

Zero Waste SA

Review of Solid Waste Levy

Report

2 February 2007

Report no: 1-6



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Report

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Executive Summary

Background

Zero Waste SA commenced on July 1, 2003 with the primary objective to promote waste management practices that, as far as possible, eliminate waste or its consignment to landfill, advance the development of resource recovery and recycling, and are based on an integrated strategy for the State. The function of Zero Waste SA is among other things to, from time to time, advise the Minister about the amount to be charged by way of the levy under section 113 of the Environment Protection Act 1993.

Zero Waste SA has commissioned Hyder Consulting to undertake a study reviewing the amount to be charged for waste disposal by way of the waste depot levy (landfill levy). Concurrently, the South Australian Government has announced that the levy will increase by \$10m in July 2007, and associated impacts have therefore also been considered in this study. In particular, this study reviews the way in which this increase could be given effect.

Purpose

The report will be used as the basis for consultation on the nature of the levy increase in 2007, and the potential for further increases.

The State Government intends to consider both the findings of this report and comments raised through subsequent consultation in forming and ultimately deciding on the nature of the waste levy.

Community Attitudes

South Australia is a strong performer in recycling and recovery of resources. Recent studies show that 65% of waste material is being recycled or put to better use rather than being disposed of to landfill. However, and despite the many initiatives aimed at increasing sustainable resource recovery in South Australia, significant parts of the overall waste stream continue to be landfilled, with about 1 million tonnes of waste going to landfill each year.

In 2005, Zero Waste SA studied the knowledge, behaviours and attitudes of community members with regard to waste management and recycling. Overall attitudes to waste reduction were positive, with 89% of people surveyed stating that it was very important that the amount of waste to dumps is reduced and 82% stating that they are prepared to do more to help protect the environment.

Waste Trends

Historical waste trends have been compiled and documented. Reliable disposal figures (from landfills) are available over a number of years, in particular since weighbridges became compulsory at larger landfill sites.

Since around 2002, disposal quantities have been slowly declining. Although reliable data on recycling is only available for the past few years, it is certain that recycling quantities have been increasing significantly, and have more than compensated for the trend of a continuous increase in overall waste generation in line with population and economic growth and consumption.

The 2003/04 Levy Increase

As a result of the 2003/04 levy increase the additional amount paid by Local Government (and, hence, residents) was around \$1.7 million per annum, or \$3.70 per household per year. The average additional cost on business was between \$20-\$23/yr in metropolitan Adelaide. As such, the increase in the levy (from \$5 to \$10 in metropolitan Adelaide and from \$2.50 to \$5 in regional SA) was barely recognisable (in a financial impact sense) to businesses and not at all to residents. It was obviously felt by Local Government but there the predominant view appears to be that sufficient support was provided by Zero Waste SA to compensate for the increase and assist in changing to good practice domestic waste and recycling systems.

Since the increase in the waste levy in 2003/04, the amount of material disposed to landfill has decreased approximately 9%, though clearly not all of the reduction was caused by the levy as waste disposal is also impacted by a range of other factors.

The GHG benefits associated with this levy increase are estimated to be in the order of 50,000 t CO₂ equivalents/yr. Using the most recent costs of greenhouse gases as estimated by the UK Treasury late last year ('Stern Review') this is equivalent to a benefit of approximately \$5.5 million per year.

Stakeholders expressed concerns about the upcoming levy increase (July 2007) in that the increase was seen as principally a revenue generating exercise for State government.

What about other jurisdictions?

Levies are very successful in generating revenues. Success in driving overall reductions in waste disposal to landfill has been more modest. The main purpose of landfill levies or taxes is to make the alternatives to landfilling more attractive and to guide waste producers to recycle, prevent and minimise waste. Evidence from other jurisdictions suggests that there is no significant correlation between the levy and reduction in waste disposal unless the levy is substantial i.e. in the order of at least \$50 per tonne. Both in Australia and overseas, experience and predictions have shown that a lower increase may achieve small gains in terms of resource recovery but will not lead to significant changes in the way waste is managed.

Clearly, the landfill levy in South Australia should continue to be reviewed to determine its effectiveness. Future increases in the levy beyond the

\$10m increase intended in July 2007 are likely to be necessary but remain a decision for the State Government.

Future Waste and Recycling Scenarios

Three different scenarios have been developed to project the landfill (and recycling) quantities up until 2013/14 as described below. Historical and projected waste trends are depicted in Figure I.

Low Diversion: The Low Diversion scenario assumes *no additional* activities, programs or incentives targeted at waste minimisation and resource recovery will be provided.

Sustained Efforts: The Sustained Efforts scenario assumes a continuing – and increasing – involvement and expansion of programs by ZWSA, with a corresponding increase in resource recovery.

High Diversion: This scenario assumes that the waste reduction targets are met, and that additional resource recovery beyond these targets will be achieved through continuous waste minimisation.

Figure I also shows the South Australian Waste Strategy Targets which are shown here as a combination of the targets for the three individual waste streams: MSW (75% recycled by 2010), C&I (30% increase in re-use and recovery by 2010) and C&D (50% increase in re-use and recovery by 2010).

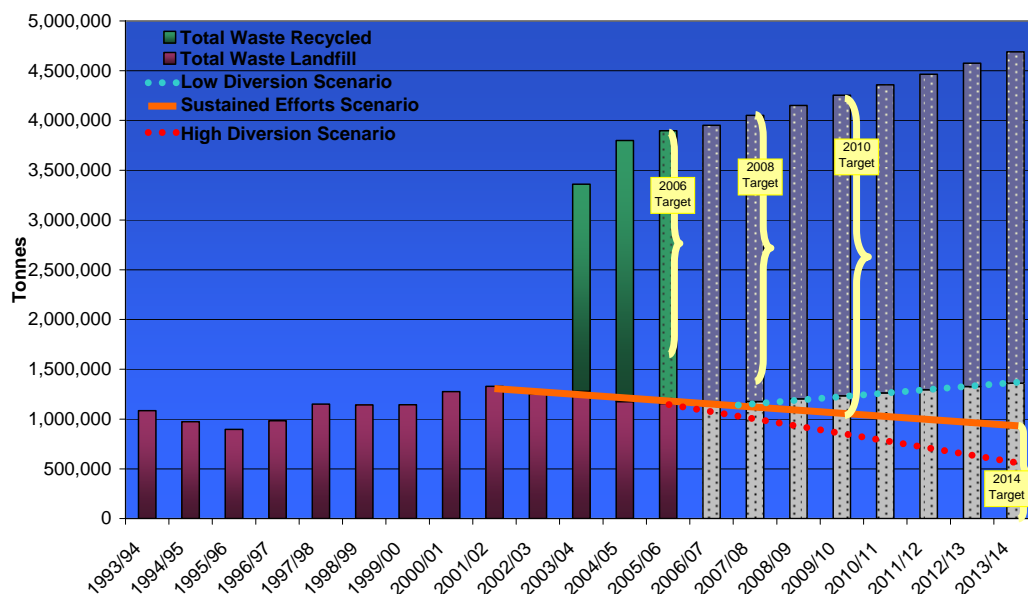


Figure I: Historical and Projected Waste Trends

Financial Impacts

Four Financial Impact Scenarios have been developed as per Table 1. These are based on two different trajectories for the waste levy:

- A doubling of the levy in July 2007, with no further increases except for CPI (3.1%) for subsequent years; and
- A doubling of the levy in July 2007, plus a further stepwise increase to \$55 by 2013/14. The suggested increase to \$55 is based on evidence from other jurisdictions and would be necessary to drive sustained gains in re-use and recovery of resources from waste.

It is the finding of this review that the announced \$10m increase in the levy in July 2007 should be given effect through a doubling of the respective metropolitan and non-metropolitan levy amounts. However, this ultimately remains a decision for the State Government.

Table I: Financial Impact Scenarios

Financial Impact Scenario	Waste Scenario	Waste Levy Increase
1	Low Diversion	No increase after 2007
2	Sustained Efforts	No increase after 2007
3	Sustained Efforts	To \$55/t by 2014
4	High Diversion	To \$55/t by 2014

Note: Scenarios are consistent with projections; Scenario 3 is a financial worst case scenario as it assumes the unlikely situation that even an increase to \$55/t will not achieve a high recovery rate

Table II summarises the results of the above estimates. Most of the cost increases are due to the levy increase in July 2007. Even with a rise in the levy to \$55/tonne the actual costs to households and businesses do not go up significantly compared to the lower levy if the High Diversion scenario for waste disposal can be achieved.

It is noted that actual generation of waste is not likely to reduce significantly, so most of the reductions in waste disposal would be achieved through increased re-use and recycling. A proportion of these activities will also be more costly than they currently are (to cater for additional quantities) and actual costs to households and businesses may therefore be up to twice the amounts shown (which only relate to waste disposal). However, it is important to look at the order of magnitude of these potential cost increases: If the waste levy increases to \$55/t (Table II, Scenario 3) the annual costs to households amount to \$6 and to business to \$84 in metropolitan Adelaide. For regional SA, the changes are negligible (as we have assumed no further increases except for the increase in July 2007).

Table II: Increased annual costs difference between 2007 and 2013/14

Financial Impact Scenario	\$/hhld/yr in metro Adelaide	\$/hhld/yr in rural SA	\$/business/yr in metro Adelaide	\$/business/yr in rural SA
1 (CPI)	12	4	76	27
2 (CPI)	6	2	42	15
3 (\$55/t)	6	1	84	5
Financial Worst Case	19	2	132	15

Implications on Waste to Resources Fund

Table III provides a summary of annual revenues generated from the levy under each of the four scenarios, and the annual monies available under the Waste to Resources Fund.

The most important aspect is that - regardless of the actual levy charged per tonne - more monies will be available for waste minimisation programs if the levy itself does not achieve the desired results, and less money will be available if the levy does achieve the desired results. In other words, utilisation of levy funds available from the Waste to Resources Fund would enable a “flexible response”: If the desired results (targets) are not achieved then more monies will be available to contribute to the achievement of these results, and vice versa.

Table III: Levy Revenue and Waste to Resources Fund

Scenario	Expected total annual revenue in 2013 (\$M)	Expected annual Waste to Resources Fund allocation in 2013 (\$M)
#1	33	16.5
#2	23	11.5
#3	45	22.5
#4	29	14.5

Impact on GSP

Economic activity and impact on Gross State Product (GSP) has been estimated as the difference between the Business as Usual and the High Diversion Scenario (and the difference between Business as Usual and Sustained Efforts in brackets): A total of 477 (258) additional jobs would be created, as well as an additional annual contribution of \$155 (\$83) million to GSP. This represents an increase in GSP of 0.25% (0.14%).

Environmental Benefits

Environmental benefits have been expressed in greenhouse gas (GHG) savings. The annual benefits amount to between 175,000 t/yr of CO₂ equivalents for the Sustained Efforts scenario and 322,000 t/yr for the High Diversion scenario. The monetised benefits amount to between almost \$20 M and over \$35 M respectively. The cumulative additional benefits between now and 2013/14 are \$74 M and \$139 M respectively. Note that the total monetised GHG benefits for the same period amount to between \$1.3 and \$1.45 billion.

Another way of expressing environmental benefits (including many more factors than just GHG) is the Ecodollar method¹. Despite the uncertainties and discussions regarding this method it can be useful to provide this estimate as an order of magnitude. The (monetised) environmental benefits of enhanced waste diversion and resource recovery in SA would amount to between \$120 and \$220 M per year.

Social Considerations

Social aspects have also been considered and discussed. It was concluded that a levy increase to \$55/t which will enable high waste diversion would bring the greatest social satisfaction with the waste levy increase, as a recent attitudinal survey showed that 89% of people in SA believe it is very important to reduce waste to landfill and 82% are prepared to do more to help protect the environment. Further, it was highlighted that the community needs to be aware of the long-term environmental, social, and environmental benefits associated with a waste levy.

Other Issues

The issue of a *differentiated levy* was also considered. Levies can be differentiated by location and by material, and applied at different points in the waste and resource recovery system. This report concludes that the current relative difference between metropolitan and regional SA should be maintained (due to current economic conditions, to consolidate adequate waste infrastructure, to minimise illegal dumping). The levy is best kept as simple as possible and be charged at the point of final disposal, with any rebate systems kept minimised as far as possible.

Government *administrative costs* resulting from the increase are likely to be marginal, given current collection efforts. Recordkeeping costs should not change significantly. Local Government, however, will have increased costs for compliance and enforcement activities, largely due to an expected (temporary) increase in illegal dumping.

¹ A method developed in Australia to estimate the value of environmental impacts and benefits in dollar terms (more detail in Section 6.3 of the report)

Recommendations

This project has reviewed the structure of the solid waste levy under section 113 of the Environment Protection Act 1993 and based upon its findings, the following recommendations are made:

- 1. The \$10m increase in the levy announced by the Government to be introduced in July 2007 should be given effect by way of a doubling of the metropolitan and non-metropolitan levy rates.*
- 2. The current levy 'gap' between regional and metropolitan SA should be maintained in the medium term.*
- 3. No differentiation of the levy by waste type should be made.*
- 4. For sustained and increasing resource recovery in the medium to long term, the waste levy should be continuously increased to around \$55 per tonne by 2013.*
- 5. The waste levy should be as simple as possible and continue to apply at the disposal point for waste.*
- 6. At least 50% of the levy funds should continue to be directed to the Waste to Resources Fund to maintain an adequate and flexible response.*

It is recognised that these recommendations and the subsequent process of consultation to be undertaken with key stakeholders in relation to this report will assist the Government to determine the final structure of the solid waste levy for implementation in 2007-08 and future years.

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Appendix A

Waste Scenario Projections

Appendix B

Cost Estimates

1 Background

Zero Waste SA has commissioned Hyder Consulting to undertake a study with the primary objective of reviewing the amount to be charged for waste disposal by way of the waste depot levy (landfill levy). This has required consideration of the following:

- effectiveness of the levy as an instrument to influence waste generation and disposal behaviour;
- upstream and downstream benefits and costs;
- impacts on Local Government, State Government, industry and the community;
- impacts on regional and metropolitan South Australia; and
- demand anticipated on the *Waste to Resources Fund* in order to achieve the targets as of 'South Australia's Waste Strategy 2005-2010'.

Zero Waste SA commenced on July 1, 2003 with the primary objective to promote waste management practices that, as far as possible, eliminate waste or its consignment to landfill, advance the development of resource recovery and recycling, and are based on an integrated strategy for the State. The function of Zero Waste SA is among other things to, from time to time, advise the Minister about the amount to be charged by way of the levy under section 113 of the Environment Protection Act 1993.

The use of landfill levies is the most prominent economic instrument being used in Australia to influence waste management behaviour (ZWSA, 2005).

Currently the levy is \$11.20 for metropolitan waste and \$5.60 for non-metropolitan waste, of which 50% is paid into the Waste to Resources Fund pursuant to the Zero Waste SA Act. Of the remaining 50%, 5% goes to Environment Protection Fund as outlined in the EP Act to fund specific environmental projects, and 45% is paid into EPA recurrent funding for operations and environmental programs.

The South Australian Government has announced that the levy will increase by \$10m in July 2007, and associated impacts have therefore also been considered in this study. In particular, this study reviews the way in which this increase could be given effect.

Objectives for the use of landfill levies internationally and in Australia have variously comprised;

- Revenue generation;
- Reduction in downstream environmental impacts associated with waste disposal
- Promoting volumetric recycling and disposal targets, as a surrogate for reducing upstream environmental impacts associated with resource exploitation and material processing.

Decisions in relation to the amount of the landfill levy and how it should be applied rest with the South Australian State Government.

South Australia is a strong performer in recycling and recovery of resources. Recent studies show that 65% of waste material is being recycled or put to better use rather than being disposed of to landfill (ZWSA, 2006a). However, and despite the many initiatives aimed at increasing sustainable resource recovery in South Australia, significant parts of the overall waste stream continue to be landfilled, with about 1 million tonnes of waste going to landfill each year.

It is noted that there are also other objectives besides simply diverting waste from landfill – including finding the highest value end use for the recycle material. There is currently a problem in SA with significant volumes of C&D waste being shredded and stockpiled – but not actually being used. An increase in the waste levy would allow additional funds to be made available as incentives to re-process these stockpiles and – at the same time – stimulate markets for recycled products.

2 Trends and Projections

2.1 South Australia

2.1.1 Historical Waste Generation

This section presents the amounts of waste sent to landfill and recycled in South Australia for the three different streams, MSW, C&I and C&D.

Overall landfill **disposal** data is compiled from information provided by Zero Waste SA (2006b). The proportions of the three main waste streams were determined based on the report 'Landfill Survey Zero Waste South Australia June 2004' (Zero Waste SA *et al*, 2004) as follows:

- Domestic 32%
- C&I 29%
- C&D 39%²

It is noted that these proportions of waste to landfill may have slightly changed over the past two and a half years, however the quoted figures are the most recent ones and have therefore been used here as the best available estimate.

Table 2-1 shows tonnages of waste landfilled from 1993/94 to 2005/06. In October 2000, weighbridges became compulsory at landfill sites in SA that exceed 10,000 tonnes per annum. Previous data was partially based on volumetric estimates provided by landfill operators and this approach significantly underestimated actual tonnages of waste disposal.

Reliable information on quantities of waste **recycled** is only available for recent years i.e. 2003/04 and 2004/05. This data is drawn from the report *Recycling Activity in South Australia 2004-05. Review of recycling activities in South Australia* (Zero Waste SA, 2006a). This report also gives the split between the three streams for the 2004/05 financial year, and a similar split has been assumed here for 2003/04. Tonnages of waste recycled are presented in Table 2-2.

² Includes residues from C&D recycling centres.

Table 2-1: Waste Landfilled in SA 1993/94-2005/06 (Tonnes).

Year	MSW	C&I	C&D	Total
1993/94	345,561	319,486	418,996	1,084,043
1994/95	310,144	286,742	376,052	972,937
1995/96	285,633	264,080	346,332	896,045
1996/97	313,160	289,531	379,710	982,400
1997/98	367,033	339,338	445,031	1,151,402
1998/99	363,740	336,294	441,038	1,141,072
1999/00	364,642	337,128	442,131	1,143,901
2000/01	406,984	376,275	493,472	1,276,731
2001/02	423,672	391,704	513,706	1,329,083
2002/03	399,088	368,975	483,898	1,251,960
2003/04	407,354	376,617	493,921	1,277,892
2004/05	374,460	346,205	454,037	1,174,702
2005/06	368,882	341,047	447,272	1,157,201

Table 2-2: Waste Recycled in SA 2001/02-2005/06 (Tonnes).

Year	MSW	C&I	C&D	Total
2003/04	278,349	794,489	1,008,538	2,081,376
2004/05	357,463	1,020,304	1,295,190	2,623,367

Total disposal and recycling data is also presented in Figure 2-1. The quantities of material being landfilled appear to have been fairly constant over the period with a slight decline being apparent for the last couple of years. The apparent increase in total waste generation (significantly increased recycling in 2004/05) is due to the following factors: 1) A lack of past recycling data or poor recycling data (since addressed by introduction of compulsory weighbridges at large landfills noted above); and 2) Inclusion of new materials such as fly ash etc. which never went to landfill - this sort of material was stockpiled at power stations and did not attract the levy. Extrapolations are presented as dotted bars.

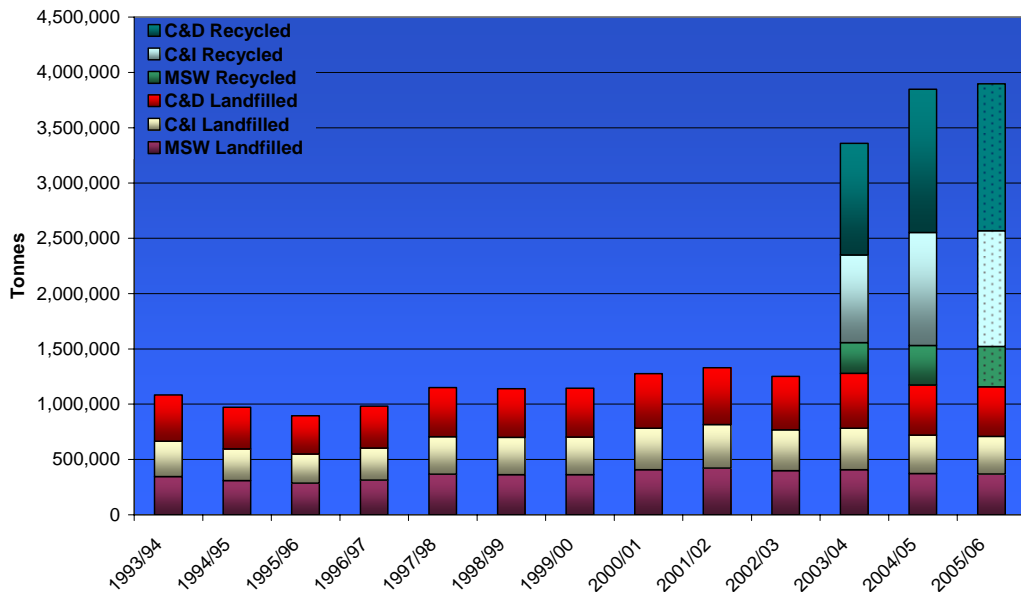


Figure 2-1: Total waste in South Australia

Figure 2-2 shows the historical landfill trend in the state together with the gross state product (GSP) development since 1997/98. As apparent from the graph, GSP has grown significantly - and steadily – over the years whereas waste disposal has remained constant until 02/03, and decreased since. South Australia has since 2003/04 managed to decouple the waste disposal from the GSP growth. Data on GSP growth is derived from the ‘Australian National Accounts State Accounts 2005/06’ (ABS, 2006).

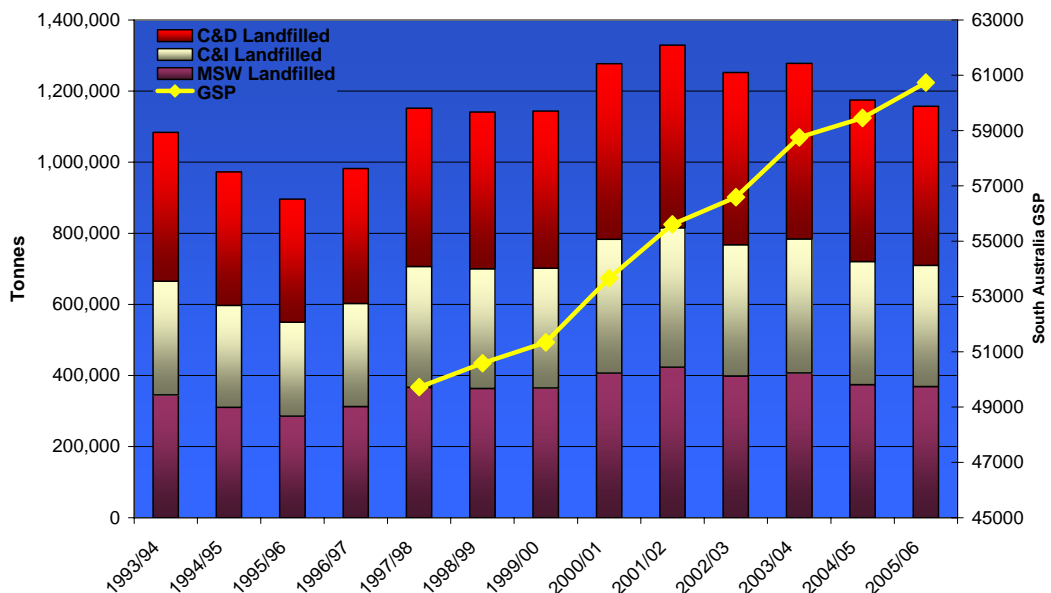


Figure 2-2: Total Landfill Disposal Trends vs GSP Trend

Figure 2-3, Figure 2-4 and Figure 2-5 show the historical trend for each of the three waste streams. All streams show a decrease in waste disposal for the last few years. It is noted that recycling figures have only become available over the last couple of years. Therefore, the totals (landfilled and recycled) do not represent an accurate trend on waste actually generated.

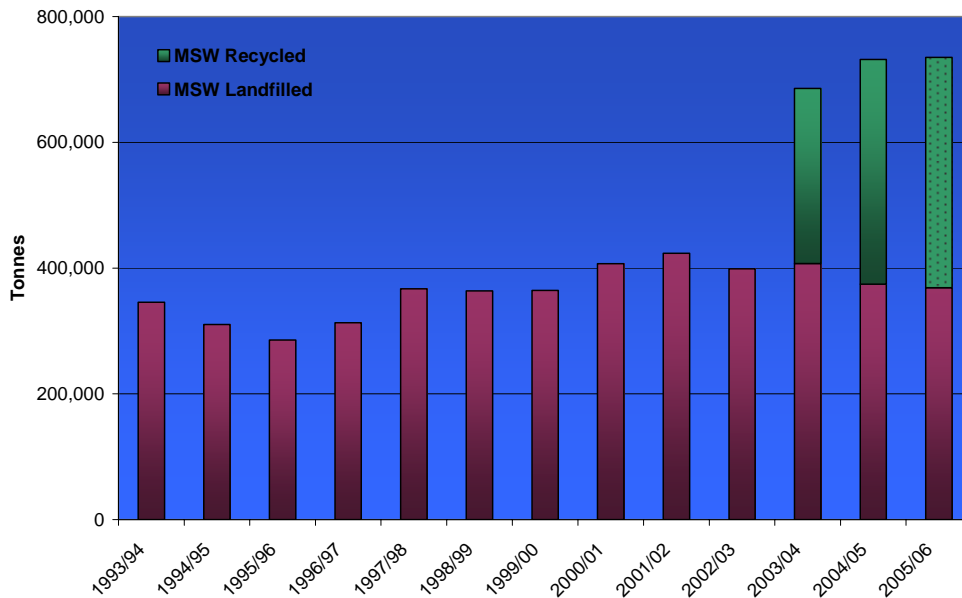


Figure 2-3: MSW Landfill and Recycling Trend in South Australia

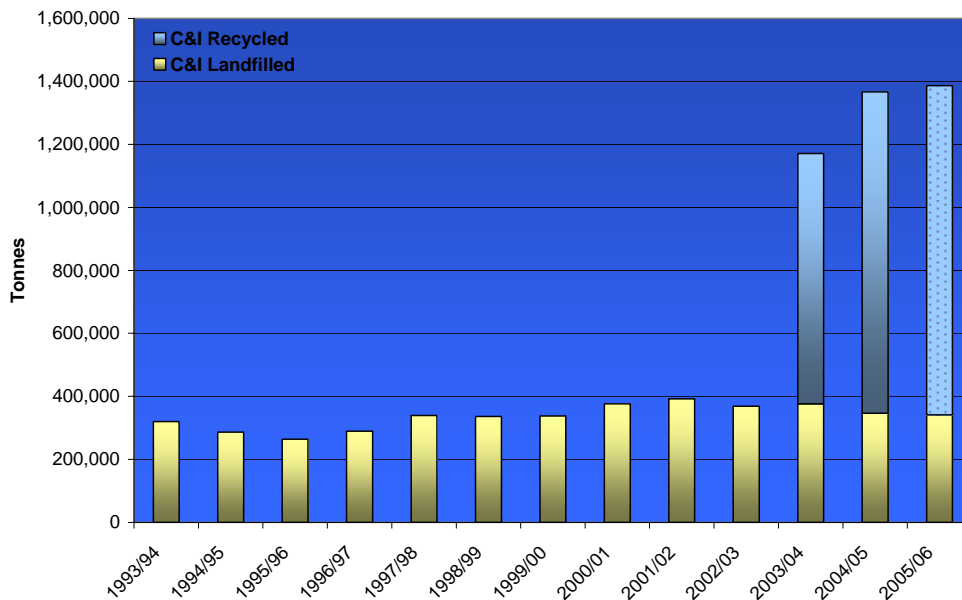


Figure 2-4: C&I Landfill & Recycling Trend in South Australia.

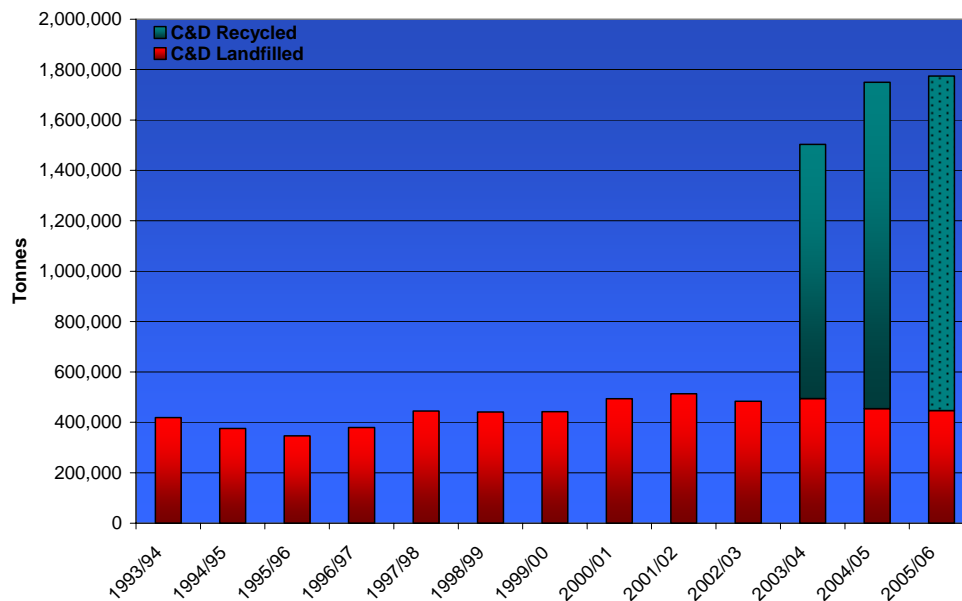


Figure 2-5: C&D Landfill & Recycling Trend in South Australia.

2.2 Metropolitan and Regional South Australia

Table 2-3 and Figure 2-6 present the overall disposal trend in South Australia, both for metropolitan Adelaide and regional SA between 1993/94 and 2005/06. This data is derived from information provided by Zero Waste SA (2006b).

Table 2-3: Historical Landfill Trend in South Australia.

Year	Metropolitan	Rural	Total
1993/94	1,053,365	30,678	1,084,043
1994/95	939,358	33,579	972,937
1995/96	858,658	37,387	896,045
1996/97	943,015	39,385	982,400
1997/98	975,564	175,839	1,151,402
1998/99	907,235	233,837	1,141,072
1999/00	928,509	215,392	1,143,901
2000/01	1,070,146	206,585	1,276,731
2001/02	1,112,355	216,727	1,329,083
2002/03	1,024,522	227,439	1,251,960
2003/04	1,040,745	237,147	1,277,892
2004/05	950,600	224,102	1,174,702
2005/06	928,169	229,032	1,157,201

Note: Until 2001/02, waste disposal was underreported due to inaccurate measurement procedures (i.e., often without weighbridges)

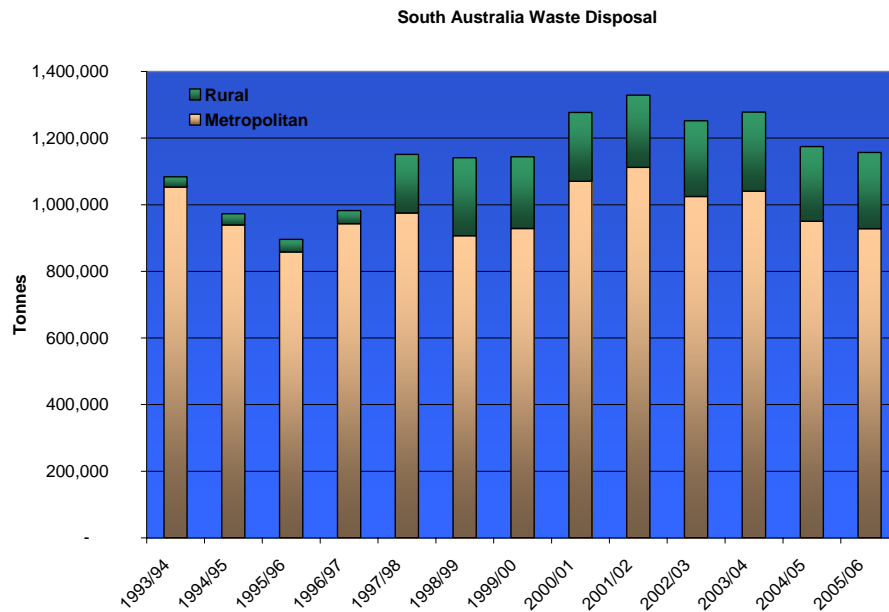


Figure 2-6: Historical Landfill Trend in South Australia.

As can be seen regional SA only produces a small proportion of the total waste going to landfill in SA. On the other hand, there are significantly more (smaller) landfills in regional SA. These figures are also based more on estimates as there are only a limited number of landfills with weighbridges, and the levy is calculated based on estimates. It is noted that these estimates of regional waste are likely to underreport actual waste generation in these areas.

However, and as is the case in other states, there is a trend towards a regionalisation of landfills which aims to provide sufficient economies of scale at such facilities to allow for modern environmental controls at affordable prices. It is noted that regional waste management and recycling facilities (usually at – or adjacent to – landfills) are facing higher transport costs to get recovered materials to markets.

3 Outcomes of the 2003 levy increase

This task comprises a brief analysis of the distribution of costs and benefits as a result of the increase in the levy in 2003.

There are two distinct components to the determination of costs in this task. These are:

- 1 Eliciting views and information from a cross section of key stakeholders.
- 2 Using available data such as levy monies raised and waste tonnages disposed in the various sectors (MSW, C&I, C&D), estimating the impacts on Local Government, individual households and industry.

Stakeholder views

The purpose of this document is to provide the basis for discussion and consultation with stakeholders. Therefore, no consultation has been undertaken as part of this study. However, a small number of key stakeholders³ have been contacted to seek their views and experiences during and after the 2003 levy increase, and to invite any comments in relation to the levy.

The general view appears to be that the last waste levy increase (2003/04) was barely recognisable (in a financial impact sense) to businesses and not at all to residents. It was obviously felt by Local Government but there the predominant view is that sufficient support was provided by ZWSA to compensate for the increase and assist in changing to good practice domestic waste and recycling systems.

It was generally felt that the impact on actual quantities of waste disposed was negligible with the possible exception of domestic waste.

On the other hand, most stakeholders expressed concerns about the upcoming levy increase (July 2007) in that this was seen as principally as a revenue generating exercise for State government. Although it was acknowledged that 50% of the revenue is directed to the Waste to Resources Fund (established under the *Zero Waste SA Act 2004*), doubts were expressed on the actual approval of program spending from this fund.

Discussions were also had on any potential further increases to the levy. Here, the general view was that, in principle, it would be efficient and useful to have a program of levy increases in place for several years to give businesses and the waste and recycling industry an opportunity to plan ahead. Further, it was felt that such increases could be 'politically feasible'

³ Peter Wadewitz, MD Peat's Soils, Chairman Compost Australia; Les Perry, CEO Southern Region Waste Resource Authority; Mike Haywood, GM ResourceCo, President WMAASA; Trevor Hockley, Waste Care SA; Michael Barry, Director Legislation and Environment, Local Government Association.

if the rationale would be clearly communicated and the monies are dedicated to support waste minimisation and resource recovery activities.

Measurable costs and benefits

A determination of costs and benefits associated with the 2003 waste levy increase has been undertaken based on historic waste trends discussed in Section 2. Figure 3-1 illustrates waste trends for the years preceding and following the 2003 waste levy increase, and compares it against the actual size of the levy. As can be seen, the trend – an increase in waste disposal – was reverted in the year following the doubling of the waste levy. However, we note that there may have been other market forces that influenced waste quantities disposed to landfill, such as the closure of the Wingfield landfill or the fact that GSP only grew by 1.2% in 2004/05, compared to 3.8% in 2003/04. It was not possible to determine with any degree of accuracy the influence of the various factors, however it appears the waste levy increase would have been at least a contributing factor to a reduction in landfill disposal. In other words, despite the levy increase having been barely recognisable to residents and businesses (as waste generators) as a financial impact, Councils implemented measures to recover more resources from waste, and recycling businesses were provided incentives to expand their activities.

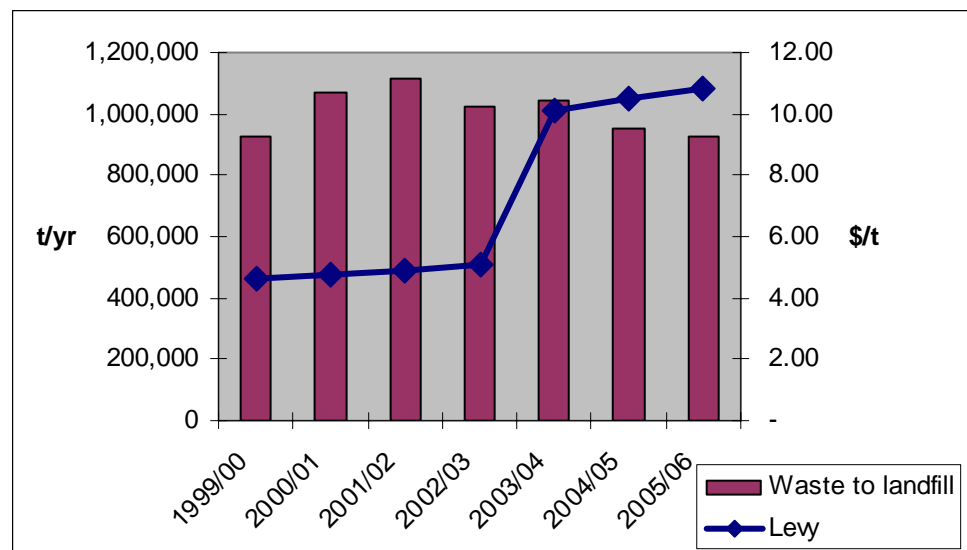


Figure 3-1: Impact of the 2003 Waste Levy increase

The total amount of levies paid in metropolitan Adelaide in 02/03 was around \$5.2m. The doubling of the levy in the subsequent year and its impact on communities and businesses is estimated in Table 3-1 below. The municipal component of waste to landfill was assumed to be 32% (refer Section 2.1), with the remainder coming from businesses (C&I as well as C&D). Based on disposal figures we have estimated the additional amount paid by Local Government (and, hence, residents) to be around \$1.7m per annum, or \$3.70 per household per year. According to ABS

there are around 157,000 businesses in Adelaide. The average additional cost on business is therefore between \$20-\$23/yr.

In any case, it can be concluded that the financial impact of the 2003/04 waste levy increase on households was negligible. Considering the average income of SA businesses (\$610,000⁴), the financial impact on businesses was also negligible. Consequently, and in line with the (initial) stakeholders views provided above, the levy increase (in isolation) is likely to have had limited impact on disposal behaviour of general businesses. On the other hand it would have provided some incentive to recyclers to divert material from landfill.

Table 3-1: Estimated cost impact of 03/04 levy increase on households and businesses in Adelaide

Year	Total Waste disposed (t/yr)	Levy (\$)	Increase (\$/yr)	Municipal (\$/yr)	per hhld/yr (458,002)	Non-municipal (\$/yr)	Per business/yr (156,562)
2002/03	1,024,649	5.09		0	0	0	0
2003/04	1,040,745	10.10	5,296,061	1,694,740	3.70	3,601,322	23.00
2004/05	950,600	10.50	4,765,837	1,525,068	3.33	3,240,769	20.70
2005/06	928,169	10.80	4,808,762	1,538,804	3.36	3,269,958	20.89

Note: The "Increase" in levy funds generated is calculated by multiplying the waste quantity of the relevant year with the waste levy (per tonne), and subtracting the corresponding amount from 02/03 (before waste levy increase). The column "Municipal" is calculated as 32% of that difference as 32% of waste to landfill is municipal waste. "Non-municipal" is the remainder i.e., 68%

As is often the case in Cost Benefit Analyses, the benefits are much more difficult to quantify than the costs, particularly if the benefits are of a non-financial nature such as environmental or social. Here, the difficulties in estimating these are due to the following factors:

- Waste quantities may have changed for a number of reasons other than the waste levy;
- Materials not ending up at landfill could have been avoided, re-used, or recycled (with different environmental implications);
- The composition of materials not ending up at landfills is unknown⁵; and
- It is unknown how much waste would have gone to landfill without a levy increase and/or any other waste minimisation programs.

⁴ ABS, Cat No. 8155.0 Australian Industry

⁵ There is insufficient information over a period of time to determine a changing composition of materials recycled or landfilled.

Despite the above, there are real and indisputable environmental benefits from basically all activities diverting waste from landfill (NSW DEC, 2006; DEH, 2006). Such benefits comprise reduced energy consumption, greenhouse gas savings, reduced eco-toxicity and human toxicity as life cycle assessment indicators of our economy, reduced air pollution, reduced water pollution, reduced water consumption, to name but a few.

As an example, the greenhouse gas benefits associated with the waste levy increase have been estimated based on the following assumptions:

- 50% of waste reduction recorded since the levy increase was caused by the levy⁶; and
- Each tonne of waste not landfilled achieves an average of one tonne of savings in terms of CO₂ equivalents⁷.

Table 3-2 provides estimates of the reductions of waste to landfill from 2002/03 as the base year. The associated GHG benefits are estimated to be in the order of 50,000 t/yr for last financial year. Using the most recent costs of greenhouse gases as estimated by the UK Treasury late last year (Stern N, 2006) this is equivalent to a benefit of approximately \$5.5 million per year.

Table 3-2: Estimation of GHG benefits through levy increase

Year	Waste to LF (t)	Difference to 2002/03	GHG benefits (t CO ₂ eq)	GHG benefits (AUD 110 as per Stern Report)
2002/03	1,024,649			
2003/04	1,040,745			
2004/05	950,600	74,049	37,025	~\$4 million
2005/06	928,169	96,480	48,240	~\$5.3 million

⁶ There is no information that could be used estimate this figure. The assumption has been made by the authors of this report for the purpose of discussion.

⁷ Landfilling one tonne of waste leads to the generation of between 200 and 1,100 kg of CO₂eq depending on the waste stream. With 60-70% landfill gas capture and a mix of flaring and energy recovery the net GHG emissions are estimated to be between 200-300 kg per tonne of waste. Recycling of materials yields benefits of between 0.2 and 15 t of CO₂eq per tonne (for kerbside recycling in NSW, the average GHG benefit is 530kg of CO₂eq per tonne (NSW DEC, 2005). Benefits from 'avoided production' (waste avoidance) are usually much higher than benefits from recycling. More details on these issues are provided in Section 6.3.

4 The Interstate and Overseas Experience

4.1 Interstate

Table 4-1 shows landfill disposal costs by population centre on a dollar per tonne basis including levies where applicable, but excluding GST.

Table 4-1: Current landfill disposal costs by population centres

Population Centre	2003–2004 Landfill Levy ⁽¹⁾ (\$/tonne)	Landfill Disposal Cost Including Levy but excluding GST (\$/tonne)
Sydney	\$30.40	~\$100
Melbourne	\$8.00	~\$38
Brisbane	\$0.00	~\$60
Perth	\$6.00	~\$35
Adelaide	\$11.60	~\$65
Canberra	\$0.00	~\$60
Newcastle	\$23.10	~\$70
Gold Coast	\$0.00	~\$65

⁽¹⁾ The amount of levy varies by state. Many states (e.g. NSW, Vic, WA) are in the process of increasing or considering increasing the levy.

Nevertheless, landfill costs have risen considerably in recent years. In the Sydney metropolitan area, for example, the costs to dispose one tonne of domestic waste to landfill was \$18 in 1990. The equivalent 2006–2007 cost is \$100 (exclusive of GST) at landfills, and more at transfer stations. This is due to several reasons. One is the partial internalisation of some social and environmental externalities, such as stricter environmental regulations, increasing financial allocation for rehabilitation, and ongoing post-closure environmental management of landfill sites.

The other reason is the increasing use of landfill disposal levies: These are determined and administered by State and Territory environmental agencies with some yet to introduce a levy (i.e. Queensland, Northern Territory and the ACT).

The current and future levels of the levy for each population centre are shown in Table 4-2 below.

Table 4-2: Current and future levels of the landfill levy by population centre

Population Centre	Current Landfill Levy (\$/tonne)	Future Landfill Levy ⁽¹⁾	
		Amount (\$/tonne)	Date applicable
Sydney	\$30.40	\$56.70 ⁽²⁾	July 2010
Melbourne	\$8.00	\$9 (MSW) \$15 (industrial)	July 2007
Perth	\$6.00	\$9	Under consideration

⁽¹⁾ Levies are typically raised annually in equal increments. Actual amount of future levy may be higher than indicated as some states include CPI adjustment.

⁽²⁾ For Sydney. \$52.50 for Extended Regulated Area (Newcastle, Wollongong).

Apart from Sydney, disposal levies have historically been low - and are still comparatively low. Work commissioned by Sita Environmental Solutions and available on the Waste Management Association (NSW branch) website shows that the levy does not appear to have had a measurable impact in those other states.

Figure 4-1 shows the historic trend of waste quantities to landfill and gate fees for the Sydney metropolitan area. As can be seen even landfill gate fees of \$80/t did not have a significant impact on the quantities of waste disposed. It is noted that the NSW DEC has issued an update report in late 2006⁸ which indicates some reductions in the quantities landfilled for some waste streams, however the data is not fully compatible with the figures depicted below.

In mid-2006, the NSW Government announced a significant increase in the amount of waste levy charged in the future. This increase was preceded by discussions of representatives of the waste and recycling industry with NSW DEC and other government officials, and a policy paper prepared by Hyder Consulting for the Waste Management Association (Hyder, 2006a).

It was argued by the industry that the State Waste Reduction targets could only be achieved if the levy rose to above \$50 per tonne of waste disposed.

⁸ NSW DEC (2006): NSW Waste Avoidance and Resource Recovery Strategy and Performance Report 2006.

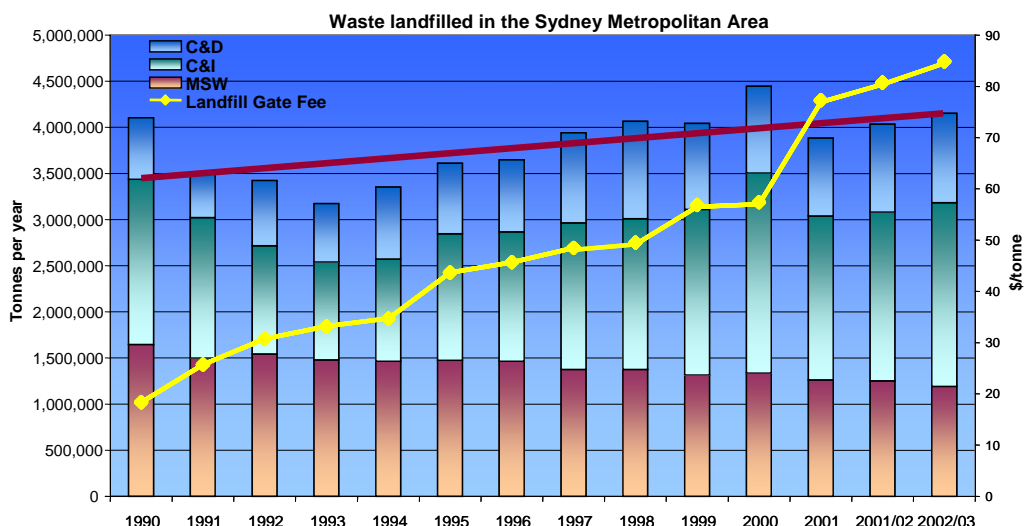


Figure 4-1: Waste Disposal and Landfill Fee Trends in Sydney
(Graph courtesy of SITA Environmental Solutions)

Up until June 2006, the NSW levy payable on all waste to landfill was \$22.70. Since 1 July 06 the levy is almost \$30 per tonne. Future increases are as follows:

- 1 July 2007 +\$7 = \$37
- 1 July 2008 +\$7 = \$44
- 1 July 2009 +\$7 = \$51
- 1 July 2010 + \$6 = \$57

This increase will bring the total landfill gate fees for putrescible waste up to around \$130-140 per tonne which will enable a range of alternative processing and resource recovery activities. More and more Councils in NSW are already embarking on tendering processes to introduce new services and technologies, while industry is also gearing up in anticipation of these significant changes.

4.2 The Overseas Experience

By introducing landfill taxes, many countries within Europe are attempting to divert waste from landfill and encourage waste producers to recycle or prevent the generation of waste. Figure 4-2 illustrates in purple the European countries that have had a landfill tax implemented 4 years ago⁹. The Netherlands has the highest tax, whilst France has one of the lowest. In addition to the landfill tax, countries like Norway, Denmark and the Netherlands have placed taxes on incineration (Jacobsen *et al*, 2002).

⁹ More up-to-date information on specific countries is presented later in this section.

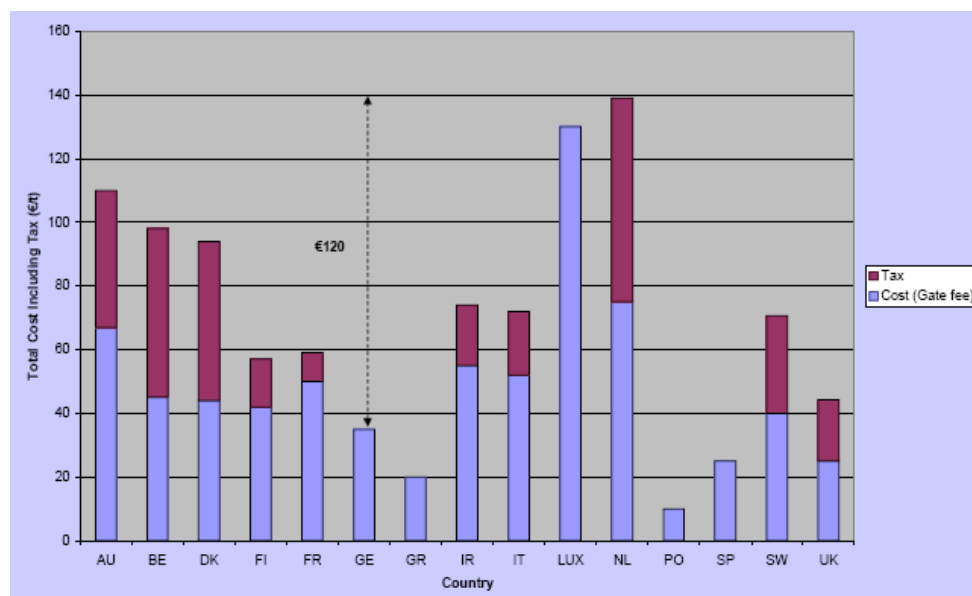


Figure 4-2: Total cost of Landfilling (including tax) in European Countries.
Source: Enomia, 2002

In **Denmark**, a differentiated waste tax was introduced in 1987 with the main objective of directing waste away from landfilling and incineration to recycling. The greatest motivation behind the waste tax stems from the lack of space and landfill scarcity in Denmark.

The Danish Ministry of Environment (DMOE) has suggested that the financial incentive the tax provides is an important factor behind the high rate of recycling in Denmark. Around about 65% of waste was being recycled in 2004, up from 63% in 2001¹⁰. A study done by Morton (2001) also found the tax to be an influential economic incentive in terms of garden, bulky and building waste recycling. With an increased rate of recycling in Denmark, the amount of waste going to landfill has concurrently decreased (DMOE, 2004).

With the introduction of the landfill tax in Denmark, the amount of construction and demolition waste has also increased. Figure 4-3 depicts a strong correlation between the tax and recycling levels. A tax increase from € 18 to € 48 per tonne has managed to increase the recycling rate from 28% to almost 90%. The tax has in effect created a market for the recycling of construction and demolition waste.

It is important to note that together with a tax introduction, Denmark has simultaneously implemented a joint system of physical and organisational infrastructures etc to ensure control over major waste flows and increased recycling rates (Jacobsen *et al*, 2002).

¹⁰ It should be noted that the data is not based exclusively on waste subjected to the tax but on the total volume of waste.

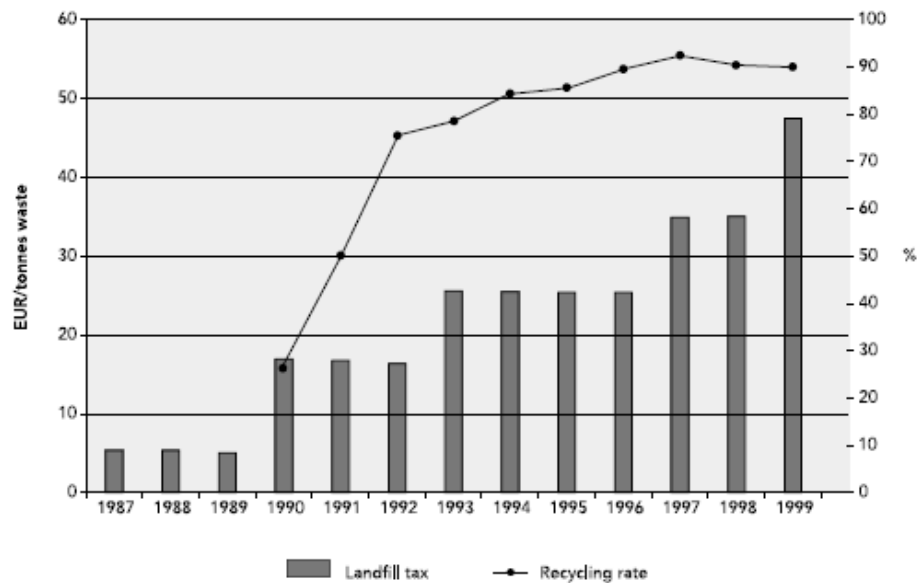


Figure 4-3: Recycling rate for construction and demolition waste compared to the landfill tax in Denmark. Source: Jacobsen et al, 2002

In the case of the **Netherlands**, a waste tax introduced in 1995 is levied on waste that is delivered to landfills. In 1997, the government conducted an evaluation report on the waste tax that was later submitted to parliament. The results from the report were generally positive, and it was concluded that the tax played a fundamental role in the mix of instruments used to shift waste from landfilling to prevention, recycling and incineration. Additionally, no significant side effects or economic problems were found at the time (MHSPE, 2004).

As an example, ash from waste incinerators going to landfill in the Netherlands is taxed. It has been suggested that this prompted the recycling of ash waste and in 1996, all 895,000 tonnes of incineration bottom ash were subsequently recycled (Morton, 2001).

Although a number of information sources indicate a significant increase in recycling due to the introduction of a waste tax in 1995, the figure below indicates a gradual increase already since 1985. The rate of landfilling has concurrently been declining since 1985. This trend may be due to greater public awareness of environmental issues and other government initiatives. The figure also indicates that a fairly sharp increase in tax did not significantly influence the general trend.



Figure 4-4: Correlation between landfill tax and landfill and recycling trend in the Netherlands. Source: SITA, 2006

Finland introduced a landfill tax to all municipal sites in 1996. Again, the primary aim was to increase recovery and reduce the amount of waste going to landfill. A report conducted by the Finnish Ministry of the Environment found the tax reduced amounts of waste being landfilled, even though there had been an overall increase in national consumption (FMOE, 2005).

In **Norway**, approximately 8.8 million tonnes of waste is generated each year. The volume of waste is increasing each year, but the amount of material recovery has offset the need to landfill. Since 1995, the recovery proportion has steadily increased from 57%. In 2002, around 67% of all industrial and household waste was recycled or converted into energy. The remaining 34% was either incinerated or landfilled. In 2004, the proportion of waste recovered jumped to 70%.

It is difficult to isolate what exactly is responsible for Norway's successful waste recovery rate, as the tax on landfilling and incineration is only one of many incentives used by the Norwegian government to counteract waste disposal. Some other important instruments used in Norwegian policy include the following:

- Regulation of landfilling and incineration according to EU legislation
- Municipal responsibility for household waste
- Producer responsibility for e-waste, packaging, cars (from 2007), tyres, batteries, lubricant oils and PCB-windows.

(SOE, Norway 2006)

The Norwegian government considers the waste tax to be a very important tool in overall waste policy and a fundamental instrument in shifting taxation from income and employment (red tax) to pollution and resource use (green tax). This is based on the polluter-pays-principle and aims to reward consumers and customers who opt for the environmentally sound solutions (NMOE, 2006).

Like Norway, the UK government wanted to endorse the 'Polluter-Pays' Principle to better reflect the environmental costs of landfilling and promote a more sustainable approach to waste management. The UK landfill tax was introduced in 1996 and is considered by the Department for Environment, Food and Rural Affairs to play an important role in allowing local authorities to meet their recycling and composting standards and in effect, the national government's waste recycling targets.

Revenue and survey data found that the tax rate of £12 in 2001 had little effect in diverting waste from landfill as exemplified by Figure 4-5 (Advisory Committee on Business and the Environment, 2001). In 2005 the UK Government announced that the levy would be increased by £3 /tonne per year up to a maximum of £35 /tonne. The landfill tax is currently £21 per tonne (T W Bradley May 2006- The Role of Economic Instruments in UK/EU Waste Management Policy Implementation.)



Figure 4-5: Correlation between landfill tax and landfill and recycling trend the United Kingdom. Source: SITA, 2006

The UK government has implemented a number of other waste minimisation incentives such as the Packaging Waste Recovery Notes (PRNs) and trading scheme for landfill permits from 2005. The PRN system alone has increased the recovery rate for packaging waste from 27% in 1997 to 48% in 2001 (BDA Group and EconSearch, 2004).

The landfill tax was introduced to **Sweden** in the year 2000, with the main aim of minimising waste and promoting reuse, recycling and energy recover. The secondary intention was to reduce the number of landfill sites available in the country. It was estimated a 50% reduction in landfill waste would occur within 10 years of the tax introduction (Morton, 2001).

Figure 4-6 below depicts a decrease in landfilling the year the levy was introduced. In 2003 the tax increased to approximately \$A68/ tonne from around \$A47/ tonne. This lead to a significant decrease in landfilling. By 2004, the figure shows Sweden was in close proximity to the 50% waste to landfill reduction.



Figure 4-6: Correlation between landfill tax and landfill and recycling trend in Sweden.
Source: SITA, 2006

In **Austria**, a landfill tax “Altlastenbeitrag” was introduced in 1989 to help finance and support the containment and treatment of contaminated sites, and as an attempt to internalise the externalities presented by landfills. The tax is also one of the instruments used to minimise the amount of biodegradable waste going to landfills. From 1989, the amount of recycled bio-waste increased from a mere 1% to 13% in 1996. Furthermore, due to increased incineration, the amount of waste going to landfill halved in 1996 compared to 1989 (refer to Table 6-1). It is suggested that these results have been achieved not only through mandatory collection schemes, but also by differentiated taxes and new rules on landfill (Jacobsen *et al*, 2002).

Table 4-3: Austrian recovery and treatment of waste from households and similar establishments, 1989-96 (%). Source: Jacobsen *et al*, 2002

Treatment	1989	1996
Recycling of bio-waste	1.0	13.0
Mechanical-biological treatment of residual waste	16.7	7.0
Recovery of waste collected separately	12.9	31.7
Special treatment of hazardous household waste	0.4	0.8
Incineration	5.9	15.5
Landfill	63.1	32.0
Total:	100	100

4.2.1 Summary

Levies are very successful in generating revenues. Success in driving overall reductions in waste disposal to landfill has been more modest where levies are set at relatively low levels. The main purpose of landfill levies or taxes is to make the alternatives to landfilling more attractive and to guide waste producers to recycle, prevent and minimise waste. Overseas evidence appears to confirm the obvious: For any levy to be effective it needs to be sufficiently high to make alternatives to landfill disposal commercially viable.

An added difficulty in determining the effectiveness of waste disposal levies is the fact that these are usually not implemented in isolation but operate in combination with other tools, incentives, initiatives and regulatory options to achieve lower waste to landfill targets.

Clearly, the landfill levy in South Australia should continue to be reviewed to determine its effectiveness. Future increases in the levy beyond the \$10m increase intended in July 2007 are likely to be necessary but remain a decision for the State Government.

It is noted that one of the functions of Zero Waste SA set out in section 6(g) of the *Zero Waste SA Act 2004*, is: *to advise the Minister from time to time about the amount to be charge by way of the levy under section 113 of the Environment Protection Act.*

This section of the Zero Waste Act provides a means to continually review the adequacy of the levy.

5 Projected Waste Generation

Weighbridges became compulsory at landfill sites in SA in October 2000. Previous data was partially based on volumetric estimates provided by landfill operators and is likely to be underestimated. To provide more reliable data, projections into the future are based on landfill trends from 2000/01 onwards. Based on data for these six years an extrapolated figure has been set for the current year 2006/07.¹¹

Three different scenarios have been developed to project the landfill quantities up until 2013/14:

Low Diversion: The Low Diversion scenario assumes *no additional* activities, programs or incentives targeted at waste minimisation and resource recovery will be provided. As total waste generation increases, the quantity of waste being disposed to landfill increases. It is noted that this scenario also assumes increased resource recovery but not in sufficient quantities to continuously reduce the waste going to landfill from an increasing population and growing economy.

Sustained Efforts: The Sustained Efforts scenario assumes a continuing – and increasing – involvement and expansion of programs by ZWSA, with a corresponding increase in resource recovery.

High Diversion: This scenario assumes that the waste reduction targets are met, and that additional resource recovery beyond these targets will be achieved through continuous waste minimisation. Part of this reduction in waste going to landfill will be achieved through the provision of a range of recycling facilities which may also include Alternative Waste Treatment (AWT) facilities to process residual waste (MSW) in addition to separation and recovery of 'clean' compost and 'dry' recyclables.

Figure 5-1 to Figure 5-3 show the projections for the waste streams and Figure 5-4 for the total. Added to the projected disposal and recycling quantities are also historical disposal trend lines based on the last six years of reporting. This is then extrapolated up to 2013/14 to show the anticipated result if measures and efforts are continuously implemented.¹² This Sustained Efforts scenario trend is depicted as a solid line. More detailed tables are provided in Appendix A.

Also shown are the State targets for 2006, 2008 and 2010 (which are based on percentages recycled).

¹¹ Trends for the C&I and C&D streams are based on quantities from 2002/03 onwards due to an apparent inconsistency in the 2001/02 data.

¹² Note however that it may become more difficult and potentially more costly to continuously decrease the quantity of waste requiring disposal.

It is noted that these projections and comparisons with state targets appear to illustrate for the first time what the various targets mean in terms of actual tonnages of waste to landfill.

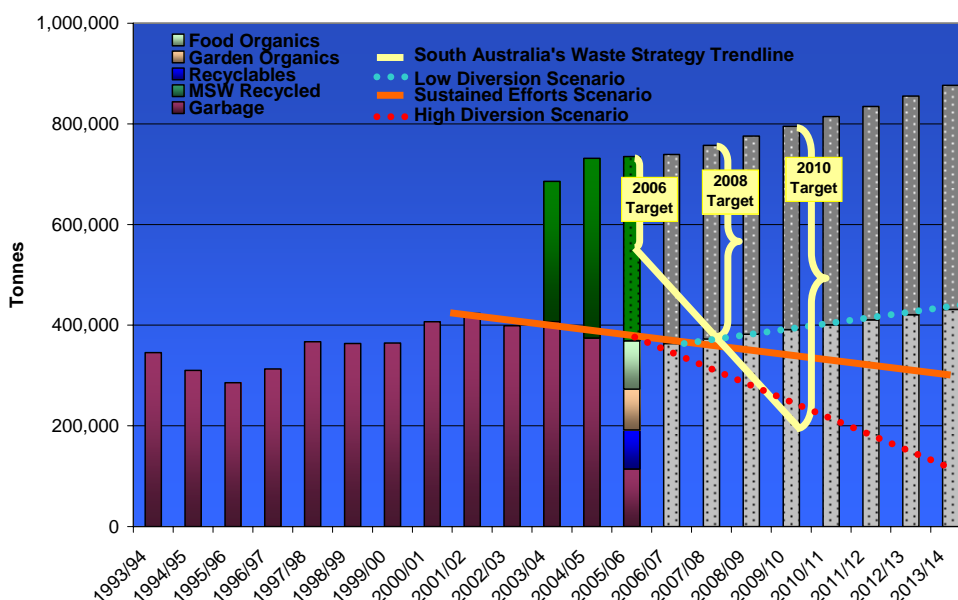


Figure 5-1: MSW Waste and Recycling Projections and Targets

For the 2005/06 reporting year, the MSW disposal (garbage) stream¹³ was split up to indicate its composition and potential for additional resource recovery (see Figure 5-1). This split is based on a waste composition study available on the SA EPA webpage (SA EPA, 2005).

- Food organics 26%
- Garden organics 22%
- Recyclables 21%
- Garbage 31%

This would indicate a (theoretical) potential to recycle an additional 70 percent of the MSW waste stream currently going to landfill - 48 percent organics and 21 percent recyclables. International best practice studies show that recovery rates of between 40 and 80 percent can be achieved for well established domestic waste and recycling systems (NSW DEC, 2006).

¹³ Note that this refers to the contents of the waste bin only and does not include separate kerbside collected bins for the recycling of recyclables and for green organics (garden waste). The data indicates that some material that could be directed to the recyclable or green organics bin is still disposed of in the waste bin.

This means that an *additional* 40 to 65 percent of the waste currently being landfilled could potentially (and realistically) be recovered.

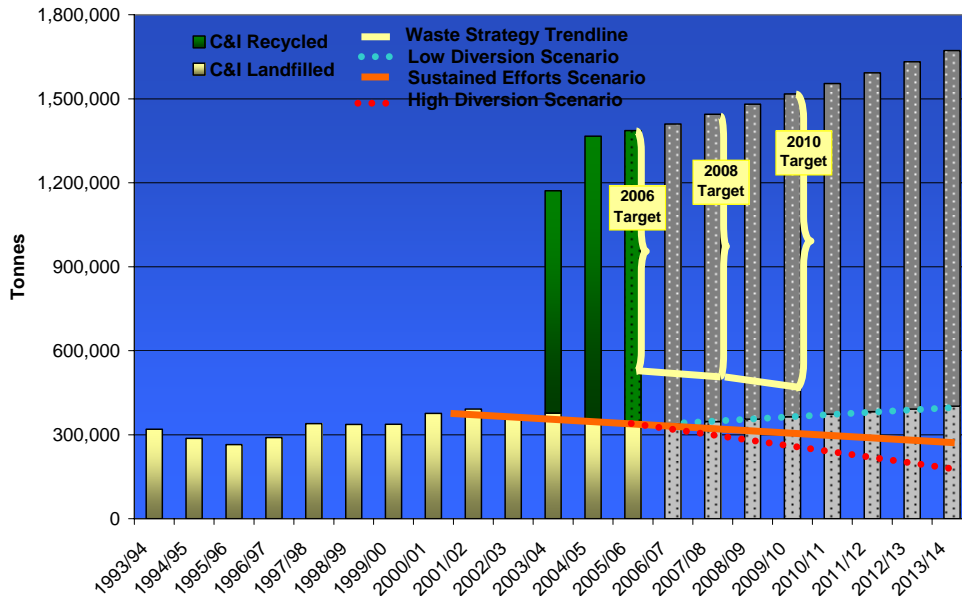


Figure 5-2: C&I Waste and Recycling Projections and Targets

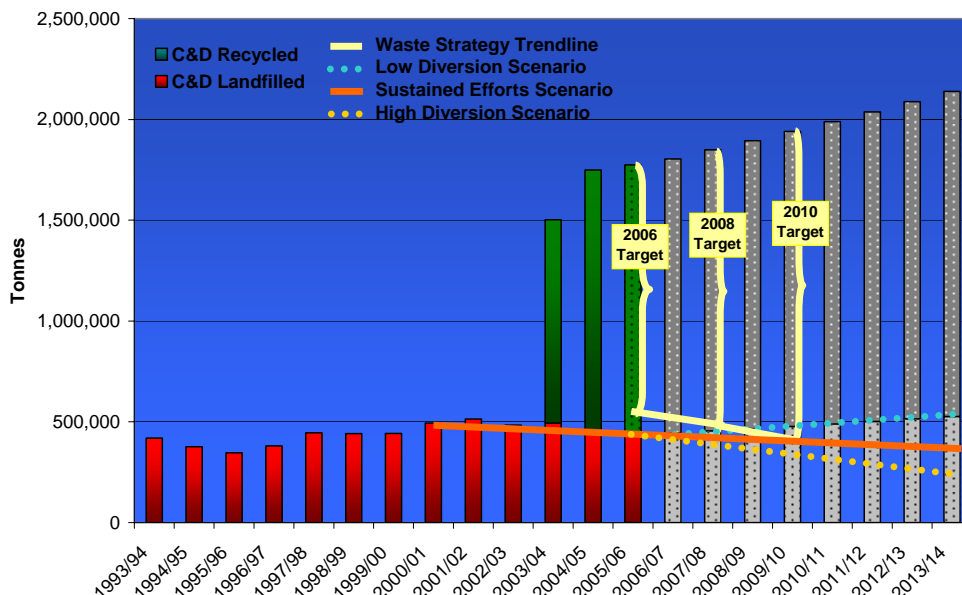


Figure 5-3: C&D Waste and Recycling Projections and Targets

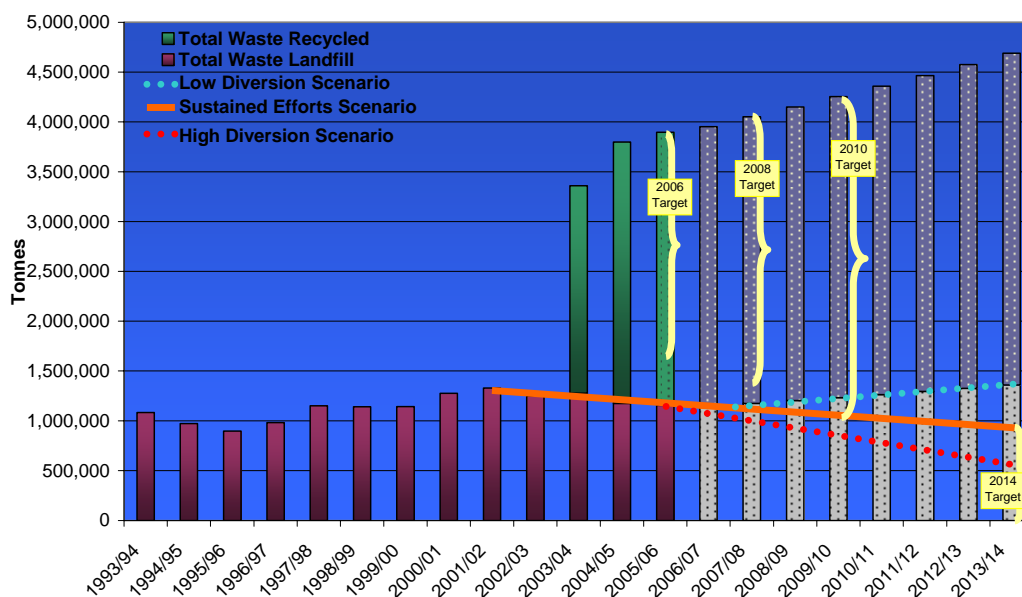


Figure 5-4: Total Waste Projections and Targets

The 2006 and 2008 ‘South Australia’s Waste Strategy 2005-2010’ targets appear achievable under both the Sustained Efforts and Low Diversion scenarios. Also the 2010 target is achievable for the C&I stream assuming both a Sustained Efforts and Low Diversion scenario. However, a Low Diversion scenario may not be sufficient to reach the 2010 C&D target. The MSW target for 2010 does not appear to be achievable under either of the projected trend lines.

In terms of the overall 2014 target identified in South Australia’s Strategic Plan, the Sustained Efforts approach appears to be just sufficient while a Low Diversion approach is not.

6 Financial, Environmental and Social Impacts

6.1 Scenario Development

To determine the annual cost of an increased waste levy, scenarios have been developed to provide a preliminary estimate of the impact of an increasing waste levy. The rationale for the development of these scenarios follows.

Current landfill gate fees in Adelaide are around \$65 per tonne (excluding GST)¹⁴. It is assumed that most recycling and waste diversion activities that are commercially competitive at those gate fees are already in place. Any significant additional activities will require higher gate fees in order to be competitive. It is not possible to develop a 'price scale' that indicates which materials, and at what rate, would be diverted from landfill for reprocessing due to a wide range of influencing factors including the diverse nature of the wastes, the varying degrees of contamination, the ease of separation (or lack thereof) at the point of generation, the distance to landfills and reprocessing facilities to name but a few.

However, a group of waste and resource recovery industry stakeholders in NSW have developed some estimates which were subsequently used to lobby State Government to increase the waste levy up to a point where the industry would be able to provide the services required to achieve the NSW State waste reduction targets for Municipal and C&I wastes (66% and 63% respectively). Based on landfill gate fees in Sydney of (then) around \$90-\$100 per tonne (listed price) it was argued that these fees would need to go up by between \$20 and \$30 per tonne to allow for a commercially viable establishment and operation of resource recovery facilities capable of meeting the state waste targets (Hyder Consulting, 2006).

The NSW estimates have been adapted for use in SA as follows: In South Australia, recycling and reprocessing services may be able to be provided at lower costs due to factors such as lower prices for suitable land (especially when compared with Sydney) and lower labour costs. An additional important factor is that despite the significant differential in landfill prices between Sydney and Adelaide, current resource recovery appears to take place at a comparable level. This would also suggest that similar increases in landfill gate fees will achieve similar results in waste diversion.

It is also noted that the competitiveness of alternatives to landfilling of wastes are significantly dependent on any financial incentives provided (e.g. through use of levy funds for resource recovery programs but also through other activities such as streamlined approvals processes, provision of suitable land etc.).

¹⁴ This reflects the listed prices. Actual contracted prices can be up to 30% lower.

The South Australian Government has announced that the levy will increase by \$10m in July 2007. Revenue generated from the levy was \$11.3M in 2005/06. This review considers it should be given effect by doubling the current levy for the following reasons.

The recent trend shows a slight reduction in waste to landfill which may be further encouraged by the July 07 increase in the levy (as was the case with the previous increase - refer Section 3). The impact of the levy increase in further reducing landfill disposal is referred to as 'elasticity'. Although some assessment has been undertaken (BDA, 2004) on the elasticity of waste quantities, Hyder believes that insufficient evidence is available to indicate a strong connection. Therefore, the 2007 levy increase may result in a slightly lower amount of landfilling and therefore a slight drop in expected levy revenue.

As presented in Section 4, it is more likely that waste to landfill quantities show a more elastic response at certain threshold values beyond which additional resource recovery activities become commercially viable. Above these values, impacts of the levy increase would be greater. The full extent of these impacts cannot be accurately determined at this time, although it is expected that some reduction of waste to landfill can be expected which would reduce the amount of additional funds generated toward the \$10M figure announced by State Government. A doubling of the levy would help to offset the reduced revenue anticipated. The main reason for maintaining the relative difference between metropolitan and regional SA is the current economic situation in regional SA (for more discussion see Section 7.1).

Based on the above this report hereafter evaluates the levy based on a doubling in July 2007 but it is recognised that the decision to do so ultimately rests with State Government.

Based on the above considerations, four Financial Impact Scenarios have been developed as per Table 6-1. These are based on two different trajectories for the waste levy:

- A doubling of the levy in July 2007, with no further increases except for CPI (3.1%) for subsequent years;
- A doubling of the levy in July 2007, plus a further stepwise increase to \$55 by 2013/14.

Table 6-1: Financial Impact Scenarios

Financial Impact Scenario	Waste Scenario	Waste Levy Increase
1	Low Diversion	No increase after 2007
2	Sustained Efforts	No increase after 2007
3	High Diversion	To \$55/t by 2014
Worst Case	Sustained Efforts	To \$55/t by 2014

These levy increases have been combined with projected waste disposal quantities as per the three waste scenarios discussed in Section 5. No “High Diversion” waste scenario has been calculated for the case where the waste levy only increases by CPI after 2007 (assuming this will provide opportunities for additional separation and recycling but insufficient for large scale introduction of significant additional recycling and reprocessing infrastructure because capital and operating costs cannot be justified through gate fees that are competitive with landfill, and no Low Diversion Scenario has been calculated for waste levy reaching \$55 per tonne. A brief description of the scenarios is given below:

Scenario 1: The doubling of the waste levy in 2007 does not have a desired effect. Programs under the Waste to Resources Fund do not show the desired effects.

Scenario 2: This assumes that a doubling of the waste levy in 2007 (together with a commensurate increase in spending for programs under the Waste to Resources Fund¹⁵) will trigger some additional waste minimisation and resource recovery activities - predominantly increased diversion of organics and recyclables from households and businesses - in line with the “Sustained Efforts” Model (refer Section 5).

Scenario 3: Here, the “High Diversion” scenario has been assumed to be possible with a continuous increase in the waste levy (after its doubling in 2007) to \$55 per tonne in the year 2013. Such a change is likely to enable another level resource recovery including a range of facilities and possibly including processing of mixed wastes, a way that has commenced in NSW and WA, and is common practice in the majority of European countries.

Financial Worst Case: The waste levy doubles and the increases to \$55/t by 2013/14 as per above but does not have an additional effect on waste diversion beyond the “Sustained Efforts” waste diversion scenario. This scenario is unlikely to arise and has only been modelled to show the financial impact to households and businesses in the “worst case”.

6.2 Economic Impacts

6.2.1 Waste Levy Cost per Household and Business

To determine the annual cost of an increased waste levy per household and per business, waste quantities, population and number of businesses were projected until 2013/14.

Population figures for South Australia were taken from the Australian Bureau of Statistics and the Department for Transport and Urban Planning publications (ABS, 2002a; 2002b & DTUP, 2006; see Table 6-2).

¹⁵ 50% of waste levy revenue is directed to this fund.

Population figures for years without official estimates have been interpolated.

Information on average household size, 2.27 for Metropolitan Adelaide and 2.02 for Rural South Australia, was drawn from ABS sources (2002a,b). Data on the number of businesses in metropolitan and rural SA were purchased from ABS (2004).

Table 6-2: Population and Household Projections

	2001	2006	2011	2016
<i>South Australia</i>				
No. of Persons	1,507,419	1,540,793	1,570,515	1,595,988
No. of Households	645,944	660,245	672,981	683,897
<i>Adelaide</i>				
No. of Persons	1,082,635	1,112,646	1,141,107	1,167,117
No. of Households	458,002	470,698	482,738	493,742

Table 6-3 to Table 6-5 show the annual costs to households¹⁶ and businesses depending on the scenario applied, for the years 2006/07 through to 2013/14. The costs per household (per business) have been calculated as follows: Quantity of waste generated as projected under the respective scenario and year, multiplied by the waste levy, and divided by the number of households (businesses) as projected by ABS for that year. It is noted that the waste levy for rural SA was not changed i.e. in all scenarios the levy is doubled in July 2007 and then only increases by CPI. The detailed calculations for these estimates are provided in Appendix B.

The levy column in the tables indicates the levy charged in future years, while the \$/household (business) column indicates the actual incremental cost to households (businesses) for waste disposal as the levy increases.

¹⁶ Are costs to households if Councils pass these directly on to residents.

Table 6-3: Projected/estimated Financial Impact Scenario 1

Year	Levy (\$/t)	\$/household/yr	\$/business/yr
<i>Metropolitan Adelaide</i>			
2006/07	11.20	6.61	43.38
2007/08	22.40	13.48	88.44
2008/09	23.09	14.17	92.96
2009/10	23.81	14.89	97.72
2010/11	24.55	15.66	102.72
2011/12	25.31	16.46	108.03
2012/13	26.09	17.32	113.61
2013/14	26.90	18.21	119.48
<i>Rural SA</i>			
2006/07	5.60	1.93	14.84
2007/08	11.20	3.95	30.39
2008/09	11.55	4.17	32.08
2009/10	11.91	4.41	33.87
2010/11	12.27	4.65	35.77
2011/12	12.65	4.92	37.79
2012/13	13.05	5.19	39.94
2013/14	13.45	5.49	42.20

As can be seen from the above table, a doubling of the levy in July 2007 will double the costs for waste disposal to households (and businesses). All subsequent (smaller) increases in the levy will also cause a corresponding (smaller) cost increase for households (and businesses).

Table 6-4: : Projected/estimated Financial Impact Scenario 2

Year	Levy (\$/t)	\$/household/yr	\$/business/yr
<i>Metropolitan Adelaide</i>			
2006/07	11.20	6.61	43.38
2007/08	22.40	12.83	84.61
2008/09	23.09	12.84	85.05
2009/10	23.81	12.83	85.45
2010/11	24.55	12.81	85.82
2011/12	25.31	12.79	86.19
2012/13	26.09	12.77	86.53
2013/14	26.90	12.57	85.58
<i>Rural SA</i>			
2006/07	5.60	1.93	14.84
2007/08	11.20	3.77	29.03
2008/09	11.55	3.81	29.26
2009/10	11.91	3.83	29.48
2010/11	12.27	3.86	29.69
2011/12	12.65	3.89	29.91
2012/13	13.05	3.92	30.11
2013/14	13.45	3.89	29.88

This scenario has the following effect: Because an increasing amount of household waste will be recycled rather than going to landfill the cost of disposing of household waste will not increase as much as the levy - therefore Councils will not need to increase rates by as much as the increase in the levy.

Table 6-5: Projected/estimated Financial Impact Scenario 3

Year	Levy (\$/t)	\$/household/yr	\$/business/yr
<i>Metropolitan Adelaide</i>			
2006/07	11.20	6.09	43.38
2007/08	22.40	10.88	84.61
2008/09	27.83	11.93	102.50
2009/10	33.27	12.38	119.39
2010/11	38.70	12.23	124.37
2011/12	44.13	12.50	127.07
2012/13	49.57	12.58	127.87
2013/14	55.00	12.50	127.12
<i>Rural SA</i>			
2006/07	5.60	1.88	14.46
2007/08	11.20	3.59	27.63
2008/09	11.55	3.53	27.15
2009/10	11.91	3.46	26.62
2010/11	12.27	3.17	24.38
2011/12	12.65	2.94	22.63
2012/13	13.05	2.73	21.00
2013/14	13.45	2.53	19.49

Here, a similar situation occurs as in Scenario 2: Despite a continuous increase in the waste levy up to \$55 per tonne, costs to households (and businesses) do not increase significantly after the doubling of the waste levy in 2007 due to reducing quantities of waste requiring landfill disposal.

In other words, a waste levy increasing to \$55/tonne is unlikely to have a significant financial impact on either households or businesses in addition to the impact that the announced levy increase in 2007 will have.

Table 6-6: Projected/estimated Worst Case Financial Impact Scenario

Year	Levy (\$/t)	\$/household/yr	\$/business/yr
<i>Metropolitan Adelaide</i>			
2006/07	11.20	6.61	43.38
2007/08	22.40	12.83	84.61
2008/09	27.83	15.47	102.50
2009/10	33.27	17.92	119.39
2010/11	38.70	20.20	135.30
2011/12	44.13	22.31	150.30
2012/13	49.57	24.25	164.36
2013/14	55.00	25.69	174.96
<i>Rural SA</i>			
2006/07	5.60	1.93	14.84
2007/08	11.20	3.77	29.03
2008/09	11.55	3.81	29.26
2009/10	11.91	3.83	29.48
2010/11	12.27	3.86	29.69
2011/12	12.65	3.89	29.91
2012/13	13.05	3.92	30.11
2013/14	13.45	3.89	29.88

The worst case financial scenario (Table 6-6) would see another doubling of waste disposal costs for households and businesses in metropolitan Adelaide by 2013/14, after the doubling of the levy anticipated for 2007. No corresponding increase of the levy was modelled for regional SA and therefore the financial impacts there are identical to Scenario 3.

Table 6-7 summarises the results of the above estimates as it shows the cost increases for each scenario that have been estimated to occur between 2006/07 and 2013/14. (and include the anticipated doubling of the levy in July 2007). Most of the cost increases are due to the levy increase in July 2007. Even with a rise in the levy to \$55/tonne the actual costs do not go up significantly compared to the lower levy if the High Diversion scenario for waste disposal can be achieved because waste to landfill quantities – where the levy applies – will reduce).

Based on the combined experience of the project team and supported by evidence from waste management literature over the last 20 years actual *generation* of waste¹⁷ is not likely to reduce significantly. A proportion of these alternatives to landfill will also be more costly than they currently are as it is likely that higher gate fees will be charged to cater for additional quantities (and these gate fees will be paid because they are still competitive with increased landfill prices). Actual costs to households and businesses may therefore be slightly higher than the amounts shown.

However, it is important to look at the order of magnitude of these potential cost increases: If the waste levy increases to \$55/t (Table 6-7, Scenario 3)

¹⁷ I.e. waste to landfill plus waste to processing/recycling/re-use

the increase in annual costs to households amounts to \$6 and to business to \$84 in metropolitan Adelaide. For regional SA, the changes are negligible (as we have assumed no further increases except for the increase in July 2007).

Table 6-7: Summary of increased annual costs between 2007 and 2013/14 (rounded)

Financial Impact Scenario	\$/hhld/yr in metro Adelaide	\$/hhld/yr in rural SA	\$/business/yr in metro Adelaide	\$/business/yr in rural SA
1 (CPI) – Low Diversion	12	4	76	27
2 (CPI) – Sustained Efforts	6	2	42	15
3 (\$55/t) – High Diversion	6	1	84	5
Financial Worst Case	19	2	132	15

6.2.2 Waste Quantities and Waste Levy Revenues

Figure 6-1 to Figure 6-3 illustrate the total quantities of waste disposed from 2000/01 to present plus the projected quantities to 2013/14. A discussion is provided below.

Scenario 1 – Low Diversion (Figure 6-1): The levy doubles and then remains constant (except for CPI increases). The waste diversion is low. Quantities of waste ending up on landfills will increase from just under 1.2M t/yr in 2005/06 to just under 1.4M t/yr in 2013/14. The majority of this waste is from the metropolitan area, with about one third MSW (from Councils – in light blue) and around two thirds C&I and C&D waste (in yellow). Another 20% of the total waste disposed to landfill is generated in regional SA (dark blue). The income from the waste levy (orange line) was around \$5M/yr until 2003/04 when it doubled to around \$10M/yr. The announced increase will double the income to approximately \$20M/yr in 2007/08. From there, levy revenue will continue to increase steadily to about \$33M/yr in 2013/14.

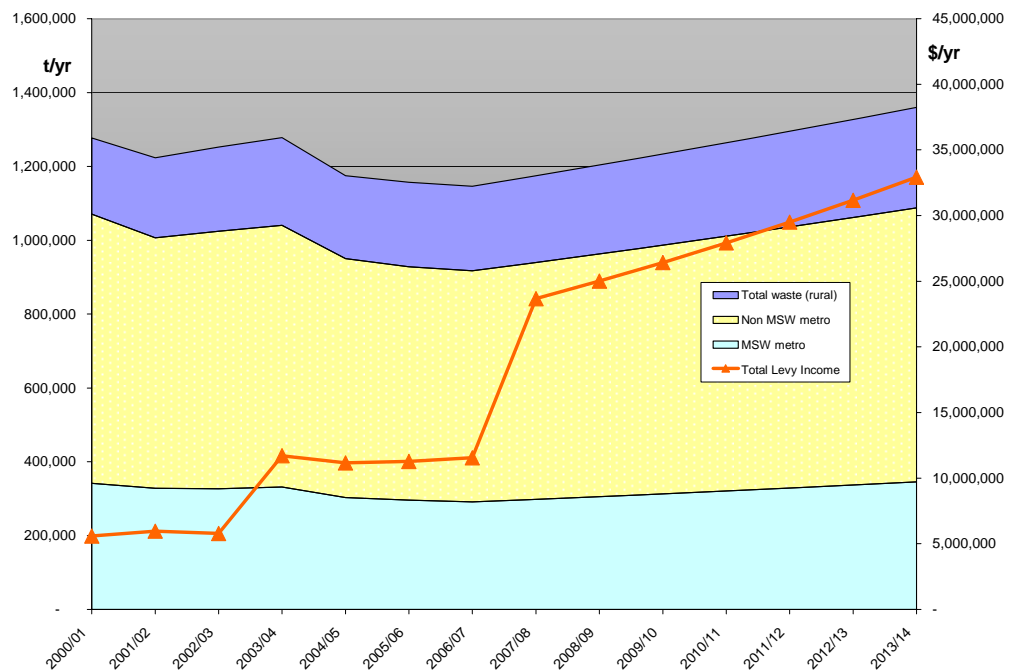


Figure 6-1: Scenario 1 (Levy doubles then constant, waste to landfill 'Low Diversion')

Scenario 2 - Sustained Efforts (Figure 6-2): The levy doubles and then remains constant (except for CPI increases). The waste diversion is higher ("Sustained Efforts"), and follows the recent trends of a reduction of waste to landfill coupled with an increasing recovery of materials. The quantities of waste to landfill reduce to just under 1M t/yr by 2013/14. Total revenue from the levy does not increase significantly after this year's doubling.

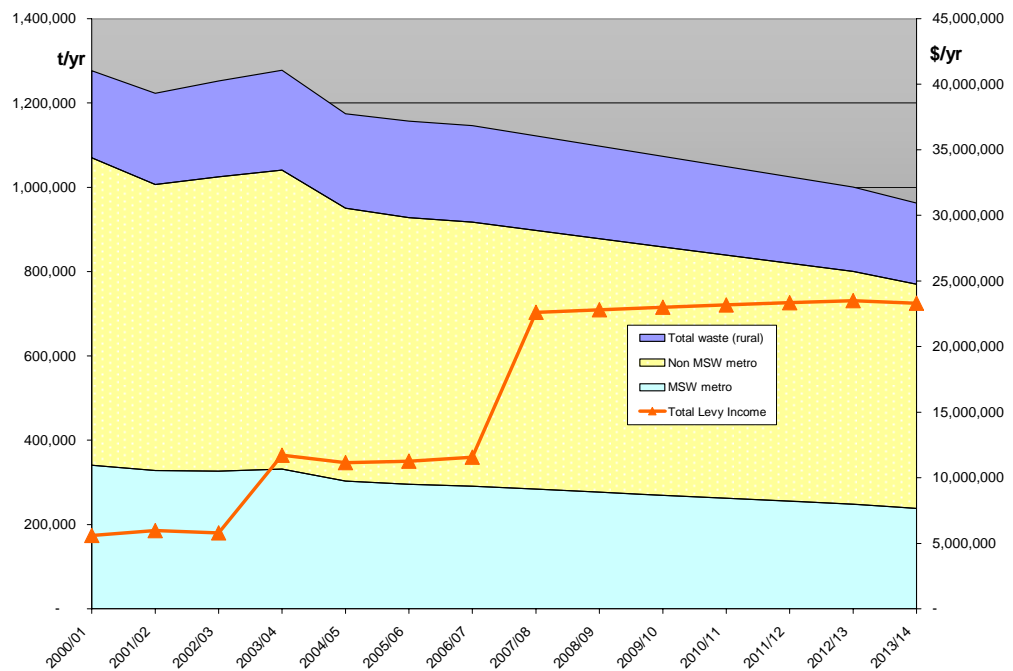


Figure 6-2: Scenario 2 (Levy doubles then constant, waste to landfill 'Sustained Efforts')

Scenario 3 - High Diversion (Figure 6-3): The levy doubles in July 2007, and then continues to increase to \$55/t in 2013/14, with the effect of achieving a high waste diversion from landfill. This high diversion effectively caps the levy revenue at just under \$30M/yr.

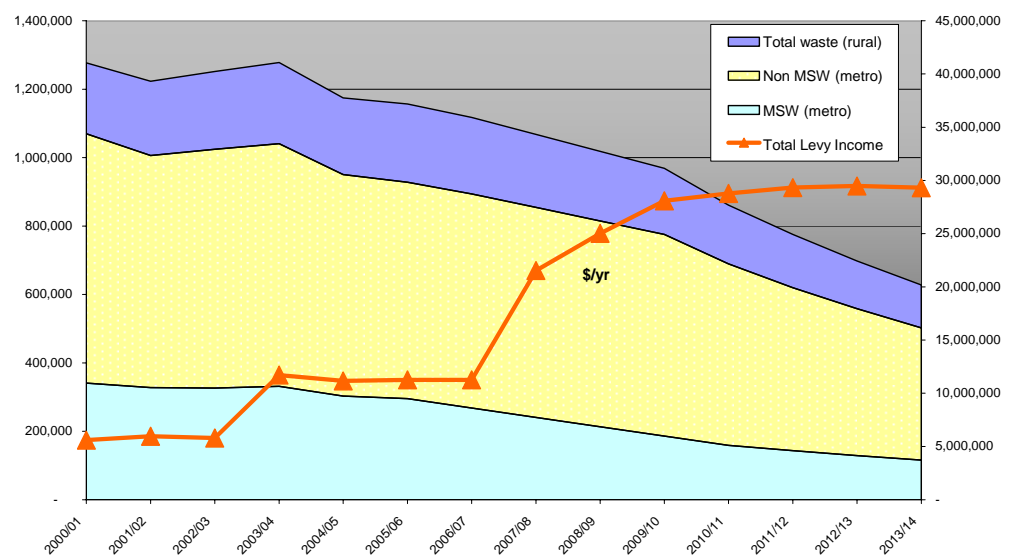


Figure 6-3: Scenario 3 (Levy doubles then up to %55, waste to landfill 'High Diversion')

Financial Worst Case (Figure 6-4): This is a worst case scenario from a waste generator's perspective (on the other side, high revenue would be generated for State Government). Although the levy continues to increase to \$55/t, the waste diversion is not higher than in Scenario 2 where the levy only increases with CPI. The effect would be that levy revenues would grow to about \$45M/yr in 2013/14.

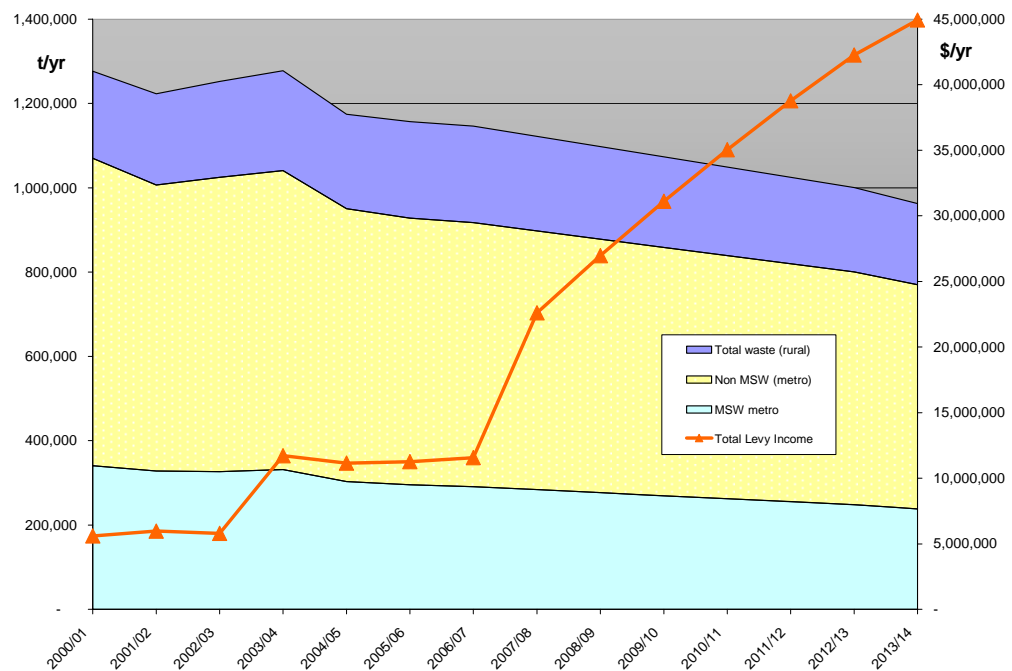


Figure 6-4: Financial Worst Case Scenario

As can be seen from the above figures, the total income generated through the waste levy is not only dependent on the actual levy amount charged but is heavily influenced by the assumptions regarding waste quantities going to landfill.

For all scenarios, the anticipated doubling of the levy in mid-2007 will almost double the revenue stream, predominantly because there is little time for waste generators and recyclers to adapt to the change. Over the subsequent years, the increase in revenue may be marginal in the two most likely scenarios as follows:

- The waste levy remains at double its current level (except for CPI) and the waste disposal quantities develop according to the “Sustained Efforts” scenario; or
- The waste levy increases to \$55 and the waste disposal quantities develop according to the “High Diversion” scenario.

6.2.3 Waste to Resources Fund Implications

The waste levy is paid by the licence holder of a waste depot for all waste that is to be disposed of in the landfill. The Environment Protection Authority (EPA) collects 100% of waste levies and administers the levy as required by legislation and State Government instruction.

A total of 50% of all income generated by the waste levy is forwarded to the "Waste to Resources Fund" which is administered by Zero Waste SA. Another 45% is directed towards treasury where it is deducted off the annual draw. The remaining 5% goes into a fund administered by the EPA which is called the "Environmental Protection Fund".

Table 6-8 provides a summary of annual revenues generated under each of the four scenarios, and the annual monies available under the Waste to Resources Fund, assuming that 50% of the levy continues to be directed to the Waste to Resources Fund. All figures are based on the projections discussed in Section 6.2.2.

The most important aspect is that - regardless of the actual levy charged per tonne - more monies will be available for waste minimisation programs if the levy itself does not achieve the desired results, and less money will be available if the levy does achieve the desired results.

In other words, continued utilisation of levy funds available from the Waste to Resources Fund would enable a "flexible response": If the desired results (targets) are not achieved then more monies will be available to contribute to the achievement of these results, and vice versa.

It is therefore recommended to maintain the current arrangements (i.e., 50% of the levy is directed to the Waste to Resources Fund) to enable an adequate and flexible response.

Table 6-8: Levy Revenue and Waste to Resources Fund

Scenario	Description	Expected total annual revenue in 2013 (\$M)	Expected annual Waste to Resources Fund allocation in 2013 (\$M)
#1	Levy doubles then constant; Waste to Landfill "Low Diversion"	33	16.5
#2	Levy doubles then constant: Waste to Landfill "Sustained Efforts"	23	11.5
#3	Levy goes to \$55; Waste to Landfill "High Diversion"	29	14.5
#4	Financial 'Worst Case'	45	22.5

6.2.4 Economic Impact on Gross State Product

Wider macro-economic benefits are generated from projects of this nature, although it is not possible to fully “add” them directly to dollar values in the economic evaluation. Where such impacts on the overall economy are significant, they can be important in gaining stakeholder support and / or attracting funding for projects.

The macro-economic benefits that are associated with such activities include:

- Job creation;
- Initial direct capital investment (measured on the cost side of the cost benefit equation) plus flow on impacts in the rest of the economy;
- Operational expenditures and indirect impacts in supply and downstream industries;
- Potential additions to state and national Gross Domestic Product, if the project is not displacing others, nor replacing a component of existing activity (the “transfer” impact – which in this project involves some downsizing of landfill activities as the resource recovery stream increases);
- Catalyst to emissions trading and resource recovery certificate trading schemes (e.g. RECs);
- Provides impetus for investment/adoption of sustainable eco-infrastructure projects in other areas (e.g. water, salinity, energy); and
- Potential impacts on the balance of trade – depending on the import and export composition of the investments and operational activities.

The costs and benefits have to be identified at two related levels: costs/benefits that are a direct result of changes to the waste and affiliated industries; and costs/benefits that are secondary by nature, e.g. flow-on implications for the overall economy. It is noted here that only the impact of the difference between the “Low Diversion” and the two enhanced resource recovery scenarios is being estimated.

Quantifying the macro-economic benefits

Table 6-9 shows the direct expenditure impact from the two scenarios with enhanced resource recovery, compared to the “Low Diversion” scenario¹⁸. The direct expenditure has been estimated based on additional tonnes to be processed and an assumed average facility size and capital cost (Hyder estimates). Subsequently, the number of facilities necessary to process the

¹⁸ These figures describe the relative change and have been estimated as the additional economic activity that will take place in the Sustained Efforts and High Diversion scenarios. Absolute figures on the current economic parameters (including infrastructure costs etc.) of the waste and recycling industry are not available.

additional tonnes can be calculated and the aggregated capital cost discounted over the implementation period to derive the present value.

Table 6-9: Direct Expenditure Impact

	Sustained Efforts (Scenario 1 and 2)	High Diversion (Scenario 3)
Additional t/yr diverted from landfill	397,023	731,661
Average facility size (t/yr)	60,000	60,000
Estimated # of additional facilities (Hyder estimates)	7	13
Average capital cost/facility	25 M	\$25 M
Capital expenditure	\$175 M	\$325 M
Present value (7 years at 10% discount rate)	\$150 M	\$281

Direct employment was estimated based on current employment figures per tonne of material recycled (ACOR, 2006).

Table 6-10: Estimated jobs created

	Sustained Efforts	High Diversion
Additional jobs	176	324
Additional jobs, adjusted for "lost waste disposal jobs"	160	294
Construction jobs, averaged over 7 year period	98	183
Total jobs	258	477

Flow-on impacts from direct project expenditures and employment creation occur due to the interrelation of sectors within the economy both from suppliers and downstream industries. The waste management sector has, relatively, lower cross sector interdependencies due to:

- Its "end of pipe" or residual activity nature – many of the prior activities are for other uses (e.g. packaging relates primarily to product protection prior to consumption)
- Downstream sectors are relatively limited in process activities (e.g. resource recovery).

Multiplier analysis (using input-output data) is traditionally used to estimate the "flow-on" or indirect impacts from the direct data. For the economy as a

whole the indirect impacts represent a multiple of 1.75¹⁹ compared to the direct impacts (i.e. direct multiplied by 2.75 gives total output).

Given the above discussion, however, the waste management sector tends to have significantly lower “multipliers” than the average at a national level. Previous analysis of the ABS waste Management data by members of the project team, indicates the national sectoral multipliers are of the order of 2.1 (i.e. \$1 in direct expenditure leads to indirect expenditure of \$1.10). Applying these average sectoral factors to the direct expenditure results in total impact estimates as shown in

Table 6-11: Gross Economic Impact per annum

	Sustained Efforts	High Diversion
Present value	\$150 M	\$281 M
Flow On	\$165 M	\$309 M
Total	\$316 M	\$590 M

Increased resource recovery activity in SA is expected to create the equivalent of 477 (258)²⁰ jobs overall (FTE) and annual expenditure of \$590 million (\$316 million).

Gross State Product (GSP) comprises the sum of the “value added” outputs of each sector (direct and indirect impacts). The value added of a sector is a proportion (generally 20-60%) of a sector’s gross output. There is no available data to accurately estimate the value added share in the solid waste management sector. Therefore we have assumed that the sector achieves the “average value added share” of 35% from this project.

The gross output figures already presented also have to be adjusted for the “transfer impact” – as was applied to the employment figures. This represents the offset to additional production due to the lower level of activity required in certain other waste management activities. This factor is assumed at 25% to account for reduced economic activity in the landfill sector.

Applying both these factors results in impacts from implementation of the levy increase on GSP shown in Table 6-12.

¹⁹ ABS Catalogue 5209.0 Australian National Accounts: Input-Output Tables 1996-97

²⁰ Figures show effects of High Diversion (Scenario 3), with the effects of Sustained Efforts (Scenario 2) in brackets

Table 6-12: Impact on Gross State Product (\$ Million/yr)

Economic Impact	Sustained Efforts	High Diversion
Gross Output	316	590
Net Output (adjusted for transfers)	237	443
Value Added (GSP)	83	155

South Australian GSP was \$61 billion in the financial year 2005/06. An impact of \$155 (\$83) million per year represents an increase in South Australian GSP by 0.25% (0.14%), attributable to an increase in resource recovery activity above the Low Diversion assumptions.

6.3 Environmental Assessment

6.3.1 Environmental indicators

The environmental assessment is based on previous life cycle assessments and experience. The main data sources we have used are listed below:

- Centre for Design at RMIT University (2005): Life Cycle Impact Data for Resource Recovery from Commercial & Industrial and Construction and Demolition Waste in Victoria, prepared for Sustainability Victoria.
- NSW DEC (2006): Environmental Benefits of Recycling Calculator.
- Nolan-ITU (2001): Independent Assessment of Kerbside Recycling in Australia, for the National Packaging Covenant Council.
- Centre for Design at RMIT University, in association with Nolan-ITU (2003): Life Cycle Assessment of Waste and Resource Recovery Options, for EcoRecycle Victoria.
- Nolan-ITU (2004): National Benefits of UR-3R Implementation – A Triple Bottom Line Assessment for GRL.
- NSW DEC (2004): Assessment of Domestic Waste and Recycling Systems.
- NSW DEC (2005): TBL Assessment of Garden Organics Management.
- NSW DEC (2007): TBL Assessment of (Domestic) Food Organics Management (to be published shortly).

As a first step, the projected additional quantities of materials recovered from the waste streams have been estimated. These are summarised in

Table 6-13. More discussion on projected quantities is provided in Section 5 of this report. As can be seen from the table, the quantities of materials diverted from landfill will amount to approximately 3.3 M t/yr for the Low Diversion scenario, 3.7 M t/yr for the Sustained Efforts scenario, and 4.1 M t/yr for the High Diversion scenario. The total quantities of materials recovered/diverted from landfill between now and 2013/14 are therefore between 27 M and 30 M tonnes.

Table 6-14 shows the estimated additional quantities of materials recovered in the Sustained Efforts and the High Diversion Scenarios, compared to the Base Case, both the annual figures and the cumulative totals. As can be seen, the additional quantities recovered between now and 2013/14 are around 1.5M tonnes for the Sustained Efforts Scenario, and almost 3 M tonnes for the High Diversion scenario.

Table 6-13: Projected Quantities of Resources Recovered / Materials Diverted from Landfill

	Low Diversion	Sustained Efforts	High Diversion
2005/06	2,738,930	2,738,930	2,738,930
2006/07	2,806,532	2,806,532	2,835,421
2007/08	2,875,802	2,928,421	2,982,439
2008/09	2,946,782	3,052,718	3,131,866
2009/10	3,019,514	3,179,483	3,283,761
2010/11	3,094,041	3,308,775	3,496,366
2011/12	3,170,407	3,440,659	3,690,062
2012/13	3,248,658	3,575,197	3,877,798
2013/14	3,328,841	3,725,863	4,060,502
Totals	27,229,506	28,756,579	30,097,145

Table 6-14: Estimated Additional Quantities of Resources Recovered compared to Low Diversion

Year	Difference to Low Diversion (t/yr)		Cumulative Difference to Low Diversion (t/yr)	
	Sustained Efforts	High Diversion	Sustained Efforts	High Diversion
2006/07	0	28,889	0	28,889
2007/08	52,619	106,637	52,619	135,526
2008/09	105,936	185,084	158,555	320,610
2009/10	159,969	264,247	318,524	584,857
2010/11	214,735	402,326	533,259	987,183
2011/12	270,252	519,655	803,511	1,506,838
2012/13	326,539	629,140	1,130,050	2,135,978
2013/14	397,023	731,661	1,527,073	2,867,639

Based on the quantities of materials estimated above, the environmental benefits can be estimated. It is generally more difficult to quantify these benefits, and a recent report produced as a result of a Federal Public Inquiry into Waste Management and Resource Efficiency has vigorously attempted to neglect any benefits of recycling and reducing waste going to landfill (Productivity Commission, 2006). A range of submissions and representations by public agencies, companies and NGOs have attempted to convey to the Productivity Commission that, for instance, upstream benefits should not be neglected in waste policy development²¹. Entirely dismissed by the Commission, the following extract from the submission of the NSW DEC best summarises the facts:

“There have been numerous analyses of the cost-benefit of recycling. These clearly demonstrate benefits although there is continuing debate about how to best ‘price’ or represent these benefits in the analysis. Regardless of the debate, however, these benefits are real and substantial.”

Environmental benefits can be expressed in a number of ways, usually by grouping emissions (or emission savings) throughout the life cycle of materials and products into so called environmental (impact) categories. Examples are: Air pollution, water pollution, photochemical smog potential, resource (or energy) intensity, ecotoxicity, global warming potential, to name but a few.

As climate change (global warming) and, with it, greenhouse gases (GHG) have recently hit the mainstream debate, and have also developed into a significant political issue even at federal level, the environmental benefits

²¹ Submissions and transcripts available on www.pc.gov.au

achievable through increasing resource recovery / recycling and minimising landfill in SA are discussed and presented below.

The actual mix of materials that will be diverted in the future is not known. Therefore, the mix of materials that is currently being recycled in SA has been used to estimate the GHG benefits. Recycling in SA achieves a GHG benefit of 440 kg per tonne for the average mix of materials recovered in South Australia in 2004/05 (Hyder, 2006).

Using this figure provides an idea of the order of magnitude of GHG benefits in South Australia. Table 6-15 provides estimates of GHG benefits in addition to those achieved through the “Low Diversion”. The annual benefits amount to between 175,000 t/yr of CO₂ equivalents for the Sustained Efforts scenario and 322,000 t/yr for the High Diversion scenario. The equivalent cumulative benefits between now and 2013/14 are between 672,000 and 1,262,000 t/yr respectively. It is noted that these benefits are *in addition to* benefits achieved under the Low Diversion scenario which will already provide GHG benefits of 12 million tonnes of CO₂ equivalents²² between now and 2013/14.

Table 6-15: Additional GHG Benefits over Base Case

Year	Additional Annual Benefits (tonnes CO ₂ eq)		Cumulative Benefits (tonnes CO ₂ eq)	
	Sustained Efforts	High Diversion	Sustained Efforts	High Diversion
2006/07	-	12,711	-	12,711
2007/08	23,152	46,920	23,152	59,631
2008/09	46,612	81,437	69,764	141,069
2009/10	70,386	116,269	140,151	257,337
2010/11	94,483	177,023	234,634	434,361
2011/12	118,911	228,648	353,545	663,009
2012/13	143,677	276,822	497,222	939,830
2013/14	174,690		671,912	1,261,761

These GHG benefits can then be expressed in dollar terms. The recently published Stern Review (Stern, 2006) estimated the social costs of one tonne of carbon dioxide equivalent at US \$85 per tonne. If this figure is used to estimate the benefits of reducing GHG emissions through more waste minimisation and resource recovery, then the benefits of additional resource recovery as estimated for the Sustained Efforts and High Diversion scenarios, the monetised benefits amount to between almost AU \$20 M and over \$35 M respectively. The cumulative additional benefits

²² 27 million tonnes of resource recovery (see Table 6-13) multiplied by 0.44 (440 kg GHG benefits per tonne)

between now and 2013/14 are \$74 M and \$139 M. Note that the total monetised GHG benefits including those from the Low Diversion scenario) for the same period amount to between \$1.3 and \$1.45 billion (increasing from \$150M to \$180M/yr).

Table 6-16: Additional GHG Benefits expressed in monetary terms
(Australian dollars, based on Stern report)

Year	Additional Annual Benefits (\$)		Cumulative Additional Benefits (\$)	
	Sustained Efforts	High Diversion	Sustained Efforts	High Diversion
2006/07	-	1,398,000	-	1,398,000
2007/08	2,547,000	5,161,000	2,547,000	6,559,000
2008/09	5,127,000	8,958,000	7,674,000	15,518,000
2009/10	7,742,000	12,790,000	15,417,000	28,307,000
2010/11	10,393,000	19,473,000	25,810,000	47,780,000
2011/12	13,080,000	25,151,000	38,890,000	72,931,000
2012/13	15,804,000	30,450,000	54,694,000	103,381,000
2013/14	19,216,000	35,412,000	73,910,000	138,794,000

The above discussion provides an indication of the significance of environmental benefits achievable through increased resource recovery and waste minimisation in SA.

There are, however, a range of environmental benefits that are achieved in addition to GHG savings. In their totality, these are more significant than GHG savings, and include impacts such as various forms of air and water pollution as well as resource conservation.

In Australia, a method was developed to estimate the value of environmental impacts and benefits (Nolan-ITU, 2001) in monetary terms ('Ecodollar' methodology) which was refined over the years and applied for a range of studies for EcoRecycle Victoria, NSW DEC and others. From these studies, a figure of \$300 has been adopted for each tonne of material diverted from landfill²³.

Despite the acknowledged uncertainties associated with these figures it is useful to provide this estimate as an order of magnitude. As can be seen, the (monetised) environmental benefits of enhanced waste diversion and

²³ Based on \$400 per tonne for materials recycled from kerbside collections and a figure of \$200 per tonne for resource recovery from lower value waste streams (Nolan-ITU, 2004), assuming a 50/50 mix for additional quantities recovered.

resource recovery in SA would amount to between \$120 and \$220 M per year²⁴.

Table 6-17: Estimated Environmental Benefits – monetised

Year	Additional Annual Benefits (Eco\$)		Cumulative Benefits (Eco\$)	
	Sustained Efforts	High Diversion	Sustained Efforts	High Diversion
2006/07	0	8,667,000	0	8,667,000
2007/08	15,786,000	31,991,000	15,786,000	40,658,000
2008/09	31,781,000	55,525,000	47,567,000	96,183,000
2009/10	47,991,000	79,274,000	95,557,000	175,457,000
2010/11	64,420,000	120,698,000	159,978,000	296,155,000
2011/12	81,076,000	155,896,000	241,053,000	452,051,000
2012/13	97,962,000	188,742,000	339,015,000	640,793,000
2013/14	119,107,000	219,498,000	458,122,000	860,292,000

6.4 Social Considerations

6.4.1 Litter and Illegal Dumping

Increasing the levy is likely to have direct impacts on litter and illegal dumping, as well as compliance, enforcement, education and management efforts to minimise impacts from these activities. Local governments are likely to bear the brunt of most of these impacts due to associated enforcement, clean-up and mitigation costs. Failure to address such costs could result in increased pollution and clean-up costs (EPA Victoria 2006).

Extent of these impacts is affected by factors such as amount of the levy increase and how this influences the price of disposal (gate fee) set by landfill operators, unwillingness to pay, availability of alternative (illegal) disposal options and perceived risks of enforcement. As impacts of the levy increase are relatively diffuse for households but potentially significant for C&I and C&D sources, potential disposal practices of these sources must be taken into account.

²⁴ As this study only estimates the impact of the waste levy, no baseline figure (i.e. showing the overall total environmental benefit of current resource recovery activities using current recycling and waste stream compositions and quantities) has been calculated.

Recent research by the NSW DEC (2006) shows that urban fringe councils with high population densities see illegal dumping as a greater problem and report more annual incidents than rural councils. To some extent, this higher incidence may be related to an unwillingness to pay the higher disposal costs of metropolitan areas and perceived limited disposal options.

Due to the nature of illegal dumping, reliable data on its full extent is scarce²⁵. Understanding of cost impacts is also limited to the extent that available cost information is generally limited. Indirect potential costs that could accompany an increase in the levy include (Industry Commission 1996 from PC Inquiry):

- loss of aesthetic value
- danger to wildlife
- danger to human health
- the high costs of collection.

Direct costs associated with litter and illegal dumping would be incurred primarily by local government in relation to (NSW DEC 2006):

- compiling evidence
- pursuing clean-up options
- issuing enforcement notices
- prosecutions (where possible)
- clean-up costs, including landscaping, revegetation and creation of barriers to clean up existing sites or reduce likelihood of repeat dumping
- strengthened surveillance and enforcement in particular hotspots
- education/awareness efforts to deter other illegal dumpers, including increased awareness of disposal options and/or of enforcement efforts

The Productivity Commission (2006, p.137) states that, “Littering and illegal dumping are best addressed by combining regulation with other measures, such as education, community involvement and moral suasion”. This view is also supported by other research. Therefore, ability and costs to address these issues in addition to the direct compliance and enforcement costs above will need to be considered with an increase in the levy. Phasing and awareness of levy increases over time can minimise potential for illegal dumping, as businesses can build the expected increase in waste disposal fees into cost structures (Waste Management Board 2005).

Likelihood of illegal dumping, especially for C&D waste, can be minimised through the availability of recycling options that are provided at lower cost than landfill disposal costs. Therefore, provisions of such options,

²⁵ One exception is the report “An Investigation on Illegal Dumping in SA”, a joint project of KESAB, Zero Waste SA, EPA SA, and LGA SA.

especially in metropolitan areas, would need to be maintained or expanded as the levy is increased.

It should be noted that the current differential between metropolitan and non-metropolitan levy amounts will increase²⁶. As a result, there is likely to be an increase in illegal dumping as some businesses seek to avoid the cost increase.²⁷

Should subsequent increases seek to reduce this differential by proportionately increasing the levy in non-metropolitan areas, then enforcement/compliance activities would need to increase in rural areas to help combat the increased likelihood of illegal dumping associated with that increase and the greater difficulties of catching illegal dumping offenders in non-metropolitan areas. Note, however that greater equalisation could serve to reduce some of the potential incentives for transporting from metropolitan areas to non-metropolitan areas to avoid higher disposal costs.

6.4.2 Attitudes to waste

In 2005, ZWSA commissioned a study to understand the knowledge, behaviours and attitudes of community members with regard to waste management and recycling. The study provides a benchmark against which South Australia's Waste Strategy 2005-2010 and ZWSA's performance can be measured (Harrison Market Research, 2005). The project brings together a mix of qualitative and quantitative research in order to gain a rounder perspective on waste management and recycling in South Australia.

Relevant to this report, the study looked at the community's attitude to waste. Respondents were read a series of seventeen statements and asked to rate the extent to which they agreed or disagreed with them, using a 0-10 scale where 0 means they strongly disagree and 10 means they strongly agree.

The statements in full are as follows:

- It's very important that the amount of waste going to dumps is reduced.
- Much of the material put out for recycling ends up as landfill anyway.
- My household recycles more than it did 2 years ago.
- I can't see how my efforts to recycle make any real difference.
- All materials put out for recycling end up being recycled.
- Split bins are useless; it all goes in the same place.

²⁶ In absolute terms (if the recommendations of this report are adopted)

²⁷ Higher levy increase in metro areas means greater incentive to dump illegally, whether in metro or rural areas.

- I just recycle the obvious things like bottles, cans and newspapers.
- I can't be bothered sorting recyclables from other waste.
- I'm quite conscientious about recycling everything I can.
- I'd probably recycle more if the council provided suitable bins.
- Littering is a problem in my area.
- Illegal dumping is a problem in my area.
- I'd like to know more about the benefits of recycling.
- I'd like to know more about what should be recycled.
- A lot of threats to the environment are exaggerated.
- I am prepared to do more to help protect the environment.
- It's easy to recycle most things.

Overall attitudes to waste reduction were positive, with 89% of respondents stating that it was very important that the amount of waste to dumps is reduced and 82% stating that they are prepared to do more to help protect the environment.

68% of respondents indicated that they would like to know more about what should be recycled, 63% said they would like to know more about the benefits of recycling, 49% stated that they only recycle obvious things and 56% stated that they would probably recycle more if the council provided suitable bins. Respondents from outer regional and remote areas were particularly enthusiastic in their commitment to recycling more, if afforded appropriate bins, with 79% and 76% respectively answering in the affirmative²⁸.

These responses highlight a knowledge and infrastructure shortfall, which must be overcome to continue with such remarkable success and ensure a continued commitment to waste minimisation and behavioural change. It is integral in the application of a waste levy that the community is afforded alternative waste disposal options. Given the positive attitudes towards waste reduction, there is significant potential to leverage further positive behavioural change through education and to couple this with the installation of appropriate infrastructure. Through strategic public education regarding waste minimisation options, highlighting the benefits of recycling, and ensuring that appropriate infrastructure is in place to support behaviours, Zero Waste SA stands to encourage a continued positive trend towards waste reduction. Additionally, the provision of appropriate alternatives to waste going to landfill helps reduce the likelihood of backlash regarding the announced waste levy increase.

²⁸ This enthusiasm in regional areas is likely due to the fact that residents have generally a lower level of recycling service and fewer recycling facilities provided to them than people in metropolitan areas.

Of note, in relation to the 2005 study, is that some responses to questions differed significantly depending on the geographical location of the respondent. People in the metropolitan area generally expressed views in accordance with preferred practice; in that they tended to be in greater agreement with the constructive/supportive statements and in greater disagreement with the unsupportive ones. In contrast, residents of the outer regional areas (i.e. regional towns and cities) tend to be more pessimistic about the value of their recycling efforts. This group responded most positively that they are prepared to do more if Councils make it easier for them via infrastructure e.g. suitable bins.

Illegal dumping is perceived more often as a problem in the outer regional and remote parts of the State than the metro and inner regional zones. However, agreement that littering is a problem in their areas gained virtually equal mention (i.e. slight but not strong disagreement) in all areas except outer regional, which tended to agree more with the statement.

Thus, when formulating responses and future waste management plans, it is imperative that regional variations in behaviour, need, and opinion are incorporated.

While this survey highlights several key opportunities to move towards various strategic waste reduction targets, particularly those addressing municipal solid waste, it does not incorporate the commercial and industrial or construction and demolition waste streams. Similar studies, geared more closely towards these other waste streams would certainly hold value and provide a clearer and more holistic picture of how to best formulate future responses to waste reduction and attitudes of all stakeholders to the waste levy.

6.4.3 Preliminary Assessment

The preliminary social assessment is based on the Scenarios developed in Section 6.1, and the costs associated with levy increases as estimated in Section 6.2.

When implementing levy increases, *it is important that the community is aware of the long-term environmental, social, and environmental benefits associated with a waste levy.* Behavioural change in response to the levy may result through purely economic reasoning or a combination of economic incentives and raised environmental values.

Although there may be initial negative feedback regarding the high cost of the levy, the long-term cost to households and businesses may not increase significantly relative to other scenarios as community understanding rises and behavioural change occurs. This is particularly significant in the case of regional SA, where household and business waste disposal costs are reduced by around 30% between 2006/07 and 2013/14 under Scenario 3 (High Diversion).

Both scenarios 1 and 2 do not offer any guarantees that waste reduction targets will be met. Scenario 3 has a much higher levy cost/tonne than

Scenario 1, but has the best value as it elicits significant social behavioural change. Further, this scenario ensures that waste reduction targets are met or exceeded, and present the most beneficial option to ensure communities and business experience a noticeable difference in waste reduction in proportion to economic savings within 6 years (2007-2013). It is foreseen that scenario 3 would bring the greatest social satisfaction with the waste levy.

The community may raise questions in relation to the proposed disbursement of the levy. It will be important to stress that the levy is in fact a 'waste minimisation levy' collected as a means of funding regional and local waste minimisation initiatives. It may prove particularly important to communicate how money is controlled between metropolitan and regional areas and between municipal, C&I, and C&D waste disposal initiatives.

Issues of fairness and "reasonableness" in the application of the levy will possibly arise for both households and business, along with issues relating to household/business capabilities to change versus their ability to pay. It will be useful to showcase precedents where levies have had positive outcomes for society, the environment and the economy.

The introduction of the levy itself will undoubtedly bring about raised awareness of why it has been applied where the money is reinvested. Though some initial reactions may be negative, it is important to recognise that even negative dialogue is healthy as it places issues in the public domain and serves to augment the profile of South Australia's Waste Strategy. In this manner, constructive dialogue, both positive and negative will assist in the implementation of the levy and in Zero Waste SA activities.

Positions and reactions to the levy will depend on a number of variables including the nature of the person or organisation's business, the degree of public and private (company) involvement in waste activities, geographical location and existing arrangements for waste management, including charging and access.

If implemented with a strategic education and awareness campaign, the levy may provide an incentive towards waste minimisation by altering consumer purchasing decisions and motivating households and businesses to avoid or recover waste. The higher cost of waste disposal associated with the levy directly rewards those who reduce their disposal of waste while simultaneously stimulating growth in a range of markets for recovered resources. In this way the levy acts as a penalty for waste generation, an incentive for waste minimisation and a revenue source for funding Zero Waste SA initiatives.

Under scenario 3, as community behavioural change occurs and waste to landfill is reduced, the eventual outcome would be a reduction in the availability of funding to promote future initiatives. However, as communities develop a greater understanding of the necessity of and methods for waste reduction, the need for future funding would subsequently be reduced.

6.4.4 Related factors

Increasing a waste levy that enables significant resource recovery from waste also affects social parameters beyond those discussed in the sections above. These are:

- Higher employment (see Section 6.2.4 for details); and
- Improved environmental conditions through reduced emissions from resource extraction and manufacturing, as well as through minimised landfill emissions (see Section 6.3), and associated improved health.

6.4.5 Summary

A levy increase to \$55/t which will enable high waste diversion would bring the greatest social satisfaction with the waste levy increase, as a recent attitudinal survey showed that 89% of people in SA believe it is very important to reduce waste to landfill and 82% are prepared to do more to help protect the environment.

However, it is emphasised that the community needs to be aware of the long-term environmental, social, and environmental benefits associated with a waste levy increase.

A negative impact may be experienced through increased littering and illegal dumping. The magnitude of this cannot be quantified and will largely depend on education and enforcement efforts. Local Government will bear the majority of these costs, and it is recommended to provide support²⁹ to Local Government for these activities.

It would also be beneficial to elicit the views of the business community about waste, recycling and the waste levy through surveys and/or a public consultation process³⁰.

²⁹ Financial and other (education, information etc.)

³⁰ Hyder understands that this report will be used for discussion and consultation.

7 Other Issues

7.1 Assessment of a Differentiated Levy

The waste disposal levy can be applied uniformly or differentiated depending on location (metropolitan and non-metropolitan area), point of delivery (which facilities), and waste type.

There is general agreement – supported by experience in other jurisdictions - that the waste levy should be kept as simple as possible as every exemption or complication presents an opportunity for rorting.³¹

Differentiation by Location (metropolitan vs rural)

At present, the waste levy in rural SA is 50% of the levy in metropolitan Adelaide (i.e. \$5.60). Should the Government decide to give effect to its decision to increase the levy by \$10m in July 2007 by doubling the current levy (metropolitan and rural), then this situation will not change.

In terms of financial impacts it should be noted that regional SA only disposes of around 20% of the total waste disposed in SA. With the current differentiation in the levy, regional SA contributes 10% to total revenue. Should this differential be eliminated it would mean a significant impact on communities and businesses already much more affected by the drought and sluggish economic conditions than residents and businesses in metropolitan Adelaide. On the other hand, it would increase the revenue by no more than 10%.

Differentiation at Point of delivery

As an example, the features of the current NSW levy system is described below (according to the NSW DEC, the previous levy system in NSW was too complex). The NSW Government now levies on receipt of the waste at landfills. Where a landfill does recycling, it gets levy deductions for any waste that is reprocessed (or sent to another landfill) but only when it is sent off site.

The NSW Government has steadily restricted the opportunities for levy deductions for waste 'used' on-site - currently it is only for final capping as part of closure plan, and use of virgin soil/rock below the water table to rehabilitate old sand mines.

No levy applies to waste received at a facility that only processes (e.g. transfer station or composting facility), but does not dispose of, waste on-site. However, for such a facility, the levy is payable when any residual waste is received at a disposal facility. The NSW DEC is using stockpile

³¹ For example, operators of waste facilities can claim tonnages of materials being recycled when in fact these are only stockpiled or only partially recycled.

limits on recycling facilities. The issue of 'stockpiling' at recycling facilities is fairly significant both in SA and in other locations. Anecdotal evidence suggests some operators use the 'stockpiles' as 'above ground landfills' to save paying disposal and levy fees, if not forever at least for some period of time³². Problems can be expected whenever the responsible agency takes their regulatory eye off the game³³.

In summary, it is recommended to apply the levy at the point of final disposal (i.e. landfill).

Differentiation by material type

Victoria waste levy funds are used exclusively for environment protection activities, including fostering the sustainable use of resources and best practices in waste management. Victoria has differential levies in place for the following four waste categories: Municipal, Industrial, Prescribed Waste, and Cat B Hazardous Industrial Waste. Applicable levies are listed in Table 7-1.

Table 7-1: Waste Levies in Victoria (\$/tonne)

Year	Non-hazardous waste				Prescribed waste
	Rural		Metro and provincial		
	Municipal	Industrial	Municipal	Industrial	
2001–2	2	2	4	4	10
2002–3	2	3	4	5	10
2003–4	3	5	5	7	14
2004–5	4	7	6	9	18
2005–6	5	9	7	11	22
2006–7	6	11	8	13	26
2007–8	7	13	9	15	30

In July 2006 the Victoria Government introduced a four-fold increase in levies charged on category B hazardous industrial waste. Environment Victoria believes the rise from \$30 to \$130 a tonne will give industry the price incentive necessary to drive the change to less toxic production processes. It stated that education and voluntary schemes have failed to provide the necessary reductions in hazardous waste. Existing levies have also been insufficient to drive change. Current waste disposal costs represent a very small proportion (0.1% - 2.2%) of total manufacturing costs. (Environment Victoria, 2006). The above also underlines the need for a high levy if it is to achieve significant waste reduction targets.

³² The analogy of an 'interest free loan' has also been used by some in the industry

³³ This section reflects advice provided by Mark Gorta, Manager Waste Management, NSW DEC.

No evidence of the impact of the differential waste levy on landfill could be found, however it appears the difference (and perhaps the entire levy) is too small to discern a direct impact. However, programs and incentives provided by EcoRecycle Victoria (now part of Sustainability Victoria) over the years would have had a significant impact.

For levy purposes, the WA Government distinguishes between putrescible waste and inert waste. Since 1 October 2006, the levy amounts to \$6/t for biodegradable waste and \$3/m³ for inert, as follows:

Table 7-2: Waste Levies in WA

Date	Putrescible Landfill (Class II, III & IV)	Increase	Inert Landfill	Increase
Current	\$3/tonne	-	\$1/tonne	-
2006/07	\$6/tonne	\$3	\$3/m ³	\$2
2007/08	\$6/tonne	\$0	\$3/m ³	\$0
2008/09	\$7/tonne	\$1	\$5/m ³	\$2
2009/10	\$8/tonne	\$1	\$7/m ³	\$2
2010/11	\$9/tonne	\$1	\$9/m ³	\$2

Again, there is no evidence available as to the impact of this differentiated levy.

In summary of the above, differentiated levy by material could be justified on environmental grounds as inert waste has significantly lower environmental impacts in a landfill than putrescible waste³⁴. However, this form of differentiation is likely to lead to the disposal of materials that could otherwise be recycled. One of the reasons that South Australia has high recycling rates for construction and demolition waste is that it does not provide a lower levy price for this material which would enable a low cost disposal rate relative to recycling. In addition, the monitoring and controlling of a system with a levy differentiated by material appears to be fraught with risks such as rorting the system and higher administrative costs. One of the consequences would also be environmental damage through waste ending up being disposed at unsuitable landfills (i.e. putrescible waste being landfilled at a site designed for inert fill, with inadequate environmental controls such as leachate and landfill gas management systems). A differentiated levy by material is therefore not recommended.

³⁴ Putrescible waste generates landfill gas (which inert waste does not) and generates significantly more leachate than inert waste

7.2 Implications for the EPA

The implications of the increased levy on compliance and enforcement activities vary between state and local government. While the state government will have responsibility for ensuring the additional levy proceeds are correctly collected and audited, local government will bear greater responsibility for costs of any increased litter and illegal dumping resulting from the levy increase.

Government administrative costs resulting from the increase are likely to be marginal, given current collection efforts. Recordkeeping costs should not change significantly. To the extent that increased cash flow may lead to greater potential incidences of fraud, the Government may need to allocate greater resources to verification and enforcement activities, especially within the first year. Some increased level of education will also be necessary to explain the increase and uses of levy funds.

The levy increase may result in increased litter and illegal dumping, local governments and the EPA could incur additional costs for compliance, enforcement and education, as outlined previously.

Appropriate policy support may prove necessary to assist in additional compliance and enforcement efforts that may be required. The legislative review proposed as part of the proposed Environment Protection Policy on Waste to Resources (Waste to Resources EPP) should specifically examine potential commercial gains from illegal dumping and improve compliance and enforcement provisions, if such a review is undertaken.

Finally, the implications for the EPA of the waste levy increase will depend on the nature of the levy as discussed in Section 7.1. The waste levy should be as simple as possible, with no differentiation by material (the only differentiation between metropolitan and non-metropolitan SA).

8 Recommendations

This project has reviewed the structure of the solid waste levy under section 113 of the Environment Protection Act 1993 and based upon its findings, the following recommendations are made:

- 1. that the \$10m increase in the levy announced by the Government to be introduced in July 2007 should be given effect by way of a doubling of the metropolitan and non-metropolitan levy rates.*
- 2. The current levy 'gap' between regional and metropolitan SA should be maintained in the medium term.*
- 3. No differentiation of the levy by waste type should be made.*
- 4. For sustained and increasing resource recovery in the medium to long term, the waste levy should be continuously increased to around \$55 per tonne by 2013.*
- 5. The waste levy should be as simple as possible and continue to apply at the disposal point for waste.*
- 6. At least 50% of the levy funds should continue to be directed to the Waste to Resources Fund to maintain an adequate and flexible response.*

It is recognised that these recommendations and the subsequent process of consultation to be undertaken with key stakeholders in relation to this report will assist the Government to determine the final structure of the solid waste levy for implementation in 2007-08 and future years.

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Appendix A

Waste Scenario Projections

	Total Generation								
	MSW	C&I	C&D						
2005/06	735,167	1,386,534	1,774,430	3,896,132					
2006/07	739,079	1,409,834	1,803,902	3,952,814					
2007/08	757,320	1,444,631	1,848,425	4,050,376					
2008/09	776,012	1,480,287	1,894,047	4,150,347					
2009/10	795,166	1,516,823	1,940,796	4,252,785					
2010/11	814,792	1,554,261	1,988,698	4,357,751					
2011/12	834,902	1,592,623	2,037,783	4,465,308					
2012/13	855,509	1,631,932	2,088,079	4,575,519					
2013/14	876,625	1,672,210	2,139,616	4,688,451					
	High Diversion Disposal			Sustained Efforts Disposal			Low Diversion Disposal		
	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D
2005/06	368,882	341,047	447,272	368,882	341,047	447,272	368,882	341,047	447,272
2006/07	334,864	338,542	443,987	363,752	338,542	443,987	363,752	338,542	443,987
2007/08	300,846	331,863	435,228	354,864	331,863	435,228	372,730	346,898	454,946
2008/09	266,828	325,184	426,469	345,976	325,184	426,469	381,930	355,460	466,175
2009/10	232,809	318,505	417,709	337,088	318,505	417,709	391,357	364,234	477,681
2010/11	198,791	286,655	375,938	328,199	311,826	408,950	401,016	373,224	489,471
2011/12	178,912	257,989	338,345	319,311	305,147	400,191	410,914	382,435	501,552
2012/13	161,021	232,190	304,510	310,423	298,468	391,431	421,056	391,875	513,931
2013/14	144,919	208,971	274,059	297,776	287,615	377,198	431,448	401,547	526,616
Totals		627,949			962,588			1,359,611	
	High Diversion Recycling			Sustained Efforts Recycling			Low Diversion Recycling		
	MSW	C&I	C&D	MSW	C&I	C&D	MSW	C&I	C&D
2005/06	366,286	1,045,487	1,327,158	366,286	1,045,487	1,327,158	366,286	1,045,487	1,327,158
2006/07	404,215	1,071,291	1,359,914	375,326	1,071,291	1,359,914	375,326	1,071,291	1,359,914
2007/08	456,475	1,112,768	1,413,197	402,456	1,112,768	1,413,197	384,590	1,097,733	1,393,479
2008/09	509,185	1,155,103	1,467,579	430,037	1,155,103	1,467,579	394,082	1,124,827	1,427,873
2009/10	562,356	1,198,318	1,523,086	458,078	1,198,318	1,523,086	403,809	1,152,589	1,463,115
2010/11	616,000	1,267,606	1,612,760	486,593	1,242,435	1,579,748	413,776	1,181,037	1,499,227
2011/12	655,990	1,334,634	1,699,438	515,591	1,287,476	1,637,592	423,989	1,210,187	1,536,231
2012/13	694,488	1,399,741	1,783,569	545,086	1,333,464	1,696,647	434,453	1,240,057	1,574,148
2013/14	731,706	1,463,239	1,865,557	578,849	1,384,596	1,762,419	445,176	1,270,664	1,613,001
Totals		4,060,502			3,725,863			3,328,841	

Appendix B

Cost Estimates

Scenario 1

HHLDS Metro Adelaide										Businesses Metro Adelaide									
Year	Levy	t/yr	\$/yr	hlds	\$/hld/yr					Year	Levy	t/yr	\$/yr	businesses	\$/bus/yr				
2000/01	4.76	341,131	1,623,784	458,002	3.55					2000/01	4.76	729,015	3,470,111	150,171	23.11				
2001/02	4.88	328,086	1,601,060	464,499	3.45					2001/02	4.88	678,468	3,310,924	152,302	21.74				
2002/03	5.09	326,628	1,662,537	470,995	3.53					2002/03	5.09	698,021	3,552,927	154,432	23.01				
2003/04	10.10	331,759	3,350,766	477,492	7.02					2003/04	10.10	708,986	7,160,759	156,562	45.74				
2004/05	10.50	303,023	3,181,742	483,989	6.57					2004/05	10.50	647,576	6,799,548	158,692	42.85				
2005/06	10.80	295,873	3,195,428	490,486	6.51					2005/06	10.80	632,296	6,828,797	160,822	42.46				
2006/07	11.20	291,002	3,259,220	492,995	6.61					2006/07	11.20	626,024	7,011,467	161,645	43.38				
2007/08	22.40	298,184	6,679,326	495,504	13.48					2007/08	22.40	641,475	14,369,045	162,468	88.44				
2008/09	23.09	305,544	7,056,353	498,014	14.17					2008/09	23.09	657,308	15,180,133	163,291	92.96				
2009/10	23.81	313,085	7,454,662	500,523	14.89					2009/10	23.81	673,531	16,037,004	164,113	97.72				
2010/11	24.55	320,813	7,875,455	503,032	15.66					2010/11	24.55	690,155	16,942,243	164,936	102.72				
2011/12	25.31	328,731	8,320,000	505,325	16.46					2011/12	25.31	707,190	17,898,580	165,688	108.03				
2012/13	26.09	336,845	8,789,638	507,619	17.32					2012/13	26.09	724,644	18,908,899	166,440	113.61				
2013/14	26.90	345,159	9,285,786	509,912	18.21					2013/14	26.90	742,530	19,976,248	167,192	119.48				
HHLDS Regional SA										Businesses Regional SA									
2000/01	2.40	65,853	158,048	187,942	0.84					2000/01	2.40	140,732	337,757	52,234	6.47				
2001/02	2.46	69,353	170,608	192,750	0.89					2001/02	2.46	147,374	362,541	53,570	6.77				
2002/03	2.56	72,501	185,602	197,557	0.94					2002/03	2.56	154,938	396,641	54,906	7.22				
2003/04	5.05	75,596	381,758	202,365	1.89					2003/04	5.05	161,552	815,836	56,242	14.51				
2004/05	5.25	71,437	375,045	207,172	1.81					2004/05	5.25	152,665	801,490	57,578	13.92				
2005/06	5.40	73,009	394,248	211,980	1.86					2005/06	5.40	156,024	842,528	58,914	14.30				
2006/07	5.60	73,080	409,249	212,104	1.93					2006/07	5.60	156,176	874,587	58,949	14.84				
2007/08	11.20	74,884	838,700	212,229	3.95					2007/08	11.20	160,031	1,792,346	58,984	30.39				
2008/09	11.55	76,732	886,042	212,354	4.17					2008/09	11.55	163,981	1,893,519	59,018	32.08				
2009/10	11.91	78,626	936,057	212,479	4.41					2009/10	11.91	168,028	2,000,402	59,053	33.87				
2010/11	12.27	80,567	988,894	212,604	4.65					2010/11	12.27	172,175	2,113,319	59,088	35.77				
2011/12	12.65	82,555	1,044,714	212,551	4.92					2011/12	12.65	176,425	2,232,609	59,073	37.79				
2012/13	13.05	84,593	1,103,685	212,498	5.19					2012/13	13.05	180,779	2,358,633	59,058	39.94				
2013/14	13.45	86,681	1,165,985	212,444	5.49					2013/14	13.45	185,241	2,491,770	59,043	42.20				

Scenario 2

HHLDS Metro Adelaide										Businesses Metro Adelaide									
Year	Levy	t/yr	\$/yr	hhd	hhd/yr	Year	Levy	t/yr	\$/yr	businesses	\$/bus/yr	Year	Levy	t/yr	\$/yr	businesses	\$/bus/yr		
2000/01	4.76	341,131	1,623,784	458,002	3.55	2000/01	4.76	729,015	3,470,111	150,171	23.11	2000/01	4.76	729,015	3,470,111	150,171	23.11		
2001/02	4.88	328,086	1,601,060	464,499	3.45	2001/02	4.88	678,468	3,310,924	152,302	21.74	2001/02	4.88	678,468	3,310,924	152,302	21.74		
2002/03	5.09	326,628	1,662,537	470,995	3.53	2002/03	5.09	698,021	3,552,927	154,432	23.01	2002/03	5.09	698,021	3,552,927	154,432	23.01		
2003/04	10.10	331,759	3,350,766	477,492	7.02	2003/04	10.10	708,986	7,160,759	156,562	45.74	2003/04	10.10	708,986	7,160,759	156,562	45.74		
2004/05	10.50	303,023	3,181,742	483,989	6.57	2004/05	10.50	647,576	6,799,548	158,692	42.85	2004/05	10.50	647,576	6,799,548	158,692	42.85		
2005/06	10.80	295,873	3,195,428	490,486	6.51	2005/06	10.80	632,296	6,828,797	160,822	42.46	2005/06	10.80	632,296	6,828,797	160,822	42.46		
2006/07	11.20	291,002	3,259,220	492,995	6.61	2006/07	11.20	626,024	7,011,467	161,645	43.38	2006/07	11.20	626,024	7,011,467	161,645	43.38		
2007/08	22.40	283,891	6,359,162	495,504	12.83	2007/08	22.40	613,673	13,746,277	162,468	84.61	2007/08	22.40	613,673	13,746,277	162,468	84.61		
2008/09	23.09	276,781	6,392,082	498,014	12.84	2008/09	23.09	601,322	13,887,179	163,291	85.05	2008/09	23.09	601,322	13,887,179	163,291	85.05		
2009/10	23.81	269,670	6,420,931	500,523	12.83	2009/10	23.81	588,972	14,023,606	164,113	85.45	2009/10	23.81	588,972	14,023,606	164,113	85.45		
2010/11	24.55	262,559	6,445,426	503,032	12.81	2010/11	24.55	576,621	14,155,147	164,936	85.82	2010/11	24.55	576,621	14,155,147	164,936	85.82		
2011/12	25.31	255,449	6,465,269	505,325	12.79	2011/12	25.31	564,270	14,281,366	165,688	86.19	2011/12	25.31	564,270	14,281,366	165,688	86.19		
2012/13	26.09	248,338	6,480,149	507,619	12.77	2012/13	26.09	551,919	14,401,807	166,440	86.53	2012/13	26.09	551,919	14,401,807	166,440	86.53		
2013/14	26.90	238,221	6,408,840	509,912	12.57	2013/14	26.90	531,850	14,308,331	167,192	85.58	2013/14	26.90	531,850	14,308,331	167,192	85.58		
HHLDS Regional SA										Businesses Regional SA									
2000/01	2.40	65,853	158,048	187,942	0.84	2000/01	2.40	140,732	337,757	52,234	6.47	2000/01	2.40	140,732	337,757	52,234	6.47		
2001/02	2.46	69,353	170,608	192,750	0.89	2001/02	2.46	147,374	362,541	53,570	6.77	2001/02	2.46	147,374	362,541	53,570	6.77		
2002/03	2.56	72,501	185,602	197,557	0.94	2002/03	2.56	154,938	396,641	54,906	7.22	2002/03	2.56	154,938	396,641	54,906	7.22		
2003/04	5.05	75,596	381,758	202,365	1.89	2003/04	5.05	161,552	815,836	56,242	14.51	2003/04	5.05	161,552	815,836	56,242	14.51		
2004/05	5.25	71,437	375,045	207,172	1.81	2004/05	5.25	152,665	801,490	57,578	13.92	2004/05	5.25	152,665	801,490	57,578	13.92		
2005/06	5.40	73,009	394,248	211,980	1.86	2005/06	5.40	156,024	842,528	58,914	14.30	2005/06	5.40	156,024	842,528	58,914	14.30		
2006/07	5.60	73,080	409,249	212,104	1.93	2006/07	5.60	156,176	874,587	58,949	14.84	2006/07	5.60	156,176	874,587	58,949	14.84		
2007/08	11.20	71,529	801,128	212,229	3.77	2007/08	11.20	152,862	1,712,052	58,984	29.03	2007/08	11.20	152,862	1,712,052	58,984	29.03		
2008/09	11.55	69,978	808,054	212,354	3.81	2008/09	11.55	149,547	1,726,854	59,018	29.26	2008/09	11.55	149,547	1,726,854	59,018	29.26		
2009/10	11.91	68,427	814,640	212,479	3.83	2009/10	11.91	146,233	1,740,928	59,053	29.48	2009/10	11.91	146,233	1,740,928	59,053	29.48		
2010/11	12.27	66,877	820,857	212,604	3.86	2010/11	12.27	142,919	1,754,215	59,088	29.69	2010/11	12.27	142,919	1,754,215	59,088	29.69		
2011/12	12.65	65,326	826,677	212,551	3.89	2011/12	12.65	139,604	1,766,653	59,073	29.91	2011/12	12.65	139,604	1,766,653	59,073	29.91		
2012/13	13.05	63,775	832,069	212,498	3.92	2012/13	13.05	136,290	1,778,176	59,058	30.11	2012/13	13.05	136,290	1,778,176	59,058	30.11		
2013/14	13.45	61,369	825,503	212,444	3.89	2013/14	13.45	131,149	1,764,144	59,043	29.88	2013/14	13.45	131,149	1,764,144	59,043	29.88		

Scenario 3

HHLDS Metro Adelaide						Businesses Metro Adelaide					
Year	Levy	t/yr	\$/yr	hhlds	\$/hhld/yr	Year	Levy	t/yr	\$/yr	businesses	\$/bus/yr
2000/01	4.76		341,131	1,623,784	3.55	2000/01	4.76	729,015	3,470,111	150,171	23.11
2001/02	4.88		328,086	1,601,060	3.45	2001/02	4.88	678,468	3,310,924	152,302	21.74
2002/03	5.09		326,628	1,662,537	3.53	2002/03	5.09	698,021	3,952,927	154,432	23.01
2003/04	10.10		331,759	3,350,766	7.02	2003/04	10.10	708,986	7,160,759	156,562	45.74
2004/05	10.50		303,023	3,181,742	6.57	2004/05	10.50	647,576	6,799,548	158,692	42.85
2005/06	10.80		295,873	3,195,428	6.51	2005/06	10.80	632,296	6,828,797	160,822	42.46
2006/07	11.20		267,891	3,000,378	6.09	2006/07	11.20	626,024	7,011,467	161,645	43.38
2007/08	22.40		240,676	5,391,152	10.88	2007/08	22.40	613,673	13,746,277	162,468	84.61
2008/09	27.83		213,462	5,941,359	11.93	2008/09	27.83	601,322	16,736,806	163,291	102.50
2009/10	33.27		186,248	6,195,836	12.38	2009/10	33.27	588,972	19,593,122	164,113	119.39
2010/11	38.70		159,033	6,154,583	12.23	2010/11	38.70	530,074	20,513,881	164,936	124.37
2011/12	44.13		143,130	6,316,796	12.50	2011/12	44.13	477,067	21,054,557	165,688	127.07
2012/13	49.57		128,817	6,385,022	12.98	2012/13	49.57	429,360	21,281,959	166,440	127.87
2013/14	55.00		115,935	6,376,434	12.50	2013/14	55.00	386,424	21,253,335	167,192	127.12
HHLDS Regional SA						Businesses Regional SA					
2000/01	2.40		65,853	158,048	0.84	2000/01	2.40	140,732	337,757	52,234	6.47
2001/02	2.46		69,353	170,608	0.89	2001/02	2.46	147,374	362,541	53,570	6.77
2002/03	2.56		72,501	185,602	0.94	2002/03	2.56	154,938	396,641	54,906	7.22
2003/04	5.05		75,596	381,758	1.89	2003/04	5.05	161,562	815,836	56,242	14.51
2004/05	5.25		71,437	375,045	1.81	2004/05	5.25	152,665	801,490	57,578	13.92
2005/06	5.40		73,009	394,248	1.86	2005/06	5.40	156,024	842,528	58,914	14.30
2006/07	5.60		71,238	398,935	1.88	2006/07	5.60	152,240	852,546	58,949	14.46
2007/08	11.20		68,085	762,556	3.59	2007/08	11.20	145,502	1,629,623	58,984	27.63
2008/09	11.55		64,932	749,787	3.53	2008/09	11.55	138,764	1,602,333	59,018	27.15
2009/10	11.91		61,779	735,492	3.46	2009/10	11.91	132,026	1,571,786	59,053	26.62
2010/11	12.27		54,917	674,061	3.17	2010/11	12.27	117,360	1,440,504	59,088	24.38
2011/12	12.65		49,425	625,462	2.94	2011/12	12.65	105,624	1,336,644	59,073	22.63
2012/13	13.05		44,483	580,366	2.73	2012/13	13.05	95,062	1,240,272	59,058	21.00
2013/14	13.45		40,034	538,521	2.53	2013/14	13.45	85,556	1,150,848	59,043	19.49

Worst Case Financial impact Scenario

HHLDS Metro Adelaide												Businesses Metro Adelaide											
Year	Levy	t/yr	\$/yr	hhlds	\$/hhld/yr				Levy	t/yr	\$/yr	businesses	\$/bus/yr										
2000/01	4.76	341,131	1,623,784	458,002	3.55				4.76	729,015	3,470,111	150,171	23.11										
2001/02	4.88	328,086	1,601,060	464,499	3.45				4.88	678,468	3,310,924	152,302	21.74										
2002/03	5.09	326,628	1,662,537	470,995	3.53				5.09	698,021	3,552,927	154,432	23.01										
2003/04	10.10	331,759	3,350,766	477,492	7.02				10.10	708,986	7,160,759	156,562	45.74										
2004/05	10.50	303,023	3,181,742	483,989	6.57				10.50	647,576	6,799,548	158,692	42.85										
2005/06	10.80	295,873	3,195,428	490,486	6.51				10.80	632,296	6,828,797	160,822	42.46										
2006/07	11.20	291,002	3,259,220	492,995	6.61				11.20	626,024	7,011,467	161,645	43.38										
2007/08	22.40	283,891	6,359,162	495,504	12.83				22.40	613,673	13,746,277	162,468	84.61										
2008/09	27.83	276,781	7,703,727	498,014	15.47				27.83	601,322	16,736,806	163,291	102.50										
2009/10	33.27	269,670	8,971,022	500,523	17.92				33.27	588,972	19,593,122	164,113	119.39										
2010/11	38.70	262,559	10,161,050	503,032	20.20				38.70	576,621	22,315,228	164,936	135.30										
2011/12	44.13	255,449	11,273,809	505,325	22.31				44.13	564,270	24,903,122	165,688	150.30										
2012/13	49.57	248,338	12,309,300	507,619	24.25				49.57	551,919	27,356,804	166,440	164.36										
2013/14	55.00	238,221	13,102,135	509,912	25.69				55.00	531,850	29,251,737	167,192	174.96										
HHLDS Regional SA												Businesses Regional SA											
Year	Levy	t/yr	\$/yr	hhlds	\$/hhld/yr				Levy	t/yr	\$/yr	businesses	\$/bus/yr										
2000/01	2.40	65,853	158,048	187,942	0.84				2.40	140,732	337,757	52,234	6.47										
2001/02	2.46	69,353	170,608	192,750	0.89				2.46	147,374	362,541	53,570	6.77										
2002/03	2.56	72,501	185,602	197,557	0.94				2.56	154,938	396,641	54,906	7.22										
2003/04	5.05	75,596	381,758	202,365	1.89				5.05	161,552	815,836	56,242	14.51										
2004/05	5.25	71,437	375,045	207,172	1.81				5.25	152,665	801,490	57,578	13.92										
2005/06	5.40	73,009	394,248	211,980	1.86				5.40	156,024	842,528	58,914	14.30										
2006/07	5.60	73,080	409,249	212,104	1.93				5.60	156,176	874,587	58,949	14.84										
2007/08	11.20	71,529	801,128	212,229	3.77				11.20	152,862	1,712,052	59,984	29.03										
2008/09	11.55	69,978	808,054	212,354	3.81				11.55	149,547	1,726,854	59,018	29.26										
2009/10	11.91	68,427	814,640	212,479	3.83				11.91	146,233	1,740,928	59,053	29.48										
2010/11	12.27	66,877	820,857	212,604	3.86				12.27	142,919	1,754,215	59,088	29.69										
2011/12	12.65	65,326	826,677	212,551	3.89				12.65	139,604	1,766,653	59,073	29.91										
2012/13	13.05	63,775	832,069	212,498	3.92				13.05	136,290	1,778,176	59,058	30.11										
2013/14	13.45	61,369	825,503	212,444	3.89				13.45	131,149	1,764,144	59,043	29.88										