Landfill Levy Review

Prepared for the Waste Management Board
of Western Australia

5 November 2007

FOUR SCENES

Disclaimer

The contents of this report are provided in good faith. Every effort has been made to be accurate, truthful and current. Reasonable care, skill and judgment have been exercised in the preparation of the Report. This Report has been prepared in accordance with the project brief and description of works, dated 27 September 2007.

Four Scenes Pty Ltd does not guarantee or warrant the accuracy, reliability, completeness or currency of the information in this report unless contrary to law.

Four Scenes Pty Ltd does not accept any responsibility or liability in respect of any opinion provided in this Report or by any person acting in reliance on the information in it.

This report was prepared by:

Dr Michael Blyth
Director of Four Scenes Pty Ltd
5 November 2007

Acknowledgements

The support and guidance provided to the reviewer by Ms Fleur Newman on behalf of the Waste Management Board is gratefully acknowledged.

Advice and assistance provided to the reviewer by Mr Bernard Ryan, Manager Policy and Evaluation, Waste Management Branch, Department of Environment and Conservation prior to and during the review are gratefully acknowledged. Bernard was instrumental in arranging interviews with key stakeholders of the waste management sector in Perth. He also participated in stakeholder interviews, making valuable contributions to discussions and assessment of issues.

Contents

1. Executive summary

The objectives of this review of the Landfill Levy for the Waste Management Board were to:

a) Review the current and future effectiveness of the Landfill Levy as an economic instrument for influencing waste management practices, including reducing waste to landfill.

b) Review the Landfill Levy to determine a sound methodology for medium to long term increases - for the purpose of (a) an effective economic instrument for reducing waste to landfill; and (b) ensuring the levy is able to raise sufficient funds for waste related programs.

The approach to the review involved interviews with stakeholders, review of relevant literature and a discussion of preliminary findings with the Waste Management Board.

Landfill Levy effectiveness

From a theoretical assessment of the economics of landfill levies, a review of waste disposal trends and feedback from stakeholders it was concluded that to date there is little evidence to indicate that the Landfill Levy has been an effective instrument for influencing waste management practices, including reducing wastes to landfill. However, it is clear that the levy was not originally intended to influence behaviour, but rather it was imposed to generate sufficient revenue to fund specific programs and initiatives that were focused on encouraging resource recovery and reducing waste to landfill. The redistribution of levy funds via rebates to councils is likely to have contributed to reductions in waste going to landfill from the municipal sector.

The effectiveness of a landfill levy is enhanced when:

- it captures residual externalities, avoiding duplication of externalities incorporated in landfill gate fees
- it is based on knowledge of the supply of and demand for landfill and recycling services for each waste producing sector and waste type
- it is part of a mix of instruments that combine in a complementary way to achieve the optimal mix of landfill and resource recovery outcomes
- it is supported with the appropriate amount of enforcement to minimise illegal waste management practices
- it is exposed directly to waste producers via appropriate collection and pricing methods allowing waste producers to choose between alternatives.

Differences in environmental impact and in the nature and costs of different wastes streams provide a sound rationale for maintaining differential rates for putrescible and inert wastes. Differentials levy rates for residual wastes after resource recovery and for good landfill management practices may lead to increased waste to landfill, while a differential rate reflecting differences in

greenhouse gas emissions may be an inefficient solution in the context of a national carbon emissions trading scheme.

A blanket ban on waste to landfill is a more costly and disruptive approach than alternative instruments. The small size of the market in Western Australia for recycled materials and underinvestment in recovery capacity render this option economically, socially and environmentally infeasible. Extending the levy to rural and regional councils may be a sensible long-term aim, but a number of higher priority areas should be addressed in the short to medium term such as improving landfill standards and encouraging waste reduction, reuse and recycling.

The effectiveness of the Landfill Levy is likely to strengthen when it is combined with other instruments and initiatives to improve waste management outcomes in Western Australia. Changes in the legislative environment including implementation of the Waste Avoidance and Resource Recovery Bill 2006 will pave the way for a range of new instruments including Extended Producer Responsibility, Product Stewardship and Container Deposit Schemes. These initiatives address waste at its source. Introduction of variable disposal fee systems for households such as pay by weight will be effective in reducing waste to landfill.

Looking to the future the Landfill Levy is likely to be more effective in influencing waste management practices, including reducing waste to landfill. As the levy rate rises, alternatives will become more attractive especially for inert wastes. The rate rises for putrescible wastes are unlikely to have much effect on waste diversion from landfill, especially while households remain shielded from unit disposal prices. Introduction of new initiatives such as EPR will complement the Levy by creating incentives to recover wastes for reuse or recycling.

Landfill Levy framework

A framework to guide the Waste Management Board in preparing its advice to the Minister for the Environment on the Landfill Levy should:

- align the Landfill Levy with the goals and principles of environmental policy in Western Australia, including the *State Sustainability Strategy* and the *Towards Zero Waste* vision and with other relevant contextual influences including economic, social, technological and environmental factors
- accommodate the dual purposes of the Landfill Levy – influencing waste management behaviour and raising revenue for strategic programs and projects
- be comprehensive, based on an integrated approach that includes a quantitative component that can simultaneously measure the demand response of landfill and alternative technologies to changes in the landfill levy and a qualitative component that involves dialogue with stakeholders on setting levy rates and generating revenues
- be transparent and open and remove uncertainty for current and new players

Landfill Levy funds are hypothecated for reinvestment in programs and projects that support improved waste management practices. As the levy rate increases, the quantity of levy funds will fall, depending on elasticities of demand. A sound priority setting framework is essential, set within a strategic planning context and based on appropriate criteria that can be applied consistently and rigorously to prospective investment opportunities.

Participative strategic planning and priority setting process involving representatives from key stakeholder groups who will share divergent perspectives on current and future opportunities and threats is an effective way of setting direction and defining priorities in the context of the strategic direction that are owned and understood by all stakeholders. Levy funds can be invested in many different types of activities and ideas. Appropriate areas include those where the benefits of the investment are shared by many, where investment facilitates establishment of markets and the sharing of knowledge and experience, where investment strengthens capacity and productivity across the sector and where investments are aligned with achievement of strategic goals.

Dissemination and communication of the results from supported projects should be strengthened in a number of ways including requiring all project proposals to include a detailed knowledge dissemination and communication strategy, commissioning evaluations of completed projects and publicising the results, facilitating the sharing of project results, promoting investment in multi-partner action research projects and using knowledge brokers to facilitate exchange of information, ideas and technologies across the sector.

Separation of the strategic and policy development role of the Board from the regulatory role of the Department of Environment and Conservation will be facilitated by the implementation of the WARR 2006 Bill.

Deleted: 1996

2. Introduction

2.1 Scope of the review

This report was prepared by Four Scenes Pty Ltd for the Waste Management Board. It presents background to and findings of a review of the Landfill Levy in accordance with the project brief and description of works as provided to the consultant by the Waste Management Board.

The broad objectives of the review as provided to the consultant were to:

c) Review the current and future effectiveness of the Landfill Levy as an economic instrument for influencing waste management practices, including reducing waste to landfill.

d) Review the Landfill Levy to determine a sound methodology for medium to long term increases - for the purpose of (a) an effective economic instrument for reducing waste to landfill; and (b) ensuring the levy is able to raise sufficient funds for waste related programs.

The brief and description of works requested that the review of the Landfill Levy be based on 'previous studies and on a range of contemporary interviews with key stakeholders'.

Interviews were conducted in Perth from Monday 8 October 2007 to Wednesday 10 October. A presentation of preliminary findings and recommendations of the review was made to the Waste Management Board on Thursday 11 October 2007. This report expands the material presented to the Board and incorporates the Board's feedback.

2.2 Approach

The approach to the review comprised three key components:

1. interviews with key stakeholders of the waste management sector in metropolitan Perth
2. review of previous studies including reviews and consultancies commissioned by the Waste Management Board or the Department of Environment and Conservation and other relevant published and grey literature
3. discussion of preliminary findings with the Waste Management Board

Invitations were extended to a number of individuals and organisations that have an interest in or involvement with waste management in the Perth metropolitan area, including landfill operators, resource recovery and recycling operators, state government, regional local government, industry associations and the community. Fourteen interviews were conducted involving twenty two people. A list of individuals and organisations who participated in the interviews is included in Appendix 1.

Those organisations and individuals who accepted the invitation to contribute to the review were provided with details on the scope of the review and the purpose of the interview prior to the interview. The interview process allowed interviewees to address the two objectives and to raise any important issues that they believed were related to the review.

Supplementing the information provided through the interviews, a review of relevant literature was also conducted. This included previous reviews, audit reports and consultancy reports on aspects of the Landfill Levy and the Waste Management Recycling Fund from the Waste Management Board or the Western Australian Department of Conservation and Environment as well as published and grey literature from Australian and international sources.

Feedback provided by the Board in response to the presentation of preliminary findings is incorporated in this report. The presentation to the Board was made on Thursday 11 October 2007.

2.3 Background

The Landfill Levy was introduced by the Western Australia State Government in 1998 following an amendment to the *Environmental Protection Act 1986*. The levy applies to wastes generated within metropolitan Perth and wastes disposed at landfill sites within the metropolitan area. The levy commenced in July 1998. A particular feature of the Landfill Levy is that the funds generated by the imposition of the levy are hypothecated or earmarked for strategic programs in the areas of management, reduction, reuse, recycling, monitoring or measurement of waste (Waste Management Board of Western Australia 2004). The levy revenues are credited to the Waste Management and Recycling Account and the funds are disbursed in accordance with approval of the Minister for the Environment and Conservation on advice from the Waste Management Board (Waste Management Board of Western Australia 2006).

The levy has two functions:

1. to increase the comparative price of landfill and make recycling more cost-competitive
2. to provide resources for the state government to strategically invest in recycling initiatives

The Landfill Levy is an important policy instrument for achieving the Waste Management Board's vision of *towards zero waste*, as outlined in the policy document Towards Zero Waste in Western Australia (Waste Management Board of Western Australia 2006. 'Reducing waste and managing it as a resource' is a priority area under the State Sustainability Strategy goal to 'plan and provide settlements that reduce the ecological footprint and enhance quality of life at the same time'(Government of Western Australia 2003).

In 2006 the Government of Western Australia implemented a decision to progressively increase the landfill levy from $3 a tonne to $9 a tonne for

putrescible waste and from $1 a cubic meter to $9 a cubic metre for inert waste to by 2010-11. The first increase occurred in October 2006, with unit increases of $1 for putrescible and $2 for inert each year from 2008-09. Over the five years the price differential between the two types of waste will be eliminated, although if expressed on an equivalent weight basis the rate for putrescible is likely to be higher than that for inert.

3. Economic aspects of a landfill levy

Landfill levies are used by governments in most jurisdictions throughout Australia and overseas as a policy instrument to influence waste management practices, including diversion of wastes from landfill. A landfill levy is imposed over and above the normal gate fees charged by a landfill operator to divert waste to recycling or reuse. As well as influencing waste management practices, landfill levies raise revenues which may be used for specific waste management purposes.

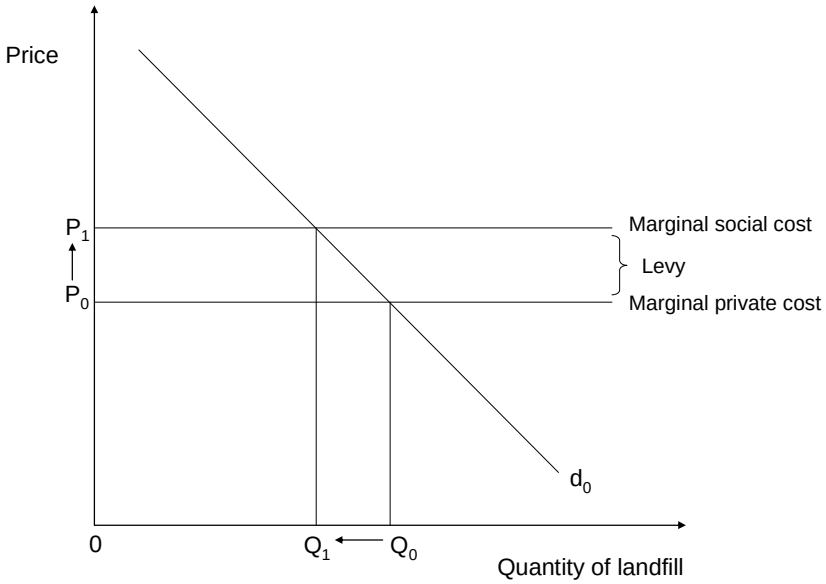
A landfill levy can be set and imposed on landfill wastes in order to capture the negative externalities generated by disposal to landfill. In the absence of a levy, a socially unacceptable level of external costs would be imposed on society. External costs unaccounted for by the landfill operator include greenhouse emissions, loss of visual amenity, transport corridor impacts such as increased traffic and likelihood of accidents and intergenerational equity. The imposition of a levy results in the socially optimal outcome, but only where the levy is equal to the value of the external costs to society of the negative externalities associated with landfill. As noted by the Productivity Commission (2006), the size of the reduction depends on the costs to landfill users of alternatives for dealing with the waste. The less it costs for a waste producer to divert waste to alternatives such as recycling or reuse, the more responsive their demand for landfill will be to increases in price. Diversion costs may include additional transport costs and the opportunity costs of the waste producer's time to divert waste to alternative users.

Bartelings et al (2005) point out that waste diversion from landfill will only happen when the price signal from the landfill levy is transmitted directly to the waste producer. If waste producers face the correct price of landfill disposal, regardless of the degree of responsiveness, the resulting level of disposal is that which maximises net benefit to the community (Productivity Commission 2006).

A simple model of the supply and demand for landfill can help illustrate how the imposition of a levy influences the amount of waste diverted from landfill[1]. Demand for landfill in Figure 1 is represented by the demand curve, d_0 which is equivalent to market demand. This representation is a simplification of the real market where the shape and slope of the demand curve is unlikely to be linear, reflecting the price elasticity of demand for landfill. The supply of landfill is represented by the landfill operator's long-run marginal private cost curve which is assumed to be constant at price P_0. The equilibrium level of landfill in the absence of levies is Q_0, where supply intersects with demand. This level of landfill from society's perspective exceeds the socially optimal level. The market fails to account for the external costs associated with landfill.

[1] Based on ACIL Tasman (2006).

Figure 1 Supply and demand for landfill



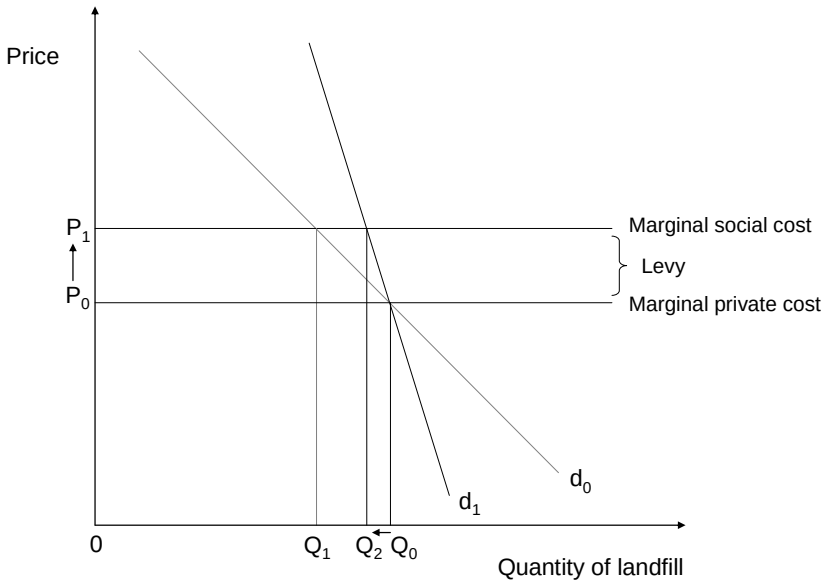
Adding the marginal external costs of landfill to the landfill operator's marginal private costs, results in the marginal social costs of landfill, which is equivalent to the supply curve for landfill. When external costs are taken into account, the equilibrium level of landfill declines to Q_1. If the landfill levy is equal to the marginal external costs of landfill, then the socially optimal level of landfill is achieved. The landfill charge to waste producers increases from P_0 to P_1, equivalent to the amount of the levy. The quantity of waste diverted to alternative uses is the difference between Q_0 and Q_1.

The challenge for governments is to set the levy so that private costs exactly equate with social costs, based on determination of the external costs of landfill. Without accurate information, setting the levy at the correct level is impossible. For example, if the levy is set too high waste producers may choose illegal disposal. On the other hand if the price of waste disposal is kept low, waste producers may not have sufficient incentive to reduce waste generation or divert waste to reuse or recycling. Therefore, in reality all that governments and regulatory agencies can hope to achieve is a movement towards the optimum level of landfill or diversion of waste from landfill.

As noted earlier, the responsiveness of demand for landfill to changes in price (price elasticity of demand) will determine the socially optimal level of landfill. The price elasticity of demand for landfill is the percentage change in quantity of landfill demanded in response to a percentage change in the price of landfill. Figure 2 illustrates the situation where demand for landfill is inelastic, represented by the demand curve d_1. In this situation demand response to changes in the price of landfill (the sum of the gate fee and the levy) is proportionately less than the change in the price. There is only a small reduction in waste to landfill equivalent to the difference between Q_0 and Q_2. The difference to the situation where demand is more elastic and responsive to price changes can be seen in Figure 2 as well.

An inelastic demand response may be due to commitment to a particular technology which can restrain immediate response to price changes. It may also reflect the situation where consumers are not directly exposed to changes in price. This may be the result of interventions in the market as in the case of municipal solid waste collections where a levy price change may not be passed onto households immediately and/or fully and where collection technologies are fixed in the short term. In this situation households pay a flat fee for waste collection as a component of their annual land rates. Furthermore, they must comply with the collection and waste management technologies provided by the local government collector. Decisions regarding diversion of waste from landfill to recycling or reuse are made by local government not by the householders who generate the waste.

Figure 2 Inelastic demand for landfill



Bartelings et al (2005) concluded from an extensive review of empirical studies that the demand for municipal or household waste disposal services is inelastic. Empirical evidence indicates that inert wastes demonstrate a more elastic demand response to landfill prices (ACIL Tasman 2006).

Demand for landfill addresses only part of the waste management solution. The other part of the solution relates to the demand for recycling and reuse. For a given quantity of waste produced there are alternative disposal technologies, such as landfill and recycling. The social objective is not to determine the optimal quantity of landfill, but the optimal mix of landfill and alternative disposal options (Choe and Fraser 1998). The optimal mix of disposal technologies is found by equating the marginal social cost of the alternatives. This requires estimates of the supply of recycling/reuse services, coupled with the supply of landfill services and the demand for waste disposal services (equivalent to the sum of the demand for landfill and the demand for recycling/reuse).

As Choe and Fraser (1998) concluded following their review of the economic theory of waste management, 'waste management needs to be analysed in a comprehensive framework where various policy instruments targeting consumption, waste disposal services and illegal waste disposal can be considered simultaneously, along with the choice of waste disposal technologies.' An example of the application of a comprehensive analysis is that by the BDA Group and Econsearch (2004) for the South Australian Government's *Zero Waste SA* strategy.

Key messages emerging from this overview of the economics of landfill levies are:

1. To achieve the socially optimal level of landfill, the landfill levy must account for the costs to society of the negative externalities from landfill. Therefore, to set the levy to achieve the socially optimal level of landfill, external costs of landfill have to be determined. This is challenging.

2. The price elasticity of demand for landfill, irrespective of the external costs of landfill, is a key determinant of the change in the quantity of landfill demanded in response to a change in the price of landfill. Therefore, quantification of the price elasticity of demand for landfill is critical to understanding the impact of imposing and changing a landfill levy on the level landfill demanded.

3. Previous empirical studies indicate that the demand for household waste disposal services is price inelastic. This reflects the inflexible nature of household waste collection services including the use of flat-fee pricing schemes and limited exposure of households to changes in landfill prices. Demand for inert wastes tends to be more elastic.

4. Waste management is a complicated problem. Comprehensive policy analysis frameworks incorporating demand and supply functions for alternative waste disposal technologies are needed to determine efficient policy solutions.

4. Collection, recycling and disposal of waste in Western Australia

Local governments have the primary responsibility for managing municipal (predominantly household) waste. This encompasses kerbside collection of wastes and recyclables, management of landfills and in some cases operation of resource recovery facilities. Privately owned and operated landfill sites within the Perth metropolitan are primarily for inert wastes. Local governments make extensive use of private contractors for household waste collections, with the wastes disposed of at council landfills or processed in council resource recovery facilities.

Access to landfill sites on the Swan coastal plan has declined over the past two decades. Tips have been closed as they have reached capacity or because of residential encroachment or environmental limitations. Current regulations prohibit establishment of new landfills on the coastal plain. New waste disposal sites must be located on the outskirts of the metropolitan area.

Within the Perth metropolitan area most Regional Councils were established to manage existing landfills and provide the scale necessary to develop and access new landfill sites and establish resource recovery and recycling operations (Economics Consulting Services 2003). Regional Councils are statutory bodies set up by a group of local councils to perform some of their functions. They have been able to achieve economies of scale and levels of throughput that individual councils could not, and which have been critical to the viability of investments in alternative technologies to landfill. Regional Councils have had a significant influence on the diversion of waste from landfills and the level of revenue generated by the Landfill Levy (Economics Consulting Services 2003).

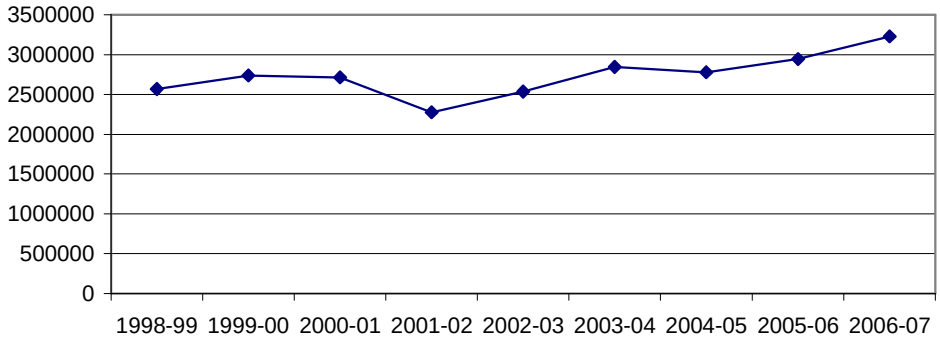
5. Effectiveness of the Landfill Levy as an economic instrument

5.1 Statistical evidence

5.1.1 Trends in waste to landfill 1998 to 2007

There are a number of ways that the effectiveness of the Landfill Levy as an economic instrument can be measured. The first is to consider the trend or pattern of waste to landfill since the introduction of the Landfill Levy. Figure 3 presents the trend in waste disposals to landfills in the Perth metropolitan area since July 1998 to June 2007. Despite the existence of the Landfill Levy the quantity of total waste to landfill has increased by 25% over the eight years of its existence. However, the unit value of the Levy remained unchanged from the time it was introduced until October 2006. In real terms the value of the Levy declined by 21.5%.

Figure 3: Trend in total waste to landfill, 1998-99 to 2006-07
('000 tonnes)



Source: DEC 2007

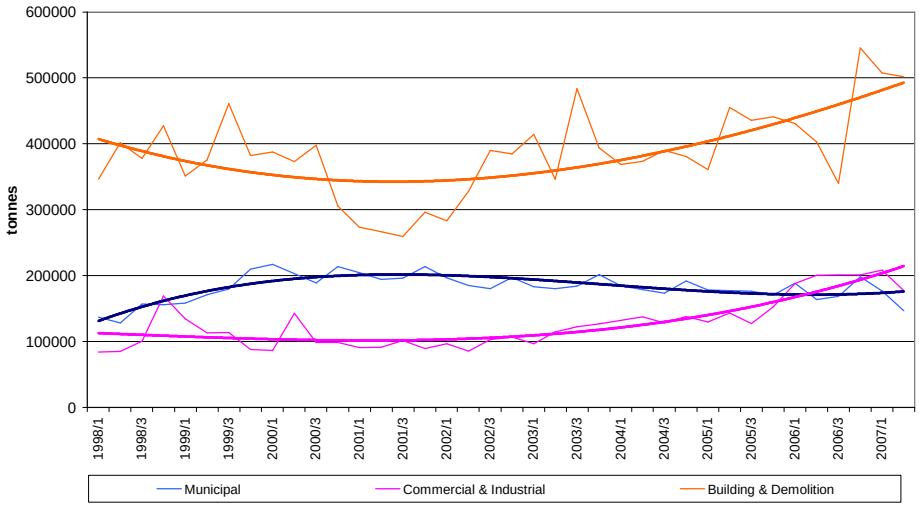
Data in Figure 3 indicate a continuing upward trend in waste to landfill since the Levy was increased. As the Landfill Levy has been applied differentially to inert and putrescible wastes it is informative to consider its impact for the different waste streams.

While the Landfill Levy is imposed on the type of waste, i.e. inert and putrescible, data are collected and reported for the three main waste generating sectors: municipal which includes all household wastes collected by councils, commercial and industrial (C&I) which includes wastes generated by industrial and service enterprises and building and demolition (B&D). Each sector generates both putrescible and inert wastes in different proportions and is exposed to the Landfill Levy accordingly. Waste management strategies and practices vary between the sectors reflecting the different waste characteristics and compositions.

Figure 4 presents trends in wastes to landfill for the three sectors for the period 1998 to 2007. The pattern for each sector is one of short-term fluctuations around a long term increasing or decreasing trend. In the case of C&I and B&D, the trend in waste to landfill is generally upward. On the other hand, the trend for household waste is downward. The wide fluctuations for B&D suggest that waste flows are relatively more responsive to changes in the business environment, reflecting the variable nature of the construction industry. Municipal and C&I waste streams appear to be less volatile.

A downward trend in municipal waste to landfill has been apparent since 2000-01. While it is not possible to conclude that the Landfill Levy has been responsible, it cannot be ruled out either, especially as up to half of the Landfill Levy funds collected were rebated to councils through the Resource Recovery Rebate Scheme (RRRS).

Figure 4: Trend in Waste to Landfill, Perth Metropolitan Area
Quarterly Breakdown by Waste Stream, 1998 - 2007



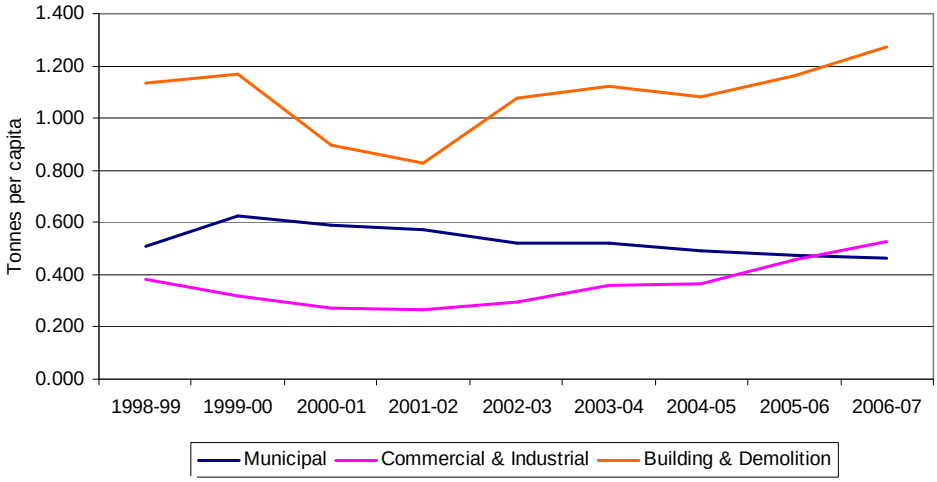
Source: DEC 2007

The quantity of waste generated is related to growth in income and population growth. Expressing waste to landfill on a per capita basis provides further evidence of the different waste stream patterns. On a per capita basis municipal waste to landfill has declined from 624 kg per person in 1999-00 to 463 kg in 2006-07. Per capita trends for B&D and C&I per person are increasing.

5.1.2 Trends in resource recovery activity 1998 to 2007

While there is some evidence of reduction in waste to landfill it cannot be linked directly or exclusively to the Landfill Levy. Furthermore, to complete the statistical analysis, data on resource recovery and recycling and illegal dumping are also required. Recycling data have not been as routinely collected as data on waste to landfill. In fact, data collection for recycling and reuse is more complicated. Data from surveys of recycling activity in Western Australia are available for 2004-05 and 2005-06 (Cardno BSD 2007). Unfortunately, the data are not comparable between the two years for all recycled materials or for total recycling activity. There are not equivalent data on resource recovery as there are for waste to landfill at this time.

Figure 5: Trend in Waste to Landfill, Perth Metropolitan Area July 1998 to June 2007, Tonnes per Capita

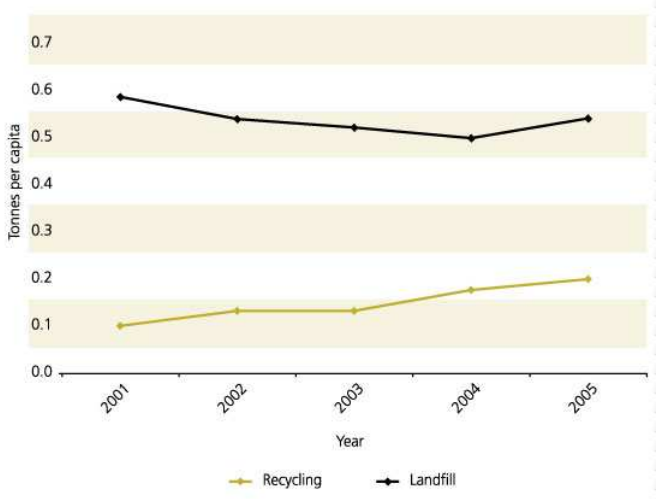


Source: DEC 2007

Per capita recycling data for the household sector were obtained from the Western Australian State of the Environment Report (EPA 2007), and are reproduced in Figure 6. The chart reveals that recycling per person increased in each year over the period, from approximately 100 kg to approximately 200 kg which is almost 19% per year. This compares to an annual per capita rate of household waste to landfill of 4.5%, based on data in Figure 5. Household recycling data for 2005-06 from Cardno BSD (2007) indicate that per capita levels increased to over 240 kg.

While there is evidence that recycling activity in the household sector is growing strongly, it is unlikely that this level of activity is due to the Landfill Levy. Similar time series data for the other sectors are not available. Cardno BSD (2007) reported a 46% increase in recovery of building and demolition material from waste streams between 2004-05 and 2005-06 (data for earlier years are not available). The increase in wastes to landfill between these years was just under 8%.

Figure 6: Trend in municipal waste disposed to landfill and recycled per capita per year, 2001-2005



Source: Environmental Protection Authority 2007.

It is concluded from this analysis of trends since the introduction of the Landfill Levy that:

- The unit value of the Landfill Levy remained constant for most of the period, while at the same time gate fees for landfill facilities have increased; in real terms the value of the Levy has decreased considerably; the portion of the Levy in gate fees has declined over most of the period. Effectively, waste producers have been subject to a declining levy in unit value terms relative to prices of landfill and resource recovery services. Therefore, it should be expected that waste to landfill will increase in such a situation.
- C&I and C&D waste to land fill have increased in both absolute and per capita terms.
- Household waste to landfill has fallen in both absolute and per capita terms.
- Recovery of household waste for reuse and recycling has increased since 2001.
- Measurements of total recycling activity over the period of the Landfill Levy are not readily available.
- As an economic instrument aimed at influencing waste management behaviour, the Landfill Levy has not been effective. However, the rebating of Levy funds to local councils is likely to have contributed to reductions in waste to landfill in the household sector.
- Unexpected landfill and recovery outcomes, such as those for the household sector, may be explained by changes in the many other factors that influence waste management decisions.

Stakeholders interviewed for this review identified many of the other factors at play and possible reasons for unexpected outcomes.

5.2 Stakeholders' assessments of Landfill Levy effectiveness

When asked to comment on the effectiveness of the Landfill Levy as an economic instrument, stakeholders responded with a range of comments. These have been grouped into three broad areas as follow:

1. It is an effective economic instrument because

    - It captures some of the externalities that would otherwise be ignored
    - Captures spatial externalities
    - Since the Levy on inert wastes was increased from $1 to $3 a cubic metre, there has been an increase in diversion of B&D materials from landfill
    - It raises awareness about alternatives to landfill
    - Revenues generated are hypothecated

2. It is not an effective economic instrument because

    - The Landfill Levy was set originally to generate sufficient revenue to meet the costs of seven specific programs; reducing wastes to landfill is of secondary importance
    - The quantum of the levy is not that important; what is important is that there is a levy; the existence of the levy raises awareness of reuse and recycling, regardless of its level
    - Landfill costs have been increasing due to other factors including costs of suitable land
    - Levy represents a very small component of the total costs of disposing waste to landfill
    - Costs of alternative technologies have increased as well
    - Western Australia's relatively small population and the size of the economy cannot sustain viable recycling activities; the long distances are also a limitation on effectiveness
    - Modern landfill facilities generate few externalities
    - Serious recycling is not profitable and needs to be underpinned by government
    - Is not based on accurate assessments of environmental externalities, including those of competing industries such as quarrying
    - Markets for recoverable materials work independently of levies when the prices cover the costs of recovery; for example current prices for metals are high enough to extract all metals from waste streams; there are good markets for reusable building materials
    - It would need to be $20 or $30 a tonne to divert organic wastes from landfill (putrescible wastes)
    - It would have to increase to $60 a tonne to justify investment in alternative technologies (municipal wastes and recovery of organic material)

3. It could be an effective economic instrument, but

    - It has been set too low; it should be $15/tonne; at $3 it has no effect; at $10 would create an incentive to change behaviour
    - It's impact has been eroded over time as landfill gate fees for municipal wastes have increased from around $30 a tonne to $70 a tonne; needs to keep pace with inflation and changes in landfill gate charges
    - Policy not able to accommodate economic conditions
    - As the rate is increased, need to make sure that enforcement is strengthened to address illegal dumping and ensure consistency
    - Needs to apply across the state, for rural as well as metropolitan landfills
    - On its own it is not enough – need complementary policy instruments such as bans on particular wastes to landfill or mandatory use of recycled materials, extended producer responsibility
    - Consumer perceptions about the quality or performance of recycled materials is limiting development of otherwise viable markets
    - In some sectors the wastes producers are not directly exposed to changes in the value of Levy (household sector)

Support for the Landfill Levy as an effective economic instrument was not strong. Only a couple of those interviewed mentioned the role of the Levy in internalising externalities associated with landfills. Many stakeholders mentioned that the original and primary purpose of the Landfill Levy was to generate revenue for allocation to specific programs and projects. It was not designed to change waste management behaviour. As reported by ECS (2003), the 1995 Report of the Parliamentary Select Committee on Recycling and Waste Management stated that the levy concept was developed primarily to fund a range of activities related to waste minimisation and recycling. The levy rate was determined by dividing the total amount of funds needed by the estimated tonnage to landfill.

To be an effective economic instrument the Landfill Levy needs to be set at a level much higher than current levels, with suggestions ranging from $10 to $60 a tonne. The wide range reflects the different waste types, with $10 commonly suggested as the level for inert waste and higher levels for putrescible wastes. While this indicates support for differential levies, very few stakeholders referred to differences in environmental impact between the types of waste as justification for differential rates.

To maintain its relative impact over time, the Levy should be indexed either to changes in the prices for landfill services and/or resource recovery prices, or to an appropriate price index. These comments reveal the challenge for government to set the Levy at the level that delivers the socially optimal balance between the quantity of waste to landfill and the quantity of resource recovery.

Several stakeholders suggested that the effectiveness of the Landfill Levy would be strengthened if it was one of a mix of instruments and initiatives used by government to encourage recycling and reuse. These include bans to landfill for selective materials, EPR and procurement mandates for recycled materials. For many stakeholders the effectiveness of the Landfill Levy, especially as the rates are increased, depends on the level of resources deployed to enforcement. Only

when there is effective policing to reduce illegal dumping and non-compliance with standards, will expected waste flows occur. Of concern was the apparent lack of resources for enforcement in the Department of Environment and Conservation and the subsequent lack of consistency in enforcement.

5.3 An effective economic instrument?

To date there is little evidence to indicate that the Landfill Levy has been an effective instrument for influencing waste management practices, including reducing wastes to landfill. However, it is clear that the Levy was not intended to influence behaviour, but rather it was imposed to generate sufficient revenue to fund specific programs and initiatives that were focused on encouraging resource recovery and reducing waste to landfill. This is consistent with findings of previous reviews and studies (ECS 2003 and ACIL Tasman 2006)

On balance, the effectiveness of a landfill levy is enhanced when it:

- internalises residual externalities (avoiding duplication of externalities captured in landfill gate fees, via regulations on the design and operation of landfill sites)
- is set with the knowledge of the supply of and demand for landfill and recycling services within a comprehensive analytical framework, based on knowledge and costs of alternative technologies and estimates of demand elasticities for landfill and alternative technologies for each waste producing sector (household, commercial and industrial, and building and demolition) and waste type (inert and putrescible – as disaggregated as is economically feasible)
- is one of a mix of instruments that combine in a complementary way to achieve the optimal mix of landfill and resource recovery outcomes
- is supported with the appropriate amount of enforcement to minimise illegal waste management practices
- is exposed directly to waste producers via appropriate collection and pricing methods allowing waste producers the choice between alternatives.

Interviews with stakeholders and previous reviews and research have identified a number of specific areas that are considered to be important to the successful operation of the Landfill Levy. These include:

- the feasibility of differentiating the imposition of the Landfill Levy
- the need for landfill bans to encourage alternative technologies
- extending the Levy to rural areas
- the value of a mix of policy instruments and initiatives
- distortionary impacts of the Landfill Levy.

Strengths and weaknesses of each of these are presented in the following sections.

5.3.1 A differential levy?

When the Landfill Levy was first introduced in 1998 the rate for putrescible waste was set at $3 a tonne while that for inert waste was set at $1 per cubic metre. This

differential was based on differences in the environmental impact of the different waste streams. The Western Australian Government's decision to progressively increase the Land fill Levy for both waste types involves an effective removal of the price differentiation by 2010-11.

As an effective market instrument the Landfill Levy should reflect the unique characteristics of each waste stream and its component products and should be set at a level that will influence diversion of wastes from landfill to resource recovery. From a practical administrative perspective this approach to the Levy is demanding on technical and market information especially if wastes and recoverable products are to be separately levied. However, as ECS (2003) suggested, a differential levy could be used to target a specific waste problem that required an effective and quick response.

Although the Landfill Levy will increase and converge to an equivalent rate over the next four years it will have a differential impact on the diversion of inert and putrescible wastes from landfill as a result of their different characteristics and differences in the relative costs of alternative technologies. The increase in 2006 from $3 to $6 a tonne for putrescible wastes represents a small change in overall costs of waste to landfill. At $6 the levy represents between 7% and 10% of the total landfill gate fees (which range from around $60 to $84 per tonne). Stakeholders advised that the putrescible levy would have to be increased by between $20 and $60 a tonne to divert wastes from landfill. This is complicated by the fact that households who produce waste are not directly exposed to the Levy as result of pricing and collection arrangements used by local councils. In some cases the council may absorb the levy increase especially if the change is small. One of the Regional Councils interviewed for this review indicated that it maintained reserve funds which could be used for such a purpose. It is unlikely that a Landfill Levy of $9 in 2010-11 will have much effect on resource recovery from putrescible waste streams, unless there are significant reductions in the costs of resource recovery, or changes are introduced to provide households with increased incentives to reduce waste or divert waste from landfill.

The increase in the Landfill Levy in 2006 for inert wastes from $1 a cubic metre to $3 a cubic metre was more significant. At $3 the levy represents between 22% and 33% of the total landfill gate fees (which range from $9 to $15.50 per cubic metre). Evidence from B&D recyclers indicated that the $2 increase triggered an increase in diversion of inert material from landfill. The increase in the Levy to $9 by 2010-11 will divert more wastes to recyclers. If it is too high, the amount of recycled material generated will exceed market demand and the amount of illegal dumping will increase. However, based on feedback from B&D industry operators a Landfill Levy of $10 in 2007 is unlikely to result in surplus supplies.

There was a lot of support among stakeholders interviewed for this review for maintaining a differential Landfill Levy that reflected the different environmental impacts and the relative costs of landfill and resource recovery. The stakeholders also nominated three other bases on which to base a differential:

- for residual wastes to landfill after resource recovery
- for better standards and practices of landfill operators

- for the different impact on greenhouse gas emissions

Lower Landfill Levy for residual wastes
If the Landfill Levy was reduced for the residual disposed of after resource recovery this would have the effect of reducing the cost of waste to landfill and therefore increase the flow of waste to landfill. Operators would reduce resource recovery in line with the reduced costs of landfill disposal. The key point raised by stakeholders in relation to this proposal was about recognition for recovery efforts and performance. Reducing the levy for residual wastes is not an efficient solution. In fact, increasing the Landfill Levy is a more efficient solution as this would result in higher recovery rates and lower residuals for landfill, assuming recovery services have sufficient capacity to recover more materials. Alternatively, operators who exceed industry recovery standards or targets could be acknowledged by the industry or government and recognised for their public contribution.

Lower Landfill Levy for better landfill practices
The argument underlying this proposal is similar to that for residual wastes, namely recognition for exceeding standards or performance targets. There are regulations governing the design and operation of landfills with which operators must comply. If these are not met penalties are imposed. There is not a system in place for rewarding operators who exceed the standards. This is not a failing of the Landfill Levy. Lowering the Landfill Levy is not the appropriate way to recognise the efforts of these operators. Depending on the type of waste, a lower Landfill Levy may reduce the net environmental outcome by reducing recycling and reuse activities and increasing waste to landfill. Furthermore, it will reduce the amount of levy funds generated and therefore the level of investment in better practice programs and initiatives. Better landfill practices should be recognised without distorting the Levy price signals. Industry or government awards or recognition are less distortionary.

Landfill Levy should reflect different greenhouse gas emissions impacts
The Landfill Levy should reflect the different environmental impacts of different wastes and material recovery activities. Greenhouse gas emissions are one of a number of externalities that can be considered in setting the Landfill Levy. However, in light of proposals to implement a carbon emissions trading scheme nationally, the issue of carbon and greenhouse gas emissions in relation to landfill and resource recovery should be considered within a more comprehensive climate change and greenhouse gas management policy framework. This may result in a more efficient solution from an environmental and economic perspective.

5.3.2 Landfill bans for selected wastes?

During the interviews for this review there were calls from stakeholders to ban particular wastes to landfill to ensure that sufficient volumes of material were generated to make alternative technologies viable. Particular interest was addressed to B&D wastes and green organic wastes.

The effect of a ban is to increase the cost of disposal for waste producers in the form of separation costs at the source and added costs of transport. This may lead to illegal dumping where distance to recyclers adds to transport costs. This can be

addressed with effective enforcement, although there are added costs of policing. On the positive side, environmental benefits of a ban to landfill include reduction in pollution; reduced greenhouse gas emissions; resource and energy conservation; reduced demand for virgin materials; and extended landfill capacities.

A review of the environmental, social and economic impacts of a ban on landfill conducted for the Western Australian Department of Environment by ACIL Tasman and GHD (2006) concluded that:

> landfill bans should only be imposed where:
> - it is determined that there is a demand for the materials recovered as a result of the ban; and
> - materials recovery and recycling infrastructure have sufficient capacity to manage the increased quantity of materials arising from the ban

ACIL Tasman and GHD (2006) found that B&D and organic wastes do not meet these requirements, as local demand is unlikely to absorb the increased quantity of materials arising from the ban. For B&D wastes, while recycling capacity may be adequate, demand would have to be stimulated by imposition of a minimum content recycled materials policy in the construction industry. However, of greater concern is the finding that in the short-term the costs of disposal to builders of a ban would increase by 46%. The incentive for illegal dumping would be high and the environmental consequences would be costly.

For organic wastes, ACIL Tasman GHD (2006) concluded that current capacity would be insufficient to handle the projected increased supplies and that the investment required would add considerably to the costs of recovery. They estimated that for households, rates would be at least doubled to cover the additional costs of collection and recovery facilities.

A ban on landfill is a rather inflexible and potentially costly instrument compared to alternative instruments. ACIL Tasman and GHD (2006) recommended a number of alternative courses of action for the Department including working with local governments to improve waste collection services and recycling infrastructure and focussing more effort on the sources of waste to reduce waste and increase recycling rates.

5.3.3 A State-wide Levy?

The Landfill Levy applies to wastes received at licensed landfill sites within the Perth metropolitan area or collected within the metropolitan area and disposed of at licensed landfills outside the metropolitan area. Extending the Levy to wastes generated and disposed off at non-metropolitan landfills may make sense from a general equity perspective, but from a capacity-to-pay perspective the impost of the Levy may be highly inequitable. Rural and regional centres are at a disadvantage in terms of financial and human resources, waste volumes, distance to markets for recovered and recycled materials and capacity to comply. Enforcement of Landfill site standards would be a sensible step to take before imposing the Landfill Levy, followed by programs to encourage reduction, reuse and recycling. There may be a case for imposing the Landfill Levy in larger regional centres, although this should be approached strategically in the context of

waste management objectives, past and current waste management performance and consideration of a number of possible measures and instruments for improving performance, including the Landfill Levy. Differential levy rates operate in New South Wales for the Sydney metropolitan area, the extended regulated area and the rest of the state. The extended regulated area encompasses local government adjacent to the Sydney metropolitan area.

One feature of the Landfill Levy is that non-metropolitan councils have benefited from the Levy Funds through rebates and specific programs aimed at increasing resource recovery and reducing waste to landfill. This should continue through Levy funded programs. The stakeholders interviewed for this review were supportive of distribution of Levy funds outside of the metropolitan area.

Non-metropolitan landfill sites located close to the metropolitan area will require increased compliance monitoring and enforcement as the Landfill Levy increases.

5.3.4 A mix of policy instruments and initiatives

A number of stakeholders interviewed suggested that the Landfill Levy on its own was not effective. Various instruments and initiatives were suggested to complement the Levy, some of which have been considered already, such as a ban on waste to landfill. Others include:

- Extended Producer Responsibility (EPR)
- Product Stewardship
- Recycled materials content policy (voluntary or mandatory)
- Variable disposal fee systems (*pay as you throw - PAYT*) for households
- Container deposit systems (CDS)

The legislative environment in Western Australia for EPR, product stewardship and CDS is conducive to the establishment of these programs. In 2005 the Western Australia Government released the 'Extended Producer Responsibility Policy Statement' which outlined the government's intention to establish voluntary mandatory EPR schemes. The Environmental Defender's Office (2007) reported that the government has not initiated any mandatory EPR schemes, however some are being considered through the Waste Avoidance and Resource Recovery (WARR) 2006 Bill[2]. Also, there are prospects of a container deposit system being implemented.

Evidence from stakeholders indicated that at least one local government council has committed to using a portion of crushed concrete in road base specifications. Perceptions regarding the relative performance of recycled materials need to be addressed through education, including participative action research involving construction companies, relevant State and local government agencies and researchers. This type of research should be supported by the Levy funds as it has the potential to increase demand for recycled materials.

[2] For details on the WARR 2006 Bill see Appendix 2.

A significant limitation to effective household waste management in Western Australia is that householders are not directly exposed to landfill charges and they have limited choice in waste management practices. Householders receive weak price signals on the costs of waste disposal. Their marginal private cost of waste disposal is effectively zero, while the marginal social cost is positive. This pricing system provides no incentive to reduce, reuse or recycle. A variable pricing scheme reflecting waste disposal costs where households pay by unit such as weight or volume for individual waste collections is more effective in reducing waste to landfill than arrangements where landfill fees including the Levy are a component of annual rates. A couple of councils in the Perth metropolitan area provide households with a choice of collection bin size at different prices. This is the simplest form of a PAYT system and has been adopted by a number of local governments in Australia (Productivity Commission 2006). On the downside to more sophisticated weight-based or volume-based pricing systems are the high administrative costs which may outweigh the additional benefits of PAYT. However, as technology advances these costs will fall. For example, micro-chips can be fitted to bins which allow the weight of rubbish to be recorded as it is collected.

Instruments and initiatives that increase the responsibility for waste management at the source should be encouraged in association with a Landfill Levy that is set in accordance with the externalities associated with a particular waste stream and the relative costs of disposal and recovery.

5.3.5 Distortionary impacts of the Landfill Levy

A landfill levy is a deliberate intervention in the market to achieve more socially acceptable outcomes in terms of waste disposal than the free market will provide. Interventions may result in unintended or unanticipated outcomes that may not be socially optimal. These emerge when the levy is changed.

One situation brought to the review's attention is that of using B&D waste to recover, rehabilitate and reuse sand and limestone quarry sites within the Perth metropolitan area. This activity includes recovering exhausted sites and sequential backfilling in working quarries. According to relevant legislation this activity is classed and licensed as landfill and therefore disposals to these sites attract the levy. As the levy increases it becomes more difficult to compete with recyclers where disposals are not levied. The economics of land recovery may be jeopardised.

If land recovery and rehabilitation activities using B&D waste were reclassified as recycling or reuse, the operators of such activities would not be penalised by levy increases. Furthermore, their continuing availability would assist in reducing illegal dumping as the levy increases. Additional benefits from diverting B&D wastes to recover and rehabilitate quarries include lower energy use and greenhouse emissions per tonne of material deposited compared to B&D recycling where material must be crushed before it can be reused and where there is more handling of the material.

The levy can be differentially imposed on different cases and classes. The framework for setting the Landfill Levy should provide an opportunity for stakeholders to demonstrate to the Waste Management Board circumstances where levy changes disadvantage environmentally and economically sound activities.

6. A framework for setting the Landfill Levy

A framework to guide the Waste Management Board in preparing its advice to the Minister for the Environment on the Landfill Levy should:

- align the Landfill Levy with the goals and principles of environmental policy in Western Australia, including the *State Sustainability Strategy* and the *Towards Zero Waste* vision
- accommodate the purpose of the Landfill Levy
- be comprehensive, based on an integrated approach
- be transparent and open

The essential characteristics of an effective economic instrument for influencing waste management decisions were listed in the section 5.3. These define some of the critical aspects of the framework for setting the Landfill Levy over the medium to longer term.

6.1 Landfill Levy aligned with environmental policy goals and principles

The State Sustainability Strategy embodies a set of principles to guide the thinking and actions of government, industry and communities in relation to resource management (Government of Western Australia 2003). One of the seven foundation principles is *settlement efficiency and quality of life*. It states that:

> Sustainability recognises that settlements need to reduce their ecological footprint (i.e. less material and energy demands and reduction in wastes), while they simultaneously improve their quality of life (health, housing, employment, community,..)

The Sustainability Strategy refers to development of waste avoidance initiatives, the role of the State Government in stimulating the development of markets for recycled materials through its own purchasing requirements (Sustainability Procurement Policy) and new policy initiatives such as EPR especially in relation to influencing action on waste management at the source for both producers and consumers.

The Western Australian government's *towards zero waste* vision is a state-wide policy which directly affects local government waste management practices. It is an integral component of the Sustainability Strategy in relation to settlement efficiency and quality of life. Underpinning the zero waste strategy is the waste management hierarchy: reduce – reuse – recycle – secondary reprocessing – recover energy – disposal. The zero waste principles are to avoid the creation of

waste (prevention), to efficiently recover, re-treat and reuse all wastes and to responsible manage wastes into the environment.

These policy drivers provide the strategic context for the Landfill Levy, which is one of a number of policy instruments and government initiatives and programs directed at sustainable resource management in Western Australia. By deliberately incorporating the policy context in the framework changes to the Levy will be consistent with the goals and principles of environmental and waste management policy in Western Australia.

The policy context is critical, but other contextual influences need to be considered as well including the economy, social factors, technology and broader changes in the natural environment and its management. These factors are considered further in section 6.5.1.

6.2 Purpose of the Landfill Levy

Critical to the framework is the purpose of the Landfill Levy. The Levy has two purposes which can be described as:

1. to increase the relative price of landfill and make recycling more cost-competitive
2. to provide resources for the State Government to strategically invest in recycling initiatives

For most of the time since it was introduced the focus has been on the second purpose. In the second reading speech to the Assembly on the *Environmental Protection (Landfill Levy) Bill* in 1997, the Minister for the Environment stated that 'the introduction of a levy on waste to urban landfill was proposed to provide the necessary funding for waste management and recycling programs'. The explanatory notes for the *WARR Bill 2006* state that: 'the primary rationale for the landfill levy is to provide funds for supporting the relevant strategic activities; specifically, implementation of the *Strategic Direction*, and the administration costs directly associated with its implementation'. The majority of stakeholders interviewed for this review supported this purpose of the Levy.

In announcing an increase in the Landfill Levy in May 2006, the Minister for Environment said that the original rates of the Landfill Levy did 'not reflect the true cost of waste for the community' (Government of Western Australia 2006). He said that the increase in the Levy is to 'improve the waste management and recycling programs already in place'. The Minister also noted the use of Landfill Levy funds for programs to improve waste management and recycling. These comments are consistent with arguments advanced by the Waste Management Board when it proposed the increase in the Landfill Levy (Waste Management Board 2005). The Board advocated that the Landfill Levy be increased so that:

- landfill prices reflect the full environmental cost of landfilling
- increased landfill pricing acts to reduce our reliance on landfill and encourage resource recovery and waste avoidance
- sufficient funds are available to resource the programs required to achieve the State's Zero Waste vision

The Minister's decision in 2006 to increase the Landfill Levy and the rationale underpinning the increase marks a change in approach to the Landfill Levy by the Government and the WMB, with greater emphasis placed on its purpose in capturing externalities and influencing waste management behaviour directly. This change needs to be communicated to stakeholders.

The framework for setting the Landfill Levy must accommodate both purposes. A decision to increase the Landfill Levy should not be considered in isolation of the likely impacts of the increase on the flow of waste to landfill. The two must be considered simultaneously. This requires a comprehensive modelling framework in contrast to the approach used in the past where the Levy rate was set by dividing the desired level of funds required for waste management programs by expected level of waste disposals. A more comprehensive framework can incorporate the dynamics of supply and demand and provide a mechanism for simulating the effects of changes in the levy.

A consequence of this change is the need to raise awareness and understanding of the changed focus and the implications for stakeholders. This would be a key component of a communication strategy on the Landfill Levy framework.

6.3 A comprehensive framework

At the core of the Landfill Levy framework is a comprehensive quantitative model that can measure simultaneously the responsiveness of demand for landfill and demand for alternative technologies to changes in the Landfill Levy for the three waste producing sectors. The model would include formulations of landfill supply curves for inert and putrescible wastes and supply curves for materials recovery or recycling services associated with each waste type. Supply curves can be derived from actual costs of operators providing landfill services and providers of recovery and recycling services. Demand curves for landfill in each waste producing sector can be estimated from empirical cross-sectional and/or time series data. Choe and Fraser (1998) and Bartelings et al (2005) provide extensive reviews of the literature on the economics of waste management and landfill taxes. A study of policy instruments by BDA Group and Econsearch (2004) for the South Australian government describes a model of the supply and demand for waste disposal with landfill and recycling options. It could be adapted for Western Australia.

If the Landfill Levy is to reflect the full environmental costs of landfill then estimates of these external costs will have to be made and incorporated into the model. However, the extent to which they are captured through regulations and landfill gate fees will have to be determined to avoid duplication. This will provide the basis for determining the socially optimal level of waste to landfill.

A model cannot provide the answer. It is a component of the framework with a particular role to play. Models are imperfect and unable to capture every variable. For example, the model described above does not specifically allow for any illegal dumping, assuming that the reduction in waste to landfill associated with an increase in the levy is diverted to recycling and that there is an appropriate level of enforcement. However, an estimate of the level of illegal dumping could be

imposed exogenously on the model. The model is used as a guide to indicate the level of demand response and the likely level of revenue generated by the Levy.

Model assumptions and results of levy simulations can be discussed with key stakeholders to gauge their response to possible changes in the levy. Further simulations can be run incorporating variations to assumptions suggested by stakeholders.

6.4 A transparent and open framework

In the course of this review many stakeholders indicated a need for greater openness in relation to decisions about setting the Landfill Levy and related processes. Their biggest concern was uncertainty. For example, one landfill operator warned that if the Levy is increased too far, too fast the outcome could be a single technological solution, at the expense of current investments and investment plans. Another wanted to know where the levy was heading, given the level of landfill levies in the eastern States of Australia, which are much higher.

It is important that the framework include the opportunity for dialogue with stakeholders including landfill operators, recyclers and waste generators. These would be formal sessions between DEC staff and representatives of each stakeholder group to gauge responses to possible changes in the Landfill Levy. The rationale behind the proposed Levy change would be explained by DEC staff and estimated impacts on waste flows to landfill and recovery indicated. Levy revenue levels would also be discussed in the context of strategic directions and needs. The dialogue with stakeholders would include consideration of the timing of changes to the Levy.

On the basis of feedback received from stakeholder dialogue sessions the Waste Management Board would make its recommendations to the Minister for changes to the Landfill Levy.

6.5 Landfill Levy funds for waste management programs

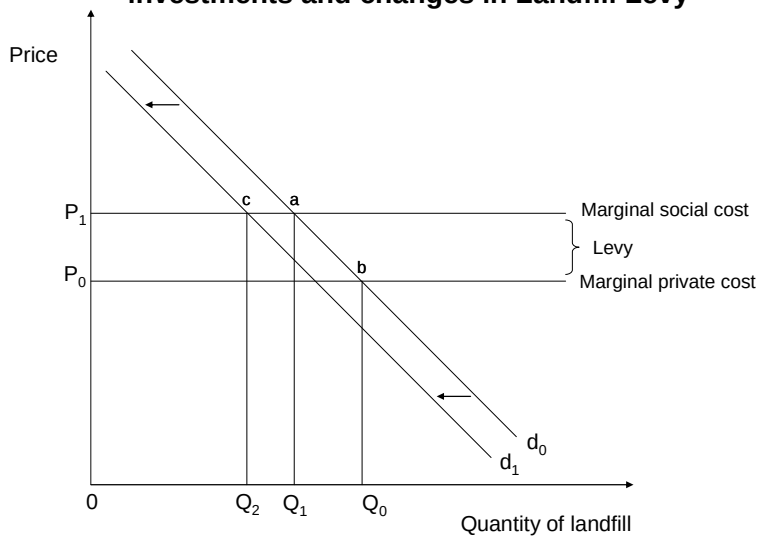
Should the requirement for desired amount of Levy funds be the driver of the Levy rate or should it be driven? In the past it has been the primary driver, but looking to the future, more emphasis will be placed on the role of the levy in changing waste management practices. Hypothecation for specific projects and programs has attracted more interest by stakeholders than the role of the levy in influencing the flow of waste to landfill. There are historical reasons for this including the use of rebates. The Levy framework should consider the two purposes equally, as noted in section 6.2. As the levy is increased it will affect the behaviour of waste generators with the prospect of declining levy funds being an outcome. Options and impacts can be explored through the Landfill Levy framework.

The Landfill Levy generates levy funds for allocation to projects, programs and initiatives. A consequence of the ongoing investment of levy funds in programs and projects to facilitate material recovery and recycling is that the demand for landfill declines. This is represented in Figure 7 by the shift in the demand curve from d_0 originally to d_1 reflecting the impact of levy fund investments. If the levy was set at P_1 without considering the decline in demand, the expected level of

landfill would be Q_1. However, accounting for the reduction in demand, a more likely level of landfill is Q_2. The level of revenue generated at this level of landfill is less as well.

The elasticity of demand for landfill is critical to this assessment. In fact, the investment of levy funds to encourage waste reduction, recycling and reuse for household and C&I wastes which have fairly inelastic demands for landfill may have more affect on waste flows to landfill (by reducing demand) than increasing the levy, until the levy reaches the price where diversions are triggered. The comprehensive quantitative model within the Landfill Levy framework can represent this situation.

Figure 7: Combined impact on demand for landfill of levy fund investments and changes in Landfill Levy



In the course of the review stakeholders offered many suggestions regarding suitable processes for directing where funds should go and suggestions as to the type of activities for which levy funds should be used. There was strong support for a participative process to identify strategic priorities (priority wastes, priority needs, priority areas). This was amid concerns that there was not a clear forward plan to link the levy and future needs or a particular strategy linked to expenditure of levy funds.

6.5.1 Strategic priorities and strategic planning

Priority setting is necessary when demands for funds exceed the supply of funds. Landfill levy funds are limited and are likely to decline over the coming years. When deciding how to allocate funds, a medium to long term perspective is appropriate. That can be provided by the organisation's strategic goals and the strategies to achieve those goals (strategic plan).

Priority setting is an important component of planning and often comes towards the final stages of the planning process, after directions and key strategies have been defined. Priority setting is not planning. Priorities are set in the context of an organisation's strategic plan and strategic directions. Planning responds to the

needs, opportunities and challenges of the organisation's target audience. Priority setting defines the focus of your business portfolio in line with higher level goals and strategies. In some cases these goals may already exist, although in many cases they are derived from an assessment of key opportunities and challenges in the external environment. Planning is a continuous process. The relevance of goals and strategies has to be regularly monitored to ensure that they are still relevant to the needs of the target audience. Priority setting is a more episodic process, occurring at regular intervals. However, it is good practice to review priorities each year to ensure that the project investments are still relevant to the needs of the user community.

Many of the stakeholders that were interviewed for this review mentioned the importance of planning within a strategic context where the influences of policy, technology, society, the economy and the natural environment are accounted. The importance of context was addressed in relation to the Landfill Levy framework and changes to the Levy (section 6.1). The broad context for setting the Levy and for defining strategic directions and priorities for waste management in Western Australia could be provided by the Waste Management Board's strategic plan.

A participative planning process involving representatives from various stakeholder groups sharing perspectives on current and future opportunities and threats is an effective way of setting a direction that is owned by stakeholders. One approach that can be effectively used for waste management is that of scenario planning. It would be effective for waste management because there are divergent views and a diverse stakeholder community, investment time frames are long and there is a high degree of uncertainty. Stakeholders can use the scenarios to develop and test their individual strategies. The shared part is the agreed perspectives of the future. Scenario planning is a tool for exploring sustainability futures.[3]

To set priorities appropriate criteria are needed. A number of stakeholders mentioned the importance of focussing on priority areas where a return can be generated, emphasising public benefit. Criteria that assess impact and capacity have been found to be effective in discriminating between competing proposals for funds, based on experience in research priority setting. The overall focus is the economic, social and environmental return to society from investment in a project or area of opportunity. The return is higher, the higher the impact and the higher the capacity. Impact is a measure of the economic, social and environmental benefits associated with advances due to successful implementation of the project, considering the ability of potential users to adopt the advances. Capacity is a measure of the project proponents' skills, experience, facilities and networks to deliver the advances within budget and on time. Priorities can be assessed using simple scoring procedures. Critical to the assessment is involvement of the right people. Priorities can be set at many levels. High level strategic priority areas can be defined and individual projects can be prioritised.

[3] For an introduction to scenario planning see: Blyth (2005).

6.5.2 Appropriate use of levy funds

Many stakeholders interviewed for the review expressed a view on appropriate and inappropriate areas for expending levy funds. These are presented in Table 1.

Table 1: Assessment of possible uses of levy funds

Focus area	Appropriate	Inappropriate
Infrastructure establishment	• Where many organisations can benefit	• Where benefits are appropriated by one organisation
Transport subsidies		• Unsustainable and distortionary • Benefits to a few • High opportunity cost
Market development; demonstration of market potential	• Facilitate investment in recovery facilities	• Where benefits to a single operator
Development of business cases	• Valuable market intelligence shared widely	• Where intelligence not disseminated to all potential investors
Administration and support	• Support for DEC capped at x% of the Fund or a fixed number of staff	• If allocated to activities that DEC would do otherwise undertake
Priority wastes	• Agreed through participative priority setting process	• Set by top down procedure
Start-up capital	• Where it is repaid with interest and no other source of finance available	• Direct subsidy to a single business • Alternative sources available
Establish contingency of waste precincts	• Overcome high transaction costs for council, but high opportunity cost	• High cost – explore other avenues
Non-metropolitan council areas	• Equity; assist with sharing best practices	
Training and knowledge dissemination	• A key component of all levy funded projects • Assisted and supported through partnerships with WALGA	• If access is exclusive
Meaningful application of best practices	• Facilitate sharing among landfill operators and recyclers	• When some players unwilling to participate
Improving market acceptance of recycled material	• Education and awareness raising programs	
Development of standards for recycled material	• Available to all operators	
Strengthen other policy instruments, such as EPR	• If helps achieve strategic goals	• Opportunity costs – DEC may have adequate funding

The list in Table 1 is not exhaustive but is illustrative of the range of areas to which levy funds could be allocated and have been allocated in the past. In most

cases for and against comments were received. In some cases it is difficult to justify an alternative argument. For example, transport subsidies to improve competitiveness cannot be justified.

6.5.3 Delivering impact

A number of comments were received during interviews with stakeholders regarding the impact of past levy investments, such as:

- 'we are not aware of achievements and outcomes achieved from previous levy funding' and
- 'to date there haven't been any great success stories from expenditure of levy funds, which makes it hard to sell increases in the levy'.

This suggests that dissemination and communication of the results of past projects has been poor. This can be strengthened in a number of ways, including

1. require all funding proposals to include a knowledge dissemination strategy and associated budget
2. commission evaluations of the economic, environmental and social impacts of a selection of completed projects and publicise the information to the industry and the wider community
3. facilitate the sharing of project results through training and sponsored industry forums/demonstration at the site where the project was funded
4. support investment in a small number of large multi-partner action learning projects
5. appoint knowledge brokers to facilitate information exchange across the industry

These are actions that the WMB in association with DEC can address.

Accountability was raised by a number of interviewees. It is important the Board inform stakeholders of where and how funds have been allocated and of the outputs and outcomes that have been generated.

At the individual project level accountability could be strengthened by implementing payment for performance such as achievement of agreed milestones or other suitable performance indicators identified in the approved project plan.

6.6 Administrative efficiency and effectiveness

Many stakeholders interviewed for the review referred to the need to separate of the regulatory and strategy roles of the WMB and the DEC. The WARR Bill 1996 (Appendix 1) is expected to help with this, but other changes may be necessary to confirm the independence of the Board and its functions in policy and strategy development. These included locating it in another department. Stakeholders would like the Board and its supporting staff to focus its resources on strategy rather than policing and enforcement.

Comments were also made on the portion of levy funds directed to the DEC to support the functions of the Board. There were concerns expressed that levy funds were being used for functions that should be funded directly by DEC. There is a

perception that a large share of the levy is going to administrative and support functions. This needs to be clarified.

The skills set within the DEC needs to complement changes in the management of the Landfill Levy as may be required by adoption of the Landfill Levy framework as described in this report. During the review, there were calls for more economists and behavioural scientists to contribute to advice provided to the Board, irrespective of any changes. It was commented that there were too few senior staff in DEC working on waste management.

In relation to assessment of proposals for funding under programs such as the Strategic Waste Initiative Scheme (SWIS) there is a need for independent assessment to ensure that appropriate technical evaluation is applied to the feasibility of the proposal and the likelihood of achieving expected benefits.

References

ACIL Tasman 2006. *Landfill Levy. An assessment of the impact of increasing the Landfill Levy*. 27 January.

ACIL Tasman and GHD 2006. *Landfill ban. An investigation into the environmental, social and economic impacts of a potential ban on disposal of household recyclable packaging, recyclable building products and organic waste to landfill.* Report to the Department of Environment, 26 October.

Bartelings, H., van Beukering, P., Kuik, O., Linderhof, V. and Oosterhuis, F 2005. *Effectiveness of Landfill Taxation*, Institute for Environmental Studies, Ansterdam, November.

BDA Group and Econsearch 2004. *Analysis of levies and financial instruments in relation to waste management.* Report prepared for Zero waste SA. 24 October.

Blyth, Michael 2005. Learning from the future through scenario planning, Four Scenes, cited at http://www.fourscenes.com.au/LearningFromScenarios0305.pdf, on 24 October 2007.

Cardno BSD 2007. Review of Total Recycling Activity in Western Australia 2005/06. Report prepared for the Department of Environment and Conservation, June.

Choe, Chongwoo and Fraser, Iain 1998. 'The economics of household waste management: a review', *The Australian Journal of Agricultural and Resource Economics*, 42:3, pp.269-302.

Department of Environment and Conservation 2007. Landfill Data, personal communication 19 October 2007.

Economics Consulting Service 2003. *Landfill Levy Study*. Report to the Waste Management Board, February.

Environmental Defender's Office 2007. *Waste management in Western Australia: current law and practice and recommendations for reform*. August.

Government of Western Australia 2003. *Hope for the Future: The Western Australian State Sustainable Strategy*, Department of Premier and Cabinet, Perth, September.

Government of Western Australia 2005. *Extended Producer Responsibility Policy Statement* 29 June.

Government of Western Australia 2006. *Waste levy increase to improve recycling*. Media statement by the Minister for the Environment, Mark McGowan MLA, 20 May.

Environmental Protection Authority 2007. *State of the Environment Report: Western Australia. Government of Western Australia*, cited at http://www.soe.wa.gov.au/home.html, on 22 October 2007.

Productivity Commission 2006. Waste Management, Report no. 38. Canberra.

Waste Management Board of Western Australia. 2004. *Waste Management and Recycling Fund. Final recommendations for the Statutory Review of the Fund*, September.

Waste Management Board of Western Australian 2005. *Resourcing the Zero Waste Vision. A discussion paper on the Landfill Levy and the programs it funds*. December.

Waste Management Board of Western Australia 2006. *Waste Management and Recycling Fund Audit of Completed Projects Funded under the Grant Schemes*, version 2 report No. 2002/43, prepared by ATA.

Appendix 1: Landfill Levy Review –Stakeholder interviews

Interviews were conducted with the following stakeholders between Monday 8 to Wednesday 10 October in the Perth CBD. Stakeholders are listed in the order of interview.

1 - Waste Management Association of Australia (WA)

Representative – Mr Marcus Geisler (President- WA)

The WMAA mission is to provide a peak national forum to foster the necessary structural and cultural changes within its membership that will enable the waste management industry to respond to the demands for integrated resource management services.

In addition to being WA President, Mr Geisler is currently the General Manager - Western Region for Thiess Services Pty Ltd and was previously with Sita Environmental Solutions as state manager. He has been actively involved in developing commercial businesses centred around waste management and recycling, both in Australia and the Netherlands, for over 20 years.

2 – Department of Environment and Conservation

Representatives – Mr Michael Kerr and Mr Tony Beeson
Mr Kerr is the manager of the Waste Management Branch within the DEC. The branch is responsible for providing administrative support to the Waste Management Board. Mr Beeson is the manager of funded programs within the Waste Management Branch and has been in charge of administering the landfill levy and the programs funded from it since the introduction of the levy in 1998.

3 – Chamber of Commerce and Industry (WA)

Representatives – Mr Cameron Schuster and Ms Brenna Pavey
The Chamber's role is to serve its members by providing quality cost-effective support and services to help members build their business and to lobby government to promote an economic and legislative environment that encourages the development of responsible private enterprise.

Mr Schuster is a former director with the then Department of Environment with responsibility in the area when the levy was introduced. Currently he is chair of the Chamber's environment committee. Ms Pavey is the Senior Environmental Adviser at the Chamber and executive officer to the environment committee.

4 – Waste Reformation in Western Australia
Representative – Mr Ian Watkins

The Waste Reformation in Western Australia group has formed relatively recently to promote the views of those operators in the waste industry that are required to collect and pay the landfill levy.

Mr Watkins is the executive officer to the Waste Reformation in Western Australia group. Mr Watkins is also a specialist landfill consultant and works in a part time capacity with the Mindarie Regional Council on landfill related issues.

5 – WA Local Government Association
Representatives – Ms Rebecca Brown and Ms Megan Graham
The WA Local Government Association is the voice of local government in WA. As the peak industry body WALGA advocates on behalf of the State's 142 local governments and negotiates service agreements for the sector.

Ms Brown is the executive officer to the Municipal Waste Advisory Council which has delegated authority on waste issues and includes regional councils as members. Ms Graham is the policy coordinator for the Council.

6 – Southern Metropolitan Regional Council (SMRC)
Representative – Mr Stuart McAll

The SMRC is a regional local government council responsible for developing environmentally sustainable waste management solutions and climate change abatement measures for the communities of Canning, Cockburn, East Fremantle, Fremantle, Kwinana, Melville and Rockingham.

Mr McAll is the CEO of the Council and has been employed in local government for over ten years. The Council is responsible for about a third of the metropolitan population and operates a resource recovery facility for five of its seven members, services 380,000 residents. It currently processes over 285,000 tonnes per year with an approximate diversion from landfill of 70%.

7 – Veolia Environmental Services
Representatives – Mr Peter Grassi and Mr Bruce Bowman

Veolia specialises in providing integrated waste and resource management services within a broader umbrella of essential service provision. Veolia's business has an approximate turnover in WA of $100m. Waste services make up about $20m of their business with about $2m being associated with inert recycling.

Mr Grassi is the Group General Manager, WA for Veolia Environmental Services. Mr Bowman is the executive officer to the C&D Working Group in WA and is an engineering consultant providing advice to a number of waste management operators in WA.

8 – C&D Recycling Company
Representatives – Mr Adrian Lester (by phone) and Mr Bruce Bowman

C&D Recycling is one of four major inert recyclers in WA and can recycle all types of construction and demolition waste including concrete, bitumen and sand and sell clean fill, aggregate and road base as products.

Mr Lester is a director of C&D Recycling and also chair of the WA C&D working group (WMAA).

9 – Conservation Council of WA (CCWA)

Representatives – Ms Sue Graham Taylor and Mr Chris Tallentire

Established in 1967, CCWA is the State's peak non-government, non-profit conservation organisation. An umbrella organisation for almost 80 affiliated conservation-focused groups throughout WA, the CCWA advocates for a sustainable society in WA, has long pushed for the protection of the State's wildlife and natural areas.

CCWA campaigns on a range of environmental issues including protection of our biodiversity, land clearing, water policy, wetlands, salinity, feral pests, sustainable fisheries, forests and marine protection.

Ms Graham Taylor is the President of the Council and has been an active participant in waste processes in the state. She is a past member of the Waste Management Board and has been involved with the Pollution Action Network for many years. Mr Tallentire is the Director of the Council and has responsibility for servicing the needs of the range of groups that make up the Council.

10 – Eclipse Resources

Representatives – Mr Trevor Delroy and Mr Rob Sippe

Eclipse Resources is primarily a land development company that has been involved in extractive industry and resource recovery operations since 1994. It currently operates two sites that receive inert waste.

Mr Delroy is a director of Eclipse Resources and Mr Sippe is the Managing Director. Until mid 2007 Mr Sippe was the Director, Strategic Policy with the DEC.

11 – Custom Composts

Representatives – Mr Andy Gulliver and Mr David Cullen

Custom Composts produces mainly organic certified composts and mulches for the farming sector. The company’s product comes from agricultural wastes and green organics from local governments. The company has extensive experience in composting putrescible material from food wastes to animal carcases.

Mr Gullier and Mr Cullen are joint owners of Custom Composts and have been widely recognised in the industry for their pursuit of excellence in producing quality composts. Custom Composts has won numerous awards in Western Australia.

12 – Minister's Office

Representative – Mr Piers Verstegen

Mr Verstegen is the principal policy advisor on environmental matters to Minister David Templeman. Mr Verstegen has worked for the state government and Minister's office on environment and waste related matters for several years.

13 – Eastern Metropolitan Regional Council (EMRC)

Representatives – Mr Gavin Watters and Mr Brian Jones

The EMRC's vision is to be a responsive and innovative leader in assisting Perth's Eastern Region to be a great place to live, work, play and do business. The EMRC, by partnering with member Councils and other stakeholders, facilitates strategies and provides services for the benefit and sustainability of the region. The EMRC operates the Redhill landfill facility which takes approximately one third of the metropolitan putrescible waste stream.

Mr Watters is the CEO of the EMRC and holds qualifications in civil engineering and business. Mr Watters was a member of the Waste Management Board until late 2006. Mr Jones is the retiring Executive Manager, Waste Management Services and holds engineering and business qualifications.

Appendix 2: Policy changes

The Waste Avoidance and Resource Recovery Bill 2006 (WARR Bill)

The Waste Avoidance and Resource Recovery Bill 2006 (WARR Bill) strengthens the State's commitment to sustainability and progress towards a waste-free society. The objectives of the Bill are to:

1. promote the most efficient use of resources and reduce environmental harm in accordance with the principles of ecologically sustainable development
2. consider resource management options against the following hierarchy:
   a. avoidance of unnecessary resource consumption
   b. resource recovery (including reuse, reprocessing, recycling and energy recovery)
   c. disposal

The Waste Avoidance and Resource Recovery Levy Bill 2006

The Waste Avoidance and Resource Recovery Levy Bill 2006 provides that the Governor, on the recommendation of the Waste Authority (as proposed in the WARR Bill, replacing the Waste Management Board) make regulations under the Waste Avoidance and Resource Recovery Act 2006 prescribing an amount by way of levy that is to be payable in respect of waste received at licensed premises.

The Bill indicates that regulations may:

a. provide that the amount by way of the levy is the payable in all cases, in all cases subject to specified exceptions or in any specified case or class of case; and
b. prescribe different amounts by way of levy that are payable in respect of different cases or class of case; and
c. provide for the levy to be calculated on such basis, and in accordance with such factors, as are specified; and
d. provide for reimbursement of administrative costs incurred by the person, organisation or licensee, collecting the levy.