

*Review of*  
South Australia's  
Waste Strategy  
2011-2015

FEBRUARY 2014

**RWA**  
resources and waste  
advisory group

# Executive Summary

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## THIS REVIEW

Zero Waste SA engaged a team of international and Australian waste management experts to provide an independent review of *South Australia's Waste Strategy 2011–2015*. The objectives of the review were to:

- understand and analyse South Australia's waste strategy and programs
- review international best practice in waste management
- identify critical needs for the next strategy period
- assess institutional delivery options to best meet these needs.

The review has been conducted by Resources and Waste Advisory Group (UK), in association with Rawtec (SA) and EconSearch (SA).

## SOUTH AUSTRALIAN WASTE AND RESOURCES INDUSTRY

The waste management and resource recovery industry is a significant sector of the economy in South Australia. The sector has an annual turnover of around \$1 billion, contributes directly and indirectly more than \$500 million to Gross State Product ( $\approx 0.6\%$  of GSP), and employs around 4,800 people across a wide spectrum of jobs. Putting this into perspective, the industry is similar in economic value to the fishing and aquaculture industry, and similar to the water industry in terms of employment.

The waste and resources industry also contributes to economic activity not yet routinely captured in statistics. Materials separated from the waste streams return to downstream re-manufacturing industries within South Australia and elsewhere, making new products that people buy, and in the process, further contributing to the economy and employment.

## SOUTH AUSTRALIAN WASTE STRATEGY

Zero Waste SA has supported the development of the waste and resources sector through two consecutive waste strategies.

Effective waste management is more than protecting public health, being environmentally sustainable or reducing reliance on landfill. The State's waste strategy and programs have also contributed strongly to technological innovation, business productivity, economic development and community cohesion.

In order to understand how the strategies have contributed to the economy and quality of life in South Australia we have economically assessed a range of programs run by Zero Waste SA since its foundation. These programs represent around 10% of the organisation's total program interventions since its establishment in 2004.

We have also qualitatively reviewed the entire range of programs implemented during the strategy period in order to gain a fuller perspective of the work undertaken, and its wider economic impact.

## Industry competitiveness

The Industry Program has focused on improving the productivity and competitiveness of South Australian industry. The aim has been better resource use, efficiency in waste, water and energy management, using fewer raw resources to produce more and better quality products at lower cost.

Analysis of a representative range of projects implemented under the Industry Program reveals a net benefit of around \$7.8 million at a Benefit Cost Ratio of 6.7. In other words, for every dollar invested by State Government in resource efficiency, \$6.70 has been returned in direct cost savings for South Australian industry.

We consider there is significant potential for future resource efficiency gains across South Australian industry, as there is plenty of scope for the work to date to be deepened and extended.

## Infrastructure investment

State Government has been a catalyst for much of the current stock of infrastructure investment in the waste management and recycling sector in South Australia, through support programs and co-investment. Analysis of Zero Waste SA support establishing the three-bin kerbside waste collection

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system across metropolitan councils indicates a net benefit of \$22 million at a Benefit Cost Ratio of 2.6. Similarly, analysis of three individual regional waste management and recycling infrastructure investment projects illustrates a net benefit of \$3.39 million at a benefit cost ratio of 1.4 to 11.5.

### **Growing the economy and creating jobs**

Ever since the establishment of container deposit legislation (CDL) nearly 40 years ago, South Australian waste policy has been founded on source separation. Strategic programs have consistently expanded the practical opportunities for source separation, put in place the infrastructure to cope with the various waste streams, and helped to further embed the practice as a cultural norm.

Source separation is well established and widespread and has delivered economic benefits to South Australia. Source separation also provides a platform for further business opportunities in design, re-manufacturing and associated services. Materials diligently and consistently extracted 'clean' from the waste stream represent locally available and potentially low-cost input materials for new high-value manufacturing-based industry.

Zero Waste SA already has a demonstrated track record in supporting an infant industry to become a demand-driven and highly productive sector of the South Australian economy. Helped by a combination of direct and indirect support, the South Australian composting industry has been able to establish itself and its products in the consumer market place.

We believe that there is considerable unexplored potential for new nascent industries to become part of a South Australian circular economy, generating the type of high value-added jobs that people want.

### **Saving government money**

The size and importance of the state and local government sector within the South Australian economy mean that interventions across government offer considerable potential for cost savings. For example, Zero Waste SA assisted a major government agency with advanced procurement of waste and recycling services at more than 300 facilities across South Australia. This intervention is forecasted to generate \$8–\$10 million in direct savings.

Implementing resource efficiency programs across the whole of government not only has the potential to generate significant savings, it will also be an important catalytic driver of wider economic benefits.

### **Reducing cost of living**

Regardless of whether the specific waste management approach is collection, sorting, treatment or disposal, systems cost money to run. Therefore the generation of waste itself, regardless of whether it is recycled or not, places a cost on society that needs to be covered. These costs represent a relatively small, but still significant, component of the everyday cost of living reflected in the price of products and council rates paid by citizens.

Developing effective recycling systems has helped to reduce the costs of kerbside collection for South Australians, keeping council rates lower than they would otherwise have been. Good planning and strategic investment in resource recovery infrastructure has also reduced the costs of these waste and recycling services even further, for households and businesses alike.

A finding of this review is that the waste and resource industry is estimated to require some \$400– \$700 million of new investment over the next 10–15 years in order to address critical infrastructure bottlenecks. This is expected to include new resource recovery facilities to serve the southern suburbs, replacement of existing equipment, and establishment of a state-wide network of strategic and regional resource recovery facilities.

The waste and resources industry in South Australia is competitive, with diverse firms operating across the market. Considering the current level of economic activity in the sector, and future investment and industry potential, government must continue to safeguard the public interest by increasing efficiency, protecting against monopoly, and balancing investment risks.

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## A VISION FOR THE FUTURE

South Australians have high expectations that the environment they enjoy will be sustained for future generations, and there is strong awareness that scarce resources need to be managed and used efficiently. It is clear that South Australia's waste strategies and programs have enabled substantial progress in diverting waste from landfill and improving resource recovery in an efficient and cost-effective way. South Australia's landfill diversion rates are some of the highest in Australia and internationally, as a result of which many of the more accessible waste management objectives and targets have already been addressed.

To achieve further gains, more intractable problems must now be tackled, identifying how to:

- reduce waste generation rates that are still rising
- reduce waste management costs to households and businesses
- create and exploit the economic and employment opportunities arising from an industry trend towards re-manufacturing
- help South Australian businesses become even more resource efficient, resilient and competitive.

We believe that these future needs can be encapsulated within a policy of implementing a **circular economy**, and that the concept and practice of a circular economy can be a major driving force for new business innovation, investment, economic growth and high value employment across South Australia.

The waste and resources industry is already moving in this direction spawning the growth of innovative companies that are developing new technologies for re-manufacturing products from resource-recovered materials. Research and development programs on this theme are also being expanded at South Australia's three universities, and State Government has a competent authority with a track record for leadership in this field.

A policy of implementing a circular economy would provide a clear rationale for continued, even enhanced, State Government support to the development of the sector.

## MOVING FORWARD

As part of this review we have comprehensively assessed the range of institutional options available

for delivering on the future critical needs. The review has included evaluation of a total of 10 different forms of institutional organisation.

The conclusion of the analysis is that the current institutional arrangements for catalysing development of the waste and resources sector are globally 'state of the art'. There are alternative models available, but they do not appear to offer any significant generic advantages over the current State Government corporation with a skills based board.

The Charter and mandate of Zero Waste SA could be amended to include greater focus on industry, but there appears no clear rationale to close the organisation and replace it with a community-based non-government organisation (NGO), apart from purely budgetary considerations.

There are opportunities to diversify the revenue base away from pure reliance on the waste levy, and orient the membership and staffing of Zero Waste SA towards future critical needs. Emphasis should be placed on delivering industry potential, noting that local government is an important part of the industry.

International experience shows that optimal outcomes in the waste sector do not arise autonomously, simply by introducing landfill levies or other policy measures and leaving the outcomes to government regulation or market forces. The more challenging the waste management task becomes, the more complex and risky are the possible solutions for meeting those challenges.

Strong leadership, a systematic approach and more finely nuanced strategies and programs will be essential for success in implementing a circular economy. In this respect, other Australian states are already setting advanced targets for the future, looking to use waste management as an entry point to improving resource efficiency, productivity and competitiveness of their manufacturing industries. A similar trend is observed internationally.

It is therefore important for South Australia to continue with its current efforts in this sector if it is not to be left behind or lose ground in the future. A consequence of stalling could mean South Australia missing out on new opportunities for investment, jobs and economic activity. Even worse, South Australia's hard-earned reputation for excellence and know-how in the waste and resources sector could be damaged, thereby diminishing its international standing and undermining the successful efforts made to date to brand the state 'clean and green'.

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## **The shape of future programs and initiatives**

The critical needs of future waste management programs and initiatives are summarised below under five themes.

### ***Consolidating and evaluating benefits***

Zero Waste SA has been responsible for stimulating and coordinating a wide range of initiatives in the waste and resources sector, and unless these are continued to completion some of the investments made to date could be lost. Technical and economic performance data are needed to evaluate the success or otherwise of these and forthcoming programs in order to replicate the successes and avoid remaking the mistakes. The importance of this should be recognised in the forward program, even if only in the form of interim, or bridging, arrangements designed to consolidate current benefits for future society.

### ***Anticipating change***

Patterns of waste generation are continually changing, as are the chemicals and materials used to make the products we buy. Current developments indicate a shift in the way products are manufactured, an outcome that could radically alter the nature of municipal waste, the types of waste generating enterprises and the facilities needed to manage the waste and resource recovery cycle. Planning, program development and investment in new infrastructure and waste and recycling services will inevitably be needed to keep pace with and accommodate these changes.

### ***Planning and investment***

The waste and recycling industry interstate and internationally is beset with examples of poorly planned and executed investments in technologies that have failed to deliver their projected benefits. The financial losses of such projects, both public and private, can be huge. To date, South Australia has avoided making mistakes of this kind. Future governments would want to retain the capacity to plan and coordinate the scope and scale of its strategic waste management infrastructure requirements in a way that is technically appropriate, financially viable and socially acceptable.

### ***Resource efficiency and productivity gains***

Improvements in resource efficiency that reduce raw material demand, waste generation and waste disposal costs can give a competitive advantage to South Australian industry. Re-manufacturing of recovered resources provides opportunities for creating and attracting high-technology, advanced industries to the state. Fostering an environment that reduces business and industry costs, improves productivity and attracts economic development is a strategic imperative both for consolidating existing industry and for creating new manufacturing and service enterprises.

### ***Leadership***

Being a leader in this sector will become increasingly important from a cost efficiency and competitiveness perspective, to facilitate global market participation and acceptance of products and services, and for South Australia to remain attractive as a desirable investment destination. South Australia also needs the capacity to contribute effectively to national waste regulatory developments and initiatives such as National Environment Protection Measures (NEPMs) and product stewardship schemes. South Australians have an expectation that their state will remain a leader in this field and continue to have an influence nationally and internationally.

# Table of contents

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Acronyms	vii
About the authors	viii
<b>1 THIS REVIEW</b>	<b>1</b>
<b>2 POLICY</b>	<b>2</b>
<b>2.1 Forty years of policy</b>	<b>2</b>
<b>2.2 Zero Waste SA</b>	<b>2</b>
<b>2.3 Policy drivers</b>	<b>3</b>
<b>3 STRATEGY</b>	<b>6</b>
<b>3.1 Background</b>	<b>6</b>
<b>3.2 The first strategy (2005–2010)</b>	<b>6</b>
<b>3.3 Review of the current strategy (2011–2015)</b>	<b>7</b>
3.3.1 Current strategy objectives	7
3.3.2 Current strategy targets	8
<b>3.4 Outcomes</b>	<b>12</b>
<b>4 ECONOMIC BENEFITS</b>	<b>13</b>
<b>4.1 Scope</b>	<b>13</b>
<b>4.2 South Australia’s waste and resource recovery sector</b>	<b>13</b>
<b>4.3 Economic evaluation of Zero Waste SA programs</b>	<b>14</b>
4.3.1 Method	14
4.3.2 Metropolitan kerbside recycling	16
4.3.3 Regional Infrastructure Implementation Program	17
4.3.4 Industry Program	19
<b>4.4 Summary</b>	<b>21</b>
<b>5 INTERNATIONAL DEVELOPMENTS AND BEST PRACTICE</b>	<b>22</b>
<b>5.1 Scope</b>	<b>22</b>
<b>5.2 Resource Efficiency</b>	<b>22</b>
5.2.1 Context	22
5.2.2 How resource efficiency helps	23
5.2.3 Practice	23
5.2.4 Financial benefits of resource efficiency	26
<b>5.3 Waste prevention initiatives</b>	<b>27</b>
5.3.1 Context	27
5.3.2 Evidence on household waste prevention	27
5.3.3 Evidence on business waste prevention	28
5.3.4 Setting targets for waste prevention	29
5.3.5 Measuring waste prevention initiatives	29
<b>5.4 Social innovation</b>	<b>30</b>
5.4.1 The circular economy and the collaborative economy	30
5.4.2 Fostering the collaborative economy using digital technology	30
5.4.3 Social innovation to support the collaborative economy	30

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<b>5.5</b>	<b>Policy instruments</b>	<b>31</b>
5.5.1	Direct ‘command and control’ regulation	31
5.5.2	Economic instruments	32
5.5.3	Information-based instruments	33
5.5.4	Co-regulation and self-regulation	33
5.5.5	Support mechanisms and capacity building	33
<b>6</b>	<b>POLICY INSTRUMENTS IN SOUTH AUSTRALIA</b>	<b>35</b>
<b>6.1</b>	<b>Policies in use</b>	<b>35</b>
<b>6.2</b>	<b>Future themes</b>	<b>36</b>
<b>7</b>	<b>CRITICAL FUTURE NEEDS</b>	<b>37</b>
<b>7.1</b>	<b>Outlook</b>	<b>37</b>
<b>7.2</b>	<b>Framework</b>	<b>37</b>
<b>7.3</b>	<b>Consolidating benefits</b>	<b>38</b>
<b>7.4</b>	<b>Anticipating change</b>	<b>38</b>
<b>7.5</b>	<b>Planning and investment</b>	<b>38</b>
<b>7.6</b>	<b>Productivity and economic gains</b>	<b>39</b>
<b>7.7</b>	<b>Leadership</b>	<b>39</b>
<b>8</b>	<b>INSTITUTIONAL OPTIONS</b>	<b>41</b>
<b>8.1</b>	<b>Functions</b>	<b>41</b>
<b>8.2</b>	<b>Methodology</b>	<b>42</b>
<b>8.3</b>	<b>Options</b>	<b>42</b>
<b>8.4</b>	<b>Outcomes</b>	<b>44</b>
<b>8.5</b>	<b>Strengths and weaknesses of different models</b>	<b>45</b>
<b>8.6</b>	<b>Summary of findings</b>	<b>49</b>
<b>9</b>	<b>CONCLUSIONS</b>	<b>51</b>
<b>9.1</b>	<b>Culture</b>	<b>51</b>
<b>9.2</b>	<b>Future policy challenges</b>	<b>51</b>
<b>9.3</b>	<b>Economic considerations</b>	<b>52</b>
<b>9.4</b>	<b>Value of Zero Waste SA</b>	<b>53</b>
<b>9.5</b>	<b>The way forward</b>	<b>54</b>
<b>9.6</b>	<b>Remaining questions</b>	<b>55</b>
<b>10</b>	<b>GLOSSARY</b>	<b>56</b>
<b>Annex A:</b>	<b>Statement of requirements</b>	<b>58</b>
<b>Annex B:</b>	<b>Summary listing of Zero Waste SA programs and initiatives since 2003–2004</b>	<b>60</b>
<b>Annex C:</b>	<b>Bibliography</b>	<b>62</b>
<b>Annex D:</b>	<b>Report: Economic Aspects of the Zero Waste SA Strategy Review</b>	<b>65</b>

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# Acronyms

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3R	Reduce, Reuse, Recycle	MRF	Material Recycling Facility
BCR	Benefit Cost Ratio	MSC	Marine Stewardship Council
C&D	Construction and Demolition	MUD	Multi-Unit Dwelling
C&I	Commercial and Industrial	MYBR	Mid-Year Budget Review
CBA	Cost Benefit Analysis	NGO	Non Government Organisation
CCA	Copper Chrome Arsenic	NPV	Net Present Value
CDL	Container Deposit Legislation	OECD	Organisation for Economic Cooperation and Development
CFL	Compact Fluorescent Lamp	PAYT	Pay-As-You-Throw
CSD	Commission on Sustainable Development	PES	Payments for Environmental Services
DC	District Council	PET	Poly Ethylene Terephthalate
DEFRA	Department for Environment, Food and Rural Affairs, UK	PPP	Public Private Partnership
DEWNR	Department of Environment, Water and Natural Resources (South Australia)	PS	Product Stewardship
EC	European Commission	R&D	Research and Development
ECHA	European Chemicals Agency	RDC	Research and Development Corporation
EEA	European Environment Agency	REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
EPA	Environment Protection Authority (South Australia)	REC	Resource Efficiency Club
EPR	Extended Producer Responsibility	RoHS	Restriction of Hazardous Substances
EU	European Union	RWA	Resources and Waste Advisory Group
FSC	Forest Stewardship Council	SA	South Australia
FTE	Full Time Equivalent	SME	Small to Medium Enterprise
GDP	Gross Domestic Product	UK	United Kingdom
GSP	Gross State Product	UNEP	United National Environment Programme
ISO	International Standards Organisation	UniSA	University of South Australia
ISWA	International Solid Waste Association	USA	United States of America
ISWM	Integrated Sustainable (Solid) Waste Management	WEEE	Waste Electrical and Electronic Equipment
KESAB	Keep South Australia Beautiful	WMAA	Waste Management Association Australia
LGA	Local Government Association	WRAP	Waste and Resources Action Programme, UK
NVMP	Dutch Foundation for the Disposal of Metal and Electrical Products	WtE	Waste to Energy
MFA	Material Flow Accounting	ZWSA	Zero Waste South Australia
MSW	Municipal Solid Waste		



# About the authors

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This strategy review has been prepared by a team of international and Australian experts led by Resources and Waste Advisory Group Ltd (UK), in association with Rawtec Pty Ltd (SA) and EconSearch Pty Ltd (SA).

Resources and Waste Advisory Group is active from Cabinet to street level, specialising in the waste management, resources recovery and resource efficiency sector. Work includes policy and strategy and international advocacy and publications, grounded by practical work in the design and implementation of waste management systems, in more than 25 countries worldwide.

Rawtec Pty Ltd is a market leader in the waste management and resources recovery sector in South Australia. Rawtec has implemented a diverse range of waste and recycling projects both for Zero Waste SA, and across a wide number of other government agencies and bodies, industry sectors and individual businesses.

EconSearch Pty Ltd is a specialised consultancy in applied economic research and analysis. EconSearch has undertaken many projects involving economic modelling and cost benefit analysis across different sectors of the economy, including regional economic models for all Australian states and territories.

## The team for preparation of this strategy review:

**Andrew Whiteman** is a policy and strategy specialist in the resources and waste management sector. He has experience in more than 40 countries worldwide, and works at the forefront of global innovation in the sector.

**Chris Colby** is a leading expert in the waste and resources sector, with in depth knowledge of the current situation, performance and challenges of South Australia's waste and resources sector.

**Mark Rawson** is a respected advisor to the waste and recycling industry in South Australia, and President of WMAA's South Australian Branch.

**Julian Morison** is an economist, with extensive experience in natural resources, primary industries and regional economic development in South Australia.

**Peter Faircloth** is a policy economist with experience in the resources and waste management sector globally. He specialises in financial and economic analysis of policies, programs and projects.

**Ljiljana Rodic-Wiersma** is a researcher and teacher in solid waste management at Wageningen University in the Netherlands, specialising in resource efficiency and the circular economy.

**David C Wilson** is Professor in Waste Management at Imperial College London. David is a senior and respected figure globally, as reflected in his receipt of an MBE for services to waste management in Europe.

**Heather Bailey** is an economist experienced in applied economic analysis including cost benefit analysis. She has experience across several industry sectors in South Australia.

**Brian McCarthy** is a municipal governance specialist with international experience in municipal and industrial waste management strategies, policies, technologies and infrastructure.

**Cosmin Briciu** is an environmental management expert specialising in the field of waste and resources. He has co-authored international publications in integrated sustainable waste management.

# 1 This review

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Zero Waste SA commissioned Resources and Waste Advisory Group (RWA) to undertake a review of *South Australia's Waste Strategy 2011–2015* (the Strategy 2011–2015). This review focuses on understanding and analysing strategy and programs, reviewing international best practice, identifying critical needs for the next strategy period, and assessing institutional delivery options to meet these needs (the Statement of Requirements is provided in Annex A).

In conducting this review, a key target has been to economically assess a representative range of Zero Waste SA's programs. We have gathered evidence on the costs and benefits of selected programs and analysed it using widely accepted techniques. We shed light on the nature of economic and associated impacts that have arisen from a cross-section of different programs that have been implemented.

The range and nature of programs implemented by Zero Waste SA is impressive, particularly considering how lean the organisation is in staffing terms. It has not been possible within the scope of this study to analyse the totality of the economic contribution of Zero Waste SA's programs and support.

Zero Waste SA runs some of the most innovative and well-targeted programs that can be seen worldwide. Strategic interventions have helped to make South Australia an attractive environment for citizens and businesses. Zero Waste SA programs have helped by:

- coordinating and rationalising capital and operating expenditure across state and local government

- establishing high quality recycling and waste services to the community
- leveraging research and development
- generating and sharing knowledge, and
- furthering the culture of environmental consciousness and responsibility.

State Government announced in the 2012-13 Mid-Year Budget Review (MYBR) that it intends to look at options for delivering Zero Waste SA's functions in different ways. Specifically, the MYBR states that

Zero Waste SA will cease operations in 2015–16 within government.

This review aims to contribute, in a comprehensive and balanced way, to the policy discussion on the issues surrounding how to meet future challenges and maximise opportunities in the waste and resources management sector in South Australia.

The past 10 years have seen dramatic, positive changes in the environment, economy and related waste management and resources recovery sector. The next 10 years are likely to see similar change. A move towards circular economies, which

is in its infancy, is expected to impact local and global economies, from producers and retailers to the entire waste and resources management sector.

We are grateful for the opportunity to undertake this important piece of work, at this critical point in time for South Australia's waste and resources sector. The task has been challenging and therefore we apologise in advance for any gaps or misunderstandings. The views expressed in this review are those of the authors.

## **This review Includes:**

- **understanding policy context and drivers**
- **evaluating Zero Waste SA's strategic objectives in the current waste strategy and progress in meeting its targets**
- **understanding the range of programs implemented by Zero Waste SA**
- **economically evaluating the costs and benefits of a cross-section of these programs**
- **characterising the waste management and resource recovery sector within the context of the South Australian economy**
- **distilling key success factors influencing the performance of the sector**
- **international benchmarking**
- **identifying critical future needs for development of the sector**
- **evaluating the institutional delivery options.**

## 2 Policy

### 2.1 FORTY YEARS OF POLICY

Waste management policy took its first step in South Australia in 1975 with the enactment of container deposit legislation (CDL). This regulatory-economic instrument for return of beverage containers still forms an important part of South Australia's waste management system today.

The creation of the Waste Management Commission in 1979 regulated landfills and associated activities for the first time in South Australia. A waste levy was introduced in July 1988 along with increased responsibilities for the promotion of waste reduction and the conservation of resources by recycling and reuse of waste and resource recovery. The levy was introduced to fund the Commission's activities, and was set by the Commission.

In 1993, waste policy took another major step forward with the *Environment Protection Act 1993*<sup>1</sup>, which established the Environment Protection Agency, the Environment Protection Fund, and the Waste Depot Levy. Like all other jurisdictions that introduced a 'landfill tax' at around that time, the levy was brought in as a policy instrument to help ensure that environmental externalities were reflected in landfill pricing.

In 2004, with the *Zero Waste SA Act 2004*<sup>2</sup> and associated creation of the Waste to Resources Fund, waste policy in South Australia arguably took its most profound step. The Act established Zero Waste SA with the objectives to eliminate waste or its consignment to landfill, and advance the development of resources recovery and recycling, implemented under the purview of an integrated strategy for the state.

The Waste to Resources Fund was designated to receive 50% of the waste levy, kept as directed by the Treasurer, and applied by Zero Waste SA in accordance with the business plan or in any other manner authorised by the Minister for the purposes of the Act. Zero Waste SA may also invest, with the approval of the Treasurer, any of the money

belonging to the fund that is not immediately required for its purposes.

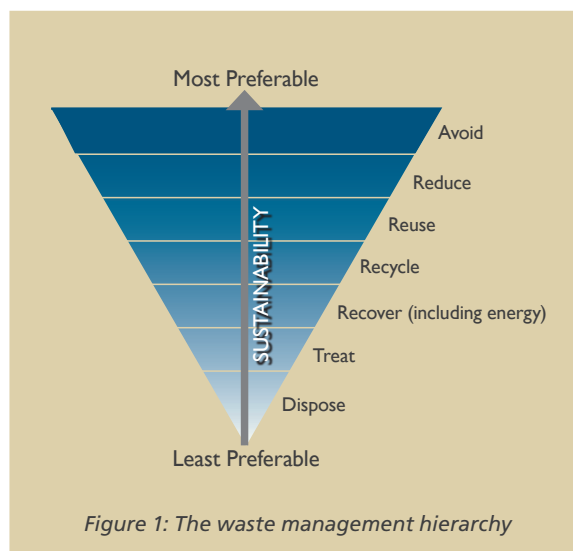
In policy terms this development can be seen as a profound change in the objective and function of the waste levy. In 2004 the waste levy ceased to be just an economic instrument designed purely to assist in internalising environmental costs into the price of landfill, but became a transparent policy instrument

intended to drive a shift in practices away from landfill. This shift in policy provided a means of improving the competitive position of recycling and resources recovery technologies and practices, and stimulating high levels of landfill diversion.

### 2.2 ZERO WASTE SA

Zero Waste SA was charged with exercising its functions, to be guided by:

- a) the waste management hierarchy (Figure 1)
- b) the principles of ecologically sustainable development
- c) best practice methods and standards in waste management
- d) the principle that government management policies should be developed through a process of open dialogue with local government, industry and the community.



<sup>1</sup> <http://www.legislation.sa.gov.au/LZ/c/a/environment%20protection%20act%201993.aspx>

<sup>2</sup> <http://www.legislation.sa.gov.au/LZ/C/A/ZERO%20WASTE%20SA%20ACT%202004.aspx>

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Zero Waste SA was established as a body corporate, and instrumentality of the Crown, under the direction of the Minister. The Board of Zero Waste SA is the governing body of Zero Waste SA, and consists of not less than six and not more than 10 members. It is a skills based board including members who together demonstrate a broad range of practical knowledge and skills. Zero Waste SA establishes and manages its programs through annual business plans approved by the Minister.

### **Use of the Waste to Resources Fund**

The designation of a hypothecated (earmarked) fund from waste levy payments, for the purposes of eliminating waste or its consignment to landfill, is a far-reaching policy / economic instrument. The specific construction of the Waste to Resources Fund appears to be unique in the world, at least in its application to this sector.

In practice, we understand that Zero Waste SA has received operational funding from the Waste to Resources Fund at around 25% of the total waste levy receipts, and the remaining 25% has been accumulating. Zero Waste SA's *Annual Report 2012–13* indicates revenue from waste levy receipts of \$19.7 million was paid into the Waste to Resources Fund and that Zero Waste SA had expenditure approval of approximately \$9 million. The report indicates cash in the Waste to Resources Fund at \$43.7 million.

There is a vibrant discourse amongst policy analysts as to the relative merits of hypothecated funds. It is not within the scope of this study to join that debate, recommend options for this accumulation of funds or options for the level of waste levy. These are political issues in the realm of fiscal policy.

However this review does consider:

- that government could consider reforming the hypothecation clause separately from the issue of which institutional arrangements should govern the sector even if these appear in the same Act
- institutional options for delivery of Zero Waste SA's functions into the future.

It is apparent that the reinvestment of 25% of the waste levy has had significant environmental and financial benefits to the South Australian economy. We believe there is clear scope for further improvements and use of available funds should government decide to continue its active support.

## **2.3 POLICY DRIVERS**

The South Australian policy of eliminating waste or its consignment to landfill that started in 1975 is still very much in place, and is being strengthened by further regulation such as landfill bans and mandatory resource recovery. For example, from September 2012 a person must not dispose of waste produced in metropolitan Adelaide to a landfill depot unless the waste results from, or has been subject to, resources recovery processes.

Most OECD countries now have policies in place that are focused on eliminating waste or its consignment to landfill. Combinations of policy instruments are applied in different ways in different jurisdictions to achieve this goal. In the northern European countries, the existence of landfill has virtually been eliminated for all but the most limited of waste fractions. Increasingly across the rest of Europe waste entering a landfill is subjected to some sort of pre-treatment.

Despite the landfill disposal versus waste incineration debate during the 1980s and 1990s, neither of these options remains particularly welcome, except in northern European states where waste is commonly used as fuel for electricity and district heating.

There has been a realisation at the global level that using resources in the way we do at the present time is ecologically unsustainable, and that technological fixes are only a part of the solution. The debate is now about a paradigm shift away from 'waste' to 'resources', with some even predicting a new age of human civilisation where 'waste' will cease to be a used term, and instead resource efficiency will become a major driving force of long-term economic competitiveness, and by inference the power balance within the world's economy.

However the dynamics of the global economy pan out over the coming decades, we believe that it would seem reasonable to predict that:

- the paradigm shift of 'waste' to 'resources' will continue to take hold, and shape the future development of the 'waste and resources' industry and circular economies
- government policies that stimulate efficient use of resources in the economy will continue to be developed and implemented

- jurisdictions that have the clearest and best articulated policies will attract a disproportionately higher share of investment, which will in turn attract business innovation and the best people
- policies are likely to become more rather than less ambitious as the next generation of highly environmentally educated children take their place in commerce and industry, community leadership and government
- staying ahead of the curve in this sector will foster productivity, competitive advantage, economic development and new spheres of high value employment.

In the light of these predictions, our view is that South Australia is currently ideally positioned to take advantage of this global shift from 'waste' to

'resources' and indeed has already made substantial achievements in leveraging this opportunity. Nearly 40 years of policy have delivered high quality practices functioning within a popular culture of environmental consciousness and responsibility.

As stated in the UN Habitat's 2010 publication *Solid Waste Management in the World's Cities*<sup>3</sup>:

*South Australia has demonstrated a high level of political commitment and willingness to 'stick its neck out' and implement some policies and legislation upon which other administrations take a more conservative position. The Zero Waste Act and Plastic Bag Ban are two excellent samples of South Australia's Government showing leadership by putting in place arrangements to support a major drive towards the 3Rs (reduce, reuse, recycle).*

## ACHIEVEMENTS OF ZERO WASTE SA

In the past 10 years Zero Waste SA has become a crucial catalyst and contributor to South Australia's success in waste management and recycling. In particular, it has helped expand the resource management and recycling industry by investing in incentives for infrastructure, market development and research and innovation. Achievements have included, among others:

- a metropolitan wide three-bin kerbside system, delivering high performance in household recycling outcomes
- improved regional waste planning and infrastructure that has helped to consolidate landfill disposal sites, maximise resource recovery, reduce waste management costs, and substantially improve environmental outcomes for regional communities
- stimulation of new business ventures and private sector investment in resources recovery, including composting, waste to energy, recycling services to industry, and recycling of e-waste, plastics, demolition and building waste
- partnerships with other government agencies, not-for-profit and industry associations that promote business and industry sustainability, give advice and assist research into waste generation, market development, consumption and disposal behaviour
- strategic investments in advice to businesses and the waste industry to improve the quality and value of recyclable material by reducing contamination
- development of new policy and regulatory frameworks for waste management and recycling (for example the Environment Protection (Waste to Resources) Policy).

<sup>3</sup> <http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2918>.

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These are only select examples of what Zero Waste SA has undertaken and achieved. Annex B to this report provides a summary listing of all of the different initiatives and programs that Zero Waste SA has successfully implemented. The breadth of this work has touched all aspects of the waste and resource recovery life cycle.

Under Zero Waste SA's stewardship, the tonnes of material being resource recovered for recycling by South Australians has nearly doubled, and the landfill diversion rate has leapt from 60% to nearly 80%. In 2012-2013, South Australia had the highest publicly reported diversion rate and the highest per capita resource recovery rate of any state or territory in Australia.

Against this background, it is not too difficult to imagine South Australia taking its place as one of the first societies to achieve the holy grail of resource management – to demonstrably decouple waste generation from economic growth whilst retaining a thriving competitive market for the waste and resources industry, world class recycling and resource recovery, and eliminating landfill – all within the fabric of a modern circular economy.

## 3 Strategy

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### 3.1 BACKGROUND

Zero Waste SA is charged with the responsibility of developing the waste strategy for the state, including:

- objectives, principles and priorities for the management of waste
- analysis of waste generation levels and waste management practices
- targets or goals based on the analysis for
  - diversion of waste from landfill
  - waste collection, transport and disposal
  - public and industry awareness and education programs, and
  - research
- criteria and methods for assessing the adequacy of the strategy and its implementation.

There have been two strategy periods to date, 2005–2010 and 2011–15. In order to understand more fully the achievements of the current strategy it is necessary to reflect back on the status quo of South Australia's sector in the 2000s, and the essential focus of the first strategy.

### 3.2 THE FIRST STRATEGY (2005–2010)

The first strategy focussed on supporting local government and the waste and recycling industry to address existing issues and manage the transitions that had to occur, including building the systems and infrastructure that would be needed.

#### **Wingfield closure**

The legislated closure of Adelaide City Council's Wingfield Waste Depot in December 2004 had a significant impact on subsequent management arrangements for metropolitan Adelaide's waste, and was a key milestone in the development of South Australia's waste management sector. The Wingfield landfill was accepting 700,000 tonnes of waste per annum and 700,000 tonnes of fill material, three quarters of Adelaide's total waste stream. The closure of this site caused a shock to Adelaide's waste management system, and opened

up new competitive dynamics between the landfill operators and recyclers for a share of Adelaide's waste supply.

#### **Rural and regional initiatives**

During the term of the first strategy, non-metropolitan councils were increasingly expected to rectify their approach to waste management. Regional and rural landfills needed to comply with landfill licence conditions of the Environment Protection Authority. Some councils decided to close landfills and join with neighbouring councils. This led to a process of regional planning and the development of regional landfill, transfer stations and improved resources recovery and recycling facilities.

#### **Standardised kerbside recycling**

At that time, kerbside recycling was in place in the metropolitan councils, but used a mix of systems. The 2005–2010 strategy promoted the standardisation of kerbside recycling services across councils to a three-bin system (residuals, recyclables and organic compostable waste). The strategy also worked to increase the capacity of recycling and re-processing infrastructure. Furthering the development of South Australia's waste management system through source separation of different material streams was in motion.

#### **The waste hierarchy**

The strategy introduced the waste hierarchy as an overarching guiding tool in managing these changes. The adoption of the hierarchy helped to ensure that new initiatives focussed on the 'top end' and introduced concepts of sustainable behaviour, avoiding and reducing waste, implementing policy instruments and cooperating successfully.

*South Australia's Waste Strategy 2005–2010<sup>4</sup> 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.*

<sup>4</sup> [http://www.zerowaste.sa.gov.au/upload/resources/publications/waste-strategy/zw\\_waste\\_strategy\\_final\\_3.pdf](http://www.zerowaste.sa.gov.au/upload/resources/publications/waste-strategy/zw_waste_strategy_final_3.pdf).

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*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 first strategy guided a period of major change in waste management and resource recovery practices across South Australia. It provided for the first time the opportunity to guide and coordinate change through the use of targeted regulation and incentives.

The work during this period included an economic cost benefit analysis of how well the 2005–2010 Waste Strategy was performing. This assessment demonstrated that investments and initiatives undertaken as part of the waste strategy would deliver a net economic benefit for the State of South Australia.

### 3.3 REVIEW OF THE CURRENT STRATEGY (2011–2015)

South Australia's Waste Strategy 2011–2015<sup>5</sup> builds on the previous strategy period, and deepens and extends the focus and scope of intervention. The strategy provides a detailed summary of priorities for action, grouped under strategic objectives.

This study has included assessment of whether the objectives and targets contained in the Waste Strategy 2011–2015 are appropriate and realistic.

#### 3.3.1 Current strategy objectives

Two objectives are central to the strategy:

- to avoid or reduce the amount of overall waste and
- to maximise the useful life of materials by making them last longer through re-use and recycling.

This can be contextualised as an effort to 'tackle the summit' of the waste hierarchy (Figure 1), by placing focus on the top three tiers (waste avoidance, reuse and recycling).

This review has considered similar objectives statements contained in policy and strategy documents interstate and around the world. The finding from this benchmarking exercise reveals that whilst the objective statements contained in the current strategy are clearly well focused, they fall short of packaging them into a unique selling point to promote investment behind the core objective.

The contemporary practice for objective statements as used in waste and resource sector strategies is to use a more all-encompassing global objective, sometimes labelled as a vision or mission statement. The economic

importance of the sector is gradually being recognised and policies and strategies reflect this. It is becoming more common to reflect the economic dimension of waste and resource management strategies, particularly since the onset of the global economic crisis.

#### Importance of strategy in the waste and resources sector

A waste strategy is an important tool in establishing a strategic (forward looking), unified, consistent approach to improving resource efficiency and protecting the environment, society and local economy from the negative aspects of production and consumption.

Through the strategic planning process, stakeholders including government, producers, retailers, waste managers and local citizens can identify a common direction and a platform on which to focus investment and conduct further research. The shortfalls of the market can be identified enabling intervention to capture and redistribute funds, to correct perceived distortions in the market for the protection of the unrepresented areas of the market (environment and society in particular).

The effect is to enable public and industry awareness and education to be focused and to create a more level playing field and stable business and investment environment for all.

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5 <http://www.zerowaste.sa.gov.au/upload/resource-centre/publications/waste-strategy/4821ZWSA%20WASTE%20STRATEGY%2011.12.11.pdf>.



For example, the Scottish Waste Prevention Plan defines the following mission statement:

*To achieve a zero waste Scotland, where we make the most efficient use of resources by minimising Scotland's demand on primary resources, and maximising the reuse, recycling and recovery of resources instead of treating them as waste.*<sup>6</sup>

**Conclusion**

A paradigm shift is taking place. The economic value of the sector is becoming equally important to the policy-making process, if not more important than traditional environmental and public health considerations. This is a natural trend considering the shift of focus within the industry away from 'waste' and towards 'resources'.

During the course of this study we have discussed what could potentially be an overarching objective statement that would fit the South Australian situation. A brief brainstorming session on this issue was also held during a joint meeting with key stakeholders, Local Government Association of South Australia (LGA), SA Branch of the Waste Management Association of Australia (WMAA), and Keep South Australia Beautiful (KESAB).

The discussion covered the following issues, which we consider to be worthy of trying to encapsulate within a strategic objective statement:

- A resource efficient economy where the best, or full value, is secured from products and materials produced and consumed across the state
- A stable and efficient market for investors, essentially a clearly articulated policy framework that gives a solid platform for investment decisions
- A culture enabling the SA community, businesses and institutions to continue and strengthen their role in implementing zero waste strategies and programs locally, nationally and internationally.

**3.3.2 Current strategy targets**

The Strategy 2011–2015 identifies priorities, actions and objectives broken down into different waste streams. In addition to including specific quantitative targets for municipal solid waste (MSW), commercial and industrial (C&I) and construction and demolition (C&D) waste, the strategy also includes qualitative measures and targets for problematic and hazardous waste, measures to combat disposal and illegal dumping, and priorities for research and development. The quantitative targets are shown in the Table 1 below.

*Table 1: Landfill diversion targets in South Australia's Waste Strategy 2011–2015*

Year	Metropolitan Diversion Targets			Non-metropolitan (Regional) Diversion Targets
	Municipal solid waste (MSW)	Commercial and industrial (C&I)	Construction and demolition (C&D)	All source sectors (MSW, C&I and C&D)
2009 (baseline)	55%	60%	80%	Not applicable
2012	60%	65%	85%	Maximise diversion to the extent practically achievable
2015	70%	75%	90%	Maximise diversion to the extent practically achievable

<sup>6</sup> <http://www.scotland.gov.uk/Resource/Doc/314168/0099749.pdf>.

To understand whether the strategic targets are appropriate and realistic we have referred to separate analysis undertaken recently for Zero Waste SA in the *South Australia Recycling Activity Survey, 2011-12*<sup>7</sup>.

This analysis directly addressed whether South Australia was achieving the strategy targets based on available past and current recycling and landfill data. As part of the analysis, a methodology was developed to replicate how the original targets in the strategy were conceived<sup>8</sup>. The methodology included establishing appropriate assumptions for how existing waste and recycling data should be interpreted and analysed for this purpose. The analysis came to the following conclusions.

#### ***Landfill reduction target***

South Australia should be in line to achieve this target (35% by 2020) once recent fluctuations in contaminated soil are taken into account (Figure 2).

#### ***Per capita waste reduction target***

If the current downward trend in per capita waste generation continues, South Australia should be on track to achieve the 2015 target (Figure 3).

#### ***Metropolitan area targets***

MSW - A diversion rate of 59% fell just short of the 2012 target.

C&I - The 2012 target was achieved with a diversion rate of 75%.

C&D - The diversion rate (80%) was below the 2012 target.

For the metropolitan diversion targets, additional analysis has been performed as part of this strategic review according to the methodology developed for the *South Australia Recycling Activity Survey, 2011-12*. The analysis has calculated the metropolitan diversion outcomes for 2009-10 and 2010-11, where sufficient waste and recycling data exists to apply

the same methodology. The results (Figure 4) show the trend in metropolitan diversion performance by source sector between 2009 and 2011.

#### ***The analysis suggests that:***

- MSW diversion in the metropolitan area is trending in line with the strategy targets, but it is difficult to predict if it will continue to match the higher rate of increased performance expected by the 2015 target
- C&I diversion is already well above the 2015 metropolitan target
- C&D diversion is fluctuating around the metropolitan target trajectory, but like MSW it is difficult to say that it will be able to continue to successfully increase in order to achieve the 2015 target value of 90%.

Thus, it is reasonable to say that all of these metropolitan diversion targets for 2012 have proven realistic, but the 2015 targets for MSW and C&D could be 'stretch' targets if on-going improvements are not sustained.

Based on MSW council audit data it would appear that if most recyclables remaining in the waste stream and food organics were to be collected, 70% is achievable although it will need continued consistent effort in education and roll out of food waste systems.

Because of varying timeframes and varying geographical areas (state-wide, metropolitan), comparing South Australia's diversion targets with those adopted elsewhere in Australia (Figure 5) can be difficult. Nevertheless, South Australia's targets for 2015 generally match or exceed targets that have been adopted by other Australian states and territories. However, some jurisdictions have post 2015 targets significantly greater than those currently set by South Australia.

<sup>7</sup> <http://www.zerowaste.sa.gov.au/upload/resource-centre/publications/reuse-recovery-and-recycling/Recycling%20Activity%20in%20South%20Australia%202011-12.pdf>

<sup>8</sup> Colby C, 5 December 2012, Personal Communication to Zero Waste SA: Proposed method for determination and reporting of performance against diversion targets in Figure 6 of South Australia's State Waste Strategy 2011-2015.

## Conclusion and recommendation

The targets in the Strategy 2011–2015 are set at realistic but challenging levels, appropriate for the current strategy. The source sector diversion targets are comparable to those in other Australian jurisdictions, but are not state-wide. It is wise not to have set materials-specific targets within municipal solid waste category, as these are notoriously difficult to track.

The following are recommended for consideration:

1. It may be worth considering setting separate recycling and recovery targets within the overall landfill diversion target, however definitions would need to be clear.
2. It may be worthwhile in the future considering quantitative targets for regional areas.
3. It is important to continue to track progress towards meeting the 2015 per capita 5% waste reduction target.

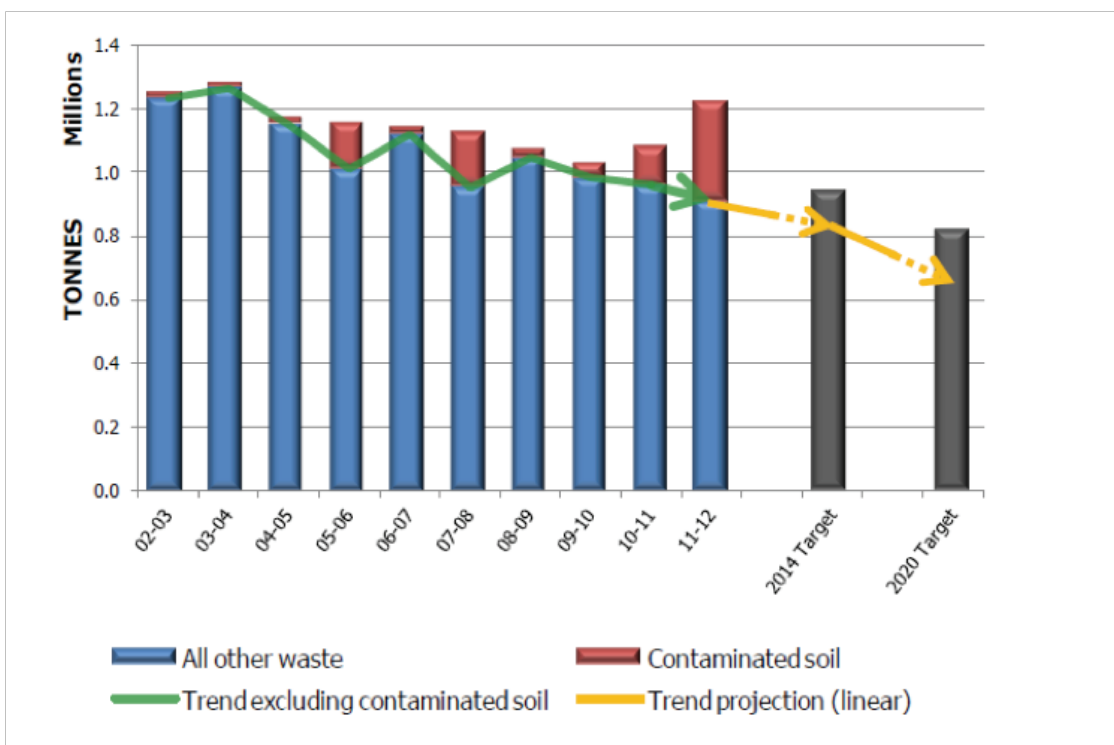


Figure 2: Landfill disposal trend in SA versus State waste strategy target for landfill reduction. Reproduced from Figure 7 in the South Australia Recycling Activity Survey, 2011–12 (ZWSA, 2013)<sup>9</sup>

	Per capita Waste Generation (kg/person/yr)			2015 target
	10-11	11-12	% change	
Standard Reporting Materials	2,300	2,210	-3.9%	5% reduction
Separately Reported Materials	960	930		
<b>Total</b>	<b>3,260</b>	<b>3,140</b>	<b>-3.7%</b>	

Figure 3: 2011–12 Recycling activity results for per capita waste generation vs. State Waste Strategy target. Reproduced from Table 2 in the South Australian Recycling Activity Survey, 2011–12 (ZWSA, 2013)

9 Zero Waste SA 2013, South Australia Recycling Activity Survey 2011-12.

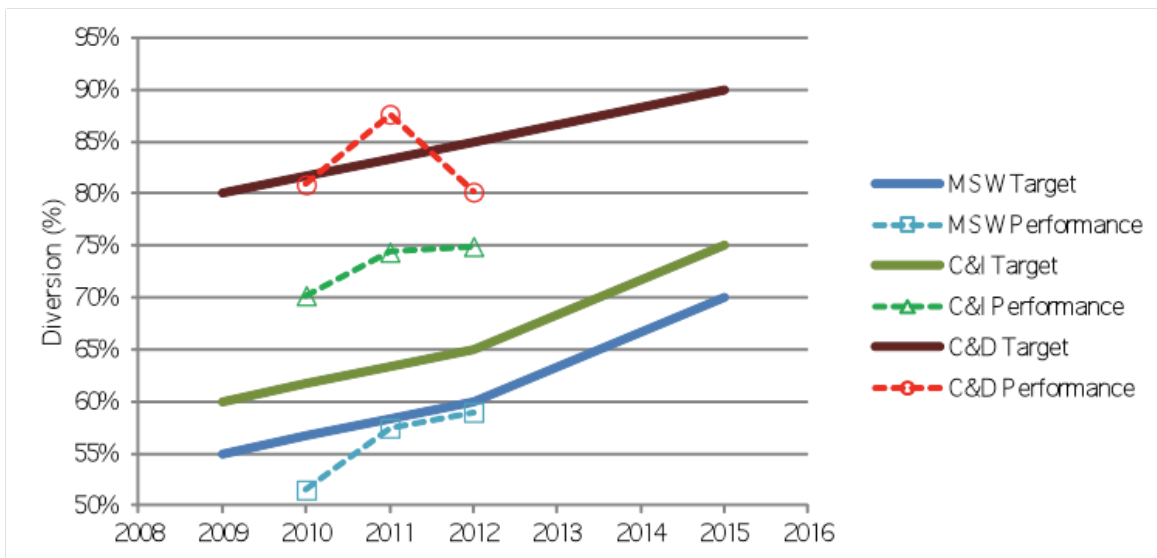


Figure 4: Additional analysis for metropolitan diversion targets in South Australia's Waste Strategy 2011–2015.

	2014			2015			2017			2020			2021			2025		
	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D
ACT				80%	80%	80%				85%	85%	85%				90%	90%	90%
NSW	66%	63%	76%										70%	70%	80%			
NT																		
Qld	50%	40%	50%				55%	50%	60%	65%	60%	75%						
SA*				65%	75%	90%												
Tas																		
Vic	65%	80%	80%															
WA				50%	55%	60%				65%	70%	75%						
* Metro target only																		

Figure 5: High-level comparison of diversion targets by source sector that have been adopted in other states and territories. Primary source: Department of Sustainability, Environment, Water, Population and Communities, Waste generation and resource recovery in Australia, Reporting period 2010-11

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### 3.4 OUTCOMES

Under the framework of the two waste strategies, South Australia has planned and implemented integrated waste management systems that have catalysed a step-change in performance, brought in new infrastructure and businesses and guarded against fragmentation and over-capacity. This has ensured efficient investment in infrastructure that has preserved market competition but avoided unnecessary duplication or over-investment.

That this has been achieved, we believe, reflects:

- clear strategic focus on core objectives, activities, outcomes and benefits

- sound understanding of waste and material flows and capacity requirements whilst defining, planning and implementing systems
- clear definition of material types, quantities, quality requirements and market development needs and opportunities
- close engagement, collaboration and cooperation between different stakeholders
- coordinated action providing incentives through targeted grants.

**Some of the most tangible strategic achievements that have been made since 2005 are summarised below. In the following section, we attach a dollar-value to some of these benefits.**

#### ***Kerbside collection system***

Local council adoption of unified separate collection services (three-bin systems in all 19 metropolitan councils and 20 out of 49 regional councils), and excellent uptake by the community

#### ***Regional infrastructure investments***

Investment and economies of scale in service provision for regional councils

#### ***Recycling business***

Significant increases in recovered materials (from 62% in 2003-04 to 77% in 2011-12) and sales value, leading to new business and jobs

#### ***Composting industry***

Establishment of a thriving and demand-responsive organics recycling industry, that operates with gate fees that compete favourably with base-costs of landfill

#### ***Industrial efficiency***

Reduced resource consumption and improved productivity, including waste / materials, water and energy efficiency

#### ***Hazardous waste***

A state-wide household and farm hazardous waste management system that does not rely on long-term storage of chemical waste and therefore poses limited long-term environmental and financial liability

#### ***Public information and awareness***

A user-friendly, and widely appreciated, recycling information and advisory service, operating at a very low unit cost, across multiple user interfaces

#### ***Knowledge generation and leverage of research ability***

The Zero Waste Centre for Sustainable Design and Behaviour, a \$2 million partnership between the University of South Australia and Zero Waste SA, created to develop innovative proposals of global relevance in sustainable design and behaviour change

#### ***Savings within government***

Budget savings for state and local government through coordinated strategy and procurement.

# 4 Economic benefits

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## 4.1 SCOPE

This review aims to provide an understanding of the economic dimension of the strategy that will, in turn, help articulate and clarify the case for allocation of public funds to the sector.

This section summarises the findings from a full and detailed report<sup>10</sup> on the economic analysis including an auditable trail of input data and assumptions provided at Annex D. The work involved:

- analysis of the direct and indirect (flow-on effects) economic contribution of the waste management<sup>11</sup> and the resource recovery<sup>12</sup> industry sectors in South Australia
- analysis of a representative range of Zero Waste SA programs, demonstrating the return on investment that these programs have achieved.

This study extends and supplements the previous work of the Cost Benefit Analysis (CBA) carried out by MMA and BDA Group in 2007<sup>13</sup> for the first strategy period<sup>14</sup> (2005–2010), which showed a modest net incremental benefit.

This study drills into specific programs, and places the economic contribution of the waste and resources sector in the context of the overall South Australian economy.

## 4.2 SOUTH AUSTRALIA'S WASTE AND RESOURCE RECOVERY SECTOR

The waste management industry is an important contributor to the South Australian economy. Macro-economic analysis reveals the following.

- Gross industry turnover is estimated at \$1,020 million.

- Value added by the industry in 2011–12 was \$280 million, or \$504 million once multiplier effects are taken into account. This is equivalent to 0.58% of Gross State Product (GSP).
- Waste management services are provided directly by private sector firms and local government authorities operating within the waste management sector and also by industrial sectors that provide their own services.
- Contributions by these sectors to GSP are 0.38%, 0.07% and 0.13%, respectively. An implication is that local government is responsible for 12% of economic activity in this area.
- Employment is estimated to be 2,900 jobs, or 3,100 when measured as full-time equivalents (FTE)<sup>15</sup>. With multiplier effects included there are an estimated 4,700 jobs in total (4,800 FTE). Approximately 20% of this total is employment generated through local government activity.

The local government component of waste management activity appears relatively modest in economic terms. However, this council component is complex. Sources are highly diffuse and material types very varied with relatively low monetary value. This gives rise to the relatively high level of effort and resources that are put into managing the municipal waste flow.

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<sup>10</sup> EconSearch 2014, *Economic Aspects of the Zero Waste SA Strategy Review. A Report to Zero Waste SA prepared by EconSearch as part of the RWA consortium.*

<sup>11</sup> ANZSIC Classification 29-Waste Collection, Treatment and Disposal Services.

<sup>12</sup> ANZSIC Classification 2922-Waste Remediation and Materials Recovery Services.

<sup>13</sup> <http://www.bdagroup.net/wp-content/uploads/2010/05/INEPC-NPC-JWG-Complementary-mechanisms-Dec-2007.pdf>

<sup>14</sup> MMA and BDA Group, for ZSWA. 2007, *South Australia's Waste Strategy 2005-2010 Benefit Cost Assessment Volume 1: Summary Report.* Note: EconSearch were also involved in the preparation of this report.

<sup>15</sup> In this case FTEs are higher than total jobs which is unusual but does happen in some other industries such as agriculture.

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Table 2, below, places the overall significance of the waste management and resource recovery industry into perspective.

**Table 2: Relative scale of the waste management and resources recovery industry compared to other sectors of the economy, 2011-12<sup>16</sup>.**

Sector	Direct contribution to GSP (\$ million)	Direct employment (FTE)
Waste and resources recovery <sup>a</sup>	280	3,100
Water	550	3,100
Air transport	290	1,700
Accommodation	600	6,000
Fishing and aquaculture	210	1,800
Fossil fuel electricity generation	330	850
Other electricity generation <sup>b</sup>	100	250

a Includes waste management services provided directly by private sector firms and local government authorities operating within the waste management sector and also by industrial sectors that provide their own waste management services. It does not include production activities involving the use of recovered materials such as compost and recycled plastics.

b Includes biomass, geothermal, solar, tidal and wind.

Based on ABS employment data<sup>17</sup>, the resource recovery sector alone generated approximately 1,440 FTE jobs and 2,200 with multiplier effects included. This represents approximately 45% of the total waste and resources recovery sector employment of 4,800 FTE. In terms of Gross State Product approximately \$125 million directly and almost \$230 million in total is generated by the

resource recovery sector. These estimates do not include all activities involving the use of recovered and recycled materials and therefore almost certainly understate the size and significance to the South Australian economy.

The analysis of the waste industry's economic contribution to the state economy relied heavily on the Australian Bureau of Statistics (ABS) publication *Waste Account, Australia, Experimental Estimates* (ABS 2013a)<sup>18</sup>. This publication provides a series of experimental tables showing information on the generation and disposal of waste to landfills or to recycling facilities, the supply of recycled materials in the economy and related financial flows.

The methodologies and data used in the ABS publication will be reviewed and assessed by the ABS over time to improve the quality and usefulness of future information. It is a recommendation of this report that Zero Waste SA engage with the ABS in this review process so that the data will provide a clear and transparent indication of waste industry activity across all sectors of the economy at the state level, particularly in the value and use of recoverable and recyclable materials.

### 4.3 ECONOMIC EVALUATION OF ZERO WASTE SA PROGRAMS

#### 4.3.1 Method

The Cost Benefit Analysis principles and methods used were according to those outlined in:

- Commonwealth Government Department of Finance and Administration 2006a *Introduction to Cost-Benefit Analysis and Alternative Evaluation Methodologies*<sup>19</sup>
- Commonwealth Government Department of Finance and Administration 2006b *Handbook of Cost-Benefit Analysis*<sup>20</sup>.

16 EconSearch (2013), *Input-Output Tables for South Australia and its Regions 2011/12 Update: Technical Report*, report to Department of Premier and Cabinet, November.

17 2011 Census data adjusted for movement in labour force data between September Quarter 2011 (when the Census was held and the four quarter average for 2011/12

18 <http://www.abs.gov.au/AUSSTATS/labs@.nsf/DetailsPage/4602.0.55.0052013?OpenDocument>

19 [http://www.finance.gov.au/sites/default/files/Intro\\_to\\_CB\\_analysis.pdf](http://www.finance.gov.au/sites/default/files/Intro_to_CB_analysis.pdf).

20 [http://www.finance.gov.au/publications/finance-circulars/2006/docs/Handbook\\_of\\_CB\\_analysis.pdf](http://www.finance.gov.au/publications/finance-circulars/2006/docs/Handbook_of_CB_analysis.pdf).

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The CBA method has the following key characteristics.

- The CBA includes a base case or counterfactual scenario, that is, the benchmark against which the 'with Zero Waste SA investment'<sup>21</sup> scenario was compared. The base case was defined as that which would have occurred without Zero Waste SA investment.
- The CBA was conducted over a 30 year time period and results were expressed in terms of net benefits. That means the incremental benefits and costs of the 'with Zero Waste SA investment' scenario relative to those generated by the base case 'without Zero Waste SA investment' scenario<sup>22</sup>.
- Costs and benefits were specified in real terms (constant 2013 dollars). Past and future values were converted to present values by applying a discount rate of 6%.
- In order to account for uncertainty, sensitivity analysis was undertaken using a range of values for key variables.
- The evaluation criteria employed in the analysis are Net Present Value (NPV)<sup>23</sup> and Benefit-Cost Ratio (BCR)<sup>24</sup>.
- In the full report analysis, costs and benefits for both the 'with Zero Waste SA investment' and 'without Zero Waste SA investment' scenarios have been listed in tabular form. These include those that can be readily identified and valued in monetary terms as well as those which cannot be easily valued in monetary terms because of the absence of market signals. The tables provide an indication of the likely distribution of the costs and benefits between stakeholder groups and the source of the information.

This method of analysis enables us to determine incremental economic benefits to society from a specific program intervention.

A positive NPV means that after weighting the financial costs and benefits of the particular program, there is a net positive economic benefit to society.

BCR measures the return on investment of the program per dollar spent.

#### METHODOLOGY FOR THE ECONOMIC ANALYSIS

Programs were selected to represent as broad a range of Zero Waste SA's types of intervention as possible within the scope of the study and resources. Choice was not based on preconceptions of performance or any specific single area of interest. Effort was made to ensure that analysed programs were relevant to different economic spheres and stakeholders. Stakeholders specifically included metropolitan and regional local government, industry and the community.

This analysis does not attempt to assign values to the wider environmental and social benefits, which may be significant in some cases. It focuses on measurable economic benefits. This means the results could be considered conservative.

Zero Waste SA works in a coordinated way with a range of stakeholders. The program benefits accrue to all the stakeholders and should not be taken as belonging to, or solely resulting from, the contribution of Zero Waste SA. Rather, the benefits should be viewed in context of Zero Waste SA's catalytic 'change agent' role. This role channels waste levy funds into targeted grant initiatives that support the State Government's policy on diversion from landfill and industry sustainability.

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21 This investment could be simply direct grant funding or could include other forms of investment (eg advertising, education), depending on the case being examined.

22 Where incremental benefits = ('with Zero Waste SA' benefits – 'without Zero Waste SA' benefits) and incremental costs = ('with Zero Waste SA' costs – 'without Zero Waste SA' costs).

23 NPV was defined as discounted net benefits, where net benefits = (incremental benefits – incremental costs).

24 BCR was defined as: discounted incremental operational savings/discounted incremental net investment



### 4.3.2 Metropolitan kerbside recycling

#### *Program description*

Zero Waste SA has been working with metropolitan and regional councils to develop a consistent, three-bin kerbside waste collection system (residual waste, comingled dry recyclables and organic waste). Before 2005, many metropolitan councils had, or were experimenting with, various kerbside collection systems to divert waste from landfill.

Zero Waste SA facilitated the rationalisation by metropolitan councils of their systems to a common, high performing three-bin system through the Kerbside Waste Incentives Program.

The program set out to achieve:

- consistency
- economies of scale
- opportunities for joint contracting
- common education material and messaging
- improved recycling performance
- less waste to landfill
- increased private sector activity in downstream processing, and
- better data collection and accountability.

Zero Waste SA identified that in order to achieve the stretch target of 70% kerbside waste diversion by 2015, food waste would need to be collected with other organic waste. Zero Waste SA has assisted councils to pilot appropriate household food waste collection systems through its Kerbside Performance Plus Program, and continues support to implement food waste collection.

Zero Waste SA has also implemented the *Recycle Right*<sup>®</sup> program, which aims to provide accurate and consistent information on how to separate household waste appropriately, in an effort to reduce contamination rates in kerbside-collected bins and increase recycling activity.

The *Recycle Right*<sup>®</sup> program uses media advertising, social media, fact sheets, a template collection calendar design, a 1300 recycling ‘hot line’, an education resource for non-English speaking members of the community, school education materials, banners, flyers and other education materials such as bin tags, and workshops and

site visits for council staff and elected members delivered by KESAB.

Zero Waste SA continues to work with councils to encourage use of the *Recycle Right*<sup>®</sup> brand and suite of educational resources, and to develop these resources further.

#### *Results of the analysis*

The results of the Cost Benefit Analysis expressed in terms of the NPV are provided in Table 3.

**Table 3: Net Present Value of the kerbside recycling intervention**

	\$ <sup>a</sup>
Avoided kerbside collection costs	36,127,865
ZWSA investment costs	-8,074,445
Local Government additional investment costs	-5,926,851
<b>Net Present Value</b>	<b>22,126,569</b>

<sup>a</sup> In 2013 dollars (consistent for all tables in this section). NPV calculated over 30 years

Relative to the base case, it is apparent that this investment generated significant net benefits to the South Australian community of approximately \$22.1 million. Expressed in terms of annual net benefits, this would equate to more than \$1.6 million per year.

The Benefit Cost Ratio (BCR) for this project, based on expected values for key variables is estimated to be 2.6. In other words, for every dollar invested, \$2.60 is returned in kerbside collection cost savings.



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### ***Sensitivity analysis***

The sensitivity analysis on key variables:

- on the discount rate, shows very little variation in the NPV and BCR
- on the base case kerbside separation efficiency assumptions, shows a significant variation on the NPV and BCR but the result is still positive over a 50% range in this variable (+/-25%)
- on local government investment in the scheme, shows some variation in the NPV and BCR, but the result is still positive over a 50% range in this variable.

### **4.3.3 Regional Infrastructure Implementation Program**

#### ***Program description***

Prior to Zero Waste SA, regional approaches to waste management service delivery were almost non-existent. Most small regional landfills were at a poor level of performance with little or no oversight due to a lack of regional approaches and appropriately dedicated resources. Zero Waste SA co-invested with the councils in regions to develop regional waste strategies and implementation plans as part of the first state waste strategy.

The Regional Infrastructure Implementation Program was developed to provide grant co-financing investment for regional waste management and resource recovery facilities. Grant assistance encourages local councils and private businesses to adopt alternatives to landfill. New operational techniques and facilities are consistent with the regional strategic plans for waste management.

In total, 109 individual regional investment projects have been supported since 2005. Three such projects were selected for economic analysis from groupings that consider geographical spread and facility type, while remaining uninfluenced by other factors:

- **Wattle Range Resource Recovery Facility**

In 2006 Wattle Range Council planned to construct resource recovery facilities on Council land in Millicent, Penola and Beachport. The Council encountered some obstacles with gaining planning approval and as a result the planned Beachport facility did not go ahead. The Millicent and Penola facilities were commissioned in July 2011 and today receive hard refuse, green waste, scrap metal and bulky items from the public<sup>25</sup>. Through this project the Council was able to rationalise to two resource recovery sites (down from seven). Waste and recyclables received at these two sites are aggregated and placed into large containers for transport to Mount Gambier resulting in lower collection and transport costs. The facilities have enabled the Council to increase resource recovery.



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<sup>25</sup> Kerbside recycling collection is also provided to residents by Council for dry comingled recyclables, and these items do not come through the waste transfer station.

- Cleve Transfer Station and Recycling Facility**  
 In 2006 the District Council (DC) of Cleve planned a transfer station and recycling facility at Cleve. The total project cost was approximately \$525,000. This site was commissioned in 2010-11 and receives recyclables from the public, as well as commercial and industrial and construction and demolition waste from businesses in the region. The new facility replaced existing transfer stations at Cleve, Darke Peak, Arno Bay and Rudall. Centralisation and greater aggregation of waste, sorting and baling of recyclables on site has reduced transport costs and also achieved greater value by presenting the material in a form suitable for delivery direct to market.



- Regional Construction and Demolition (C&D) Resource Recovery Facility**  
 In 2008 a private company planned an integrated construction and demolition resource recovery facility. This facility was commissioned in January 2013 and receives construction and demolition materials from builders and councils in the surrounding regions. Materials are recovered using mechanical and manual sorting procedures. The construction and demolition resource recovery facility resulted in improvements in sorting efficiency and product quality, leading to greater quantities of recovered materials and value.

### *Results of the analysis*

Zero Waste SA's financial contribution for the Wattle Range Recycling Facility was small, being about 5% of total investment funding. It did not generate incremental benefits and the project would reportedly have gone ahead without the funding contribution from Zero Waste SA, although access to this funding may have brought forward Council's development timeframes. Since the funding is effectively a transfer of public funds from South Australian waste levy payers to Wattle Range rate payers, the incremental costs and benefits are zero and hence the NPV for this project is also zero. It should be noted, however, that the need for rationalisation of regional facilities that was identified in the regional strategies, co-funded by Zero Waste SA, and the regulatory pressure to close poor performing landfills as articulated in the first state waste strategy, were the precursors for this investment.

The results of the CBAs of the Cleve and regional C&D resource recovery infrastructure projects expressed in terms of the NPV are provided in Tables 4 and 5.

**Table 4: Net Present Value of the Cleve Transfer Station and Recycling Facility**

	\$ <sup>a</sup>
Gate fees	-28,066
Avoided gate fees (ratepayers)	28,066
Sale of recyclables	7,017
Residual value of project capital	-4,316
Capital expenditure	-39,651
Site operating costs	20,000
Transport costs - general waste disposal	9,667
General waste disposal fees	31,687
Transport costs - recyclables to Adelaide	-5,617
<b>Net Present Value</b>	<b>18,787</b>

Relative to the base case, it is apparent that the Cleve investment generated modest net benefits to the regional community of approximately \$19,000. Expressed in terms of annual net benefits, this would equate to almost \$1,400 per year.

The BCR for this project, based on expected values for key variables is estimated to be 1.4. For every dollar invested \$1.40 is returned in operational cost savings.

**Table 5: Net Present Value of the Regional Construction and Demolition Resource Recovery Facility**

	\$ <sup>a</sup>
Gate fees	0
Sale of reprocessed material	775,357
Residual value of project capital	-73,590
Capital expenditure	-332,453
Site operating costs	-1,333,038
Residual waste disposal costs	4,327,574
<b>Net Present Value</b>	<b>3,373,850</b>

Relative to the base case, it is apparent that this investment generated significant net benefits to the regional community of approximately \$3.4 million. Expressed in terms of annual net benefits, this would equate to \$245,000 per year.

The BCR for this project, based on expected values for key variables is estimated to be 11.5. For every dollar invested \$11.50 is returned to the project proponent.

### **Sensitivity analysis**

The results of the analysis were re-estimated using values for key variables that reflect the uncertainty of those variables. Sensitivity analyses were undertaken for different values of the following variables:

- discount rate
- gate fees
- income received from reprocessed materials
- disposal costs for residual waste
- operating costs for reprocessing waste.

Sensitivity analysis for both the Cleve and the Regional C&D projects shows some variation in the NPV and BCR for all parameters, but the results are still positive. For example, for the Regional C&D project discount rate values of 4% and 8% yielded NPVs of \$4.1 million and \$2.9 million, respectively. Gate fees in the range +/- 25% produced NPVs of \$4.5 million and \$2.3 million.

### **4.3.4 Industry Program**

#### **Program description**

The Industry Program assists businesses improve their international competitiveness through driving productivity gains.



Resource assessments and evaluation form part of the Industry Program and address the avoidance and reduction of waste, energy, water and materials.

The Industry Program provides resource assessments in partnership with individual business clients that address:

- energy, water and materials
- leaner production
- productivity assessments.

Innovation and systems are also important in the Industry Program and address and facilitate:

- industry associations (collective approaches for businesses within an industry sector)
- industrial symbiosis (collective approaches for businesses co-located in a geographical area)
- commercialisation (business opportunities associated with the development of new and innovative sustainable products and services)
- sustainable investment and trade (opportunities to attract private investment into major sustainability initiatives, such as sustainable buildings, manufacturing and other capital investments)
- circular / sustainable economy (capitalising on the economic opportunities associated with transitioning to a more sustainable economy, where resources, such as energy, water and materials, are valued by the market place).

Under the program a number of activities have been undertaken, and these include:

- facilitating and funding resource efficiency assessments (materials, energy and water) for client organisations
- providing advisory services that assist clients to better manage waste contracts including recycling systems advice
- funding training and information sessions with industry regarding waste management and resource efficiency
- assisting clients to submit applications to the Energy Efficiency Information Grants and Cleantech technology investment programs
- developing 37 client case studies showcasing client achievements, which can be used to attract new clients
- facilitating industry networking and events
- establishing a range of partnerships and sponsorships to help drive behavioural change with 14 industrial and economic development associations

- piloting a supply chain sustainability program with SA Power Networks and rolling this out to metropolitan Adelaide and key regions.

Our analysis focused on the component of the overall program associated with facilitating and funding resource efficiency assessments, covering waste management issues, energy and water.

In 2012 and 2013 Zero Waste SA undertook two surveys of participating clients to assess action on resource efficiency improvements since receiving their resource efficiency assessments. This analysis is based on the results of those surveys.

In total the program has worked with 229 clients and 81 clients are currently active. Zero Waste SA sent the survey to 51 clients and 28 responded. A total of 24 responses that contained robust data have been analysed.

### ***Results of the analysis***

The results of the CBA expressed in terms of the NPV are provided in Table 6. These results are based on the expected values for key variables.

**Table 6: Net Present Value of the Industry Program Resource Efficiency Assessments**

	\$ <sup>a</sup>
Avoided costs - waste to landfill	1,193,131
Avoided costs - landfill diversion	-592,682
Avoided costs - electricity	3,416,306
Avoided costs - gas	4,760,869
Avoided costs - fuel	1,740,461
Avoided costs - water	-1,385,035
Resource efficiency investment costs	-1,360,915
<b>Net Present Value</b>	<b>7,771,134</b>

Relative to the base case, it is apparent that this investment would generate significant net benefits to industry program clients of approximately \$7.8 million. Expressed in terms of annual net benefits, this would equate to \$560,000 per year.

The BCR for this project, based on expected values for key variables is estimated to be 6.7. In other words, for every dollar invested \$6.70 is returned in operational cost savings.

This measures only the direct financial benefit from acting on the recommendations of the audit and excludes wider benefits that might accrue from improved financial viability and competitiveness of the enterprises, and the external environmental benefits.

- discount rate
- waste to landfill annual contract price increase
- recycling collection annual contract price increase
- time lag, base case.

**Sensitivity analysis**

The results of the analysis were re-estimated using values for key variables that reflect the uncertainty of those variables. Sensitivity analyses were undertaken for different values of the following variables:

Sensitivity analysis shows very little variation in the NPV and BCR for the latter three variables, with a notable variation calculated for the discount rate only. Discount rate values of 4% and 8% yielded NPVs of \$10.2 million and \$6.0 million and benefit cost ratios of 8.8 and 5.3 respectively.

**4.4 SUMMARY**

This analysis provides a marker for the financial effectiveness of interventions made and part-financed by Zero Waste SA. The primary financial net benefits in current values reported above are summarised below.

The assessed programs, however, represent less than 10% of the overall total investment in programs by Zero Waste SA since its foundation in 2004.

<i>Summary of programs evaluated</i>		
<b>Program</b>	<b>NPV of cost savings</b>	<b>Grant Contributions</b>
• Regional Infrastructure Investment Program	\$3.39 million	\$450,000
• Metropolitan kerbside recycling	\$22.1 million (equivalent to \$1.6 million per year)	\$7 million
• Industry Program	\$7.77 million	\$1.8 million *
<b>Total cost of programs evaluated</b>	<b>\$9.25 million</b>	
<b>Total net benefits of programs evaluated</b>	<b>\$33.3 million</b>	

*\*This figure includes \$1.1 million of private investment leveraged through the Industry Program, \$0.3 million of Zero Waste SA grants and staff time, and \$0.4 million of other SA and Federal Government investment.*

We do not consider it credible to scale up these numbers to present an overall economic impact from the entirety of Zero Waste SA programs. The costs and benefits of programs are specific to each case and the diversity of the program / project types supported by Zero Waste SA renders such scaling unwise.

It can be summarised, however, that all bar one of the program interventions selected for the analysis gave positive, and in some cases significantly positive, net economic benefits. The one project (Wattle Range) that did not generate any tangible net economic benefit was assessed as neutral and not negative.

Benefit Cost Ratios for the evaluated programs ranged from 1.4 (Cleve project) to 11.5 (regional C&D processing facility), with the metropolitan kerbside recycling program delivering a BCR of 2.6 and the Industry Program a BCR of 6.7. Any investment with a BCR greater than 1.0 indicates a worthwhile investment with a positive return. If similar economic outcomes were found from analysis of the remaining Zero Waste SA programs, the diversity of which is reflected in the agency’s annual business plans, the economic benefits would be much greater.

Clearly, the results presented here reflect Zero Waste SA’s ability to design and coordinate the implementation of tactical interventions that generate significant economic benefits to society.

# 5 International developments and best practice

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In reviewing the waste strategy it is important to consider relevant international developments and best practice in waste management, which may inspire and influence the best approach moving forward for South Australia.

## 5.1 SCOPE

Various aspects of Zero Waste SA's activities could be benchmarked against national and international peers and current research, including types of systems and technologies, management practices, financing methods, institutional approaches, research and development, and means of stimulating public engagement and education. This study covers a selection of leading examples identified in literature and by leading experts in the field to provide insight into global trends. Evaluation of Zero Waste SA and the current strategy against these select peers and global practice can assist with information and direction that is relevant to future waste management policy and the development of a new five-year waste strategy for 2016–21.

Zero Waste SA is recognised as an established leader in the application of different approaches to waste and resource management, both in terms of technological 'hardware' and institutional 'software'. The future of the sector is evolving to embrace resources management and the potential presented by a circular economy. We considered that it would be of greatest value to concentrate on:

- the concept and practice of resource efficiency
- practices and potential savings from waste prevention
- social innovation
- different types of policy instruments in common use.

<sup>26</sup> Although various resources are required to make a product, here only materials and energy are discussed.

<sup>27</sup> Chile and Argentina alone produce 90% of the global supplies of lithium, and China accounts for 95% of the world's output of rare earths (Grosse, 2010).

## 5.2 RESOURCE EFFICIENCY

### 5.2.1 Context

#### *Definition of resource efficiency*

Resource efficiency can be defined as the consumption of resources per unit of economic output (which can be a product or a service)<sup>26</sup>. Fundamentally, two aspects of resource efficiency can be distinguished: quantitative and qualitative efficiency. While quantitative efficiency obviously focuses on reduction of the quantities of the materials used, qualitative efficiency seeks to reduce or eliminate use of specific hazardous substances.

Benefits of quantitative efficiency are usually seen in terms of lower vulnerability to unreliable supplies, decreased dependency on global markets, and savings in purchasing expenditure.

Benefits of qualitative efficiency include all these as well as additional ones, such as savings due to avoidance of costly technologies associated with wastewater and solid waste treatment during production, solid waste treatment at the end of the product's use period, and the resulting reduction of risks to public health and the environment. Both benefits accrue now and for future generations.

Global concerns include climate change, the Earth's life-supporting services, intergenerational equity (future Australians do not pay for the failures of the present generation), the need to secure economic advantage and maintain and grow prosperity. Maintaining and growing prosperity can be achieved along various pathways, such as:

- increasing economic performance while reducing resource use
- identifying and creating new opportunities for economic growth and innovation, and
- ensuring security of supply of essential resources<sup>27</sup> (EC 2011).

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While views, priorities, concepts and proposed approaches vary widely, authors generally agree that 'continuing our current patterns of resource use is not an option'<sup>28</sup>.

Accordingly, policies on resource use and resource productivity have become increasingly prevalent and form a cornerstone for the Japanese 3R material flow policy and the European Union's (EU) strategies on natural resources and waste, with China and India gradually introducing similar ideas<sup>29</sup>. South Korea and the USA (individual state and federal) also have important policies in the area of resources use and / or recovery, as of course does South Australia.

An important distinction of such resource use policies relates to the links between materials use and economic development, or the challenge of 'dematerialisation', which can be understood as a decoupling of resources use and economic growth.

### 5.2.2 How resource efficiency helps

Resource efficiency aims to achieve more output with less input of materials and energy. It also incorporates measures such as design for disassembly, modular design for easy repair and refurbishment of spare parts and organisation of industrial 'ecology' in which materials will flow in closed cycles while maintaining high level of quality. This understanding has been adopted in the EU's *A Resource-efficient Europe – Flagship Initiative under the Europe 2020 Strategy*<sup>30</sup>(EU 2020 Strategy).

Above and beyond approaches that focus on the resources captured in products, resource efficiency policies invite businesses to develop new product-service systems with a service being the starting point for redesign, rather than an existing product. In addition to the technical challenges, such product-service systems need innovative business models to function. To emphasise this broader scope some authors use the term eco-effectiveness rather than eco-efficiency<sup>31</sup>.

28 As stated in the EU's Flagship initiative under the Europe 2020 Strategy (EC, 2011).

29 [http://www.academia.edu/1038529/Global\\_patterns\\_of\\_materials\\_use\\_A\\_socioeconomic\\_and\\_geophysical\\_analysis](http://www.academia.edu/1038529/Global_patterns_of_materials_use_A_socioeconomic_and_geophysical_analysis).

30 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0021:FIN:EN:PDF>.

31 <http://www.mcdonough.com/speaking-writing/cradle-to-cradle/#.UwTdKvmSzD4>.

32 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:266:0001:0014:en:PDF>.

33 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:174:0088:0110:en:pdf>.

### 5.2.3 Practice

Most practice in resource efficiency is simply driven by economic rationalism, where cost efficiency dictates decisions and initiatives to reduce use of resources. This can occur in any sphere of human activity including in the home, government, business and industry, and involves both provision of products or services. The driving factor in these situations is the increasing costs of resources whether they are raw materials, energy or other inputs.

#### Policy

More recently, governments have sought to implement resource efficiency related policies to achieve specific non-economic outcomes such as social or environmental outcomes. The rationale behind such decisions is usually to correct a perceived market failure which does not enable this outcome to be achieved otherwise.

Three such examples of policy initiatives on resources efficiency within the EU are:

- Batteries Directive of the European Union<sup>32</sup> (EC, 2006) prohibits the placing on the market of batteries and accumulators that contain more than 0.0005% of mercury and more than 0.002% of cadmium by weight. The Directive also requires those member states that have manufacturers to promote research and encourage improvements in environmental performance regarding content of mercury, cadmium and lead.
- RoHS (Restriction of Hazardous Substances) Directive of the European Union<sup>33</sup> (EU, 2011) restricts maximum concentration values of mercury, lead, chromiumVI, and the flame retardants polybrominated biphenyls and polybrominated diphenyl ethers, to 0.1% by weight, and of cadmium to 0.01% by weight in homogeneous materials in Waste Electrical and Electronic Equipment (WEEE). The Directive encourages manufacturers to replace these hazardous substances with safe or safer materials. The policy focus on these hazardous substances, among several others present in electrical and electronic equipment, is determined by both risk assessment and the availability of alternatives.



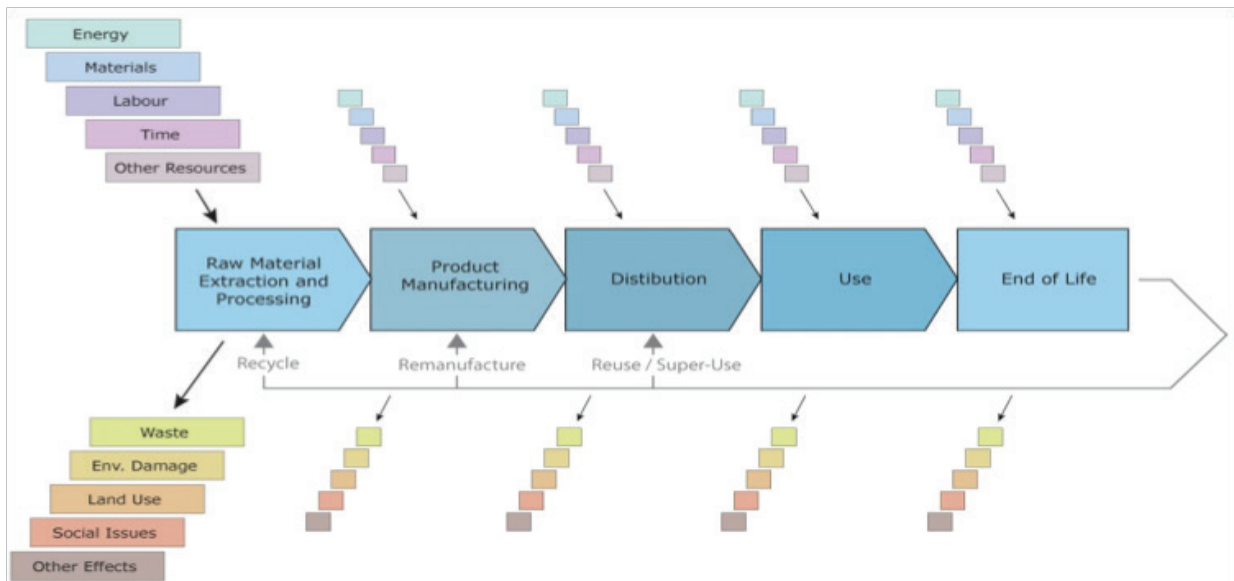


Figure 6: Life cycle (assessment) of a product. Source: [www.except.nl](http://www.except.nl)

- REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Regulation<sup>34</sup> (EC, 2006b) requires manufacturers and importers of chemicals to obtain relevant information on substances used. This information is shared with other organisations in the supply chain to manage these safely. Its scope covers all substances, whether manufactured, imported, used in production or placed on the market, with some exemptions. It also establishes the European Chemicals Agency (ECHA) to manage technical / administrative aspects of the REACH system at the EU level. The ECHA thus gathers and makes available information on hazardous substances, to be consulted by those concerned.

Efficiency in resource use can be addressed and achieved at any stage of the product's 'life cycle'; during raw material extraction and processing, product manufacturing, distribution, use, and at the end of its use period (Figure 6).

In South Australia, examples of these types of policy initiatives have included the National Environment Protection Measure for Used Packaging Materials and the state based Environment Protection (Waste-to-Resources) Policy.

### Design

Influencing the design stage of a product can have significant effect on the post manufacture life cycle. During design the decisions are made about materials, substances involved in the production process, and the assembly methods (which influence the potential for disassembly and recycling).

Design may go beyond improvements regarding resource use in the existing product. It may develop new product-service systems. One such example is Philips Lighting Leasing Business Concept, which implies that Philips remains the owner of the products and the materials contained in these, and the customer buys a lighting 'service'. The service is the starting point for redesign, rather than an existing product.

Green product innovation has been strongly encouraged in EU strategies. As stated below, public purchasing is seen as a way to encourage innovation, which the EU hopes will contribute to Europe's competitive advantage in the future.

34 [http://ec.europa.eu/enterprise/sectors/chemicals/reach/index\\_en.htm](http://ec.europa.eu/enterprise/sectors/chemicals/reach/index_en.htm).

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The importance of sustainability considerations is increasingly recognised among businesses. An example is growing interest from businesses in initiatives such as the Ellen MacArthur Foundation's promotion of a circular economy framework<sup>35</sup>. Membership of the World Business Council for Sustainable Development includes major multinationals. Even in *Harvard Business Review* articles on sustainability issues are appearing more frequently, with titles such as *Why sustainability is now the key driver for innovation*<sup>36</sup>, *The sustainability imperative*<sup>37</sup>, and *The sustainable economy*<sup>38</sup>.

Zero Waste SA has already been investing in better resource efficiency by design, in keeping with the core function of knowledge generation and leverage of research. Zero Waste SA's Research Centre for Sustainable Design and Behaviour was established in 2009 in a collaborative initiative with the University of South Australia (UniSA). The Centre undertakes a range of projects in resource efficiency relating to low carbon construction technologies, food waste recovery and sustainable buildings. Key researchers at the Centre have published books on best practice in achieving resource efficiency through better design. The Centre is establishing itself as leader in the field. Continuing this initiative would appear to stand South Australia in good stead.

### **Use**

Governments, as consumers, can encourage resource efficiency through progressive requirements for green public procurement. This can apply to office furniture, office supplies, catering, and arguably more importantly, public works including government buildings.

Public procurement of facility management for government offices can easily promote various sustainability policies regarding local sourcing, support to SMEs, fair trade, organic food, MSC certified fish, FSC certified wood, and others.

In the EU, public purchasing is seen as a potentially powerful policy instrument to encourage innovation, due to concerns about Europe's competitive advantage. Published examples include the Netherlands, Italy, Norway, Sweden, France, Germany and Finland.

Increasing use of biomass-based materials (Keegan et al, 2013) is also an issue. Primary production of biomass is bound to land use and may compete with food and fodder production. A more efficient and sustainable use of biomass is essential. Raw materials like biomass should be used several times in a cascading sequence of uses, where energy recovery is only at the end of the cascade, after other applications have been utilised. This is highlighted in the EU strategic document, *Innovating for Sustainable Growth: A Bioeconomy for Europe* (EC, 2012)<sup>39</sup>.

### **End-of-use**

After the use stage, products can enter into the reverse logistics chain for various activities to prolong use of the product and / or its materials. This can be done with different degrees of intervention exerted to change the state of the product:

- reuse (product can be reused as it is by someone else)
- repair
- refurbishing
- remanufacturing
- recycling of materials.

Internationally, a broad spectrum of policies have been devised and applied in all five areas of intervention across various regions and countries.

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35 <http://www.ellenmacarthurfoundation.org/about/history-1>.

36 <http://hbr.org/2009/09/why-sustainability-is-now-the-key-driver-of-innovation/>.

37 <http://hbr.org/2010/05/the-sustainability-imperative/ar1>.

38 <http://hbr.org/2011/10/the-sustainable-economy/ar1>.

39 [http://ec.europa.eu/research/bioeconomy/pdf/201202\\_innovating\\_sustainable\\_growth.pdf](http://ec.europa.eu/research/bioeconomy/pdf/201202_innovating_sustainable_growth.pdf).

#### 5.2.4 Financial benefits of resource efficiency

A 2009 study was commissioned by Waste and Resources Action Programme, known as WRAP (UK), to study the supply-side strategies for achieving waste savings. It identified seven such strategies, six of which fall within the definition of waste prevention (Table 7). WRAP (UK) report that

the potential for these opportunities, primarily lean production, means that the 'quick wins', defined as low or no cost waste savings that could be made by industry in the UK 2010–2020, are significant. WRAP (UK) report this could reach a potential overall saving of some GBP 40 billion per annum, due primarily to waste reduction.

*Table 7: Supply-side strategies considered for achieving waste savings<sup>40</sup>*

Strategy	Definition
Lean production	Reduced energy and material inputs into production processes through the design of lighter and leaner products and more efficient processes and manufacturing technologies
Material substitution	Substitution of highly carbon intensive materials for low carbon intensive materials
Waste reduction	A reduction in waste at the production stage that directly leads to a reduction in material requirements
Re-direction of landfill materials	Diversion of waste from landfill to recycling
Dematerialisation of the service sectors	Improving the efficiency of product use in the service sector through extending the lifetime of products, reducing edible food waste and eradicating junk mail
Strategies for sustainable building	Improving efficiency by introducing modern methods of construction such as modular design and off-site construction
Efficient use of existing infrastructure	Reduce material inputs into construction through replacing new build with retrofit

A separate report commissioned by the Department for Environment, Food and Rural Affairs, UK (DEFRA)<sup>41</sup> estimated, using 2009 data, that annual savings of around US\$66 billion (GBP 40 billion) were achievable by UK companies if they implemented solid waste prevention measures through lean manufacturing (including savings from low / no cost measures and those with a payback of greater than one year). The report estimated that 78% of the total savings potential is in the chemicals / non-metallic minerals, metals manufacturing, power and utilities, and construction sectors. Such resource efficiencies will help to maintain UK competitiveness if they are realised at a rate above that of their international competitors, and at the very least will help maintain the status quo.

A report commissioned by the Ellen MacArthur Foundation, *'Towards the Circular Economy: Economic and business rationale for an accelerated transition'*<sup>42</sup> (2012) considers the economic and business opportunity of pursuing a circular economy model. The 2012 report identifies the potential for the EU manufacturing sector to realise net materials cost savings worth in excess of US\$600 billion per annum by 2025 and to open up economic activity in the areas of product development, remanufacturing and refurbishment.

It seems reasonable to assume that proportional benefits are achievable in South Australia if initiatives continue and are enhanced by further adoption and promotion of appropriate resource efficiency strategies and initiatives.

<sup>40</sup> Source: Stockholm Environment Institute and the University of Durham for WRAP 2009, *Meeting the UK climate change challenge: The contribution of resource efficiency*.

<sup>41</sup> *The Further Benefits of Business Resource Efficiency* - [http://www.oakdenehollins.co.uk/media/221/Further\\_Benefits\\_of\\_RE\\_Final\\_report.pdf](http://www.oakdenehollins.co.uk/media/221/Further_Benefits_of_RE_Final_report.pdf).

<sup>42</sup> <http://www.ellenmacarthurfoundation.org/businessreports/ce2012>.

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## 5.3 WASTE PREVENTION INITIATIVES

### 5.3.1 Context

Waste prevention programs specifically focus on preventing waste from occurring and in turn decoupling economic growth from the environmental impacts of waste generation. Although prevention of waste can result in substantial economic savings, it can also have potential negative impacts on the economy as consumer behaviour and retail operations are potentially altered. Therefore in order to strengthen waste prevention behaviour and an improved use of resources it is generally recognised that an integrated mix of measures is required.

### 5.3.2 Evidence on household waste prevention

A 2009 international review for DEFRA on household waste prevention<sup>43</sup> found the most effective and frequently applied waste prevention instruments include:

- waste prevention targets
- producer responsibility
- variable rate charging (pay-as-you-throw or PAYT) systems for householders' residual waste
- intense public awareness / communications campaigns
- public sector funding pilot projects
- collaboration between public, private and third sectors.

The report suggested that effective combinations of these instruments can reduce the quantities of household waste by more than 10%, and that individual waste prevention measures tend to become effective where more than 15% of the population support these.

<sup>43</sup> Cox J, Giorgi S, Sharp V, Wilson DC, Blakey N 2010, *Household waste prevention – a review of evidence*, in *Waste Management & Research*, 28: 193 – 219 <http://wmr.sagepub.com/content/28/3/193.abstract>.

### *Highlights of selected international waste prevention initiatives*

#### *Austria*

Eco-shopping, or helping consumers make purchase decisions that minimised packaging or waste generation, was found to have the potential to reduce MSW by 1-3%, and an exemplary, partial decoupling of 'waste arising' and 'economic development' was achieved through a series of waste prevention measures.

#### *USA*

A study of 114 cities with PAYT schemes and 845 without, found the scheme reduced waste generation by 187 kg/person/yr (24%). Other studies have linked some displacement to illegal activity.

#### *Korea (Republic)*

A PAYT scheme introduced nationwide in 1995 resulted in a 15% drop in total waste arising.

#### *Belgium*

An exemplary case study in Flanders halved the average weight of a bag of mixed waste between 1995 and 2006, with the majority of materials also seeing a similar level of reduction.

#### *Finland*

This country commits to stabilising waste quantities, reducing to 2000 levels by 2016.

#### *Catalonia*

This country targets 10% reduction in MSW over a five year period and provides \$1.5m per annum funding for campaigns and pilot projects.

#### *France*

France sets various other targets including a 5kg/person reduction in household waste per year for five years, and also places a tax on disposable cutlery and crockery.

#### *Wales*

Wales sets an all-encompassing annual target of 'around a 1.5%' reduction in waste generation across all sectors compared to a 2007 baseline. Annual targets are set for C&D waste (1.4%) commercial and municipal waste (1.2%) and industrial waste (1.4%).

### 5.3.3 Evidence on business waste prevention

A review of motivations and barriers for business waste prevention was conducted by Wilson et al (2012)<sup>44</sup> the results of which are presented in Table 8.

This indicates that current efforts are well targeted such as business waste awareness training and assistance, and indicates that South Australia could focus future business waste prevention measures on promoting communication networks between business to business and business to customers.

**Table 8: Motivations and barriers for business waste prevention** <sup>45 46</sup>

	<b>Ethos</b>	<b>Roles and relationships</b>	<b>Resources</b>	<b>Contextual</b>
<b>Part 1: Motivations for business waste prevention</b>				
<b>Individual</b>	<b>Positive environmental attitudes</b>	<b>Champions Leadership</b>		
<b>Organisational</b>	<b>Corporate culture</b>	Open and participatory management Formal policies	<b>Productivity, efficiency and cost-savings</b>	
<b>Institutional</b>		Peer support Supplier and customer relationships Competitive advantage Image	<b>Business support</b>	<b>Compliance with legislation</b> Risk reduction Incentives
<b>Part 2: Barriers to business waste prevention</b>				
<b>Individual</b>	<b>Negative attitudes</b> Focus on recycling	<b>Lack of leadership</b>	<b>Lack of awareness, knowledge, understanding</b>	
<b>Organisational</b>	<b>Business priorities</b> <b>Corporate culture</b>	Poor communications Lack of integration	<b>Lack of resources</b>	Business size
<b>Institutional</b>		Supplier behaviour Poor communications Lack of customer demand	<b>Poor quality advice</b> <b>Poorly tailored advice</b>	

<sup>44</sup> Wilson DC, Parker D, Cox J, Strange K, Willis P, Blakey N, and Raw L, 2012, *Business waste prevention: a review of the evidence*, *Waste Management & Research*, 30(9) Supplement, pp. 17-28.

<sup>45</sup> Note: Only factors for which there is sufficient evidence are included in the table. Those with the strongest evidence are shown in bold.

<sup>46</sup> Brook Lyndhurst, *Social Marketing Practice and Resource Recovery Forum, 2009, WR1204 - Household Waste Prevention Evidence Review*, London: Defra Wilson DC, Parker D., Cox J, Strange K, Willis P, Blakey N, and Raw L, 2012, *Business waste prevention: a review of the evidence*, *Waste Management & Research*, 30(9) Supplement, pp. 17-28.

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### 5.3.4 Setting targets for waste prevention

Some countries have chosen to set targets for waste prevention (Section 3.3.2). Where targets have been set, one can distinguish three broad groups in terms of the level of ambition:

- **Medium ambition**

This involves either a relatively modest annual rate of waste prevention (~1%) continued for a relatively short period of time (up to seven years), or a total reduction in waste arisings of up to 10%.

- **High ambition**

This is either a relatively high annual rate of waste prevention (~2%) continued for 5–10 years, or a higher absolute reduction, in excess of 10%.

- **High ambition over a longer term**

This offers a relatively modest annual rate of waste prevention (~1%) but continued for a long period of time so that the absolute reductions can become very high.

Medium levels of ambition are the most prevalent in Flanders, France and Sweden. These have well-developed programs, with detailed strategies and a series of actions budgeted, to achieve 5–10% waste prevention over a five to seven year period.

Only one government body was found to have a set a high ambition. Wales has set high targets over the long term to reduce MSW by 1.2% per annum from 2006-07 through to 2050, giving a reduction of more than 20% by 2025 and 52% by 2050.

### 5.3.5 Measuring waste prevention initiatives

Measuring prevention is difficult in that it requires measuring something that has not been created. Efforts are continuing to devise adequate metrics to measure progress in waste prevention. Particularly challenging are any efforts that aim to establish internationally accepted indicators. Nevertheless, individual countries have adopted certain methodologies to aid policy-making processes.

Internationally the EU has adopted life cycle thinking.

Other current international efforts are mainly focussed on establishing common frameworks for the measurement of waste production; however these may evolve to cover waste prevention. Such initiatives include the Global Food Loss and Waste

Protocol being developed through an expert and stakeholder engagement process. The protocol will establish a globally consistent approach and give guidance to countries and companies to measure and monitor the food loss and waste that occurs within their boundaries and value chains.

In monitoring metrics, benefits should be calculated, at a minimum, as:

- cost
- carbon and tonnage savings.

Metrics also need to assess, for each potential action, both the resources required (costs) and an indicator of the relative ease of implementation (potentially qualitative). This facilitates ‘what if’ questions and iterative calculation of what can be achieved through alternative combinations of actions targeted at particular waste streams / sectors. One can compare the results against the levels of ambition that one is striving to meet.

### *Material Flow Accounting and Analysis*

Material Flow Accounting and Analysis (MFA) could be considered for South Australia.

MFA has emerged as one of the key tools to quantify and monitor human use of natural resources. It seeks to measure the physical counterpart of the monetary economy, in mass units. The concepts and methods of MFA have been increasingly standardised and are applied by statistical offices in many industrial countries (Eurostat, 2001, 2007). Aggregate material flow indicators have become an integral part of environmental reporting systems (for example EEA, 2007). Different materials have vastly different environmental implications, often exemplified by comparing one tonne of sand with one tonne of plutonium. The indicators of MFA thus report on the aggregate scale of the physical economy rather than on specific environmental consequences thereof<sup>47</sup>.

Countries that have a large share of manufacturing in their Gross Domestic Product (GDP) (Germany, 23%, Japan 20%, Italy 18%) regularly conduct economy-wide MFA and link these to policy. These countries import more metals and ores than they export (resource importing countries) and they have particularly large net exports.

<sup>47</sup> [http://www.academia.edu/1038529/Global\\_patterns\\_of\\_materials\\_use\\_A\\_socioeconomic\\_and\\_geophysical\\_analysis](http://www.academia.edu/1038529/Global_patterns_of_materials_use_A_socioeconomic_and_geophysical_analysis).

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In contrast, resource exporting countries do not regularly implement MFA as a government initiative. An exception is the UK in which manufacturing has a much smaller share (11.6%) but the country has developed MFA and used it for policy development. The countries that have a smaller share of manufacturing (Denmark, France, Netherlands, Norway, USA) do not regularly conduct MFA linked to policy<sup>48</sup>.

## 5.4 SOCIAL INNOVATION

### 5.4.1 The circular economy and the collaborative economy

The circular economy seeks to shift activity from a linear to a circular model by making better use of materials, by keeping materials in circulation through reuse and recycling, industrial symbiosis and other efforts to divert materials from landfill. It displaces some demand for new materials, but does not address the rate at which materials enter the circle, as evidenced by total material demand continuing to grow faster than the improvement in recycling rates.

While it is vital to maintain a focus on bending the linear economy into a circular one, thereby addressing the 'middle rungs' of the waste management hierarchy (recover, recycle and reuse), attention should also be focused on the most preferable 'rungs' of the hierarchy (reduce and avoid).

The rapidly growing momentum of the collaborative economy (known as sharing economy or access economy) is a means of doing this.

Rather than being focused on managing materials at end-of-life or on traditional resource efficiency (water, energy, waste, emissions reduction), the collaborative economy has the potential to address how resources are consumed, and ways in which this could result in less waste. It means designing systems that facilitate more efficient, cost effective and, in many cases, community-enhancing ways of enabling people to meet their needs by accessing what is already available by using idle assets (goods, time, space, skills). This considers the design of living systems, including how food is grown and prepared, how people clothe and transport themselves, and

how they meet their daily needs. It creates new patterns of behaviour in communities.

Two key elements that can support this approach are discussed in the following sections.

### 5.4.2 Fostering the collaborative economy using digital technology

Real-time access to the elements comprising the collaborative economy requires innovative new delivery systems.

The people who design web-driven systems that facilitate matching one person's or organisation's surpluses with another's needs are found in the digital technology community, using web platforms, 'mobile apps' and so on. The language they use revolves around 'peer-to-peer', 'resilience', 'do-it-yourself' and 'open source' rather than 'environment', 'green' or 'sustainability'.

### 5.4.3 Social innovation to support the collaborative economy

In 2010, Zero Waste SA, along with other corporate and philanthropic sponsors, funded the first van for OzHarvest, closely followed with a second van in 2012. As a consequence, OzHarvest has made an impact diverting food waste from both landfill and composting facilities. While this has been important, it has also solved food waste disposal problems for businesses, food purchase costs for charities and has contributed to the wellbeing of people in need. The OzHarvest system allows people to donate and accept food and to become involved as a volunteer, and the organisation's success, based on the concept of better sharing what we already have, has resonated with the South Australian community.

Another Zero Waste SA initiative that qualifies as 'social innovation' is the Share N Save website. This site is designed to curate and highlight ways in which people can meet more of their needs by accessing what is already around them, by mapping existing and potential sharing activity, including food swaps, community gardens, tool lending libraries, bike / car sharing, clothing swaps, co-working spaces and more.

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<sup>48</sup> Aoki-Suzuki C et al 2012, *International comparison and suggestions for capacity development in industrializing countries: Policy application of economy-wide material flow accounting*.

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The Share N Save website, though not yet at a critical mass, offers the potential to contribute to social connection and to ease the financial pressure on households, while contributing to the waste management hierarchy goals of reduce and avoid. Potential environmental outcomes are positive, but this is not, for many people, the primary reason for participation. They do so because it makes life better, easier, more enjoyable and more affordable.

### ***Selected examples of social innovation***

The Plastic Bank<sup>49</sup> is setting up plastic re-purposing centres around the world, where there is an abundance of both waste plastic and poverty. People are empowered to harvest plastics as a currency they can exchange for tools, household items, parts and 3D printing. The mission is to remove plastic waste from the land, oceans and waterways while helping people ascend from poverty and transition into entrepreneurship.

Social entrepreneurship is a large, well-established field, and there is a School for Social Entrepreneurs based in Melbourne<sup>50</sup>.

City governments and civic organisations are using new technologies aiming to increase resiliency, and reduce waste by igniting the sharing community in their own cities<sup>51</sup>.

An 'app' has been developed in the USA that matches donors who have surplus food with those who need food<sup>52</sup>.

In Brussels just recently, the world's first digital social innovation policy workshop was convened to explore a range of tools which might encourage and accelerate digital innovation to benefit society. The event was attended by more than 70 policy makers and practitioners<sup>53</sup>.

The Australian equivalent of Code for America is starting in Melbourne in 2014<sup>54</sup>. The newly launched Code for Australia will offer a fellowship program, an incubator program and a brigade of volunteer coders working on open source projects to facilitate community consultation between governments and citizens, and create 'apps' to solve social problems identified by this process. The American division has created 'apps' on social issues from locating school buses to the managing of fire hydrants during periods of heavy snowfall.

## **5.5 POLICY INSTRUMENTS**

Most existing policy arrangements or regimes have developed incrementally in an organic and sometimes ad hoc fashion over a relatively long period of time. This commonly results in a wide mix of types of policy instruments. Consequently, symptoms of 'policy layering' can result where policy instruments and programmes have been stacked on top of others. The resulting arrangements lack unifying overall logic, thus often containing counter-productive instrument mixes that are complex and costly to administer.

For these reasons, governments have become increasingly interested in crafting and adopting more carefully designed arrangements of instrument mixes, sometimes referred to as 'new governance arrangements'.

The following reviews five distinguishable types of regulatory policy.

- 1) Direct 'command and control' regulation
- 2) Economic instruments
- 3) Information based instruments
- 4) Co-regulation and self regulation
- 5) Support mechanisms and capacity building

### **5.5.1 Direct 'command and control' regulation**

Direct regulation played a role in the early development of environmental legislation in general and in the development of (hazardous) solid waste management systems in particular.

Critics have stated that direct regulation limits innovation and constrains the flexibility of businesses to choose the most cost-effective way to achieve a given environmental objective, although smaller firms may prefer prescriptive regulation if they lack skills or capacity to design their own solutions.

49 <http://plasticbank.org>.

50 <http://www.the-sse.org/schools/24/australia/142/accelerator-program>.

51 <http://socialirl.com/resilientsummit/>.

52 <http://www.fastcoexist.com/3025169/engineering-an-end-to-food-waste-with-smarter-logistics-for-our-leftovers>.

53 <http://www.nesta.org.uk/blog/digital-social-innovation-ground-policy-making>.

54 <http://www.startupsmart.com.au/leadership/workspace/social-enterprise-code-for-australia-incubator-to-launch-in-2014/2013121011340.html>.



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Environmental regulation in general has also been criticised for placing businesses at a disadvantage compared with competitors, typically overseas, who do not have to comply with such stringent controls. However, in their seminal paper, Porter and van der Linde (1995)<sup>55</sup> argued that more stringent environmental controls can also encourage regulated businesses to innovate, leading to greater competitive advantage.

In order to facilitate the introduction and economy-wide spread of resource efficient attitudes and practices, the role of government and administration has been shifting from interventionist 'command and control' approaches (such as prescribing emission standards) to frame-setting, communicating, educating and negotiating.

Concepts such as clean production, design for environment, material flow and supply chain management, ecological modernisation, and industrial symbiosis cannot be prescribed by government in the same way that emission standards can. Expectations of environmental action are shifting from government to industrial corporate actors and to the potential for product and process innovation that is based on industry's capacity to mobilise capital and knowledge<sup>56</sup>. This latter is stated in the flagship EU 2020 Strategy (EU, 2011)<sup>57</sup>.

### 5.5.2 Economic instruments

Economic instruments include taxes, subsidies, tradable rights and payments, and extended producer responsibility / product stewardship. Environmental tax reform has sought to shift the tax burden from 'employment, income and investment' to 'pollution, resource depletion and waste', thus encouraging the production of desirable social 'goods' while discouraging undesirable social 'bads'.

This shift offers the hope of a 'double dividend', better environmental performance and better economic performance<sup>58</sup>. Current proposals, also stated in the EU 2020 Strategy (EU, 2011), move towards taxes on materials instead of taxes on labour.

The argument is that material productivity will increase, as it has done for labour productivity.

### ***Taxes on non-renewable energy sources***

Taxes on non-renewable energy sources are a common proposal. An example cited by Prof. E. von Weizsacker (of the Club of Rome<sup>59</sup> at the World Resources Forum in Davos, 2013) cited Japan in the 1970s to illustrate that bold economic measures can pay off. Japan doubled energy prices with some analysts believing this would ultimately result in the end of the Japanese economy. However the opposite arguably happened; it spurred innovation and Japan became a serious global industrial player.

### ***Payments for Environmental Services (PES)***

In recent years interest in Payments for Environmental Services (PES) has grown, where individuals or governments pay ecosystem managers, such as farmers, to sustain the ecosystems from which they benefit using measures such as flood protection and carbon sequestration. The Environmental Stewardship Program in the UK is a PES scheme under which farmers are paid to improve land management practices that improve water quality and biodiversity. Practices aimed at reducing the input of pesticides and fertilisers that contribute to pollution of water bodies have been effective in improving water quality<sup>60</sup>.

### ***Extended Producer Responsibility (EPR) or Product Stewardship (PS)***

This option also offers great potential. Schemes place the responsibility for 'take-back' of remnant materials, after the goods have been used, on the manufacturers, importers, distributors and retailers of products. This gives incentive to innovate in product design. Such systems are increasingly being designed and implemented across the world. Although there are diverse models, generally the effect is to shift the burden of financing and managing systems away from the general taxpayer to the consumer. EPR is a serious option to consider in future financing of the waste and resources sector. It benefits from being well coordinated with existing traditional fiscal systems for the sector.

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55 Porter M E and van der Linde C 1995, *Toward a New Conception of the Environment-Competitiveness Relationship*.

56 Huber J 2000, *Towards industrial ecology: Sustainable development as a concept of ecological modernization*.

57 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>.

58 Bosquet B 2000, *Environmental tax reform: does it work? A survey of the empirical evidence*. *Journal of Ecological Economics*, 34 19-32.

59 Author of *Factor Four: Doubling Wealth: Halving Resource Use – A report to the Club of Rome* Taylor & Francis, 2013.

60 Kay P et al 2009, *A review of the efficacy of contemporary agricultural stewardship measures for ameliorating water pollution problems of key concern to the UK water industry*.

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### 5.5.3 Information-based instruments

Three main types of information-based instruments are identified:

- targeted information provision
- naming and shaming / faming
- registration, labelling and certification schemes<sup>61</sup>.

#### ***Targeted information provision***

Targeted information provision, for example providing advice and training to improve environmental performance of businesses, has been highlighted as an important component of regulatory activity. Measuring the impact of such educational interventions is challenging as effects are slow to materialise and difficult to attribute to the specific intervention.

In the UK, DEFRA supported the establishment of Resource Efficiency Clubs (RECs) for information sharing through their Envirowise Program. The program confirmed that well designed RECs, demonstrating the environmental and financial benefits of resource efficiency to given localities and clusters of companies, are a key policy instrument.

#### ***Naming and shaming / faming***

An example of naming and shaming / faming is the European Pollutant Emissions Register<sup>62</sup>. Research has found that stock value of listed and publicly named companies decreases if they find themselves placed on the register, so companies have a strong incentive to improve their environmental performance.

#### ***Registration, labelling and certification***

Registration, labelling and certification schemes have become widely adopted internationally, and rely on buyers preferring labelled goods to exert pressure on businesses to adopt associated environmental standards.

Some schemes, such as the EU Ecolabel have been established with government support. Some, such as the UK Farm Assurance Scheme are associated with producer trade bodies. Others have been

established by non-governmental organisations, for example the Marine Stewardship Council and Forest Stewardship Council certification schemes, which were initiated by the World Wide Fund for Nature.

### 5.5.4 Co-regulation and self-regulation

Six variants of private and voluntary regulation have been identified:

- voluntary regulation
- covenants and negotiated agreements
- private corporate regulation
- private professional regulation
- self-regulation
- civic regulation<sup>63</sup>.

It is difficult to ascertain the impact of such instruments. For example, researchers were unable to find conclusive evidence that compliance with the UK Assured Farms Standards (against which farm performance is assessed) led to better environmental performance<sup>64</sup>. Similarly, although businesses that had adopted the International Standard Organisation (ISO)14001 environmental management standard exhibited better environmental management processes than those who had not, this did not appear to reduce the likelihood of environmental incidents or complaints<sup>65</sup>.

### 5.5.5 Support mechanisms and capacity building

Three forms of support mechanisms and capacity building are identified:

- research and knowledge generation
- demonstration projects and knowledge diffusion
- network building and joint problem solving<sup>66</sup>.

A key challenge for policy makers is ensuring that funding for support and capacity building is well targeted. For example, Armsworth et al (2010) found that UK research funding is not always well aligned with the needs of business.

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61 Taylor C et al 2012, *Selecting Policy Instruments for Better Environmental Regulation: A Critique and Future Research Agenda*.

62 <http://www.eea.europa.eu/data-and-maps/data/member-states-reporting-art-7-under-the-european-pollutant-release-and-transfer-register-e-prtr-regulation-8>.

63 Gouldson et al., 2008, as cited by Taylor et al. 2012.

64 Lewis et al, 2010, as cited by Taylor et al, 2012.

65 Dahlström et al, 2003, as cited by Taylor et al, 2012.

66 Gouldson et al, 2008, as cited by Taylor et al. 2012.

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Efforts by Zero Waste SA in strategy development, through the Research Centre for Sustainable Design and Behaviour and related initiatives and stakeholder dialogue, appear to be well connected with businesses and other stakeholders within the state. Although further study is needed to determine the actual effectiveness and impact of these initiatives, they appear to be a successful support mechanism and capacity building platform for state-wide waste and resources management stakeholders.

Additional examples of the practical application of different policy instruments in the EU are:

#### ***Direct regulation***

- Bans on disposal of certain wastes (disposal ban for organic waste in Sweden; disposal ban for hazardous waste and any wastes for which a recycling or incineration option exists in the Netherlands)
- Landfill diversion targets for organic waste (EU Landfill Directive)
- Recycling targets (EU Directive on packaging and packaging waste, EU Directive on batteries, EU Directive on WEEE, EU Directive on end-of-life vehicles)

#### ***Economic (financial) instruments***

- Pay-as-you-throw (PAYT) tariffs charging for collection of unsegregated waste only (such as used in many municipalities in the Netherlands where the amounts decreased more than 20%, with no discernible increase in illegal dumping)
- Landfill taxes across the world
- Packaging deposit-refund scheme for glass and plastic bottles (various countries)
- Tradable rights such as carbon credits, recycling credits, packaging recovery notes (UK)
- Extended Producer Responsibility and Product Stewardship involving a wide variety of schemes (implemented throughout the EU for different materials streams)

#### ***Information-based instruments***

- Registration, labelling and certification schemes such as a recognisable logo for recyclable materials (Germany Der Grüne Punkt) and labelling of individual plastic polymers

#### ***Voluntary agreements***

- Self-regulation and co-regulation such as: the agreement on removal of waste electrical and electronic equipment (WEEE); establishing a foundation for the disposal of metal and electrical products (NVMP) in 1999 (Netherlands); and WEEE Directive of 2003 (EU) and voluntary packaging agreements by large supermarket chains (UK)

# 6 Policy instruments in South Australia

## 6.1 POLICIES IN USE

The box below illustrates the range of instruments in place, classified according to the five generic categories listed at the start of Section 5. Instruments that are currently in early stages of applied use or that have been identified, but not yet initiated, are highlighted in bold.

### ***Direct ‘control and command’ regulation***

- Environment Protection (Waste to Resources) Policy 2010 (landfill bans, resource recovery prior to disposal)
- Litter laws (KESAB long standing SA brand name)

### ***Economic instruments***

- Waste levy (doubled when Zero Waste SA was created and subsequent increases have occurred)
- Container deposit legislation (creation of a recycling ethos over time)
- Supply / demand induced changes in landfill operating models
- Infrastructure grant programs
- **Loan scheme**
- **Public procurement**

### ***Information-based instruments***

- Waste diversion targets in the waste strategy
- Waste strategy limitations on new metropolitan landfill development
- Industry program
- Consumer education / behavioural change (for example Recycle Right, Foodwise, Wipe Out Waste in Schools)
- Guidelines for multi-unit developments (MUDs)

- **Industrial symbiosis**
- **Government program (similar to industry program)**
- **Energy from waste strategy**
- **Strategic geographical planning for waste management / resource recovery facilities**
- **Disaster management waste plan**

### ***Co-regulation and self-regulation***

- Australian Packaging Covenant (includes design stage interventions) facilitated in SA by Zero Waste SA
- National Product Stewardship legislation (TVs / computers with potential for expanded product coverage) facilitated in SA by Zero Waste SA
- Source separation with separate collection / recovery of specific waste streams (local government three-bin system and other C&I / C&D closed loop systems)

### ***Support mechanisms and capacity building***

- Separation of enforcement and industry development agency functions
- Collaboration and partnerships
- UniSA research program
- **Demonstration projects**
- **Data management / material flow analysis.**

It is clear that existing and planned Zero Waste SA programs demonstrate a healthy mix of programs across the whole range of policy instrument types, demonstrating a comprehensive and holistic approach to stimulating development of the sector.

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## 6.2 FUTURE THEMES

The box below presents a list of policy / strategic themes that emerge from this review as being worthy of consideration for future deployment in South Australia. From discussions with Zero Waste SA it is clear that many of these themes have already been taken up in some form, are under consideration, or have been discounted for implementation in South Australia at this time.

Further assessment of the mix of programs to be implemented, their relative costs and benefits, will be undertaken following this strategy review.

### **Key policy / strategy themes to consider moving forward**

#### ***Resource efficiency***

- Water, energy, materials input efficiency
- Design (including design for extended use and dismantling)
- Procurement specifications
- Measurement

#### ***Waste prevention***

- Public awareness / communication campaigns
- Pilot projects
- Collaboration
- Measurement

#### ***Financial and economic instruments***

- Extended producer responsibility / product stewardship
- Incentives / reward schemes
- Loan schemes

#### ***Planning and investment***

- Waste management
- Resource recovery (including waste to energy)
- Re-manufacturing

# 7 Critical future needs

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## 7.1 OUTLOOK

The dynamics of the South Australian waste and recycling industry are quite interesting when compared to the rest of Australia, particularly the eastern states. The market is relatively small but still has the four major suppliers of services (Veolia, Transpacific, Sita and Remondis), creating a very competitive market place. The basis on which these companies compete is on price and resource recovery outcomes. There is also significant landfill space available (greater than 30+ years capacity remaining at current rates) to service metropolitan Adelaide. This landfill space is also owned and operated by multiple players, which is keeping the cost for landfill disposal very low compared to advanced resource recovery options.

In part the sector has responded to policy setting for further resource recovery before sending waste to landfill, but the sector is yet to realise significant additional resource recovery. This will come in time should the policy and support mechanisms such as Zero Waste SA (or similar) remain in place.

There is significant opportunity for growth in resource recovery facilities to service the C&I and MSW sectors. A logical next stage could see the development of Waste-to-Energy (WtE) facilities to extract the full value from the remaining residual waste stream, which would bring significant infrastructure investment and employment.

Without the policy development and support mechanisms, provided by Zero Waste SA and allied government agencies, it could reasonably be expected that the market could stagnate in resource recovery or perhaps slowly revert back to greater use of landfill. This will create challenges for existing recycling operations, threatening their viability. The unintended outcome may lead to a reduction in resource recovery with associated implications for employment in the sector.

## 7.2 FRAMEWORK

The waste and resources industry is still young, but with interesting development prospects. The industry as a whole is becoming stronger and more capable as a lobbying force. Globally, the industry is close to having lobbying capacity to counter the industrial / manufacturing lobby. This is a very significant development that needs to be monitored.

It is important for government to retain its ability to check and balance the industry's development through strategic planning. State coordinated strategy is the most effective means of ensuring that public expenditure in this sector remains efficient, enabling adaption and alignment of the industry for the greater good.

The value and importance of resource efficiency and effective waste management to the state's future economic performance, including in agriculture, mining, manufacturing, other industries, businesses and government sectors, is currently under-estimated.

The waste and resource sector is well positioned to deliver new, high-technology and advanced industry. There is a strategic imperative to establish and create an environment that attracts such economic growth within the state. The economic benefits of the initiatives and of the sector are significant and require significant institutional capacity, structure and continuation to retain South Australia's position on the global platform (where it currently stands high).

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State Government activities to ensure a stable framework for the waste management and resource recovery sector will include:

- closely engaging and coordinating with multiple stakeholders to formulate and guide implementation of future waste and waste-related policy and strategy
- continuing oversight and influence over core programs implemented but not necessarily completed yet
- continuing close work with the public and private waste industry to stimulate competition, bringing downward pressure on procurement costs and adding maximum value to resources recovered within the state
- defining, coordinating and managing implementation of a future investment program to realise government policy on pre-treatment of all waste before disposing to landfill
- directly controlling hazardous materials management across the state
- keeping abreast of national and international developments that affect the State's waste management and resource recovery requirements, to anticipate and respond to change
- conducting research and being a custodian of data and research.

The skills and experience needed to define, plan, prepare, implement and attract finance to a major investment program to achieve the government's waste policy will be considerable. These capabilities are currently present in Zero Waste SA. Additional skills are likely to be needed in contracting and public procurement, engineering, economics and finance.

The future critical needs can be summarised into five thematic areas:

- consolidating benefits
- anticipating change
- planning and investment
- savings and productivity gains
- leadership.

### 7.3 CONSOLIDATING BENEFITS

Zero Waste SA has stimulated and coordinated a wide range of initiatives in the waste and resources sector. Whilst the latest Zero Waste SA Business Plan makes a strong effort to concentrate on those programs that it may be possible to complete by mid-2015, it is unlikely that the full benefits from the recent year's investment will have been consolidated into sustained practice. Consequently, if Zero Waste SA activities cease there will need to be some interim, or bridging, arrangements designed to consolidate the benefits of current activities.

### 7.4 ANTICIPATING CHANGE

Patterns of waste generation are ever changing, as are the types of chemicals and materials that are used to make the products we buy. But it seems that we may be on the verge of a fundamental shift in the way products are manufactured and distributed. A revolution in 'home manufacturing' made possible by the emergence of 3D printing technology is one important potential dimension. Within the next 15–25 years, this development may radically alter the nature of municipal waste generated in our homes, as well as the spatial distribution of waste generating enterprises served by the industry. Citizens expect government to ensure that infrastructure and public services keep pace with this change.

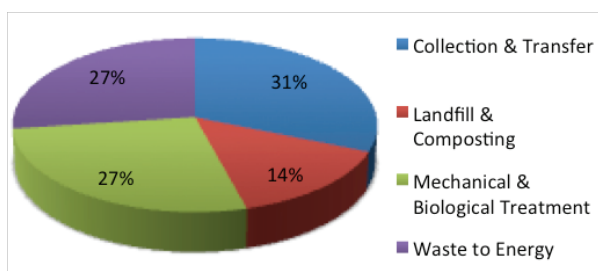
### 7.5 PLANNING AND INVESTMENT

South Australia has established functional integrated waste management infrastructure. However, there is still a significant residual reliance on landfill. Against the backdrop of the recent mandatory resource recovery initiative, a new and extended network of resource recovery facilities will need to be put in place over the coming years.

Investment demand for this additional municipal infrastructure is estimated at between \$200–350 million over the next 10–15 years, and potentially doubles if all materials / waste streams are taken into account.

These estimates have been adapted from investment modelling carried out by RWA for the UN Commission on Sustainable Development (CSD)<sup>67</sup>. They should be considered indicative rather than definitive. Investment demand should be re-evaluated under the framework of a long-term regional waste management plan, where specific facilities and service options are considered.

For illustrative purposes, the forecast breakdown of investment demand in the municipal solid waste sector over the next 10–15 years, in service components, is presented in Figure 7.



**Figure 7: Forecast distribution of MSW investment demand**

Attracting and coordinating investment into the sector represents a major future policy challenge. A well-coordinated strategic and tactical approach from and within state and local government is needed to deliver regionally distributed facilities with good economies of scale, protecting against over-capacity and securing the best value for money in procurement.

## 7.6 PRODUCTIVITY AND ECONOMIC GAINS

High performing waste management and resource recovery brings significant operational and investment cost. The industry knows that its bottom line is highly influenced by the revenues it receives for the materials collected. Finding local markets for these is one approach to reduce operating costs and business risks, to realise the local manufacturing job opportunities and the environmental benefits.

The waste and resources sector is well positioned to deliver new, high-technology and advanced industry. Establishing and creating an environment that attracts such economic growth would seem to be a strategic imperative. We consider the potential for growth in small and medium sized enterprises in

the re-manufacturing sector in South Australia to be worthy of policy attention.

## 7.7 LEADERSHIP

Being a leader in this sector will become increasingly important for cost efficiency and competitiveness, to facilitate global market participation and acceptance of products and services, and for South Australia to be attractive as an investment destination.

Tactical interventions from State Government may need to address 'higher hanging' fruit and more sophisticated waste management problems and advanced technologies. Future approaches may require 'softer' and more sophisticated tactics that target areas of waste avoidance, resource efficiency, productivity and waste industry service performance. Examples are:

- waste management procurement strategies to reduce government and business costs
- process efficiency and re-engineering for manufacturing industries
- addition of new, transformative and / or innovative technologies
- encouragement to stakeholders to build capacity
- research and knowledge generation
- adjustment to optimise policy implementation to deliver strategic outcomes
- engagement and education to achieve cultural change.

<sup>67</sup> Whiteman A and Soos R 2011, *Investing in Resources and Waste Management: Policy Context and Challenges*.



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### ***Examples of future challenges***

Newly developed materials, some already being used, that have not yet reached the end of their useful lives, could present significantly different waste management challenges. These include:

- solar panels
- building and construction materials
- new generation patterns from a shift towards 'home manufacturing' with 3-D printers
- multilayer packaging
- non-recyclable packaging
- hazardous waste and problematic wastes (e-waste, copper chrome arsenic (CCA) treated timber, asbestos, liquid and mercury wastes, paint, pharmaceuticals, tyres).

**New resource recovery and recycling technologies that could dramatically transform the processes, systems and economics of waste management and resource recovery are:**

- waste-to-energy using anaerobic digestion and energy from residual wastes
- high-technology optical and / or automated sorting systems
- fertiliser production from organic waste streams.

**Market and economic pressures will change how waste needs to be managed so industry can remain competitive as:**

- oil becomes more scarce and more expensive, increasing cost and reducing availability of plastics, thus increasing value of waste plastics and the need to recycle
- industry transformation alters what waste materials are being generated.

**Community expectations for a sustainable society continue to drive demand for policy and regulatory change to reduce waste generation and increase recycling such as:**

- product stewardship schemes for different materials streams.

**Global and international expectations and perceptions of South Australia as a 'clean and green' food producer drive requirements to improve waste management in:**

- hazardous waste management on the farm and in the factory
- alternatives to the use of CCA treated wood in the wine industry
- recycling waste plastic baskets generated by aquaculture industries
- carbon impacts from products and their packaging.

**Expanding population creates demand for better planning of waste infrastructure and services for:**

- State 30 year plan for expanded metropolitan area, as shown in Mount Barker
- more medium-to-high density housing in urban areas.

**Changing population demography with an older population creates demands for better medical waste services and infrastructure in:**

- treatment of pharmaceutical products and packaging
- aged care absorbent hygiene product treatment and disposal.

# 8 Institutional options

## 8.1 FUNCTIONS

The scope of this review includes an assessment of alternative options for delivering the functions presently carried out by Zero Waste SA.

Understanding institutions and governance of the sector necessitates some orientation. Institutional theory in the waste sector identifies six functions (Figure 8) that should be recognised, and located appropriately<sup>68</sup>.



Figure 8: Institutional Functions

These include the Policy Maker and Regulator functions (usually national or state / regional level) the Planner function (national, regional and local levels), and the Client, Revenue Collector and Operator functions (mostly local level).

RWA has researched and worked in the waste management sector in many different jurisdictions worldwide<sup>69</sup>. We see places where the sector has developed rapidly or profoundly:

- where a rapid increase in the level of investment in waste management infrastructure and services has been attracted and sustained, or
- where there has been a major increase in the collection and sanitary disposal service coverage, or
- where there has been a dramatic increase in the level of reduction, recycling and reuse.

There is always a reason behind this transformation.

There is an important seventh function not captured in the classical institutional theory. We refer to this missing seventh function as the Change Agent function (Figure 9). The 'change agent' is the institutions, people and their networks that are capable and responsible for making change happen.

Around the world change agents can come in many different forms, as government departments / agencies, NGOs and limited companies. Their role is generally to establish and implement policy and strategy, and to function effectively to coordinate change as an organisation that works for, within and amongst the wide range of stakeholders that perform different necessary functions.



Figure 9: The Change Agent

In South Australia the current distribution of institutional functions can be summarised as follows.

- The Policy Maker function involves collaboration between multiple government agencies, including Zero Waste SA, the EPA, and the Department of Environment, Water and Natural Resources (DEWNR).
- The Regulator function, including enforcement, is largely held by the EPA, but some public health aspects are also undertaken by other government agencies.
- The Planner function is distributed between state and local government, with Zero Waste SA holding a statutory function for waste strategy.

<sup>68</sup> Wilson DC, Whiteman A and Tormin A 2001, *Strategic Planning Guide for Municipal Solid Waste Management*, The World Bank, Washington DC.

<sup>69</sup> Whiteman A 2010, *Institutions and Governance for the Resources and Waste Management Sector*, RWA-Wasteaware Policy Paper Series No. 2.

- The Client function for municipal waste is held by local authorities and, for other waste streams, a wide diversity of commercial and industrial enterprises.
- The Revenue Collector function is held by both local government (rates for municipal solid waste management) and State Government (waste levy for all materials streams).
- The Operator function is performed by both local authorities and the private sector.
- The Change Agent function is performed by Zero Waste SA.

## 8.2 METHODOLOGY

### Criteria

We have developed and applied a simple and transparent multi-criteria assessment methodology for evaluation of institutional options.

#### Six sets of multi-criteria used for the assessment of institutional options

##### *Reflective of stakeholder interests*

State Government, local government, commerce and industry, community, waste and resources industry

##### *Capability to deliver productivity and economic gains*

Savings to state budget, savings to local government, productivity of commerce and industry, ability to attract and develop the best people, R&D innovation, exports and competitive advantage, new businesses and jobs

##### *Ability to establish and coordinate strategy*

Information and data, knowledge and experience, staying ahead of global trends, influencing Commonwealth policy agenda, reputation, continuity

##### *Capability to deliver on future critical needs*

Consolidation of progress, anticipating change, planning and investment, resource efficiency, leadership / setting priorities

### **Governance:**

Policy responsiveness, flexibility and mobility to respond, independence of the regulator, community representation, ease of accountability for public funds, dynamic to change

### **Cost to society**

Reliance on state budget, cost to local government, ability to attract (new) matching funds, capability to attract investors, set-up and transition costs, intrinsic cost and focus on cost optimisation, skill at targeting investment, administrative costs.

### Evaluation

Each group of criteria is given the same weighting. A low score represents a high ranking. Scores of 1–5 are given for each of the sub-criteria, and the results are normalised into an overall score for the specific criteria group.

The analysis was carried out individually by five members of the consulting team. The final scoring presented is the total score from the five separate evaluations.

Due to the large number of sub-criteria employed, and the lack of weighting, there is a risk that certain criteria considered to be of significantly greater importance may be under-represented in the analytical outcome. By way of sensitivity analysis, we have selected certain criteria, applied a x10 weighting, and determined whether the overall ranking of options has changed as a result.

## 8.3 OPTIONS

In order to ensure that the analysis is fair, and provides a like-for-like comparison, we have developed the options under the key assumptions that all of the institutional variants are:

- a. Coherent and comprehensive

A broadly comparable range of intended functionality, and core statutory functions of State Government (policy making, regulation and planning) are included in all institutional options

b. Adequately resourced

They are more or less equally funded through one means or another, and that this level of funding is sufficient to both enable the organisation(s) to adequately perform intended duties and enable State Government to perform its statutory functions.

We have not carried out this analysis with reference to a particular prescribed budgetary allocation. As such the analysis works at a strategic level. More detailed work on the organisational structures and levels of staffing will need to be carried out once the strategic and budgetary parameters have been set.

### **Institutional options**

The institutional options identified are as follows. Refer to Section 8.5 for detail.

#### ***Government department***

A strong and adequately funded policy and implementation unit within State Government, backed by a specific legislative charter and appropriate regulatory powers to deliver on this charter.

#### ***Environment Protection Agency***

A strong and adequately funded policy and implementation unit in the EPA.

#### ***Sector-oriented corporation with skills based board***

This model characterises the existing institutional arrangement as set out under the Zero Waste SA Act.

#### ***State-owned corporation***

A statutory corporation, with strong representation of the Minister, with powers to borrow and invest, and collect revenue, such as SA Water.

#### ***Industry-oriented corporation***

A statutory corporation, with strong representation of industry and a focus on representing and promoting the economic interests of this sector such as an Australian Government Research and Development Corporation (RDC) model, with a small government unit having oversight on policy implementation to regulate the behaviour of the statutory body.

#### ***Industry alliance***

A membership based non-statutory body, with limited (if any) involvement of the Minister, focused on resource efficiency, data, coordination, and some aspects of planning (lobbying / consultation role), with a board comprised mainly of industry representatives (similar to the SA Water Industry Alliance) and a strong and adequately funded government unit to play a role in policy implementation (including planning, coordination, targeted programs).

#### ***Local government based entity(ies)***

A body (or set of bodies) established under the Local Government Act, with either governmental or NGO character and with representation from local authorities, which could include regional waste management authorities collectively taking the planning and client role (at least for waste treatment and disposal) on behalf of councils.

#### ***Sector-oriented NGO***

An NGO, similar to WRAP UK, set up and owned by State Government, quasi-autonomous, but closely reporting to the Minister, possibly a company limited by guarantee (no shares or dividends) focused on supporting policy implementation across commerce and industry, with a more limited role in supporting state and local government, and which could consult with government on policy through an adequately resourced government unit.

#### ***Community-based NGO***

An NGO contracted to perform certain non-statutory work largely focused on the management of community awareness and information platforms, to assist in implementing certain waste policy goals with a strong and adequately funded government unit to have a significant role in policy implementation (including planning, coordination, targeted programs).

#### ***Privately out-sourced service provider***

A set of three or so pre-qualified consulting consortia to bid for packages of policy implementation work, including planning studies, and who would report to a small government unit that decides work packages, oversees work and determines the forms of implementation (EU-type framework consultancy contracts).

## 8.4 OUTCOMES

The overall scoring and ranking of institutional options, representing total scores from five separate evaluations is presented below (Table 9).

*Table 9: Outcome of the Institutional Options Assessment*

<b>Institutional Analysis - Total scores from evaluators</b>								
Model type	Stakeholder interests	Productivity & economy	Strategic role	Future critical needs	Governance	Costs & Financing	Total	Rank
Government Department	77	104	69	83	76	93	502	7
EPA	83	104	70	92	85	96	529	9
Sector-oriented corporation	53	58	39	48	54	63	315	1
State-owned corporation	76	80	67	66	73	77	439	5
Industry-oriented corporation	66	58	68	57	66	57	372	2
Industry alliance(s)/institute(s)	76	61	88	75	71	58	428	4
Local government based entity(ies)	73	89	81	90	79	91	504	8
Sector-oriented NGO	74	71	68	67	58	66	405	3
Community-based NGO	86	101	96	98	70	80	531	10
Framework consultant	78	78	87	80	56	76	455	6

The score of the sector-oriented corporation option (the current institutional model) is significantly better (lower) than the second option Industry-oriented corporation, which is in turn ranked better than a sector-oriented NGO.

Applying sensitivity analysis to this outcome gives the following effect on the top the ranked options (Table 10).

*Table 10: Sensitivity Analysis on the Institutional Options Assessment*

<b>Total scores from evaluators</b>						
Option ranked	Without sensitivity adjustment	Score	Reliance on state budget x 10	Score	Industry productivity x 10	Score
1	Sector-oriented corporation	315	Sector-oriented corporation	343	Sector-oriented corporation	328
2	Industry-oriented corporation	372	Industry-oriented corporation	383	Industry-oriented corporation	378
3	Sector-oriented NGO	405	Sector-oriented NGO	422	Sector-oriented NGO	411
Option ranked	Planning & investment x 10	Score	Flexibility & mobility x 10	Score	State Budget savings x 10	Score
1	Sector-oriented corporation	324	Sector-oriented corporation	330	Sector-oriented corporation	321
2	Industry-oriented corporation	381	Industry-oriented corporation	387	Industry-oriented corporation	391
3	Sector-oriented NGO	423	Sector-oriented NGO	420	Sector-oriented NGO	424

The sensitivity analysis provides the following key outcomes:

- The sector-oriented corporation option remains the first ranked option under all sensitivity analysis scenarios.
- Industry-oriented corporation option remains the second ranked option under all sensitivity analysis scenarios.

The findings of the institutional analysis are clear and stable under all sensitivity analysis scenarios. The sector-oriented corporation with skills based board model remains the highest ranked option even when applying a weighting factor of 10 to a selection of the most important criteria. This degree of weighting gives each selected criteria a very significant influence on the outcome.

This result is based on an average of scorings by the five evaluators used in the analysis. All of the evaluators were involved in the project team undertaking this review, and bring their own perspectives to this assessment. The second ranked and third ranked models (industry-oriented corporation and sector-oriented NGO) represent alternatives that, if implemented successfully, offer certain advantages. For example, an industry-oriented corporation could widen the number of potential funding contributors, lessening the financial demand on state and local government, whilst a sector-oriented NGO would have greater community representation and focus.

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## 8.5 STRENGTHS AND WEAKNESSES OF DIFFERENT MODELS

The waste management and resources recovery sector is a relatively complex sector to govern. This is due to the diffuse sources of waste, diversity of materials produced and consumed, multi-stakeholder involvement, business dynamics, and complex institutional arrangements. This complexity is compounded by the environmental, health and safety, financial / economic, and sometimes social and political consequences of getting things wrong.

This sector represents a significant component of the South Australian economy with more than \$1 billion annual turnover. It is an even more important employer, estimated as responsible for more than 3,000 full time equivalent jobs, including jobs for low-skilled and learning-impaired people.

For these and many other reasons, the governance arrangements for the sector deserve serious policy analysis, especially when changes are being envisaged or proposed.

In this section we have endeavoured, through use of a simple method, to classify and rank different institutional governance options applicable to the sector. Each institutional model brings with it positive and negative aspects. Sequentially below, we distil the key strengths and weaknesses of each option, in the context of the future governance of the sector in South Australia.

### **Option 1: government department (ranked seventh out of 10)**

This option essentially represents the transfer of strategic functions, personnel and assets from Zero Waste SA to the State Government in 2015. No alternative delivery or implementation organisation is established, and the government places Zero Waste SA's functions within the structure of another department.

This option has strengths and weaknesses that relate to its close proximity to the Minister; strengths in terms of policy responsiveness, but weaknesses in terms of lack of mandate to work across political terms, and a perceived lack of independence.

We do not believe this option to be favoured by key stakeholders; however, it should be noted that some of the institutional models below will necessitate the creation of a strong and adequately

financed government unit in order to safeguard the public interest and enable State Government to fulfil its statutory functions under the *Zero Waste SA Act 2004*.

### **Option 2: EPA (ranked ninth out of 10)**

This option essentially represents the transfer of strategic functions, personnel and assets from Zero Waste SA to the EPA in 2015. No alternative delivery or implementation organisation is established, and the government transfers Zero Waste SA's functions to the environmental regulatory body.

This option is evaluated as one of the least preferable of the available options. The creation of Zero Waste SA in 2004 effectively separated 'development promotion' from 'environmental regulation'. This is a reform critical to ensuring the independence of the regulatory function. It significantly reduces inherent conflict of interest that results from placing the 'stick' and the 'carrot' in the hands of the same organisation.

This evaluation is in no way meant to reflect on the excellent work of the EPA, but one of the most important international reforms in the environmental sector has been to clearly separate and therefore strengthen the independence of the regulatory function. South Australia should not, in our opinion, move in the opposite direction.

### **Option 3: sector-oriented corporation with skills based board (ranked first out of 10)**

This option reflects the current institutional arrangement as set out in the *Zero Waste SA Act 2004* characterised as a sector-oriented corporation with a skills based board.

The sector-oriented corporation model is ranked highest in the evaluation for a range of reasons.

- This institutional model has a mandate to work across all industry, community and governmental sectors. Policy connectivity remains strong, but through the skills based board there is multi-stakeholder involvement in the formulation and implementation of strategic programs, and therefore a high degree of horizontal connectivity with different stakeholders.

- Because the corporation is not a regulatory body, it is able to work free from conflict of interest in developing sectoral practices. A sector-oriented corporation is essentially an ‘investing’ and ‘development stimulating’ agency of government, which does not have a role in monitoring or prosecuting environmental offences. This enables the government to work more freely with external stakeholders in a partnership arrangement.

The sector-oriented corporation model has a weakness in that it can become closely dependent on government funding and procurement rules. In the case of Zero Waste SA, funding comes from industry through the waste levy and not from government per se. The tendency with this model, however, may be to rely on one dominant source of funds rather than to look for ways to diversify funding sources and diversify the range of financial products (such as to provide loans as well as grants).

Mobility to adapt programs and financing to changing needs is less than for those models that operate externally to government because the rules of expenditure and sign-off under the sector-oriented corporation are those of government.

With good management and strong political backing these weaknesses can be overcome to a large extent.

One of the most compelling benefits of the sector-oriented corporation model is that it is a tried and tested, and highly successful model currently in place. The benefits of continuity are considered to be significant. These include ability to retain professional capacity, knowledge and networks. We consider these human skills to be the driving force to attract investment, promote productivity and economic gains, and leverage budgetary savings across government. After all, any organisation is only as good as the people in it.

#### **Option 4: State-owned corporation (ranked fifth out of 10)**

This option represents the scaling up of the existing institutional arrangements in the direction of a state body to invest in, and take ownership of, regional waste management and resources recovery facilities. Such an organisation could facilitate different forms of public private partnership (PPP) to move into the waste management and resources recovery market.

The option has strengths related to its strong mandate for investment. However it has weaknesses related to its cost and tendency to displace or centralise the current waste and resources market rather than foster competition. We consider this option to be too institutionally heavy-handed for the South Australian context, and likely to impose unnecessary costs and market disruption.

#### **Option 5: industry-oriented corporation (ranked second out of 10)**

This option represents the formation of an industry-backed statutory body to take charge of the strategic direction of South Australia’s waste and resources sector. It ranks relatively strongly in the evaluation.

Under this option, the strategic functions currently held by Zero Waste SA would transfer to the industry-oriented corporation. The composition of the board and the governance procedures would need to be considered carefully and clearly defined, but could be similar to that of Zero Waste SA.

A good example of such an industry-oriented corporation is the Research and Development Corporation (RDC) model from the Australian Government that sets up the Grape and Wine RDC, Grain RDC and Dairy RDC. These RDCs successfully undertake a broad range of functions on behalf of industry stakeholders, and these demonstrate what such an institutional arrangement could do in this case. Tasks include policy development on behalf of government and working with government agencies to successfully implement policy initiatives.

In this respect, the State Government would become one of the industry stakeholders. It would provide a share of the funding needed for the corporation. The corporation could in turn undertake policy development for the State Government in the same way that Zero Waste SA does. Similarly, local government would also be an industry stakeholder, so that its interests and needs were properly represented and advanced.

Dependence on the state budget would reduce, increasing commerce and industry’s proportional financial contribution. The waste levy contributions from commerce and industry would, presumably, need to be reviewed, to offset the increased financial contribution of industry, or channel a proportion of the industry’s waste levy payments

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directly to the corporation rather than through State Government. Contributions from state and local government and from industry operators could be reduced by broadening the funding base to include other equally important stakeholders such as the waste generators, helping to make them part of the solution. However, broadening of the revenue base could also be implemented within the current Zero Waste SA model.

These funding arrangements could be formalised and administered through statutory means (as is the case with RDCs). All of the stakeholders, governance, administration, operational requirements, and responsibilities and activities of such a corporation could be defined and brought to life by statutory act (as was Zero Waste SA).

With this option we see significant future potential for resource efficiency savings across the commercial and industrial sector, alongside significant investment requirements from the waste and resources sector. Clearly an organisation that was strongly backed by industry would be well placed to deliver on these outcomes. Though not guaranteed, we presume that an industry-oriented corporation would have a relatively greater natural tendency towards cost savings and optimisation.

A potential shortfall of this option could be that the representation and influence of state and local government and the community would be less than it is now. But safeguards could be placed in the enabling legislation to ensure that this focus is maintained and the corporation is required to consult and involve these stakeholders (as Zero Waste SA does). On the other hand it would deliver greater attention to other industry stakeholders, who could benefit from improved representation and input.

#### **Option 6: industry alliance / institute (ranked fourth out of 10)**

This option represents the formation of an independent industry alliance or institute, functionally operating outside of government, focused on assisting the waste and resources sector to improve its productivity and performance and lobbying for industry interests to be reflected in policy. The option would be similar in effect to the role of the Waste Management Association of Australia, and perhaps set up within or in some way connected to WMAA's South Australian chapter.

The organisation would be resourced by membership fee payments, which could presumably include some contribution from state and local government, and would operate as a quasi-consulting organisation, but most probably with a non-profit mandate or focus.

A shortcoming of this organisational form would be the lack of direct connectivity to state and local government and the community representation which would, in our opinion, render the organisation relatively weak in comparison to the current system. We believe this would affect South Australia's ability to secure investment into the sector, and the ability of the organisation to make game-changing economic and productivity gains.

#### **Option 7: local government based entity/ies (ranked eighth out of 10)**

This option represents the formation of entities under the framework of the Local Government Act, potentially including Regional Waste Management Boards or other means of collectively representing sector interests of local authorities.

The funding contribution of the entity/ies from local government would proportionally increase, and specific arrangements would presumably need to be made to offset the increased contributions by either reducing or redirecting waste levy payments.

The strengths of this option relate to the closer proximity of governance to the community, and the relatively increased ability of local government to shape policy from its experiences and the dynamics of waste management services. The weaknesses of this option relate to the likely tendency to focus solely on municipal solid waste, and away from productivity and economic gains from the commercial and industrial sector.

From an economic perspective, local government-derived income represents around 20% of the total income of the waste and resources sector. Local authority services are certainly the bedrock of the waste and resources industry, on which a large proportion of the future bankable investment into the sector depends. However this institutional option is not ranked highly as it is less likely than other forms to promote benefits across the wider economy of the sector.



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### **Option 8: sector-oriented NGO (ranked third out of 10)**

In this option State Government would set up an NGO organisation to take charge of part of the current strategic functions of Zero Waste SA, with a focus on implementing programs funded by the waste levy. This is similar to the Waste and Resource Action Program (WRAP) in the UK, which is constituted by government as a company limited by guarantee and managed by a skills based board. Ministerial supervision would be limited to budgetary allocations on an annual basis.

A sector-oriented NGO would operate at 'arm's length' from government, although funded predominantly by State Government. It would also operate relatively independently of other stakeholders and would usually be governed by an independent board.

Under this model, such an organisation would provide services to commerce, industry and local government, channelling grant funds into tactical resource efficiency and waste prevention projects, on a material-by-material basis. A sector-oriented NGO is an interesting alternative to the current institutional arrangement for the waste and resources sector in South Australia. WRAP has an excellent reputation and does excellent work, largely due to the quality of their personnel, and a significant and historically reliable revenue stream.

Sector-oriented NGO-type models do have, by design, certain limitations. Government NGOs that operate outside of government, but rely on public funds, separate implementation from policy, essentially shifting implementation 'off the books'. By design, these organisational forms are neither intended to be a core stakeholder within, nor have the strength or reputation of, government.

The costs and reputational impacts of dissolving Zero Waste SA, we presume, would need to be offset by the alternative's economic benefits.

It is possible to imagine a sector-oriented NGO functioning effectively in South Australia, if it is given a broad enough mandate to impact across industry and local government. But it is difficult to imagine an NGO having the same reputation as Zero Waste SA, impacting on investor confidence and stakeholder buy-in and engagement, including government agencies and industry.

A potential risk is that without a strong statutory charter and oversight mechanism, an NGO could possibly attract 'alternative agendas', leading them off track into less effective areas.

In our opinion, we see more risk than potential in the NGO option.

It should be noted that as an integral part of this option, it would be necessary to transfer many of the core strategic functions currently held by Zero Waste SA back into State Government.

A sector-oriented NGO could not be entrusted with statutory functions and these would need to be fulfilled by a strong and adequately resourced unit within State Government. We envisage that the unit would take charge of the core government functions within strategy and planning for the waste and resources sector as well as having the line responsibility for overseeing the performance of the sector-oriented NGO. The working relationship, and boundary definition, between these two organisations would need to be carefully determined.

### **Option 9: community-based NGO (ranked tenth out of 10)**

In this option the State Government enters into a service provider agreement with a community-based NGO for the purposes of supporting certain aspects of policy / strategy implementation. This might include public information, awareness and behavioural change. We presume it would be an existing NGO, rather than creation of a new entity with no track record. An arrangement of this character is actually delivering excellent results through the partnership between Zero Waste SA and KESAB.

It would clearly not be possible to transfer the strategic and statutory functions of Zero Waste SA to a community-based NGO regardless of their experience and competence. The form of organisation does not lend itself to competence in delivery of statutory functions, oversight in social and economic policy, financial and budgetary policy and investment promotion. Such an institutional arrangement would not deliver any public oversight over economic policy towards the sector, and would leave South Australia's waste and resources sector very exposed.

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Actually Option 9 is really a variant of either Option 1 or 2. In pursuing this option a unit within a State Government department would need to absorb the essential strategic and statutory functions back from Zero Waste SA.

This option has been ranked low in the assessment because a transition from a State Government agency to a community-based NGO model is not a feasible option. It would send a clear signal that government is taking back the strategic statutory functions without giving any clear signal to stakeholders in the sector as to how it intended to do this. Such a move may be taken as a retreat from serious policy attention to this sector, with consequent knock on effects to South Australia's leadership position within the Commonwealth and internationally.

**Option 10: privately out-sourced service provider (ranked sixth out of 10)**

This option out-sources contracts to implement waste policy and strategy. Contracts are used widely across the EU as a means of shortening the procurement time required for specific consultancy assignments. It involves prequalifying consortia of consultancy companies for specific programs and periods of time, and then launching restricted tender procedures for particular assignments.

Like Option 9, this option would actually be a sub-option of Option 1 or 2, but the specific intent would be to contract out strategic and policy implementation to the fullest extent, and keep the internal staffing of government as light as possible.

The option has strengths in that it would engender expert-driven policy implementation. However, it has significant weaknesses related to the short-term nature of assignments, constantly changing advice, and difficulties in pinpointing accountability for decision-making.

Furthermore, the costs of strategy implementation would inevitably rise, as would the pressures placed on those within government administration to interpret consultancy outputs into recommendations for the Minister.

## 8.6 SUMMARY OF FINDINGS

This section presents the outcomes of a comprehensive evaluation of alternative institutional options for delivering the functions that are presently carried out by Zero Waste SA. The intention of this analysis has been to give a comprehensive and transparent analysis of all the major options available to the South Australian State Government.

The analysis further reinforces our opinion that the specific institutional arrangement for strategic coordination of the waste management, resources recovery and resource efficiency sector that South Australia already has in place, through a sector-oriented corporation with skills based board, is in fact global 'state of the art'.

One or two of the generic models analysed would be worthy of serious attention in determining whether a viable alternative can be found if Zero Waste SA ceases to exist in its current form. These models are an industry-oriented corporation and a sector-oriented NGO. Whilst the sector-oriented corporation model (representing the current situation with Zero Waste SA) is the highest ranked model, these other intuitional models bring with them different strengths and opportunities that could make them attractive alternatives depending on the political and economic environment and outcomes being sought.

Given the nature of the governance challenges in the waste and resources sector, we would caution that:

- transitioning to new institutional arrangements is likely to be much more complicated (and costly) than it would first appear
- the wider reputational effects of closing down Zero Waste SA will be significant, and this is likely to affect business and investor confidence negatively
- the overall effect will be to risk loss of momentum in realising the value-adding potential of the resources recovery and resource sustainability sectors to the South Australian economy.

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**Key features of the current institutional model that underpin Zero Waste SA's high ranking in the analysis**

***Governance***

Zero Waste SA:

- has clearly defined objectives and scope
- is independent from, but representative of, relevant sectors and interests
- is non-regulatory and dynamic.

***Productivity***

Zero Waste SA:

- is able to help commerce and industry to increase productivity and become more competitive
- is able to deliver savings across all sectors of the economy, including state and local government.

***Capacity***

Zero Waste SA:

- is a lean and efficient operating model
- is well respected, and able to attract well-qualified and experienced staff.

***Tactics***

Zero Waste SA is:

- evidence based
- outward looking and market / industry focused
- consultative and cooperative
- strategy driven, flexible and dynamic.

# 9 Conclusions

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## 9.1 CULTURE

South Australian society has responded positively to government led strategy for changing waste management and recycling practices across the state. Practices have been shaped by policy in a way that appears to have tapped in well to the psyche of the people of South Australia, in behavioural and cultural terms.

South Australia has faced environmental and resource adversity since its foundation and its citizens understand the meaning of scarcity. That modern waste policy was embarked upon 40 years ago, bringing in container deposit legislation well before most other jurisdictions had turned any constructive policy attention to the sector, demonstrates a certain cultural attitude to waste management and recycling that sets South Australians apart.

During the last 10 years, Zero Waste SA and its implementing partners have been able to influence not only individual behaviour but also the attitudes and behaviour of firms, local authorities and the community generally towards materials recovery and resource efficiency, costs and cost savings. In doing this it has:

- influenced investment in the materials recovery sector as well as its regional character
- improved the cost-effectiveness and competitiveness of the business sector
- helped to save costs in the public sector
- contributed to economic development
- conducted research and generated knowledge and data
- managed a smooth transition from a dependency on landfill disposal towards an industry geared towards resource efficiency and high value-added materials recovery and marketing.

A snap shot of South Australia's waste management and recycling performance in 2014 would reveal a set of community services, and resource recovery practices, underpinned by a practical and cost effective system of governance that would be the envy of the world. The root of this admirable situation lays in the culture of the people of South Australia.

## 9.2 FUTURE POLICY CHALLENGES

The waste management, resources recovery and resource efficiency sector is a complex and economically significant sector of the economy. The wide range of stakeholders, complex materials supply and value chains, diversity of materials types, as well as inherent health, safety and environmental aspects mean that this sector presents quite different policy challenges in comparison to other sectors of the economy.

South Australia has effective waste management infrastructure, and a culture of environmental responsibility that is second to none. However, there is still a significant residual reliance on landfill, and, set against the backdrop of the recent introduction of mandatory resource recovery in the state, a new and extended network of resource recovery facilities will be needed in the coming years.

The investment demand for this additional resources recovery infrastructure, as well as for the replacement of existing asset stock, and the progressive closure of landfill space, is significant. We estimate that the investment demand is likely to be in the order of \$200–350 million over the next 10–15 years for municipal solid waste, and potentially double that taking into account all materials / waste streams.

This future investment into the sector represents a major policy challenge. A well-coordinated strategic and tactical approach from and within state and local government is needed to attract and coordinate regionally distributed facilities with good economies of scale, whilst protecting against over-capacity and securing the best value for money in procurement process.

High performing waste management and resource recovery brings significant operational and investment cost. The industry knows that its bottom line is highly influenced by the revenues it receives for the materials collected. Finding local markets for these is one approach to reduce operating costs and business risks, to realise the local manufacturing job opportunities and the environmental benefits.

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The spotlight has started to shine on the business opportunity for re-manufacturing of locally collected materials into products that people want to buy. South Australia has comparative advantage to attract and grow new, potentially high value-added, re-manufacturing enterprises. Through Zero Waste SA, it also has experience in guiding a fledgling industry (compost manufacture) from start up to maturity through a mix of support mechanisms over an extended period of time.

The waste and resources sector is well positioned to deliver new, high-technology and advanced industry. Establishing and creating an environment that attracts such economic growth within the state would seem to be a strategic imperative. We consider the potential for growth in small and medium sized enterprises in the re-manufacturing sector in South Australia to be worthy of policy attention.

Patterns of waste generation are ever changing, as are the types of chemicals and materials that are used to make the products we buy. But it seems that we may be on the verge of a fundamental shift in the way products are manufactured and distributed. A revolution in 'home manufacturing' made possible by the emergence of 3D printing technology is one important potential dimension. This development may radically alter the nature of municipal waste generated in our homes, as well as the spatial distribution of waste generating enterprises that the waste and resources industry serve. Citizens will expect government to ensure that infrastructure and public services keep pace with this change.

Moving the discussion beyond just the management of post-consumer materials, there is wide recognition that current practices of resource consumption within human society are unsustainable. There is a paradigm shift taking place away from waste towards resources management and, indeed, South Australia has been influential in the uptake of the Zero Waste paradigm globally.

But the concept is one thing and the practice is another. There remains a considerable amount of work to do in shaping production and consumption practices, and implementing resource efficiency through commerce and industry, state and local government. The magnitude of savings and productivity gains that policy studies from other

OECD countries are estimating is very considerable. Certainly it seems safe to assume that innovation in resource efficiency has the potential to generate significant cost savings and productivity improvements throughout the economy.

Savings in public sector expenditure, at both state and local government level is another important area of policy focus. Public sector expenditure in South Australia makes up quite a large share of the overall economic activity in the state. In just one recent case where Zero Waste SA has sponsored the re-evaluation of waste management contracting, in SA Health, the potential for \$8–10 million of savings has been identified. Whilst these savings are not yet banked, the case certainly indicates the potential scope for considerable budgetary savings across the public sector purely by coordinated procurement, and attention to resource efficiency.

Being a leader in this sector will become increasingly important not only from a cost efficiency and competitiveness perspective, but also to facilitate global market participation and acceptance of products and services, and for South Australia to be attractive as an investment destination.

### 9.3 ECONOMIC CONSIDERATIONS

Pricing signals by the waste levy are a key incentive for waste generators to identify alternative waste treatment and disposal options. In the absence of such alternatives, the outcomes from introducing a levy will be unpredictable and fragmented. They are unlikely to lead, autonomously, to an optimally sized and efficient system of materials collection, recovery, treatment and high value-added sales.

This assertion can be evidenced by the fact that landfill diversion rates in New South Wales are considerably lower than in South Australia despite the waste levy being significantly higher.

The strong implication is that although the waste levy is almost certainly a necessary condition for achieving waste diversion from landfill (the costs of which, without the levy, are often lower than those of alternatives) it is not a sufficient condition to guide the diverted materials to their most beneficial uses within the state.

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In addition to the levy, effective organisational arrangements need to provide the institutional framework through which response measures to the materials flow can be planned, coordinated, financed and implemented.

A unified mechanism of this kind has rarely been available to guide and help facilitate the changes needed to meet the immediate consequences of landfill diversion. The absence of such a mechanism can result in short-term ad hoc planning and development, and costly mistakes reflected in low-value outcomes and redundant capacity. South Australia has been fortunate to avoid these pitfalls.

The value and importance of resource efficiency and effective waste management to the state's future economic performance should not be under-estimated. This includes agricultural, mining, manufacturing and other industries, businesses and government sectors.

#### 9.4 VALUE OF ZERO WASTE SA

Government waste policy aims to bring a wide range of benefits to society, not all of which can be quantified in financial terms. Waste policy is rarely formulated against rigorous CBA or implementation criteria, often being justified on a pragmatic basis using judgement, not measurement. This means that not all policy measures automatically return a net financial (or even economic) benefit to society.

Many of Zero Waste SA's functions are explicitly governmental, and not expressly designed or expected to generate tangible benefit, and many of the government-related functions performed by Zero Waste SA would not normally be expected to be self-financed.

Whilst the initiatives covered by the economic analysis only form a part of Zero Waste SA's overall portfolio of programs, the savings from our spot-check analysis of programs are so significant that they go a long way to justifying total Zero Waste SA funding to date. Furthermore, our analysis focuses on direct impacts only, and does not include other less tangible but also potentially significant environmental, social and economic benefits.

Zero Waste SA makes a cross cutting contribution to furthering South Australia's government policy. Key areas where it makes a difference are:

- environmental performance
- meeting community expectations
- creating a culture of resource efficiency and sustainability
- enhancing quality of life
- protecting public health
- leveraging leading edge collaborative research
- supporting government planning to meet the waste and recycling infrastructure and service needs of an expanding population
- expanding the economy, including
  - developing new industries, such as re-manufacturing
  - creating new jobs
  - increasing economic activity
  - improving the productivity and efficiency of government, businesses and industry
  - enhancing competitiveness, nationally and globally
  - enhancing the attractiveness of SA as a destination for investment and migrants.

It is impossible to place a monetary value on these benefits. Nevertheless, it is real and its loss is likely to be felt, if not directly, indirectly over time as the guiding role and influence of Zero Waste SA retreats over time.

Zero Waste SA has overseen the creation of a system that, by implementing government policies in an optimal manner without costly setbacks along the way, is the envy of many. Zero Waste SA is one of a rare breed of organisations that is widely admired by its peers and has a reputation second to none interstate and internationally.

Other jurisdictions have benefited from experiences gained from these programs and increasingly continue to do so. This is enhanced by the strength of Zero Waste SA in leveraging research and development in the waste and resource management sector, transmitting knowledge and experience, and using this in delivering support mechanisms and capacity building initiatives.

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Zero Waste SA has created an impressive organisation whose assets are valuable but intangible. They lie in its culture, *modus operandi*, institutional memory and the accumulated skills and expertise of its people. But, as with any organisation, its real value lies in the future. It is the value of the incremental benefits and pitfalls avoided over the course of the future development of South Australia's widely admired waste management system that would be lost with Zero Waste SA's demise.

The analysis in our study brings us to the conclusion that South Australians have been getting exemplary value from the work of Zero Waste SA. However, its value today is the value of the future benefits it can bring to society. On the evidence of the strategic steering and tactical implementation of state government financed support programs to date, and looking towards future critical needs, we would estimate the scale of these future benefits to be very considerable indeed.

## 9.5 THE WAY FORWARD

This review has identified that State Government support via Zero Waste SA has been of considerable value to South Australian industry and commerce (with the potential for far greater value-adding).

Strategic interventions have helped to coordinate and rationalise capital and operating expenditure across state and local government, establish high quality recycling and waste services to the community; generate and share knowledge; and further the culture of environmental consciousness and responsibility that contributes to making South Australia such an attractive environment for citizens to live and businesses to prosper.

Nevertheless, State Government announced in the 2012–13 Mid-Year Budget Review (MYBR) that it intends to look at options for delivering Zero Waste SA's functions in different ways. Specifically, the MYBR states that Zero Waste SA will cease operations in 2015–16 within government. This review aims to help inform future strategic arrangements for State Government support to this sector.

We have analysed various institutional options for delivery of the functions currently performed by Zero Waste SA, and used multi-criteria analysis to rank these options. Our conclusion is that the institutional model of a sector-oriented corporation

with skills based board (the current institutional arrangement) is global 'state of the art', and that replacing it with a different type of organisation is likely to impact on the ability of government to implement its waste policy.

Notwithstanding this, the review has highlighted two alternative institutional models that offer certain specific insights and benefits that could be taken into consideration whilst refining the governance, funding and strategic role of Zero Waste SA. We believe that in orienting future State Government institutional arrangements for the sector, there is merit in considering:

- diversifying funding sources away from complete reliance on waste levy funds
- expanding the scope of sectoral interventions to also cover resource efficiency in water and energy
- adapting membership and staffing to reflect these needs.

After reviewing contemporary programs being devised and implemented internationally, we have found Zero Waste SA's range of tactical interventions in the sector to be exemplary. As a result, we encourage a search for new innovative and hybrid institutional models that adapt and improve rather than re-construct current institutional arrangements.

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## 9.6 REMAINING QUESTIONS

There are many questions that arise from this study, but we would like to highlight four in particular for future consideration.

- 1. If the grant funding support mechanism is taken away, does that not risk undermining the functionality and credibility of the Waste Levy as an economic instrument?** This study has not looked at fiscal policy alternatives; however, we would advise that the future role and policy relevance of the waste levy also be reviewed before making final decisions on the institutional arrangements governing the sector.
- 2. What policy instruments should be put in place to drive implementation of, and investment in, resource recovery prior to landfill?** The mix of policy instruments needed to catalyse implementation of further enhanced resource recovery is a key issue for consideration in the next strategy period. Is the level of the waste levy sufficient? Or does it need to be increased in order to catalyse the introduction of further alternative waste treatment approaches? What planning and accompanying measures can be taken to lay a solid foundation for investment in resource recovery across the state?
- 3. What scope is there for Zero Waste SA to extend their range of financial support mechanisms?** Purely relying on grant financing as a means of catalysing change is rather limited. Grant funds can be very effective in attracting, or softening, loan financing. International development institutions working in this sector are increasingly providing a mix of loans and grants in their projects, and ever diversifying their 'financial products'. Is there scope and demand for extending the range of financial mechanisms being applied in South Australia?
- 4. What scope is there for Zero Waste SA to take on board additional functions?** Zero Waste SA has already started working with industry not only in the waste and materials aspects, but also in the water and energy aspects. Resource efficiency is a cross cutting issue, and some jurisdictions (notably Victoria and Scotland) have given their institutions a mandate to work across all sectors. Is there scope for consolidating the expertise within State Government into one lean and experienced organisation with a mandate to deliver cross-cutting resource efficiency benefits to the economy?



# 10 Glossary

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**Benefit Cost Ratio:** A ratio attempting to identify the relationship between the cost and benefits of a proposed project. Projects with a benefit-cost ratio greater than 1 have greater benefits than costs; hence they have positive net benefits. The higher the ratio, the greater the benefits relative to the costs.

**Cleaner production:** Defined by the United National Environment Programme (UNEP) as 'the continuous application of an integrated environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment'. It aims at resource efficiency but also explicitly addresses and strives to reduce the use of hazardous substances in products and their production processes, and generation of emissions and wastes.

**Co-mingled waste:** Waste containing mixture of materials, usually used in reference to recycling streams where multiple recyclable materials are collected together and then separated at a Material Recycling Facility (MRF).

**Consumer preferences:** A consequence of consumer choice, guiding the acquisition of a good or service on the basis of the information available. This may include the preference not to consume at all.

**Cradle-to-cradle:** Focuses, first and foremost, on defining the intention behind the design of a product in terms of its positive impact, that is, its social, economic and environmental benefits. The cradle-to-cradle concept proposes a complete move away from the linearity of the 'cradle-to-grave' model of the life-cycle approach. This approach moves towards a circular concept based on a model taken from the natural world, that residual materials from the metabolism of one organism constitute food for another organism, without the loss of quality that would eventually render them useless. Rather than ultimately ending up as waste, the materials in a product at the end of its use period begin a new life in a new cycle, at the same (or even higher) level of quality, time and again. As waste equates to food, cradle-to-cradle eliminates the very concept of waste. In order to apply this approach to products and services materials must have a known, well-defined chemical composition: materials must be either biological nutrients

(safe to return into a natural biological cycle) or technological nutrients; products must be designed for easy disassembly. Such a cycle calls for new forms of interaction along the supply chain of products, where respect, trust and partnership play a prominent role.

**Dematerialisation:** The reduction of the throughput of materials in human societies. When the total amount of material inputs in a society is decreasing, this is called absolute dematerialisation. When the amount of material input is going down per unit of GDP or per capita, the term relative dematerialisation is used.

**Design for environment:** Products designed and manufactured with materials that are safe and that can be readily disassembled to individual component parts in order to recover the resources.

**Environmental externalities:** The economic concept of uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism.

**Eco-shopping:** This is a consumer experience where products are environmentally friendly, and do not require private cars to travel to (not in and out of town shopping centres) and waste is minimised (by not offering one time use carrier bags for example).

**Fractions:** The waste fractions are the individual materials ( metal, packaging, plastic, biodegradable and so on) that make up the total waste material and / or the source of the material (for example the household waste fraction or hazardous waste fraction) of the total waste stream.

**Fly tipping:** Also known as illegal dumping, is the dumping of waste illegally instead of in an authorised waste management facility.

**Hazardous wastes:** Waste materials that, when generated, present a hazard to the environment or public health. The hazard risk of some wastes depends on the concentration of toxic materials or chemical that they contain.

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**Industrial symbiosis:** The co-location of different industrial activities where waste, energy and material generated by one party is recovered and reused by another party. The objective of industrial symbiosis is to achieve zero waste.

**Life cycle thinking:** An approach to design of products and services that takes a cradle-to-grave approach to analysis of environmental impacts.

**Multilayer packaging:** Packaging materials made up of several layers of materials (generally plastic film polymers) each with individual properties that together meet the specific packaging tolerance required by the producer for their product.

**Net present value (NPV):** The difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyse the profitability of an investment or project.

**Organic waste:** Waste that is derived from organic material such as garden clippings and food waste, but also includes a range of waste streams from industry and primary production.

**Optical sorting:** The use of optical detectors in Material Recycling Facilities to detect and identify different material types and to use this information for separately sorting these materials, usually by mechanised or automatic means.

**PET (poly-ethylene-terephthalate):** a recyclable type of plastic polymer commonly used for packaging and beverage containers.

**Resource recovery processes:** A process involving different steps that sorts and separates waste into different materials which can be recycled.

**Residual waste:** The waste left over after resource recovery or which cannot be resource recovered and is usually destined for landfill disposal.

**Source separation:** Separating waste materials at the point of disposal so that materials are not mixed or do not become contaminated and are more easily sorted for recycling.

**Three-bin system:** Commonly refers to a household kerbside collection system where a bin each is provided for general waste, comingled recyclables and organic waste.

**Waste to energy (WtE):** Where waste is converted into energy, either directly through burning, or indirectly through other processes, for example gasification, pyrolysis, chemical conversion, so it can be used to generate electricity or heat.

**Waste management hierarchy:** The hierarchy indicates an order of preference for action to reduce and manage waste. The waste hierarchy is presented as a pyramid that specifies that preventing the generation of waste is the preferred action, followed by reduction (for example through re-use), recycling, recovery and as the least preferred action, disposal.

# Annex A: Statement of requirements

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Zero Waste SA awarded this study in order to undertake a review of South Australia's Waste Strategy 2011-2015 and prepare a report and recommendations on the findings of the review. Specifically, Zero Waste SA requested the following six points to be covered:

1. Analyse and report on South Australia's progress towards achieving the waste strategy targets, strategic objectives and priorities for actions, and
  - a. determine whether the current targets are relevant and realistic and suggest alternative targets (if any), and
  - b. identify any gaps in the strategic objectives and priorities for action, assess their importance and suggest any areas for improvement and / or changes.
2. Assess the current and likely future (to 2020) status, relevance and validity of the strategy framework and principles, and objectives and determine whether these are in line with best national and international practice and thinking, and
  - a. Identify best practice opportunities, strategies, policies, initiatives, instruments (e.g.: regulatory; market-based; incentive based etc.), that are needed to maintain South Australia's leadership approach to waste management, and
  - b. Identify who is best placed to drive these measures.
3. Determine the influence of the 5-year Waste Strategy and annual Business Plans\* in guiding the direction of waste management in South Australia and how its influence could be improved.

This should discuss how the strategy and business plan support, influence and assist implementation of relevant state, national and international strategies, policies, initiatives, instruments etc. e.g. South Australia's Strategic Priorities; Environment Protection (Waste to Resources) Policy; Tackling Climate Change: South Australia's Greenhouse Strategy 2007-2020; State planning policy; National

Waste Policy; Product Stewardship Act (Commonwealth), waste to energy etc.

*\*The Strategy informs Zero Waste SA's Business Plan which provides detailed information about programs, initiatives and directions*

4. Discuss and where possible quantify the influence that implementation of the Waste Strategy and the annual Business Plan has on economic parameters for local government and business such as; payback on investment decisions, cost savings, improved productivity, improved competitive advantage and / or new business opportunities, and employment benefits:
  - a. Quantify and interpret the direct and indirect (flow-on effects) economic contribution of the waste management<sup>70</sup> and the resource recovery<sup>71</sup> industry sectors in South Australia which includes:
    - capital, revenue, expenses and employment
    - direct and indirect contribution to Gross State Product (including multipliers)
    - direct and indirect impacts on exports and imports (state boundaries)and derive performance indicators from this data allowing comparison with other jurisdictions (nationally or internationally, where available) as a measure of the effectiveness of the SA Waste Strategy.
  - b. Evaluate the economic results of a minimum of seven programs in the current and previous Zero Waste SA Business Plans, and identify the direct and indirect contribution from these activities to the waste management and resource recovery industry sectors using data/multipliers for different recycled material types.
  - c. Summarize growth forecasts for the state's waste management and resource recovery industry sectors over the next decade, including the factors and assumptions underpinning any projections.

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<sup>70</sup> ANZSIC Classification 29-Waste Collection, Treatment and Disposal Services.

<sup>71</sup> ANZSIC Classification 2922-Waste Remediation and Materials Recovery Services.

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5. Identify and discuss current and emerging challenges within the South Australian context that a future waste strategy should consider e.g. new technologies; processing infrastructure; waste to energy; commodity pricing; international influences; legislative; policy (e.g. carbon price), incorporating a broader sustainability agenda (e.g. water and energy)?
6. Conduct the following:
- a. Review the range of programs currently delivered by Zero Waste SA against new and / or innovative programs emerging in other jurisdictions (nationally and / or internationally) with particular emphasis on economic benefits and realizing the full value of materials through resource management (in what is now widely being called a circular economy) and make recommendations regarding service delivery expansion appropriate for South Australia (taking into account the issues specified in point 5).
  - b. Examine alternative options for delivering the functions presently carried out by Zero Waste SA over a ten year timeframe (from 1 July 2015) including, but not necessarily limited to, the following models:
    - I. a private (industry) entity
    - II. local government
    - III. a not for profit organization (wholly or part funded by government eg UK WRAP model)
    - IV. a combination of the aboveFactors to be considered in examining the strengths and weaknesses of each option could include, but may not necessarily be limited to:
    - transferability of functions under the Zero Waste Act to other entities
    - future administration of and / or amendment to the Act
    - responsibility for review and updating of the SA Waste Strategy
    - monitoring of worldwide trends, coordination of activities, leadership and setting new directions
  - c. Compare the analysis in 6 (b) above with the existing Zero Waste SA model and evaluate how the alternatives rate against the current benchmark.
- alternative approaches to government intervention and the future role of government
  - capacity in the private, local government and NGO sectors to fund the level of activities required to preserve and enhance SA performance
  - capacity within each option to sustain the growth expectations identified in 4 above and establish new programs identified in 6(a) as above.

# Annex B: Summary listing of Zero Waste SA programs and initiatives since 2003–2004

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Zero Waste SA's work is guided by two fundamental objectives of *South Australia's Waste Strategy 2011–2015*:

- maximise the useful life of resources through reuse and recycling
- avoid and reduce waste.

Annual business plans guide the efforts of Zero Waste SA and the South Australian community in trying to achieve these objectives.

Each year, in developing the business plan, consideration is given to the most effective mix of policy and program interventions. Many of the programs have been ongoing over a period of years. These are projects that will most likely deliver long-lasting or permanent changes in waste infrastructure and waste behaviour in the state, and consequently require sustained support to avoid loss of momentum (such as the Kerbside Waste Incentives Program, metropolitan and regional infrastructure grants, *Recycle Right*<sup>®</sup> household education program, and Household Hazardous Waste and Farm Chemical Collection Program).

Many projects and programs have been especially tailored to compliment and support waste management legislation and policy reforms. For example, the banning of electronic and electrical waste (e-waste) from landfills in South Australia and the introduction by the Australian government of a product stewardship scheme for e-waste were supported by incentives to improve e-waste storage, collection and recycling capacity in South Australia.

Other initiatives are shorter-term projects, introduced at critical times. They aim, for example, to facilitate the implementation of national programs in the state (as in the e-waste example) or to conduct research into priority waste streams or recovery and recycling of particular materials (such as opportunities for increased recovery and recycling of plastics, organic waste mapping, waste to energy). These projects address market failures usually associated with the lack of quality information and are designed to help the market make more informed investment decisions.

A summary listing of Zero Waste SA programs and initiatives since 2003–2004 is provided below.

## **Priority area 1: measurement, analysis, evaluation and reporting**

- Waste audits and recycling activity study
- Building our knowledge and data on waste and recycling (ZEUS<sup>72</sup>)
- Measuring community attitudes and behaviour

## **Priority area 2: financial and legislative instruments, strategy development**

- South Australian waste strategy development and review
- Support for development and implementation of the Environment Protection (Waste to Resources) Policy 2010
- Strategy development for problematic wastes
- Strategy development for electronic waste management
- Strategy development for food waste
- Strategy development for higher density multi-unit living
- Waste to energy policy development
- Support for plastic bag phase-out
- Review of solid waste levy
- Out-of-council and remote area problem identification and strategy development
- Out-of-council and remote area guideline development
- Input into national policy development (for example national product stewardship legislation)

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<sup>72</sup> ZEUS is a new web-based system developed by Zero Waste SA to collect data from local government and industry on waste disposal and resource recovery within South Australia <http://www.zerowaste.sa.gov.au/councils/zeus>

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**Priority area 3: Municipal solid waste**

- Kerbside waste incentives programs
- Regional Implementation Assistance Program
- *Recycle Right*<sup>®</sup> household education program
- Partnerships with the Local Government Association of South Australia

**Priority area 4: Commercial and industrial waste**

- Infrastructure grants and investment incentives:
  - metropolitan and regional infrastructure grants
  - electronic waste collection grants
  - CFL and Energy-Efficient Light Globe Infrastructure Support Scheme
  - sustainable markets and innovation industry investment incentives
- Industry Program business sector resource assessment and evaluation
- Government Resource Efficiency Assistance Program
- Commercial incentives – Recycling At Work (focusing on dry recyclables and food waste)
- Opportunities for industrial symbiosis
- Government procurement and contracts
- Partnerships with the SA Branch of the Waste Management Association of Australia

**Priority area 5: construction and demolition waste**

- Zero Waste SA / KESAB Clean Site Building and Construction Resource Recovery Program

**Priority area 6: problematic and hazardous waste**

- Household Hazardous Waste and Farm Chemical Collection Program
- Contaminated soil strategy – remediation and reuse opportunities
- Used Oil Collection Program

**Priority area 7: disposal and illegal dumping**

- Litter data and research and branded litter monitoring (Zero Waste SA / KESAB litter counts)
- Community litter, education, resources and campaigns (Zero Waste SA / KESAB litter reduction program)
- Zero Waste SA / KESAB Illegal Dumping and Compliance Program

**Priority area 8: research and development**

- Tertiary education sector (UniSA) partnership
- Promotion of better design of the built environment

**Priority area 9: community education and involvement**

- Zero Waste SA / KESAB sustainable communities (Tidy Towns) program
- Schools and Community Grants
- Wipe Out Waste schools program
- Public place and events waste minimisation

**Priority area 10: consumption and waste avoidance**

- Consumption and waste avoidance incentives program
- Collaborative (sharing) economy – Share N Save initiative<sup>73</sup>

**Priority area 11: corporate support functions**

- Coordinated communications, education and marketing in relation to all programs and activities
- Development and maintenance of website
- Zero Waste SA Board support

73 <http://www.sharensave.com.au/>.

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# Annex D: Economic Aspects of the Zero Waste SA Strategy Review

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This Annex is attached as a separate file.

Economic Aspects of the Zero Waste SA  
Strategy Review

A Report to Zero Waste SA prepared by  
EconSearch as part of the RWA consortium, 2014.