waste hierarchy is in place.

A stewardship approach predominates in waste management, whereby environmental and social factors are considered alongside financial factors in production, consumption and waste management decision making.

Objective 5: cooperate successfully

The consistent approach to waste management across all spheres of government, industry and community, includes shared principles, knowledge and activities.

Stakeholders in South Australia cooperate toward beneficial waste-resource outcomes.

Nationally, ZWSA and other similar government bodies and related stakeholders cooperate to ensure optimised effort.

ZWSA is accepted as an effective 'champion for change' in terms of improved waste-resource results in South Australia.

Getting underway: applying the objectives

The five strategic objectives have been applied to the major solid waste streams of municipal solid waste (MSW), commercial and industrial (C&I) waste and construction and demolition (C&D) waste. This first strategy identifies the targets and goals for each waste stream and provides an indication of how achievable they are.

Litter is a small component of the waste stream by volume but has significant environmental and social implications if not managed properly. Similarly, hazardous waste/liquid waste volumes dealt with in this strategy are small but have high importance because of their potential threat to human health and the environment if not managed properly (in

⁴ This 25% reduction target is consistent with South Australia's Strategic Plan (Government of South Australia 2004) and is expected to be achieved ahead of the timing required by the Strategic Plan.

⁵For any area of waste management, this represents the current 'state of the art' in achieving particular goals. Best practice is dynamic and subject to continual review and improvement (Resource NSW 2003).

The Way Forward – A Practical Strategy for South Australia



collection, handling, storage, treatment and disposal). The five policy objectives are considered together for both litter and hazardous waste/liquid waste.

A final aspect considered in this strategy relates to transfer and disposal of waste, which is not a policy objective but a highly influential management response affecting all waste streams.

Targets

Any attempt to define waste targets is confronted with the unsatisfactory status of current statistics about waste generation, recycling and disposal at a State and national level. These shortcomings mean it is not possible at this stage to propose any operational, quantified waste targets based on a rigorous and comprehensive environmental and economic analysis. Instead the targets have been based on imperfect data, an understanding of broad trends in waste disposal and recycling, and local knowledge of the means to achieve the targets.

Broad targets for each of the solid waste streams (MSW, C&I waste and C&D waste) are summarised in Table 1 and achieving these targets will:

- increase the beneficial use of materials across all waste streams that could otherwise end up in landfill

- establish high performance kerbside systems characterised by high recycling yields and low waste yields
- progress towards more sustainable business practices
- yield a more informed and participatory community that accepts personal responsibility for managing waste.

Targets are typically employed to provide direction and a means for checking the progress of waste reduction and recycling initiatives. Nothing in this first Waste Strategy prevents the stated targets from being exceeded. However, it is early days in the implementation of the Government's Zero Waste policy and progress toward many targets will remain difficult to assess until our knowledge and data information systems are strengthened. The Waste Strategy seeks to do this early in its life. In addition, achievement of the targets is significantly dependent on the actions of local government, business and industry, and the community.

In order to progress toward zero waste these targets must eventually be associated with the more challenging need to reduce the generation of waste in the first place. Without ultimately reducing or avoiding the generation of waste, South Australia will not be able to make the transition away from merely recycling



Table 1: Key material recovery and recycling targets

| Waste Stream | By 2006 | By 2008 | By 2010 | By 2014 |
|--------------|--|---|---|---|
| MSW | At least 25% of all material presented at the kerbside is recycled | 50% of all material presented at the kerbside is recycled | 75% of all material presented at the kerbside is recycled (if food waste is included) | Reduce waste to landfill by 25% (as required by <i>South Australia's Strategic Plan</i>) |
| C&I | 5% increase in recovery and use of C&I materials | 15% increase in recovery and use of C&I materials | 30% increase in recovery and use of C&I materials | |
| C&D | 20% increase in recovery and use of C&D materials | 35% increase in recovery and use of C&D materials | 50% increase in recovery and use of C&D materials | |

towards the goal of zero waste and thereby deliver even greater environmental gains and business efficiency outcomes. The strong link between economic prosperity and waste generation can be moderated through more sustainable per capita consumption behaviour and future waste strategies will need to examine targets and steps to facilitate that process.

Future waste strategies will look to re-examine and where necessary adjust these targets based on improved data acquisition and knowledge obtained through many of the initiatives in this Waste Strategy. Future targets may also be applied to specific products (e.g. end of life products such as TVs and computers) or to material streams (e.g. paper and cardboard) or a combination of both. However, it is likely that a product- or material-specific approach will require considerable analysis and need to be harmonised across state borders to avoid anti-competitive market conditions between state jurisdictions.

Future actions/monitoring and evaluating performance

Some targets and goals go beyond the term of this first strategy (five years). The steps required to achieve these goals are included to confirm

to the community that the broader thrust and direction of this first strategy will be maintained in future strategies. ZWSA will therefore need to monitor and evaluate the performance of this strategy, identify barriers, confirm responsibilities and determine the need to review waste targets, goals and the steps required to achieve them.

The performance of the Waste Strategy will be reported annually and a more detailed review will be undertaken at the end of every two year period to assess its adequacy and implementation, and determine the requirements for adjustment.

South Australia's Strategic Plan seeks to increase South Australia's population to two million by 2050 – an increase that would see the total amount of waste generated rise. (Even if per capita waste generation did not increase there would be simply more people consuming goods and services.) To meet the Strategic Plan target for reduced waste to landfill, any increase in total waste generation arising from an increase in population will need to be offset by increased diversion through recycling and resource recovery. This first five-year Waste Strategy has significant emphasis in this area.

The Way Forward – A Practical Strategy for South Australia



Ultimately, waste avoidance, reduction and reuse measures at the top of the waste hierarchy are necessary to reduce per capita waste generation, and both this and future waste strategies will need to influence these outcomes.

What will the Waste Strategy cost, and who pays?

A number of submissions on the draft Waste Strategy raised the issue of its costs and who pays.

The cost and resources required to implement *South Australia's Waste Strategy* and who should pay is a complicated matter to resolve and there are a number of points to be made. There is no doubt that detailed benefit–cost analysis of the Waste Strategy could provide information about the real and total costs (including social and environment externalities) associated with implementing the range of strategies, next steps and other measures contained within this document. With this information it would then be possible to adjust this waste management policy in such a way as to optimise its environmental (including social) effectiveness and economic efficiency.

A national study commissioned by the National Packaging Covenant Council (Nolan-ITU 2002a) concluded that the combined financial costs of kerbside recycling systems and environmental benefits show a significant net benefit to Australian communities of around \$42 per household per year. In Nova Scotia a

full cost accounting analysis estimated that the Nova Scotia Solid Waste–Resource Strategy in the fiscal year 2000–01 produced net savings of \$33 to \$178 for each Nova Scotian rather than the strictly net additional cost of \$24 of the operating and amortised capital costs of the new system (Walker et al. 2004).

South Australia's Waste Strategy is anticipated to deliver benefits in the following areas.

Increased direct and indirect employment

A study by the US Institute of Local Self Reliance (cited by Walker et al. 2004) found that one direct job was created for every 15,000 tons (13,608 tonnes) of solid waste landfill each year. For a similar amount of waste composted, seven jobs were created, and a comparable quantity of material recycled generated nine jobs in collection and processing alone. This assessment counted only jobs created through actual direct handling of materials and did not include jobs created in manufacturing using recovered and composted materials, nor jobs in enviro depots (container collection depots), education, or other secondary and derivative industries that rely on recycled and composted materials.

Studies in South Australia suggest that expansion of the composting industry would create both direct and indirect employment benefits. "This is partly a reflection of the greater benefits to farmers – as horticultural and viticulture are labour intensive industries, increasing production (associated with application of compost products) boost employment by a proportionally large amount" (Nolan-ITU 2002b, p.21). Additional indirect labour is also generated in the transport sector. In summary, the recycling and composting sectors can provide considerable stimulus to the South Australian economy and are associated with considerably greater job creation than systems that rely on landfills.

A range of other economic benefits arise from the creation of jobs within the recycling, resource recovery, and manufacturing sector (Walker et al. 2004), for example in provision of

goods and services required by the recycling, resource recovery and manufacturing sector (e.g. building and facility construction, equipment and plant, accounting and legal services, advertising and promotions).

A study on container deposit legislation (CDL) in South Australia (Environment Protection Authority 2000a) produced similar findings, estimating that CDL has a positive direct and follow on (multiplier) employment impact on the State.

Avoided/reduced greenhouse gas emissions and atmospheric pollutants

The use of recycled materials in place of virgin materials in manufacturing reduces energy use, resulting in lower levels of greenhouse gas emissions from manufacturing processes (see Background Paper to Waste Strategy). The diversion of organic waste (such as food, garden wastes and commercial organic wastes) to aerobic composting systems reduces the amount of methane (a principal greenhouse gas) emitted from landfills.

The Nova Scotia Solid Waste–Resource Management Strategy resulted in decreased emissions of several air pollutants that have negative impacts on human health and the environment. “The emission reductions occurred primarily through use of recycled materials for manufacture, which requires less energy, and therefore reduced emissions from fossil fuel use” (Walker et al. 2004, p.112). 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 3 kg 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 associated with production processes. The Victorian LCA report found that if a product is made from raw material rather than recycled material, more carbon dioxide and other greenhouse gases would be generated.



The Way Forward – A Practical Strategy for South Australia



It is considered reasonable to expect similar outcomes from South Australia's Waste Strategy although the benefits are likely to also extend beyond our boundaries and include other states that use recycled materials collected in South Australia.

Extended landfill life (thus reducing impacts associated with establishing new sites)

Waste avoidance, reduction, reuse and recycling ultimately decrease the requirement for disposal of materials and prolong the time span over which a landfill can be used. This avoids the requirement for establishing new landfills, including the inherent environmental, social and economic issues associated with siting, establishment, operation and facility closure.

ZWSA funding for waste avoidance, reduction, recovery and recycling programs

The Waste Strategy will guide the development of Zero Waste SA's Business Plan. Both the Waste Strategy and Business Plan include considerable funding incentives (e.g. grant programs, household hazardous waste

collection, plastic bag reduction) and financial support for a wide range of other activities and programs. The Zero Waste SA Act requires ZWSA to apply its funds in accordance with the Business Plan, a publicly available document.

Revenue from goods and services arising from the Waste Strategy

The targets in *South Australia's Waste Strategy* provide a clear direction for waste management in South Australia. It is anticipated that the Waste Strategy will increase the demand for waste avoidance, reduction, reuse and recycling services, and that increasingly companies will invest in technologies and/or increased processing capacity for recycled materials. This is likely to result in an increase in waste-related revenue for South Australia.

Local governments and their communities continue to contribute significantly to the capital and operating costs associated with collecting and managing recyclables, garden organics and residual waste from households in South Australia. However, capital and operational costs of waste management and processing infrastructure (e.g. landfills, organic waste processing sites, material recovery facilities) are now increasingly shared by the private sector in the metropolitan area. Groups of councils are also adopting shared contractual arrangements and partnerships that reduce costs and provide increased negotiating power with service providers.

Unlike councils, some industry sectors continue to avoid accountability for producing products that are difficult to recycle or compost and that ultimately end up in the kerbside waste stream. Both this and future waste strategies will need to encourage manufacturers and companies to take more responsibility for their waste through product redesign, reduced packaging and other producer responsibility initiatives.

We need to maximise the beneficial use of waste materials, decrease the generation of

greenhouse gas and reduce the disposal of waste to landfill. Thus we should not adopt a wait and see attitude or refrain from acting on the grounds that we do not know enough or that it is not necessarily the least cost option.

The Waste Strategy allows local government, business and other stakeholders to effectively plan for the future by providing strategic direction, next steps and other measures that help guide the planning, development and 'green re-structuring' of enterprises in waste management. The Waste Strategy is the essential document for communicating the

expectations and priorities for waste management in South Australia.

Evaluating and quantifying South Australia's costs and benefits

Reference to economic studies elsewhere is useful but ZWSA recognises that local environmental, social and economic conditions in South Australia are different from those found overseas and in other states in Australia. Our progress will be evaluated by a comprehensive benefit-cost analysis of *South Australia's Waste Strategy* using a full cost accounting analysis.

A benefit-cost analysis will be initiated by ZWSA within the first year of the life of the Waste Strategy and will determine the true or full costs of achieving the targets and goals it introduces using a genuine progress indicator assessment methodology (includes environmental and social alongside economic factors). The study will investigate and quantify upstream benefits associated with resource recovery and recycling against a range of waste disposal costs. It will compare the costs of South Australia's waste management arrangements before and after the introduction of the Waste Strategy.

The Waste Strategy will be reviewed and amended in response to the findings of the benefit-cost analysis.



Municipal Solid Waste



The municipal solid waste stream provides a point of contact with every member of our society. Community support for recycling and related services has been consistently very high.

This area highlights opportunities to foster more sustainable behaviours, and also reduce waste and encourage greater cooperation between councils.

KEY WASTES:

Garden organics; food; packaging; paper/cardboard; plastics; glass; steel cans (note: household hazardous wastes dealt with separately).

OBJECTIVE: FOSTER SUSTAINABLE BEHAVIOUR

ACHIEVABILITY: rated **high** due to capacity to work within existing well-established local government communication networks; will be more difficult in regional areas due to transport costs and economies of scale.

TARGET/GOAL:

- Increase the recovery, recycling and use of kerbside collected waste to 50% by 2008 (excluding food waste).
- Increase the recovery, recycling and use of metropolitan kerbside collected waste to 75% by 2010 (including food waste).

TARGET SECTORS: householders/consumers; councils; State Government; schools, TAFEs, universities and other learning institutions; material recovery facility operations, CDL depots, industry re-processors; packaging industry.

STRATEGY:

- Foster sustainable behaviour through innovative approaches to information provision (including information on the cost of waste management), education, and awareness programs and activities.
- Explore links and synergies with other sustainability areas (water, energy, transport).
- Promote waste avoidance and reduction with householders and councils.
- Identify and implement material-specific reduction and recycling programs.
- Promote 'green purchasing' (e.g. avoid unnecessary packaging, give preference to products with recycled content).
- Monitor and evaluate community attitudes, perceptions and behaviours.
- Ensure continued public support for container deposit legislation.
- Packaging industry to take greater responsibility for post-consumer packaging in particular to reduce the quantity of waste generated and to facilitate recycling or reuse.



RESPONSIBLE PARTNERS: local government, ZWSA, Office of Sustainability, Capital City Committee, waste management industry, EPA, schools, KESAB, container collection depot operators, community.

NEXT STEPS:

Within 1–3 years:

- ZWSA to undertake an independent community survey to determine perceptions and knowledge about waste avoidance, reduction and recycling, and barriers that inhibit, or benefits that encourage, individuals in sustainable waste management behaviour.
- ZWSA to develop a generic communications, education and promotions plan that can be adapted by councils to guide, inform and influence residents and local government operations to embrace zero waste and resource its implementation, including the benefit–cost of household waste avoidance, reduction, reuse and recycling.
- ZWSA to develop a waste education program for rollout across primary and secondary schools throughout South Australia.
- ZWSA in conjunction with the Capital City Committee, Adelaide City Council and the Green City Program to undertake relevant studies and develop initiatives to establish Adelaide City as an exemplar in innovative and sustainable waste management practices.
- EPA with ZWSA to identify possible regulatory alternatives and improvements to the National Packaging Covenant such as extended producer responsibility, product stewardship initiatives, and an enhanced role for container deposit legislation.
- ZWSA to develop, pilot, promote and evaluate community-based initiatives (subject to analysis of feasibility and effectiveness) including:

- a home composting/vermiculture guide and related residential, community garden and landscaping information and activities with emphasis on simplicity, enjoyment and health
- programs that seek to shift community attitudes, awareness and actions towards waste reduction and avoidance.

- ZWSA to survey and audit kerbside waste to identify brand owners of packaging disposed of in kerbside collection systems (a requirement under the National Packaging Covenant).

Ongoing:

- Support and promote recycling and collection depots that provide a convenient ‘drop-off’ service to residents.
- Continue to develop, improve, promote and update the ZWSA website with information about practices that can avoid, reduce, reuse and recycle waste including:
 - reuse programs by community groups that repair products for ongoing use
 - an up-to-date recycling information directory
 - case studies.
- Monitor changes in packaging materials and continue to review the effectiveness of the National Packaging Covenant (or its equivalent/alternative) on kerbside recycling systems.
- Encourage and work with industry re-processors and material recovery facility operators in developing, improving and implementing communication and education programs.
- Work with major retailers, manufacturers and brand owners to avoid, reduce and recycle packaging waste and other products that contribute or have the potential to contribute to the waste stream.

Municipal Solid Waste



- Where waste management outcomes can be evaluated and measured ZWSA will consider supporting community and household award programs that recognise best practice approaches to zero waste.
- Promote green purchasing that favours products and services that minimise their environmental effects throughout production, use and disposal (e.g. web-based green product guide).

OBJECTIVE: REDUCE WASTE

ACHIEVABILITY: rated **high** due to potential to control the quality of recycled material collected from kerbside, the existence of material recovery facilities, and expanding local and international markets; will be more difficult in regional areas due to transport costs and economies of scale.

TARGET/GOAL:

- Increase the recovery, recycling and use of metropolitan kerbside collected waste to 50% by 2008 (excluding food waste).
- Increase the recovery, recycling and use of metropolitan kerbside collected waste to 75% by 2010 (including food waste).
- Increase the recovery, recycling and use of household waste in non-metropolitan centres through drop-off and kerbside collection services where appropriate.

TARGET SECTORS: Councils; material recovery facilities, recycling drop-off facilities; households; government departments; industry; industry associations.

STRATEGY:

- Develop markets for recycled materials focusing on high volume kerbside collected recyclables and material received at recycling drop-off facilities (e.g. plastics, paper/cardboard, glass).
- Develop new and expanded markets for household organics (garden organics/food waste) through financial and other incentives directed at market development, innovation, research and related initiatives.
- Key industry sectors to accept greater responsibility for such things as design, material content, recyclability of products and product packaging (national and state product stewardship initiatives).
- Develop and implement incentive schemes for recycling infrastructure development and/or improvement.
- Establish baseline data, and monitor trends and progress.



RESPONSIBLE PARTNERS: ZWSA–local government, re-processors of kerbside materials, compost industry, businesses marketing products made from kerbside collected materials, relevant industry associations.

NEXT STEPS:

Within 1–3 years:

- Establish arrangements with local government and regions for providing key data to ZWSA including waste, recycling, contamination and contract details (as part of this activity ZWSA will investigate requirements of other agencies, such as Local Government Grants Commission, for waste data to facilitate standardised and universally suitable reporting criteria for waste), and for allowing waste generation and recycling indicators for each council to be made public.
- ZWSA to provide financial and other incentives for product and market development, and/or research with an emphasis on sustainable/long-term markets for kerbside collected materials, including organics.
- ZWSA to develop materials-based strategies and undertake market development and/or research activities for plastics, paper/cardboard, glass and organics.
- ZWSA to support research into innovative, cost-efficient organic waste processing technologies, product application practices and quality assurance issues.

Within 4–5 years:

- Develop and publish waste generation and recycling indicators for each council.
- Support the continued collection and dissemination of information on the use of recycled organic waste for horticultural, viticultural and other agricultural applications, and run targeted education campaigns for growers of intensive agricultural crops.

- Determine South Australia’s existing and potential materials re-processing capacity and needs, including a triple bottom line analysis of the impacts of exporting recyclables interstate and overseas compared with local re-processing.
- Develop infrastructure to process food organics from metropolitan Adelaide where this waste stream can be obtained in sufficient volume.

Ongoing:

- Undertake regular waste surveys and publish results.
- ZWSA to establish and publish a waste and recycled materials database including quantities disposed of and collected, commodity floor prices, and destinations for recyclables.
- Increase recycling through promotional activities and/or advertising.
- ZWSA with EPA to investigate, encourage and support the development within industry of product stewardship initiatives through state-based initiatives and/or through cooperation at a national level with the Commonwealth and other states and territories.
- ZWSA to evaluate and monitor the effectiveness of incentive (e.g. grant) programs – their continuation would depend on outcomes.

Municipal Solid Waste

OBJECTIVE: IMPLEMENT EFFECTIVE SYSTEMS

ACHIEVABILITY: rated **medium** due to the high costs associated with establishing and changing infrastructure and the inability of some councils to adopt changed kerbside practices due to fixed long term collection contracts; expected to be more difficult in regional towns and cities due to transport costs and economies of scale.

TARGET/GOAL:

All councils to provide high performance kerbside or equivalent systems servicing householders throughout South Australia by 2010.

Note: It is recognised that the capacity to provide high performance systems for non-metropolitan councils will be guided by regional waste management requirements, and be generally restricted to towns and not the entire council area; it will vary according to regional differences and population size, and will include a mix of kerbside/drop-off or equivalent arrangements subject to transport distances and economies of scale.

TARGET SECTORS: Councils, government; CDL depots, waste collection companies and processors.

STRATEGY:

- Establish high performance household waste reduction and recycling systems that achieve high recycling yields and low waste volumes, and encourage continuous improvement of those systems.
- Consistent with market supply and demand considerations, support the establishment and operation of viable, long-term:
 - material recovery facilities
 - organic waste processing facilities (including in-vessel)
 - householder transfer and resource recovery facilities (and enhance the resource recovery potential of these facilities)
 - alternatives to landfill.

- Develop and promote public place and event recycling.
- Encourage the development of increased processing capacity within recycling and re-processing facilities.
- Encourage housing design and construction, and housing subdivision design, that provides for effective and efficient recycling and waste management practices.

RESPONSIBLE PARTNERS: ZWSA–local government, EPA, State Government, waste collection companies and processors of kerbside materials, community, compost industry.

NEXT STEPS:

Within 1–3 years:

- ZWSA to maintain a financial incentives program to encourage implementation by local government of high performance household waste and recycling systems/standards and to assist with continuous improvement; all councils to be eligible for funding, with criteria having regard to regional differences.
- ZWSA to develop, promote and continuously improve a Zero Waste events guide for event and conference organisers and work with relevant government agencies to ensure the guidelines are adopted for all Government-sponsored events and conferences; ZWSA to:
 - publish Zero Waste events case studies on its website
 - provide financial incentives (e.g. sponsorship) for Zero Waste events
 - provide financial incentives for recycling infrastructure in public places and at public events.



- Provide infrastructure funding support to improve materials handling at drop-off facilities and other infrastructure initiatives in accordance with ZWSA guidelines.
- ZWSA to work with the Commonwealth Government through the Product Stewardship Arrangements for Used Oil Strategic Partnership Proposal, to establish safe collection and recovery systems for used oil throughout South Australia in consultation with local government, industry and the EPA.
- Trial new collection and processing systems that address food wastes and other problematic waste streams.
- In association with responsible partners, identify the main sources of garden organics contamination and develop an appropriate education program.

Within 4–5 years:

- Work with local government, industry and relevant stakeholders to establish safe disposal and recovery systems for used paint, batteries and oil.
- Examine the feasibility of food organics collection in conjunction with green organics collection across Adelaide.

Ongoing:

- Incorporate mechanisms to ensure that the design of housing and subdivisions allows and encourages effective and efficient recycling and waste management as part of the State Planning Strategy review and development of planning policy.
- Work with councils, architects, the housing construction industry and developers to incorporate residential waste and recycling requirements into household and subdivision design.
- Encourage waste and recycling tenders/contracts that specify high levels of materials recovery and recycling, and that consider environmental and social factors alongside economic imperatives.

OBJECTIVE: IMPLEMENT EFFECTIVE POLICY INSTRUMENTS

ACHIEVABILITY: rated **high** due to the range of statutory and other compliance measures available e.g. regulations, EPPs, Environment Protection Act amendments, conditions of environmental authorisation (licence) and the well-defined processes associated with using those measures that bring about fast change and increase certainty.

TARGET/GOAL:

All councils to provide high performance kerbside or equivalent systems servicing householders throughout South Australia by 2010.

Note: It is recognised that the capacity to provide high performance systems for non-metropolitan councils will be guided by regional waste management requirements, and be generally restricted to towns and not the entire council area; it will vary according to regional differences and population size, and will include a mix of kerbside/drop-off or equivalent arrangements subject to transport distances and economies of scale.

TARGET SECTORS: EPA, State and local government.

STRATEGY:

- Provide greater certainty for councils and waste management contractors in expectations, standards, performance measures and compliance.
- Develop best practice guides to material recovery facilities, transfer facilities and drop-off facilities.
- Evaluate the use of financial and/or policy instruments to encourage waste avoidance, reduction, reuse, recycling and recovery.
- Establish appropriate industry responsibility for its role in post-consumer waste (including setting targets) and ensure that it shares in identifying and implementing solutions.

Municipal Solid Waste



- Continue to support, review and enhance the effectiveness of container deposit legislation.
- Recommend national approaches to limit the use of, or ban, unacceptable packaging products.

RESPONSIBLE PARTNERS: ZWSA, EPA, Department of Primary Industries and Resources – Planning SA (PIRSA – Planning SA); local, State and Commonwealth government.

NEXT STEPS:

Within 1–3 years:

- ZWSA to identify and evaluate financial and other policy instruments that encourage waste avoidance, reduction, reuse and recycling.
- EPA to release a draft Waste EPP and/or implement other appropriate policy measures that provide a high performance kerbside collection system and are developed in consultation with ZWSA, Local Government Association (LGA) and relevant stakeholders.
- ZWSA work with the EPA to review the beverage container provisions of the Environment Protection Act to examine their effectiveness and future opportunities.

Within 4–5 years:

- Implement or improve policy instruments to encourage waste avoidance, reduction, reuse and recycling.

Ongoing:

- Regularly review the effectiveness of the waste depot levy to encourage waste diversion and fund the activities and programs of ZWSA and EPA.
- ZWSA and the EPA to work with responsible partners and others to identify possible regulatory alternatives and/or improvements to the National Packaging Covenant such as:
 - extended producer responsibility and product stewardship initiatives
 - mechanisms to ban packaging that is not recyclable and/or compatible with recycling systems, and/or that does not reduce the quantity of waste generated by consumption, and/or that does not reduce the toxicity of waste generated.
- ZWSA to work with the EPA to review the effectiveness of statutory mechanisms necessary to implement key aspects of *South Australia's Waste Strategy* and implement measures to address deficiencies.



OBJECTIVE: COOPERATE SUCCESSFULLY

ACHIEVABILITY: rated **high** due to the presence of existing regional groups of councils, the LGA's waste management committee, and participation by ZWSA and the EPA.

TARGET/GOAL:

Establish effective metropolitan and regional local government waste management groups working cooperatively on regional waste management issues.

TARGET SECTORS: LGA, regional council groups, individual councils; Waste Management Association of SA, material recovery facility operators, waste collection and transporters, green organics processors; KESAB, National Packaging Council, kerbside recycling groups, Jurisdictional Recycling Group; Australian Council of Recyclers; Commonwealth and State jurisdictions, and the Environment Protection and Heritage Council (EPHC).

STRATEGY:

- Develop local government regional waste management plans.
- Support regional waste management plans through the establishment of resource recovery, recycling and materials recovery infrastructure.
- Coordinate waste and recycling data collection from municipal sources.
- Communicate effectively with regional waste management groups, individual councils and industry.
- Work with interstate jurisdictions and the Commonwealth to find solutions to waste and recycling issues for problematic material streams.
- Ensure that waste management issues at the interface between State and local government are progressed in partnership using appropriate consultative arrangements.

RESPONSIBLE PARTNERS: ZWSA, EPA, LGA, councils; local government regional waste management associations, Waste Management Association of SA, PIRSA – Planning SA, State and local government.

NEXT STEPS:

Within 1–3 years:

- ZWSA with the EPA to establish a GIS-based waste and recycling infrastructure baseline map for South Australia.
- ZWSA to continue funding and providing other support for the development of regional waste management plans and the resource recovery and recycling infrastructure identified in the plans.

Ongoing:

- Continue to use consultative arrangements underpinning the State–Local Government Relations Agreement and the Minister for Local Government's Local Government Forum for problematic waste management issues that occur at the interface between State and local government.
- ZWSA and the EPA to work with the LGA's waste management committee, local government regional associations and individual councils to progress a regional approach to waste management in South Australia.
- Rural councils, CDL collection depots, community and social enterprise organisations to identify and support opportunities for a cooperative approach to recycling in rural South Australia.
- ZWSA in partnership with the LGA to continue to provide funding for a waste policy officer within the LGA subject to meeting agreed performance criteria and regular evaluation by ZWSA of the need to continue the funding arrangement.
- ZWSA in partnership with the LGA, councils and others to support seminars, forums and workshops for information exchange and discussion of relevant issues.

Commercial and Industrial Waste



The commercial and industrial waste (C&I) stream is characterised by a multitude and diversity of industry types, both large and small, often highly dispersed throughout metropolitan Adelaide and non-metropolitan centres, and intensely competitive.

It is a traditionally difficult area to capture because of the diversity of waste streams and the variety of waste management and collection systems in place. However, C&I recycling is increasing as larger companies adopt ISO 14,000 standards and environmental management systems, and many companies recognise that efficient production processes are required to remain competitive.

Waste disposal remains a small cost in terms of overall costs to businesses and thus a relatively cheap option.

KEY WASTES:

Food/kitchen wastes; cardboard; paper; wood/ timber; metals; plastics; green organics; tyres/rubber; other.

OBJECTIVE: FOSTER SUSTAINABLE BEHAVIOUR

ACHIEVABILITY: rated **medium** due to highly dispersed, diverse and competitive nature of the sector.

TARGET/GOAL:

By 2010, the recovery and use of materials from the C&I sector will have increased by 30% from 2004 weights.

TARGET SECTORS: manufacturing sector (general), food product manufacturers; retail sector (general), food services and retail sector; business and industry (general); recyclers, re-processors (resource recovery); State and local government.



STRATEGY:

- Encourage adoption of sustainability practices by South Australian business and industry, including exploring linkages with water, energy and transport sustainability activities.
- Develop industry training, education, information and awareness programs.
- Assist industry associations to develop waste avoidance, reduction and recycling guidelines for members.
- Identify and implement material-specific industry waste avoidance and reduction programs.
- Encourage implementation by State and local government, and businesses, of purchasing practices that include sustainability criteria.

RESPONSIBLE PARTNERS: ZWSA–EPA, Office of Sustainability, State government agencies; Australian Government Department of Education, Science and Training (DEST), Business SA, Waste Management Association of SA, other industry associations; priority industry sectors, industry education sector; local government.

NEXT STEPS:

Within 1–3 years:

- Using ZWSA landfill audit results and other waste generation and disposal data, identify specific industry sectors and/or companies (e.g. food processing/ manufacturing, hardware, retail) and explore opportunities and initiatives for waste avoidance, reduction, reuse and recycling.
- Work with professional and industry associations to develop resource kits, guidelines, seminars and training programs that encourage waste avoidance, reduction and recycling.

Within 4–5 years:

- Industry and trade-based training institutions, TAFE and tertiary centres to develop and/or modify curriculum to include sustainable approaches to waste management (and other business sustainability practices) as an important industry training issue and to encourage waste management innovation.

Ongoing:

- ZWSA to support industry awards and accreditation initiatives that recognise and promote achievements and innovation, continuous improvement, commitment and high performance approaches in waste avoidance, reduction and recycling.
- ZWSA to work with the EPA and Department for Environment and Heritage to promote business sustainability programs such as Greening the Supply Chain.
- Industry associations to actively encourage businesses to participate in partnership programs that encourage and foster sustainable behaviour (e.g. Buy Recycled Business Alliance).
- State Government to continue to implement the Greening of Government Operations Framework to become a leader in the field of 'green business'.
- ZWSA to highlight and promote on its website relevant case studies of businesses that have turned waste reuse to their economic advantage (e.g. Fuji Xerox re-manufacturing centre) using where possible physical demonstration sites.

Beyond 2010:

- ZWSA and the Office of Sustainability to investigate the merit of establishing a centre of excellence in business sustainability to foster the up-take of business sustainability practices and technologies in particular among small to medium sized enterprises.

Commercial and Industrial Waste



OBJECTIVE: REDUCE WASTE

ACHIEVABILITY: rated **medium** due to the dispersed and largely unsorted nature of materials collected, varied composition of C&I waste, and absence of a large scale materials recovery facility for C&I waste.

TARGET/GOAL:

By 2010, the recovery and use of materials from the C&I sector will have increased by 30% from 2004 weights.

TARGET SECTORS: manufacturing sector (general), food product manufacturers; retail sector (general), food services and retail sector; business and industry (general); recyclers, re-processors (resource recovery); State and local government.

STRATEGY:

- Support development and improvement of avoidance and reduction initiatives, reuse options and recycling markets for commercial and industrial waste.
- Improve the efficiencies of collection and processing for C&I materials.
- Improve data on waste disposal and recycling of C&I materials.
- Reduce barriers to purchasing and/or using recycled materials.

- Investigate the potential for alternative technologies to use residual C&I waste streams for which higher beneficial uses (e.g. those associated with reuse and recycling) are not viable.
- Investigate materials re-processing opportunities in regional centres (e.g. Riverland, South East, Port Lincoln, Port Augusta, Barossa).

RESPONSIBLE PARTNERS: ZWSA, EPA eco-efficiency training and Greening the Supply Chain programs, government agencies; Waste Management Association of SA, priority industry sectors, re-processors of priority materials (e.g. compost industry, paper/cardboard recyclers, metal recyclers), businesses marketing products from priority materials; relevant industry associations.

NEXT STEPS:

Within 1–3 years:

- Provide financial and other incentives for product and market development, for innovation in commercial and industrial waste materials, and for reporting on outcomes.
- Provide financial and other incentives for developing waste avoidance/reduction plans and related initiatives at the level of industry sectors or individual enterprises, and publish the results.
- Investigate the feasibility, requirements and implications for establishing a commercial/industrial waste exchange website to link waste generators with those who could reuse or recycle the material.
- Establish and publish a materials database including quantities disposed of and collected, commodity floor prices, and destinations for recyclables.



Within 4–5 years:

- Work with specific commercial/industrial sectors (e.g. shopping centre retailers and management) to maximise recycling of priority waste streams such as food and cardboard.

Ongoing:

- Undertake regular C&I recycling and disposal surveys and publish results.
- Work with the relevant agencies to encourage support for provision of service infrastructure (e.g. road access, power, water, sewerage) to new or expanding processing sites.
- Monitor the applicability of emerging technologies and other options that have the potential to reuse, recycle or recover C&I waste and publish the findings on the ZWSA website.
- Work with the Commonwealth, interstate jurisdictions, the EPA and industry sectors to develop material-specific strategies for priority wastes.



OBJECTIVE: IMPLEMENT EFFECTIVE SYSTEMS

ACHIEVABILITY: rated **low** due to dispersed and highly varied collection arrangements and processing infrastructure, and the difficulty within small to medium C&I enterprises in resources, staff or expertise, to commit to the changes required.

TARGET/GOAL:

By 2010, the recovery and use of materials from the C&I sector will have increased by 30% from 2004 weights.

TARGET SECTORS: Business and industry; waste industry (collectors, transporters, processors); Commonwealth, State and local government.

STRATEGY:

- Improve existing waste collection, transport and processing infrastructure.
- Assist companies and organisations to implement waste avoidance, reduction and recycling programs.
- Encourage development of new technologies and processes that use residual C&I wastes for which there is no higher beneficial use (e.g. those associated with materials reuse and recycling) and that comply with relevant approval processes.
- Implement the Greening of Government Operations Waste Program.

RESPONSIBLE PARTNERS: ZWSA, EPA, government agencies; priority industry sectors, re-processors of priority materials (e.g. compost industry, paper/cardboard recyclers, metal recyclers); relevant industry associations.

NEXT STEPS:

Within 1–3 years:

- ZWSA to provide financial incentives and other support for establishing or continuously improving resource recovery and recycling infrastructure, and promoting best practice systems.

Commercial and Industrial Waste



- ZWSA to identify opportunities for source separation of C&I waste streams such as paper and cardboard, food organics and wood/timber.

Within 4–5 years:

- Work with relevant industry associations, businesses or commercial sectors to develop and provide financial and other incentives for best practice collection and recycling systems (e.g. retail sector).

Ongoing:

- Through the State Government Greening of Government Operations Framework, ZWSA to investigate potential partnership arrangements, shared learning opportunities, and other synergies with local government, business and industry, many of which have their own innovative and highly effective greening systems.

OBJECTIVE: IMPLEMENT EFFECTIVE POLICY INSTRUMENTS

ACHIEVABILITY: rated **high** due to the range of statutory and other compliance measures available e.g. regulations, EPPs, Environment Protection Act amendments, conditions of environmental authorisation (licence) and the well-defined processes associated with using those measures that bring about fast change and increase certainty.

TARGET/GOAL:

By 2010, the recovery and use of materials from the C&I sector will have increased by 30% from 2004 weights.

TARGET SECTORS: Business and industry, waste transporters; EPA, State and Commonwealth governments, EPHC.

STRATEGY:

- Identify and apply appropriate financial/policy instruments to encourage waste avoidance, reduction, reuse, recycling and recovery within the C&I sector.
- Provide greater certainty for business and industry on expectations, standards, performance measures and compliance.
- Support the development of approaches at the national level to handle product-specific wastes of high environmental impact at disposal.

RESPONSIBLE PARTNERS: ZWSA, EPA, DAIS, State and local government.

NEXT STEPS:

Within 1–3 years:

- EPA to release a draft Waste EPP and/or initiate other appropriate/expedient policy measures such as changes to licence conditions that:



- require industry waste management practices to be guided by the waste hierarchy
 - require metropolitan generated C&I materials to be processed through a resource recovery facility, materials recovery facility or equivalent process that maximises resource recovery and minimises disposal to landfill (exceptions may include difficult to handle wastes such as industry dusts and sands, and materials required for landfill management purposes such as interim cover and final landform, as determined by the EPA)
 - prevent the disposal to landfill of designated C&I waste materials and/or products that have well established markets and appropriate recycling infrastructure in place
 - require preparation of extended producer/product responsibility plans by identified business and industry sectors and/or companies.
- ZWSA in consultation with the EPA and Office of Sustainability develop a consultation paper on extended producer responsibility in the South Australian context to identify wastes of concern and those for priority focus. The consultation paper should also canvas the notions of 'leasing of services' and 'dematerialisation'.

Ongoing:

- Continue to work with the EPA, the Commonwealth, other states and territories, and industry sectors to develop a national approach to managing waste from products such as electronic appliances (including whitegoods and consumer electronics), computers and peripheral IT equipment, tyres, consumer packaging, end-of-life vehicles and plastic bags.

- Continue to work with the EPA, the Commonwealth, and other states and territories to develop purchasing and other policies that lead to changes in product design or characteristics that:
 - reduce the quantity of waste generated by consumption
 - reduce the toxicity of the waste generated
 - facilitate recycling or reuse.
- Work with the EPA to review the effectiveness of the statutory mechanisms necessary to implement key aspects of *South Australia's Waste Strategy* and implement measures to address deficiencies.

Beyond 2010:

- Develop a state-wide policy framework to facilitate the adoption of business sustainability practices which would examine: incentive and assistance options; legislative options; knowledge transfer; education; accreditation; and technical, financial and/or other barriers to the take-up of business sustainability practices.

Commercial and Industrial Waste

OBJECTIVE: COOPERATE SUCCESSFULLY

ACHIEVABILITY: rated medium due to highly diverse nature of this industry sector and the huge number of small to medium sized enterprises requiring specifically tailored approaches.

TARGET/GOAL:

By 2010, the recovery and use of materials from the C&I sector will have increased by 30% from 2004 weights.

TARGET SECTORS: All business and industry; EPA, State and Commonwealth governments, EPHC.

STRATEGY:

- Provide relevant, up-to-date, readily available information to assist all stakeholders in planning and implementing programs, and to influence desired behaviour changes.
- Encourage partnership arrangements with other waste sectors (e.g. MSW) to establish integrated waste management infrastructure and achieve economies of scale.
- Work with interstate and national agencies and organisations to find solutions to waste and recycling issues for problematic C&I material streams.

RESPONSIBLE PARTNERS: ZWSA, EPA, government agencies; Australian Council of Recyclers, Waste Management Association of SA, relevant industry associations; priority industry sectors, re-processors of priority materials (e.g. compost industry, paper/cardboard recyclers, metal recyclers).

NEXT STEPS:

Within 1–3 years:

- Promote purchasing policies in industry and government that encourage the use of recycled products.

Within 4–5 years:

- Work with industry associations, EPA and the Waste Management Association of SA to support the development of industry sector waste minimisation initiatives.

Ongoing:

- EPA to continue its eco-efficiency training and Greening the Supply Chain programs.
- Foster ongoing cooperation through the development of industry training, education, information and awareness programs and activities.
- Work with industry associations/organisations such as the Australian Council of Recyclers to establish quality standards for recycled products.
- Continue to work cooperatively with interstate and Commonwealth agencies.
- ZWSA to provide part funding for a position within the Waste Management Association of Australia (SA Branch) to assist in the development and delivery of waste related programs to industry.

Construction and Demolition Waste



The construction and demolition (C&D) waste sector is characterised by a small number of stakeholders that demolish and construct building assets and recycle materials.

The waste stream generally consists of heavy materials that can be readily recycled into quarry replacement and other products. About 38% of materials disposed to landfill are from this sector and there are considerable opportunities to divert this waste to resource recovery and recycling.

South Australia is leading the nation in this area with significant investment and recycling/reuse underway. There are opportunities to build further on these strengths and to foster greater cooperation between development, local government and recyclers.

KEY WASTES:

Soil; rocks; rubble; concrete; asphalt; bricks; timber; metals; plastics; plasterboard; asbestos; garden organics.

OBJECTIVE: FOSTER SUSTAINABLE BEHAVIOUR

ACHIEVABILITY: rated **medium** due to intense commercial competitiveness within this sector; may be rated high with introduction of effective policy instruments.

TARGET/GOAL:

By 2010, C&D recovery and use will have increased by 50% from 2004 weights.

TARGET SECTORS: Building and construction industry; re-processors (resource recovery); government departments (e.g. PIRSA – Planning SA, DAIS; South Australian Housing Trust), local government; higher education (universities and TAFE sector).

STRATEGY:

- Encourage the segregation and reuse of waste at the point of generation where practicable and the transfer of materials to resource recovery/recycling facilities.
- Work with building, housing and construction industry associations to facilitate waste avoidance, reduction, reuse and recycling by developing resource kits, guidelines, best practice sites, case studies,

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- sponsorship, seminars and training programs.
- Monitor disposal trends to determine the potential and/or need for market instruments such as the waste depot levy (landfill disposal levy) to be adjusted to influence appropriate waste generation and disposal patterns.
 - Develop industry training, education, information and awareness programs on best practice systems, including links with water, energy and transport sustainability programs.
 - Promote environmentally sensitive asset management decision making over the building/infrastructure lifecycle that enables waste avoidance, reduction, reuse and recycling through all asset management functions (i.e. planning; design and construction; occupation, sustainment and maintenance; and decommissioning and disposal).
 - Support the development and promotion of innovative systems and technologies to recover and recycle difficult construction and demolition waste streams (e.g. plasterboard).

RESPONSIBLE PARTNERS: ZWSA and EPA, Office of Sustainability, DAIS, SA Housing Trust, Land Management Corporation, PIRSA – Planning SA and other government agencies; Master Builders Association, Housing Industry Association, Property Council of Australia, Green Building Council of Australia; building and construction companies; industry education sector; KESAB (Clean Sites program); local government.

NEXT STEPS:

Within 1–3 years:

- DAIS, SA Housing Trust and the Land Management Corporation to develop and implement government tender specifications and monitoring procedures that ensure waste reduction, resource recovery and recycling.

- ZWSA in association with the EPA to assist industry associations, such as the Master Builders Association and Housing Industry Association, to develop industry guidelines, standards, codes of practice, demonstration sites, resource kits, seminars and training programs that promote waste avoidance, reduction and recycling.

Within 4–5 years:

- Work with industry training institutions and tertiary centres to facilitate adoption of sustainable business practices in curriculum (e.g. TAFE courses, civil engineering).
- ZWSA with support from the SA Housing Trust and other stakeholders investigate barriers and opportunities for the on-site segregation of waste and in particular how separation of material can be improved without impacting on nearby residents or unreasonably slowing the demolition and/or building process.

Ongoing:

- Continue to support KESAB's Clean Sites Program and links to equivalent industry programs such as GreenSmart that incorporate initiatives such as:
 - ongoing industry education, information and awareness of best practice and continuous improvement principles
 - promote best practice demonstration sites to showcase effective systems that consider environmental and social factors alongside financial costs.
- DAIS, SA Housing Trust and Land Management Corporation to incorporate waste avoidance, reduction, reuse and recycling considerations in asset and facility management decisions.
- Support research requirements for the whole of lifecycle assessment and education needs of the construction and demolition industry.



OBJECTIVE: REDUCE WASTE

ACHIEVABILITY: rated **high** due to the small material range of waste streams, presence of large industry re-processors and increasing market acceptance of recycled materials.

TARGET/GOAL:

By 2010, C&D recovery and use will have increased by 50% from 2004 weights.

TARGET SECTORS: Resource recovery and salvage yards; architects; builders.

STRATEGY:

- Support the development and expansion of markets for recycled C&D material.
- Develop and implement funding incentive schemes to encourage recovery of materials rather than disposal.
- Remove barriers to purchasing and using recycled materials and encourage purchasing/procurement of recycled materials where these are 'fit for purpose'.
- Improve data collection from this industry to identify potential markets for materials.
- Investigate and identify subsidies and/or incentives, where they exist, that distort the market to benefit extractive industries at the expense of recycled materials.
- Encourage planning authorities to recognise the strategic importance of development that supports waste recovery

and recycling in the development system (e.g. Planning Strategy, Building Rules, development plans)

RESPONSIBLE PARTNERS: ZWSA, DAIS and other State Government agencies; local government; Master Builders Association, Housing Industry Association, Property Council of Australia, Green Building Council of Australia; building and construction companies; re-processors of construction and demolition materials; businesses marketing products from priority materials; relevant industry associations.

NEXT STEPS:

Within 1–3 years:

- Develop strategies and provide financial and other incentives for product innovation and market development for recovered and/or recycled C&D materials.
- DAIS to promote purchasing policies in industry and government that encourage the use of recycled products.
- ZWSA to investigate the feasibility, requirements and implications associated with establishing a C&D waste exchange internet site to link waste generators with those who could reuse or recycle the material.
- ZWSA in conjunction with the EPA to investigate current and future options for managing waste-fill arising from C&D activity to determine arrangements (including



mandatory measures) that ensure this material is used for its highest beneficial purpose (may include landfill management purposes such as interim cover and final landform requirements).

- ZWSA to work with industry associations, government departments, and research and standards organisations to establish quality standards and/or 'fit for purpose' specifications for recycled products.

Within 4–5 years:

- State Government in consultation with planning authorities to investigate the introduction of waste management plans (to encourage waste reduction and segregation (where practicable) as part of C&D projects, including the possible future requirement for these as part of the development approvals processes) and the local government cost implications.

Ongoing:

- ZWSA to continue to provide advice and information to planning authorities on the strategic importance of resource recovery/recycling industries and the need to ensure their long-term viability through appropriate planning decisions.
- Work with relevant agencies to encourage support for provision of service infrastructure (e.g. road access, power, water, sewerage) to new and/or expanding processing sites.
- EPA to examine and apply suitable disincentives and enforcement measures to discourage illegal dumping of construction and demolition waste.
- Work with relevant government departments, interstate agencies and the Commonwealth to investigate and identify subsidies and/or incentives that distort the market to benefit the extraction/harvesting of raw materials at the expense of recycled materials.

OBJECTIVE: IMPLEMENT EFFECTIVE SYSTEMS

ACHIEVABILITY: rated **medium** due to complex provisions within construction contracts that influence waste management systems (e.g. performance-based, penalty provisions regarding timing, price sensitivity (encourages quick knock down and removal of waste), and limited space on residential sites for source separation activities).

TARGET/GOAL:

By 2010, C&D recovery and use will have increased by 50% from 2004 weights.

TARGET SECTORS: Building and construction industry; re-processors (resource recovery), waste transporters; government.

STRATEGY:

- Identify and encourage adoption of best practice recycling and waste management systems on construction sites.
- Investigate new technologies that can process residual and problematic C&D wastes.
- Government development projects (including joint ventures with the private sector) to specify recycling of materials and use of recycled content materials where possible within tender specifications and procurement policies, where such materials are fit for purpose and do not compromise the health, structural integrity or durability of such developments.

RESPONSIBLE PARTNERS: ZWSA, DAIS and other government agencies; local government; Master Builders Association, Housing Industry Association, Property Council of Australia, Green Building Council of Australia; building and construction companies; re-processors of C&D materials, businesses marketing products from priority materials; relevant industry associations.



NEXT STEPS:

Within 1–3 years:

- ZWSA to provide support for developing and improving infrastructure.
- DAIS, PIRSA – Planning SA and other relevant government departments to identify and remove technical or other barriers limiting the use of recycled content materials in government construction projects.

Ongoing:

- Support industry awards that recognise and promote best practice recycling and resource recovery systems.
- ZWSA to work with SA Housing Trust and industry associations to develop best practice waste management systems and guidelines for the residential and commercial building sector, including using Housing Trust sites for data collection, analysis and demonstration projects.

OBJECTIVE: IMPLEMENT EFFECTIVE POLICY INSTRUMENTS

ACHIEVABILITY: rated **high** due to the range of statutory and other compliance measures available e.g. regulations, EPPs, Environment Protection Act amendments, conditions of environmental authorisation (licence) and the well-defined processes associated with using those measures that bring about fast change and increase certainty.

TARGET/GOAL:

By 2010, C&D recovery and use will have increased by 50% from 2004 weights.

TARGET SECTORS: Waste depot operators, re-processors (resource recovery); government departments (e.g. DAIS, SA Housing Trust).

STRATEGY:

- Identify and evaluate the use of financial/policy instruments to encourage waste avoidance, reduction, reuse, recycling and recovery within the C&D sector.
- Provide greater certainty for the C&D sector on expectations, standards, performance measures and compliance.

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- Statutory authorities and government corporations responsible for managing and developing government land assets, and housing and construction projects to specify best available technology economically achievable (BATEA) on-site waste management measures in commercial/contractual arrangements with private sector service providers.
- Reduce disposal to landfill of identified priority resources.
- Apply regulatory instruments to deter the disposal of waste soil and fill to landfill above quantities required for landfill management purposes.

RESPONSIBLE PARTNERS: ZWSA, EPA, SA Housing Trust, Land Management Corporation, State and local government.

NEXT STEPS:

Within 1–3 years:

- The EPA to release a draft Waste EPP and/or initiate other appropriate/expedient policy measures such as changes to licence conditions that:
 - require industry waste management practices to be consistent with the waste hierarchy
 - require construction and demolition materials to be processed through a resource recovery facility, material recovery facility or equivalent process that maximises resource recovery and minimises disposal to landfill (exceptions may include difficult to handle wastes such as industry dusts and sands, and materials required for landfill management purposes such as interim cover and final landform, as determined by the EPA)

- prevent the disposal to landfill of designated C&D waste materials and/or products that have well established markets and appropriate recycling infrastructure in place.

- Statutory authorities and government corporations responsible for management and development of government land assets, and housing and construction projects (e.g. Land Management Cooperation, SA Housing Trust, DAIS) to specify, implementation of initiatives such as GreenSmart, KESAB's 'Clean Sites' or equivalent measures in commercial/contractual arrangements with private sector service providers.

Within 4–5 years:

- ZWSA and the EPA to develop a strategy for the closure of licensed landfill facilities that specialise in the disposal of C&D waste from the metropolitan area.

Ongoing:

- Work with the EPA and local government to review the effectiveness of statutory mechanisms necessary to implement key aspects of South Australia's Waste Strategy and implement measures to address deficiencies.



OBJECTIVE: COOPERATE SUCCESSFULLY

ACHIEVABILITY: Rated **high** due to capacity to work with a few large industry associations representing a large membership base.

TARGET/GOAL:

By 2010, C&D recovery and use will have increased by 50% from 2004 weights.

TARGET SECTORS: Building and construction industry; re-processors (resource recovery); State and local government.

STRATEGY:

- Improve waste management and minimisation in all government construction, refitting and decommissioning projects (including joint ventures).
 - Sponsor relevant industry seminars and conferences to encourage increased understanding, networking and cooperation.
 - Conduct research to develop and implement sustainable practices.
-

RESPONSIBLE PARTNERS: ZWSA, EPA, DAIS; Business SA, industry associations (e.g. Master Builders Association, Housing Industry Association), Property Council of Australia, Green Building Council of Australia; State and local government; building and construction companies; re-processors of C&D materials, businesses marketing products from priority materials.

NEXT STEPS:

Within 1–3 years:

- SA Housing Trust and its contractors to implement industry best practice guidelines for adoption in all Housing Trust development projects (except projects subject to pre-existing contractual arrangements).
- DAIS, industry and other stakeholders to identify and adopt appropriate schemes/systems/tools that focus on sustainability throughout all stages of the building lifecycle.
- ZWSA to work with Department for Transport, Energy and Infrastructure – Transport SA (DTEI – Transport SA), local government and other partners to increase use of recycled construction and demolition materials in road construction and other uses, and publish case studies.

Ongoing:

- ZWSA, SA Housing Trust and other relevant stakeholders to assist with sponsoring relevant industry seminars and conferences that support the objectives of the Waste Strategy.
- SA Housing Trust to provide demonstration sites to test and demonstrate adoption of possible measures to increase the recovery and use of C&D waste.

Litter/Illegal Dumping



OBJECTIVES: FOSTER SUSTAINABLE BEHAVIOUR; REDUCE WASTE; IMPLEMENT EFFECTIVE SYSTEMS; IMPLEMENT EFFECTIVE POLICY INSTRUMENTS; COOPERATE SUCCESSFULLY

ACHIEVABILITY: rated **high** due to capacity of State and local government to work alongside a strong and pro-active non-government organisation (KESAB) to develop a range of approaches to address litter and illegal dumping.

KEY WASTES:

Litter – plastic bags; cigarette butts; fast food wrappers; confectionery wrappers; hard waste (near charitable collection bins).

Illegally dumped material – C&D material; garden organics; used tyres; vehicles; mattresses; old household furniture.

TARGET SECTORS: Households; packaging sector, fast food industry, hospitality industry; cigarette companies and smokers; individuals; waste removal contractors/companies; building and construction industry.

TARGET/GOAL:

- Reduce the incidence of littering and illegal dumping in South Australia.
- Demonstrate the benefits of adopting waste avoidance and reduction behaviours.



STRATEGY:

- Work with and provide ongoing funding support to KESAB to conduct its litter campaigns and recycling initiatives.
- Work with the tobacco, take-away food and hospitality industries to develop and implement waste avoidance and litter reduction strategies, particularly for public places and events.
- Phase out plastic bags by 2008.
- Implement a high-profile media and education campaign to encourage behavioural awareness of litter and illegal dumping issues.
- Review litter provisions within the *Local Government Act 1999* with a view to adopting regulatory provisions similar to those in force in other states, providing new offences and increasing enforcement powers of local government.
- Reduce illegal dumping by increasing education, information, investigation, surveillance and enforcement.
- Promote beverage container deposit system as an incentive to reduce litter.

RESPONSIBLE PARTNERS: ZWSA, EPA; KESAB; DTEI – Transport SA (Roadwatch); Office of Local Government, LGA, councils; charitable collection industry; fast food chains; tobacco companies, natural resource management boards.

NEXT STEPS:

Within 1–3 years:

- Identify infrastructure requirements and BATEA for systems as they relate to litter.
- ZWSA in conjunction with KESAB and local government to research and then develop appropriate messages and campaigns that change public littering and illegal dumping behaviour.

- In conjunction with the Butt Litter Trust Fund, conduct cigarette butt litter campaigns.
- Monitor public attitudes, perceptions and awareness of littering and illegal dumping.
- DTEI – Transport SA to continue to support Roadwatch (KESAB).
- Investigate approaches to reduce incidence of illegal dumping at charitable collection industry sites (clothing banks), and alternative collection methods for pre-owned clothing.
- Investigate the requirement for increased resources to combat illegal dumping.

Within 4–5 years:

- Review litter monitoring sites to ensure they reflect and represent various environments (e.g. beaches, car parks, highways).

Ongoing:

- Continue to support the activities of KESAB for delivery of litter reduction, waste and recycling education programs (especially to school children) through a service level agreement.
- ZWSA and KESAB to continue to collect and analyse litter data from monitoring sites across South Australia.
- Measure public attitudes, perceptions and awareness of litter, littering and illegal dumping to provide input to new campaigns.
- Identify and evaluate possible increases to illegal dumping that may arise from some measures contained in this strategy.
- ZWSA to continue to support the phasing out of plastic shopping bags by 2008 through:
 - financial incentive, education and awareness programs
 - investigation of potential legislative options with EPA.

Hazardous Waste/Liquid Waste



**OBJECTIVES: FOSTER SUSTAINABLE BEHAVIOUR;
REDUCE WASTE; IMPLEMENT EFFECTIVE SYSTEMS;
IMPLEMENT EFFECTIVE POLICY INSTRUMENTS;
COOPERATE SUCCESSFULLY**

ACHIEVABILITY: rated **medium** due to limited data on generation of the waste stream within this industry sector and the lack within small to medium C&I enterprises of resources, staff or expertise to commit to the changes required; early gains expected from informing the wider community through programs such as the household hazardous waste collections.

KEY WASTES:

Household hazardous waste; waste oil; water-based and solvent-based paints; batteries; commercial/industrial liquid waste streams (not including trade waste); grease trap waste.

TARGET SECTORS: Local and State governments; community; retail stores; business and industry, manufacturing sector.

TARGET/GOAL:

South Australia will have a Hazardous Waste Strategy by December 2005.

STRATEGY:

- EPA in consultation with ZWSA to develop and implement a Hazardous Waste Strategy for SA.

- Work nationally to find solutions to waste and recycling issues for problematic hazardous waste materials and products containing hazardous substances (e.g. nickel cadmium batteries, preservative treated timber).
- Encourage industry to adopt new technologies and BATEA to avoid and reduce hazardous content and for managing, recycling, reusing and treating hazardous waste.
- Gather additional information and improve data quality on hazardous waste, and consider statutory requirements for making this information available to the public.
- Support the implementation of management plans for organochlorine pesticides and polychlorinated bi-phenyls, and any other national guidelines that are developed.
- Promote waste avoidance, recycling and safe disposal of household and farm chemicals.
- Facilitate the reduction and recovery of household hazardous wastes across SA, and monitor and report the results.
- Provide access to convenient drop-off facilities for household and farm chemicals in the Adelaide metropolitan area and major regional centres.



- Work with priority industries to develop sustainable practices focusing on waste avoidance, reduction and recycling strategies.
- Provide the EPA with the necessary powers to require industries or industry sectors to prepare cleaner production plans (or equivalent).

RESPONSIBLE PARTNERS: ZWSA, EPA; Waste Management Association of SA; hazardous waste collection industry, hazardous waste treatment and storage industry; Business SA.

NEXT STEPS:

Within 1–3 years:

- Work with the EPA to implement the Hazardous Waste Strategy for SA.
- ZWSA to continue to fund a household and farm chemical waste collection program across SA, and monitor and report the results.
- Educate the community on proper household hazardous waste management practices and provide better information to stakeholders and the community on household and farm chemical collection facilities.
- Investigate the development of a web-based hazardous waste exchange.
- EPA to investigate the linkages between the National Pollutant Inventory database and the production of hazardous wastes by industry.

Within 4–5 years:

- Work with local government, industry and the Commonwealth Government to establish safe disposal and recovery systems for oil and paint.

- Investigate the feasibility of permanent drop-off facilities at waste and recycling depots, transfer stations and local government works depots.
- Develop provisions to provide the EPA with the power to require industries or industry sectors to prepare cleaner production plans (or equivalent).

Ongoing:

- Support the widespread adoption of cleaner production by industries producing hazardous waste with workshops held in conjunction with industry associations and the EPA, cleaner production joint ventures between large and small companies, and other means of support.
- In conjunction with the EPA work with industry associations and the waste management industry to identify and facilitate the diversion of hazardous waste with residual economic value (e.g. a source of energy) where there is a preferred waste hierarchy option; where such an option is identified, prohibit disposal of the waste to landfill by an appropriate statutory control system.
- Monitor, through the EPA, national developments on both household and agricultural chemicals, and industrial residues.
- Assist with education and collection programs on agricultural chemicals consistent with national and State strategies and funding arrangements.
- Provide information (e.g. in the form of guidelines or codes of practice) to small to medium sized industry on hazardous waste management issues.
- Implement the Greening of Government waste management program.
- The EPA to coordinate training programs and information sessions through industry groups and bodies.

Waste Transfer and Landfill Disposal and Storage



ACHIEVABILITY: not rated but nevertheless a critical component of this strategy that will require government intervention to be effective.

TARGET STREAM:

Municipal solid waste; C&I waste; C&D waste.

TARGET SECTORS: SA community, EPA, local government, waste management industry.

TARGET/GOAL:

Eliminate waste or its consignment to landfill, and advance the development of resource recovery and recycling by developing markets, infrastructure and other initiatives.

STRATEGY:

- Prevent the development of further landfills servicing metropolitan Adelaide.
- Ensure all metropolitan generated waste is processed through a transfer station, material recovery facility, resource recovery facility or equivalent facility, and not disposed direct to landfill.
- Monitor landfill capacity servicing South Australia.
- Investigate the need to establish dedicated cells or sites (mono-fills) for specific waste streams for later recovery as technologies become available.
- Upgrade non-complying landfills to meet EPA licence conditions.
- Exclude materials and products that have strongly performing markets (e.g.

construction wastes, garden organics) from metropolitan landfills to support strategy goals and/or targets.

- Ensure landfill operations are obligated to implement funding mechanisms to meet post-closure management obligations.
- Investigate and report on a range of financial options to reduce the disposal of waste to landfill and provide increased revenue for waste avoidance, reduction, reuse, recycling and recovery programs.
- Maintain enforcement focus on any illegal activities that undermine sound disposal practices or recycling activities.
- Support proposals that seek to increase the capacity of landfill gas conversion systems.

RESPONSIBLE PARTNERS: ZWSA, EPA, PIRSA – Planning SA; local government; Waste Management Association of SA; waste collection industry, waste transfer and disposal industry.

NEXT STEPS:

Within 1–3 years:

- Starting immediately, the Planning Strategy for South Australia, local government and the EPA to heed the direction of *South Australia's Waste Strategy* particularly in relation to the development of any new landfills servicing metropolitan Adelaide.
- EPA to implement measures through appropriate amendments to licences under the Environment Protection Act and/or other appropriate policy measures to ensure that:
 - metropolitan generated waste disposed of to landfills at Nuriootpa (Waste Management New Zealand), Southern Waste Depot – Maslin Beach, and Southern Region Waste Disposal Depot – McLaren Vale (Pedler Creek) is processed through a transfer station, material recovery facility, resource recovery facility or equivalent facility, and not disposed direct to landfill with the exception of difficult to handle wastes



- (e.g. industry dusts and sands) and materials required for landfill management purposes (e.g. interim cover, final landform) as determined by the EPA
 - all quantities processed through such facilities are accurately measured (inputs and outputs) and the results publicly reported
 - industry in consultation with the EPA and ZWSA identifies solid waste streams/materials requiring long-term storage until more innovative and/or cost effective solutions become available
 - streams for which there is no immediate recycling, reuse or other solution, are highlighted for product stewardship schemes.
 - EPA to investigate policy options that require landfill operations to demonstrate accrual of sufficient funds or sources of sufficient funds for post-closure management.
 - ZWSA with the EPA to undertake a study of transfer stations to determine quantity and composition of materials diverted to recycling or composting, and quantity and composition of materials taken to landfill.
 - Use data from the study to establish best practice standards for transfer facilities with an emphasis on resource recovery and recycling targets.
 - ZWSA and PIRSA – Planning SA to investigate the need to strengthen planning referral arrangements for waste management development applications.
- Within 4–5 years:
- Identify recyclable/recoverable materials and/or products that have well-established markets and appropriate recycling infrastructure in place, and ban these from disposal to landfill by changing EPA licence conditions for waste depots (landfills) or by using other appropriate statutory mechanisms as determined by the EPA.
 - Identify new technologies and processes, including mechanical biological decomposition, with the potential and capacity to more effectively manage residual waste streams.
- Ongoing:
- EPA to continue enforcing landfill compliance through regular inspections and compliance audits, requiring landfills that do not meet compliance requirements to upgrade, and working with local government to ensure actions are prioritised and have regard to regional implications.
 - ZWSA to work with PIRSA – Planning SA to update relevant sections of the Planning Strategy as required to implement key aspects of *South Australia's Waste Strategy*.
 - Office of Sustainability and Energy SA to encourage landfill operators to increase landfill gas recovery and use for beneficial purposes (thereby reducing greenhouse gas emissions) in accordance with EPA requirements.
 - ZWSA to work with PIRSA – Planning SA and others to develop the Industrial Land Development Program to consider the potential increased demand for waste infrastructure (e.g. transfer stations, material/resource recovery facilities) arising from increased diversion of waste from landfill.
 - Investigate and report on a range of financial options to reduce the disposal of waste to landfill and provide increased revenue for recycling and recovery programs, including detailed benefit–cost analysis of, for example, further increases to the waste disposal levy (landfill levy), differential levies and the use of diversion credits.

Appendix – Consultation

In finalising this strategy, Zero Waste SA – as required by section 18(4) of the *Zero Waste SA Act 2004* – released a proposed waste strategy for consultation for a period of 12 weeks from 29 November 2004 to 21 February 2005. Copies of the proposed Waste Strategy were made available for public inspection on the Zero Waste SA website and at Zero Waste SA's principal place of business. Submissions were received from the following:

State Government

Department of Trade and Economic Development:

Office of Regional Affairs
Economic Analysis and Policy

Department of Water, Land and Biodiversity Conservation

Department for Administrative and Information Services

Department for Environment and Heritage

Department of Health: Environmental Health Service

Department for Families and Communities

Department of Primary Industries and Resources

Department of Further Education, Employment, Science and Technology

Department of Education and Children's Services

Department of Transport and Urban Planning

Environment Protection Authority

Attorney-General's Department: Office of Consumer and Business Affairs

Local Government

Adelaide City Council

City of Mitcham

City of Marion

City of Burnside

City of Unley

City of Norwood Payneham & St Peters

City of Onkaparinga

City of West Torrens

City of Salisbury

City of Mount Gambier

District Council of Cleve

Alexandrina Council

The Barossa Council (on behalf of officers representing DC Mallala; Clare and Gilbert Valleys Council; Wakefield Regional Council; Light Regional Council)

Local Government Association

Local Government waste management authorities

Adelaide Hills Region Waste Management Authority

WastecareSA

Waste Management Industry

Waste Management Association of Australia – SA Branch

Smorgon Steel Recycling

Jeffries Group

Global Renewables

Coastal Transport – Coastal Bin Service

Beverage Industry Environment Council

Waste Management Pacific

Edward Nixon, Statewide Recycling

Recyclers of South Australia Inc

Non-government organisations and others

KESAB

Conservation Council of South Australia Inc
Business SA

Master Builders Association of SA

Housing Industry Association

Action Against Underground Water

Contamination Committee – J Webb

Mr J Sowerby

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Fakutech – Austria (an environment technologies consultancy)

Abbreviations



| | |
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| ANZECC | Australia and New Zealand Environment and Conservation Council (has been superceded 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) |
| DTEI – Transport SA | Department for Transport, Energy and Infrastructure – Transport SA |
| 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 |
| PIRSA – Planning SA | Department of Primary Industries and Resources – Planning SA |
| PPF | Pollution Prevention Fund |
| SME | small and medium enterprises |
| WMAA | Waste Management Association of Australia |
| ZWSA | Zero Waste SA |

Glossary

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| 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 <i>Environment Protection Act 1993</i> |
| 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 <i>Environment Protection Act 1993</i> |
| 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:

- achieving a minimum recycling yield of 3 kg per household per week
- limiting the maximum weekly residual waste bin capacity to 140 L
- providing mobile bin containers for all materials (recyclables, garden organics, waste)
- 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
- providing garden organics collection services to residents (metropolitan councils)
- providing hard waste collection and recovery services to residents (metropolitan councils)
- encouraging adoption of standard colours for recycling, garbage and green waste containers consistent with Australian Standards (in preparation)
- providing community drop-off facilities for high volume, low hazard household products such as waste oil and paint
- 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 for cartons 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

Glossary

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|-----------------------------|---|
| 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 to ensure that those parties who decide against becoming signatories to the Covenant do not gain a competitive advantage as a result. |
| 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 <i>Environment Protection Act 1993</i>) |
| 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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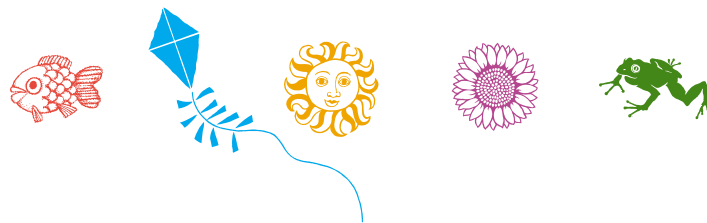
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Our Waste Our Responsibility



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