Report for

National Packaging Covenant Jurisdictional Working Group

National Packaging Covenant Complementary Economic Mechanisms Investigation

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EXECUTIVE SUMMARY

The National Packaging Covenant was established in 1999 as a broad based agreement to reduce environmental degradation resulting from the disposal of used packaging material. In 2005, the Environment Protection Heritage Council (EPHC) resolved to strengthen the Covenant by specifying performance targets, including an overall target recycling rate of 65% by 2010. The Council also resolved to investigate economic mechanisms that could complement the Covenant to help achieve its stated goals.

A Jurisdictional Working Group nominated by EPHC commissioned McLennan Magasanik Associates, in association with BDA Group, to identify, investigate and evaluate economic mechanisms that would be complementary to the Covenant and assist in filling the gap between current recycling performance and the 2010 targets (the 'recycling gap'), reducing packaging waste disposed to landfill, and increasing recycling for packaging materials either not currently recycled or recycled at very low rates.

The Covenant's 65% packaging recycling target by 2010 is the main focus of the study, because if this target is achieved, it is likely that the target relating to disposal of packaging to landfill will also be met. The critical materials for achieving the 65% recycling target are paper/cardboard and glass, as these two materials represent over 80% of packaging material consumption.

The consultancy team considered a range of possible economic mechanisms that could be used to promote the recycling of packaging in Australia, including price and quantity-based mechanisms and examined experiences from applying economic mechanisms to manage packaging waste both in Australia and overseas. Key price mechanisms include advance disposal fees, deposit-refund schemes, variable waste charges for collection and disposal, and landfill levies. The main quantity-based mechanisms are tradable rights schemes such as landfill quota schemes and tradable recycling certificate schemes. The potential mechanisms were assessed according to four broad criteria: effectiveness in increasing recycling, efficiency, administrative simplicity and equity.

A number of issues specific to the context of the National Packaging Covenant were also explored including complementarity with the Covenant; certainty to meet the recycling gap; potential for performance linkages and product design incentives; engagement of supply chain stakeholders; potential to focus on target materials; potential to address key barriers to recycling; data and timing.

The consultancy team prepared an issues paper in August 2007 for discussion with key stakeholders. The paper listed six potential mechanisms and feedback was sought from stakeholders on which mechanisms have the most merit to contribute to bridging the

recycling gap. The consultancy team also had the benefit of a peer review by Perchards Consultants in the United Kingdom, providing valuable feedback from a European perspective on experiences with economic mechanisms applied to packaging waste as well as providing valuable feedback on study approach and implications.

Based on the assessment and feedback from stakeholders, a short list of the most promising mechanisms was developed including:

- performance-based advance disposal fee (ADF)
- subsidy program using competitive tender
- recycling certificate scheme
- combined ADF and subsidy program using competitive tender.

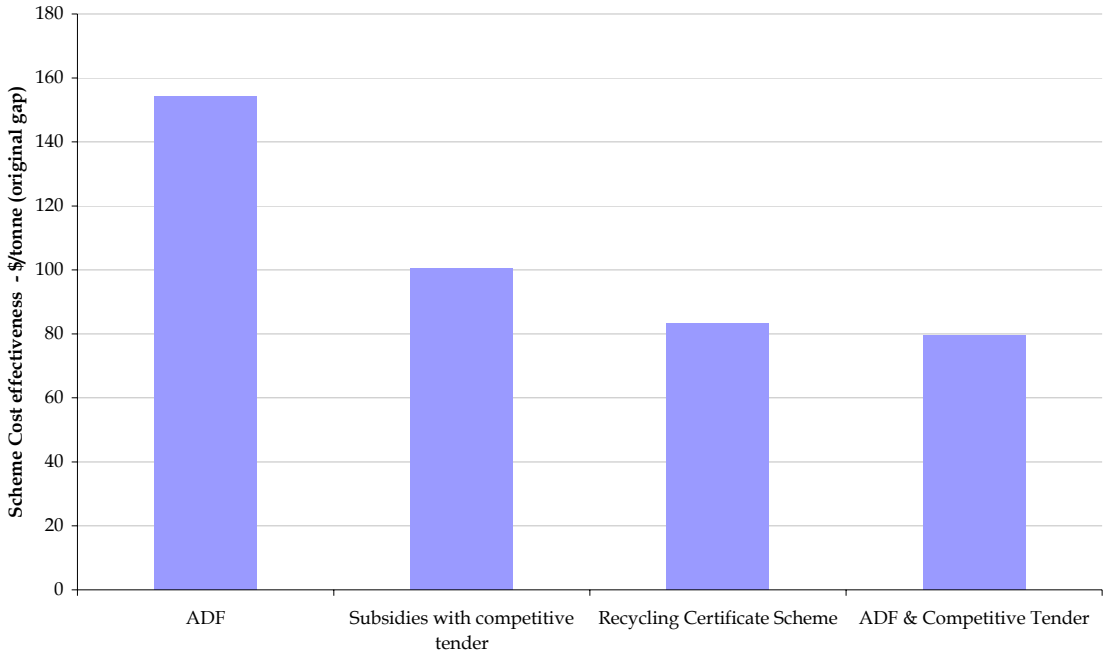
The two key mechanisms culled in the assessment process were variable user charges for waste disposal and deposit-refund schemes. There was general agreement from stakeholders that variable user charges will have limited effectiveness for addressing packaging waste as they are too indirect. There was a range of views on the potential for deposit-refund schemes. Notably, however, such schemes would be limited to increasing the recovery of containers. While they may have merit for increasing glass collection, another mechanism would be required for the other target material (paper). As there would be high administrative costs involved in operating a number of different mechanisms, and given equivocal information on the cost-effectiveness of deposit-refund schemes, they were excluded from the short list.

A quantitative analysis of the four mechanisms listed above was developed to examine their relative merits. The analysis is illustrative only and assumes no progress towards the targets in the absence of the economic mechanisms. The estimated costs of options therefore do not represent forecasts of likely costs in achieving the recycling target. Rather, the analysis has been developed to inform option selection only and more precise cost estimates would be developed during detailed design of any individual mechanism.

The administrative costs of each mechanism were estimated covering both costs to government and supply chain signatories or participants. The administrative costs of the recycling certificate scheme were estimated to be significantly higher than all other options at around $3m per annum. The lowest administrative costs are estimated for the subsidy program using a competitive tender process at an extra cost of around $650,000 per annum.

Figure ES-1 shows the relative cost effectiveness of the four options. The costs include the costs of any source reduction, as well as the costs of collection, transport, sorting, processing of recyclables, and they are net of material revenues. Administration costs are also included.

Figure ES-1 Cost effectiveness of mechanisms



The results show that the options involving competitive tender and market creation (recycling certificates) reduce compliance costs compared to an ADF. The high administration costs for a recycling certificate scheme offsets some of the advantage in compliance cost for this measure. The lowest cost option, when all costs are included, is the combined ADF/competitive tender mechanism, although the savings may not be significantly lower than the recycling certificate scheme or subsidy program with competitive tender.

Given that both the recycling certificate scheme and combined ADF/competitive tender mechanism are likely to require more time and effort to implement (including new regulations and skilling-up), the subsidy program with competitive tender may be the more realistic short-term option.

There are many institutional and regulatory issues to resolve to implement a recycling certificate scheme and it is likely to require a set-up and lead-in time of at least three years. As a result, it is probably not a realistic option to assist in meeting the 65% recycling target by 2010. In addition, it is the most complex mechanism and has a high administrative cost for delivering up to a nine percentage point increase in packaging recycling.

The subsidy program using competitive tender could be considered the most complementary with the best institutional fit, in that it may not involve new regulation if signatories agreed to incorporate the reforms under the current Covenant arrangements. That is, if signatories agreed to a higher level of contributions and changes to the scope and approach to project funding.

Importantly, the mechanism is the most likely to be able to be implemented within the relatively short timeframe available, and it would improve engagement with stakeholders by opening up a funding program to the whole supply chain.

On balance, the choice appears to be between:

1. **Renegotiate NPC project funding arrangements under current Covenant**

   Negotiate new NPC project funding arrangements including additional funding from government and increased industry contributions (under existing contribution structure). Amend funding approval process to that of competitive tender seeking projects that offer the lowest cost per tonne reduction in packaging volumes, including through either upstream source reduction or downstream recycling activities.

2. **Establish a parallel ADF and competitive tender subsidy program**

   Introduce a legislated government managed ADF (for example: payable based on weight of packaging sold), as well as competitive tender subsidy program to allocate revenue to upstream and downstream recycling activities.

If Covenant signatories are unwilling to adopt the first proposal, then governments would need to consider the introduction of new legislation as a means to secure a revenue source for a complementary recycling subsidy program. If this were the case, then as shown under the second proposal, government should take the opportunity to establish performance-based liabilities to provide maximum incentives for supply chain engagement and source reduction initiatives.

However, while either of these mechanisms could be developed and implemented by 2010, it is unlikely that the subsequently funded projects could deliver the necessary increase in recycling volumes for the Covenant target to be met by 2010. Perhaps the only means to deliver on the targets would be if government provided full funding and initiated a tender program immediately.

Finally, the assessment and recommendations could be very different if the focus was on a mechanism to provide incentives applicable to broader Covenant objectives and/or over a longer timeframe. Furthermore, any mechanism selected to achieve the recycling rate should also be consistent with the broader environmental objectives of the Federal and State Governments.

1 INTRODUCTION

1.1 The Covenant

The National Packaging Covenant was established in 1999 as a broad based agreement to reduce environmental degradation resulting from the disposal of used packaging material. It was also designed to reduce the use of packaging material and to encourage reuse and recycling of used packaging material. In 2005, the EPHC resolved to strengthen the Covenant by specifying performance targets, including an overall target recycling rate of 65% by 2010. Further, the Council resolved to investigate economic mechanisms which are complementary to the objectives of the Covenant to help achieve its stated goals.

The objectives of the Covenant are to:[1]

- reduce environmental degradation arising from the disposal of used packaging
- conserve resources through better product design and encouragement of the recovery, reuse and recycling of used packaging materials.

The packaging materials covered by the Covenant are paper and cardboard, glass, steel, aluminium and plastics. The Covenant will be assessed primarily on whether it delivers a 65% recycling rate for these materials by 2010. The Covenant's five environmental performance goals are: [2]

1. Packaging optimised to integrate considerations about resource efficiency, maximum resource re-utilisation, product protection, safety and hygiene.
2. Efficient resource recovery systems for consumer packaging and paper.
3. Consumers able to make informed decisions about consumption, use and disposal of product packaging.
4. Supply chain members and other signatories able to demonstrate how their actions contribute to goals 1, 2 and 3 above.
5. All signatories demonstrate continuous improvement in their management of packaging through their individual action plans and annual reports.

The Covenant's three overarching targets for 2010 are: [3]

1. A national recycling rate of 65% for post-consumer packaging.

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1 NPC, 2005, *The National Packaging Covenant - A Commitment to the Sustainable Manufacture, Use and Recovery of Packaging*.
2 National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
3 National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.

2. A recycling rate of 25% for packaging materials that are either not currently recycled or are recycled at very low rates.

3. No further increase in the amount of packaging waste disposed to landfill.

A mid-term review will be undertaken by December 2008 to assess the performance of the Covenant, including progress towards its targets.

1.2 The study

The aim of this project is to identify and assess possible economic mechanisms that could assist in achieving the overarching performance targets established under the National Packaging Covenant. The study is primarily an economic assessment. Social or political considerations were not included in the assessment, as these considerations were not part of the brief.

A Jurisdictional Working Group has been formed by EPHC to oversee this project and is acting for the Victorian, NSW and Commonwealth governments. The project is being administered by the Victorian Environment Protection Authority. The Working Group has commissioned McLennan Magasanik Associates, in association with BDA Group, to carry out the project.

The analysis to be undertaken in this study focuses specifically on the three overarching targets for 2010 in relation to recycling and landfill disposal of packaging. The purpose of the analysis is to identify, assess and recommend economic mechanisms complementary to the objectives of the Covenant that could assist in filling the gap in terms of current performance and the 2010 targets. While the economic mechanisms considered are likely to differ in how they may support the Covenant's broader objectives, these are not the primary focus of this study. Nevertheless, these differences have been included as secondary considerations when comparing mechanisms.

The study is designed as a screening study to make broad recommendations on the types of economic mechanisms that could achieve the stated goals of the Covenant, particularly the three overarching targets. Only broad outlines of the mechanisms are provided, as this was adequate for the purposes of this screening study. The impacts of any mechanism will depend very much on the final design of the mechanism and this should be subject to further analysis once it is decided to consider a particular mechanism in detail. The quantitative analysis has been pitched at a level to allow a broad assessment of alternatives and to highlight key issues with each mechanism. More detailed cost/benefit analysis would be required on the selected mechanisms once details of the mechanisms adopted are finalised. Once details are finalised, further research will be required on the success of the measures in jurisdictions where they have been tried and updating the quantitative analysis using more detailed data.

2 COVENANT PROGRESS AND FOCUS OF THE STUDY

This chapter summarises the key data and conclusions drawn from an assessment of progress towards Covenant targets and the importance of key materials and waste sectors for achieving the targets. More detail is provided in the appendices and these are referred to at the end of each section.

2.1 The existing Covenant framework

The National Packaging Covenant was established in 1999 as an agreement between government and industry to work cooperatively to reduce environmental degradation arising from the disposal of used consumer packaging, and to conserve resources. The Covenant is supported by a National Environment Protection Measure requiring non-signatories to meet certain standards unless they can show they are achieving equivalent outcomes to those companies implementing the Covenant. Participating companies provide annual financial contributions that are matched dollar for dollar by governments and directed towards the administration of the Covenant, and projects designed to support its objectives.

As part of their Covenant obligations, signatories are required to submit action plans, annual reports, key performance indicators and baseline data and targets that demonstrate their aims and achievements against Covenant goals and targets. Action plans and annual reports are then sent for assessment against the Covenant and if compliant, placed on the NPC website for public view.

As of June 2007, there were 507 Covenant signatories. Signatories to the Covenant include brand owners, raw material suppliers, packaging manufacturers, distributors and recovery chain participants such as waste collectors, local governments, recyclers and state, territory and national governments. Brand owners represent the largest section of signatories, with food and beverage brand owners having the largest representation. An estimated 80% of all brands sold in Australia and more than 90% of all packaging manufactured in Australia were signed up to Covenant Mk I.

See Appendix A for more detail on the background regarding the development of the existing Covenant, the breakdown of types of signatories and obligations of signatories.

Of particular relevance to this project are the two existing financial mechanisms under the Covenant:

- annual financial contributions from signatories
- penalties for non-compliance with the NEPM.

Participating companies provide annual financial contributions which are matched by government and used to administer the Covenant as well as funding specific projects designed to support its objectives. Contributions vary according to the type and size of the organisation, but generally range from $500 per annum (for turnover less than $250,000), to $200,000 per annum (for turnover over $10 billion). The annual financial contributions are fixed for the life of the Covenant.

Financial penalties for not complying with the NEPM vary for different jurisdictions. In NSW, corporations face a $22,000 fine plus up to $11,000 per day[4]. In Victoria a pollution abatement notice could be issued with a maximum fine of around $260,000.

2.2 Progress towards Covenant targets and the gap

This section provides a brief summary of progress towards the Covenant targets for 2010, including the overall national recycling rate of 65% for post-consumer packaging; the recycling rate of 25% for packaging materials that are either not currently recycled or are recycled at very low rates; and the goal of no further increase in the amount of packaging waste disposed to landfill.

At the establishment of the Covenant an agreed baseline was established for 2003 consumption and recycling rates, allowing the progress made towards the Covenant targets to be measured. Table 2-1 below shows the progress towards the overall national recycling rate target.

Table 2-1 Progress towards national recycling rate

	2003	2005	2010
Recycling (million tonnes)	1.65	2.37	2.90[1]
Consumption (million tonnes)	3.47	4.24	4.46[2]
Recycling rate	48%	56%	65%[3]

1 Estimated total recycling required to meet overall target of 65%.
2 Assumed level of consumption based on population growth.
3 Target recycling rate.

The national packaging recycling rate in 2003 was approximately 48%, and the 2005 recycling rate was approximately 56%. This represents an improvement on the 2003 agreed baseline of eight percentage points. In order to meet the target, the recycling rate needs to increase another nine percentage points by 2010. The gap between current recycling and the level required by 2010 is therefore estimated at around 500,000 tonnes per annum, (although the final tonnage required will depend on actual consumption levels).

Meeting the 65% recycling target is also likely to result in the landfill target of "no further increase in the amount of packaging waste disposed to landfill" being met. Table 2-2 presents

[4] *National Packaging Covenant Newsletter*, November 2006.

the estimated amount of packaging material to landfill if the 65% recycling target is met under two scenarios: keeping consumption values in 2010 at the 2005 levels; or adjusting them according to population growth from 2005 to 2010 (around 5%). Under either scenario, the amount of material to landfill will be around 1.5 million tonnes per annum. This represents a significant decrease in packaging going to landfill in relation to the baseline of 1.82 million tonnes per annum.

Table 2-2 Packaging to landfill in 2010 with 65% recycling (tonnes per annum)

	2010 (increasing consumption)	2010 (consumption constant from 2005)
Total consumption	4,462,006	4,230,480
Total recycling	2,900,304	2,749,812
Total to landfill	1,561,702	1,480,668

With the recycling rate of 65% met, consumption would need to increase by 23% from 2005 levels before the total to landfill would increase above the baseline value of 1.82 million tonnes. It is therefore considered likely that if the recycling target is met, the landfill target will also be met.

For the packaging materials that are either not currently recycled or are recycled at very low rates (materials referred to as non-recyclable packaging in the Covenant), data is only available for Plastics 4–7. With a current recycling arte of 23%, this group is close to its target for 2010 of 25%. Although, it is difficult to judge the current progress of other materials besides plastics 4-7, as plastics 4-7 represent 70% and this category is close to meeting its target, it is assumed that current Covenant measures together with any secondary effects from the economic mechanisms targeting the 65% recycling rate should be enough to meet the 2010 target.

Given this assessment of progress towards targets, the 65% recycling target by 2010 is the main focus of the study, because if this target is achieved, it is likely that the target relating to landfill rates will also be met. The focus is to identify economic mechanisms to assist in meeting the gap between current recycling and the level required by 2010, (estimated at around 500,000 tonnes per annum).

For more detailed information on progress towards each of the three key targets and individual material targets, see Appendix C.

2.3 Relative importance of materials/sectors and barriers

The critical materials for achieving the 65% recycling target are paper/cardboard and glass, as these two materials represent over 80% of packaging material consumption. Plastics and aluminium have already achieved their individual recycling targets and although the economic mechanisms may encourage recycling for these materials, it is not seen as a primary

consideration in selecting an appropriate mechanism. Steel has not achieved its recycling target, with current recycling at 38% and an individual target of 60-65% by 2010. Although an increase in steel recycling is desirable, because of its relatively low volume, it will have little effect in meeting the 65% target.

In terms of the required volumes of recycling to meet the 65% target, the C&I sector is the most significant, based on estimation of consumption and recycling rates. This sector has the largest volume of potentially recyclable packaging and thus can be a major contributor in achieving the target. It is recognised that there are also opportunities for increased recovery from the municipal sector, for example glass fines.

Limits on kerbside collections, declining recycling from hotels and clubs, increases in the amount and variety of packaging materials, reductions in buyback prices of materials (specifically glass) and lack of financial drivers for brand owners have been identified as critical structural barriers to achieving the 65% recycling target by 2010. A lack of alternative markets for glass products has also been a key barrier to increased recycling.

See Appendix B for more detail on packaging waste management, materials and trends and Appendix C for more information on Covenant targets, progress and barriers.

2.4 Focus of the study

The Covenant's 65% packaging recycling target by 2010 is the main focus of the study, because if this target is achieved, it is likely that the target relating to disposal of packaging to landfill will also be met. The critical materials for achieving the 65% recycling target are paper/cardboard and glass, as these two materials represent over 80% of packaging material consumption. Of the waste generating sectors, the C&I sector is considered the most significant in terms of realising the 65% target, as it generates the largest volume of potentially recyclable target materials. Furthermore, C&I packaging from some large concentrated sources can be collected and recycled at much lower cost than household packaging, and so offers the prospect of maximum diversion from landfill at minimum cost. Insofar as C&I packaging is always under the control of business, then including as part of a complementary mechanism a duty of care requirement on end-users and a data gathering system to ensure that material sent for recycling is recorded, is in the spirit of the Covenant [5]. However, the sector is highly diverse, fragmented and may not necessarily represent the most viable and efficient target for increased recycling. As discussed in the previous section, it is also recognised that there are opportunities for increased recovery from the municipal sector.

[5] Perchards Consultants, 2007, *Peer Review of Draft MMA report (7 October 2007) on Complementary Economic Mechanism*.

3 REVIEW OF ECONOMIC MECHANISMS AND STAKEHOLDER FEEDBACK

The consultancy team prepared an issues paper in August 2007 for discussion with key stakeholders. The paper considered a range of possible economic mechanisms that could be used to promote the recycling of packaging in Australia, including price and quantity-based mechanisms. It also summarised experiences from applying economic mechanisms to manage packaging waste both in Australia and overseas.

The potential mechanisms were assessed in the paper according to four broad criteria: effectiveness in increasing recycling, efficiency (taking into account both compliance and administrative costs to all stakeholders), administrative simplicity and equity. The issues paper was peer reviewed by David Perchards from Perchards Consultants in the United Kingdom. The peer review provided valuable feedback from a European perspective on experiences with economic mechanisms applied to packaging waste.

This chapter provides a brief summary of mechanisms, experiences, the assessment and the feedback provided by stakeholders. Appendix D provides more detail on where the mechanisms have been applied and where possible, how effective they have been. Appendix E provides a broad assessment of the mechanisms against the four criteria.

3.1 Range of mechanisms

Economic mechanisms generally operate as either a price or quantity-based mechanism, although mechanisms aimed at improving the operation of existing markets, termed market friction mechanisms, are sometimes also included.

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

Quantity-based mechanisms create a market in the rights to engage in an activity (that may be associated with environmental damage), by restricting the total level of activity and allocating rights to participate in that activity. An efficient allocation of rights is then determined through market transactions.

Market friction mechanisms try to improve environmental outcomes by making existing private markets work more effectively. They oil the wheels of an existing market.

Beyond the broad classification of market mechanisms as either price or quantity (property right) based, several taxonomies of mechanisms have been developed. The following classes of market mechanisms are useful for application in waste management.

3.1.1 Charges and taxes

Charges and taxes are price mechanisms linked to the environmental damage caused by different activities. While such charges have often been used for revenue purposes, true Pigovian taxes seek to internalise the externality costs of the activity. That is, the tax provides an incentive to introduce new technologies, products or processes to minimise impacts and hence avoid the tax. The effectiveness of taxes will therefore depend upon the responsiveness or price elasticity of supply of the regulated emission, activity or product. As the cost of realising environmental gains falls on those creating the externalities, these charges are often termed polluter-pays. These mechanisms are sometimes simply referred to as financial instruments. There are a range of different fees and charges directed at changing waste management practices. These include product charges, advance disposal fees (ADFs), deposit-refund schemes, performance bonds and financial enforcement incentives, variable charging systems for waste collection and disposal and landfill levies.

3.1.2 Product charges

Product charges are generally levied on sales of a product. Most applications represent fiscal, revenue raising taxes, rather than a true market instrument (or Pigovian tax), as they usually fail to be performance-based. That is, the tax paid by a producer is usually linked to production without account for changes in material reduction; use of recycled materials; or product redesign to reduce environmental impacts from product use or disposal; to reduce costs of collection and reprocessing of the product; or to support post-consumer waste collection and recycling.

Product charges are also sometimes payable on the weight of product produced or sold, such as the weight-based packaging levies charged throughout Europe, Japan, Korea and Taiwan[6]. They may be visible to the consumer when the product is purchased, or they can be assessed upstream on producers and be incorporated later into the retail price. They do provide a small incentive for material reduction, though reduced procurement costs and transport costs are usually a much bigger incentive[7]. Typically revenues are directed towards cleaner production and recycling subsidies freeing up government funds that would otherwise support these programs.

3.1.3 Advance disposal fees

An advance disposal fee is a type of product charge that is levied on a product specifically to raise revenue to fund post-consumer collection and recycling of the product. In their pure form they represent a fee for service for collection and recycling, with the aim of raising

6 Perchards Consultants, 2007, ibid.
7 Perchards Consultants, 2007, ibid.

money to fund the collection, sorting and recycling of packaging waste. They are also referred to as advance recycling fees.

3.1.4 Deposit-refund schemes

A deposit-refund scheme entails a fee levied on the sale of a product that is refunded after the product has been used and when it is collected for recycling. The mechanism is best suited for discrete products that have high environmental disposal costs, including in relation to littering. This has prompted their use for a range of beverage containers (known as container deposit systems), batteries and electrical products. In principle, the deposit should reflect the environmental cost of poor disposal practices, and ultimately only be paid for waste product that is subject to those disposal practices. In practice, these schemes are used as much to promote recycling and perceived resource conservation benefits.

3.1.5 Performance bonds and financial enforcement incentives

Performance bonds have typically been used to cover post-closure rehabilitation at landfill sites. To overcome the risk and associated problems with orphaned sites, landfill operators can be required to post performance bonds to cover post-closure rehabilitation that may arise due to land or groundwater contamination. Similar to performance bonds and more relevant to the current study are financial enforcement incentives, which represent penalties for non-compliance with environmental regulations. They only represent a market mechanism if the incentives are linked to the progressive environmental damage as performance progressively exceeds non-compliance.

3.1.6 Variable rate waste collection charging systems

Variable rate charging systems have been widely introduced for domestic waste collection. Efficient waste disposal pricing would see the full private and environmental damage costs associated with waste disposal passed on to waste generators. However, the failure of user collection fees to pass on environmental disposal costs can be compounded where public sector waste collections also fail to recover the full costs of service provision. This may arise where waste collections are subsidised out of general council revenues or flat fee pricing regimes are used that do not convey the marginal costs of disposal to waste generators. To overcome this problem, variable rate charging systems have been used and are applied by weight, bin number and/or size to reflect increasing collection costs as waste volumes increase.

3.1.7 Landfill levies

Landfill levies, as market mechanisms, are applied to wastes disposed to landfills (or incineration) to account for the environmental impacts of disposal. The levies are collected with landfill gate charges and may be based on the volumes or weight of wastes being

disposed, and may be differentiated by waste type or landfill location to reflect differences in environmental impacts or risks. In many jurisdictions however, levy rates have been increased beyond these levels to promote increased recycling and perceived upstream benefits, and to provide a revenue base for government programs.

3.1.8 Subsidies

Subsidies and tax concessions are also price mechanisms, but rather than imposing a liability, the mechanisms operate by providing a financial incentive to encourage desirable activities. In this respect they are often termed beneficiary pays incentives. Subsidies are often used when it is difficult to identify, monitor or enforce tax approaches (say where impacts are from diffuse sources), where tax imposts may lead to spillover costs (such as illegal dumping of wastes) or for equity reasons.

Subsidies used in the waste sector include a wide range of assistance mechanisms such as bounties, tax concessions and direct grants, to for example, assist the development and running of waste collection and recycling systems or encourage waste minimisation practices or the development of products that generate less waste, are less toxic or are easier to recycle. There is a range of ways that subsidies can be provided, such as lump sum payments or payments per quantity of material recycled or reused.

3.1.9 Tradable rights schemes

Property rights or market creation are quantity-based mechanisms that operate by creating tradable rights or altering existing rights to environmental resources or to the degradation of such resources. For example, rights may be created for the disposal of waste to landfill, with landfill operators allowed to trade these rights. Tradeable landfill quota schemes are based on a property rights framework. Other examples of quantity-based mechanisms are tradable landfill diversion certificates to encourage waste diversion and tradable recycling certificate schemes. The types of incentives and costs provided by quantity-based mechanisms depend on how the initial rights are assigned and the rules for creating and trading additional credits.

There are two key types of tradable rights schemes; the cap and trade system and the credit based system. A tradable landfill quota scheme involves setting a cap on the quantity of waste that can be disposed to landfill. The total quota is divided into individual allocations that are either sold or given to specified parties, (generally local authorities). Each party must hold allowances equal to the quantity of waste disposed and allowances can be traded. Under an efficient market, the scheme will ensure that the least cost recycling or waste avoidance measures are carried out to meet the landfill quota.

A credit based system encourages desired activities, rather than placing a limit on undesirable outcomes (such as land filling). A prerequisite for this type of system is an obligation or requirement on parties to undertake specified levels of recycling or waste diversion. A system

is established for recognising the creation of credits and credits can be traded or used to demonstrate compliance with individual obligations. Under a tradable landfill diversion certificate scheme, obligations are stated in terms of required quantities of waste diverted and credits are created by specified waste diversion activities. Under a tradable recycling certificate scheme, obligations are stated in terms of quantities recycled and credits are created for recycling. The purpose of the schemes is to enable individual obligations for landfill diversion or recycling to be met at least cost.

Unlike price mechanisms, the cost imposts on the waste sector will not be limited under the quantity-based mechanisms, but there will be greater certainty of realising environmental goals, subject to controlling non-compliance.

3.1.10 Market friction mechanisms

Market friction mechanisms seek to make existing markets work better by improving the information disclosed in the market. Perhaps the most familiar type of mechanisms in this category is eco-labelling. Through eco-labelling, consumers find out more about the way in which a commodity is produced, and producers learn more about what consumers are willing to pay. Both graphs can then make more informed decisions. This mostly applies to one-dimensional eco-labels such as an energy-consumption rating which have been very successful. Attempts to endorse environmental friendliness through a focus on one environmental parameter (for example, "environmentally friendly because recyclable") are more likely to mislead than to inform. As an example, an initiative in the Netherlands to boil down all important environmental impacts into a single numerical rating – the Packaging Environmental Indicator – failed and was abandoned [8].

A range of other policy mechanisms may also be considered as market friction approaches. For example, Extended Producer Responsibility (EPR) is primarily a cost-sharing principle akin to polluter-pays. Rather than the responsibility for environmental impacts resting with the persons causing environmental damage, it places the responsibility on the product manufacturer. By effectively engaging manufacturers and signalling to them the impacts associated with consumer use of their products, appropriate commercial arrangements to better manage the post-consumer waste impacts can be crafted and improved market outcomes achieved.

One example of the EPR approach is take-back mandates and recycling rate targets – either at a collective or individual brand level. Extended producer responsibility and product stewardship schemes are being increasingly considered by Australian jurisdictions as a way of shaping markets and better addressing problematic wastes. EPR also establishes a basis for market development, with firms given incentives to find least cost means to achieve targets

[8] Perchards Consultants, 2007, ibid.

and industry often introduces market mechanisms to achieve them. For example, a group of beverage companies in Australia is currently developing a proposal for a voluntary recycling levy of $10 for each tonne of glass packaging used by them, with the revenue collected to provide incentive payments for increased recovery and recycling of the glass packaging[9] – effectively an advance disposal fee.

3.1.11 Summary

Table 3-1 summarises the menu of market-based instruments available for managing packaging waste.

[9] Environmental Manager, 2007), *Coke, Fosters and Lion Nathan plan voluntary levy to boost glass recycling*, Issue No 633, July 17.

Table 3-1 Menu of market-based instruments for packaging waste

Mechanism	Typical policy objective/s	Point of application
Charges, taxes and subsidies (price-based mechanisms)		
Product charge	Raise revenue, and where linked to subsidy programs, promote reuse/recycling	Manufacturer (fee typically based on units or weight of product produced or sold)
Advance disposal fee	Raise revenue to directly fund collection/recycling	Manufacturer (fee could be based on units or weight of product produced or sold and could vary according to cost of recycling different packaging materials)
Deposit refund scheme	Promote reuse/recycling Promote safe disposal and reduce littering	Consumer (deposit payable at purchase and repaid when returned)
User charges for waste collection and disposal	Recover costs, and often Reduce waste generation	Consumer (charges may be flat per household or vary per bin/bag/kg)
Landfill levies	Reduce disposal impacts Promote reuse/recycling Revenue raising	Landfill (with the levy rates reflecting external environmental costs of disposal or make disposal more expensive in order to improve the economics of recycling or energy recovery)
Recycling/recovery subsidies	Promote reuse/recycling	Recyclers/reusers (per unit or kg of material recycled or lump sum)
Recycling investment tax credits	Increase capacity for recycling	Recyclers (tax credit for investment in infrastructure)
Cleaner production subsidies	Reduce waste generation	Manufacturers
Property rights and market creation (quantity-based mechanisms)		
Tradeable landfill quota	Cap quantity of waste sent to landfill	Landfills
Tradeable landfill diversion certificates	Promote diversion of waste from landfill	Recyclers/reusers
Tradeable recycling certificates	Promote reuse/recycling	Could be assigned to producers or recyclers/reusers
Market friction mechanisms		
Eco-labelling	Waste prevention	Manufacturers, distributors, consumers
Producer responsibility schemes	Promote reuse/recycling and reduce waste generation	Manufacturers, distributors, retailers

3.2 Experiences with mechanisms

In most OECD countries, the key waste management consideration for government has historically been disposal with a policy focus on reducing volumes disposed to landfill. Economic mechanisms chosen to promote volumetric reductions in waste disposal have included variable waste collection charges, landfill levies and landfill quota schemes.

As well as the drive to ratchet down overall disposal levels, there are increasing efforts to improve the management of specific wastes that lead to significant environmental impacts when disposed, particularly if illegally dumped outside of regulated disposal centres or as a nuisance via littering. To promote better post-consumer management of these products, there has been widespread adoption of *extended producer responsibility* and *product stewardship approaches*. Under these approaches, a number of economic mechanisms have been employed, including product taxes, advance disposal fees and deposit-refund schemes, as well as a vast array of subsidy programs and growing interest in recycling certificate approaches.

Waste policy in the United States (US) has been characterised by ambitious waste reduction goals and supply-side recycling support policies, such as kerbside recycling and grants programs, leading in some instances to a glut of recycled materials. This has prompted demand-side market development subsidies, such as tax credits, low-interest loans, and government purchasing policies. A number of economic mechanisms have been employed in the US, including landfill levies, variable pricing programs, deposit-refund schemes and subsidies. Mechanisms that are commonly applied to packaging waste in the US include voluntary and mandatory deposit-refund schemes and advance disposal fees for beverage containers.

In the European Union (EU), the 1994 *Directive on Packaging and Packaging Waste* sets targets for 2008 for the recovery and recycling of packaging wastes and specific materials contained in packaging wastes.[10] The 1999 *Landfill Directive* includes a target for reducing the quantity of biodegradable material land filled to 35% of 1995 levels by 2016.[11] Economic mechanisms employed for waste management in the EU include user charges for domestic waste collection, landfill levies, advance disposal fees, product charges, tax credits, deposit-refund schemes, tradable recycling certificate schemes and tradable landfill quota schemes.

There has also been a clear trend in the EU towards extended producer responsibility, where industries are being held more accountable for post-consumer waste recovery. Taxes and charges on packaging items are used widely in the EU. Some taxes are general revenue raisers, some are levied on the difference between recycling targets and rates achieved, or levied only if there is no organised return system. Twenty-six EU member states have packaging fees charged by national recovery organisations. There is also some

[10] European Union, 1994, *Directive 94/62/EC of the European Parliament and of the Council of the European Union of 94/62/EC of 20 December 1994 on packaging and packaging waste*.

[11] Council of the European Union, 1999, *Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste*, CEU, Brussels.

use of mandatory deposit systems for non-refillable beverage containers as well as prescribed deposit rates for refillable beverage containers.

Tradable rights approaches are also receiving increasing attention. Currently, their application to waste management is limited to the United Kingdom. The UK has a tradable recycling credits scheme to support the producer responsibility scheme for packaging waste, and landfill allowance trading schemes to assist in meeting statutory landfill diversion targets.

A number of economic mechanisms have also been applied to the waste sector in Australia. These include landfill levies, advance disposal fees, a deposit-refund scheme, performance bonds, and user charges. South Australia has operated a deposit-refund scheme for beverage containers since 1975 and Western Australia is also considering a deposit-refund scheme for beverage containers.

There has also been increasing interest in product stewardship in Australia. Under the National Packaging Covenant, industry contributions are combined with matched funding from government for Covenant projects, and nationally, an advance disposal fee has been introduced to assist the management of waste oil. The Commonwealth Government has also investigated a tradable certificates scheme for used oil. Voluntary product stewardship schemes are under development for tyres (including an advance recycling fee) and for televisions and computers.

The most common mechanisms used to manage packaging products in OCED countries are take-back requirements, product taxes and deposit-refund systems. Most take-back schemes are financed through either a fee (advance disposal fee) on all the items sold in a certain product category, or through a fee levied by a Producer Responsibility Organisation (PRO) on member firms according to their respective market shares. In a couple of cases, the PRO fee is based on the recycling costs of each individual product, resulting in an incentive for redesign of products[12].

3.3 Suitable mechanisms to promote packaging waste recycling

The suitability of alternative economic mechanisms was evaluated in terms of their merits in promoting an increase in the recycling of packaging materials from current to target levels. Appendix E provides a broad assessment of how well each mechanism meets the criteria of effectiveness, efficiency, administrative simplicity and equity.

Based on the, albeit broad, consideration of the likely effectiveness, efficiency, administrative simplicity and equity implications of alternative mechanisms, those considered to have the greatest potential to promote packaging recycling were:

- advance disposal fees
- performance-based advance disposal fees

[12] OECD, 2007, *Instrument Mixes Addressing Household Waste*, report from Working Group on Waste Prevention and Recycling, Paris.

- deposit-refund schemes
- variable charges for waste collection and disposal
- recycling subsidies provided by competitive tender
- recycling certificate schemes.

3.4 Feedback from stakeholders

The issues paper was distributed to key stakeholders at the end of August 2007. During September 2007, the consultancy team held discussions with 17 organisations including brand owners, jurisdictions, local government, recyclers and environment groups. Feedback was sought from stakeholders on the sectors and materials presenting the greatest opportunity to increase recycling volumes; and economic mechanisms with most merit to contribute to bridging the gap between performance and the recycling target under the Covenant. Appendix F shows the list of stakeholders.

3.4.1 Industry

There were strong views from industry stakeholders on which mechanisms were considered complementary to the Covenant. The industry representatives felt that any mechanism requiring a new regulatory framework would not be complementary to the existing system of co-regulation operating until 2010. Some stated that for this reason, ADFs, deposit-refund schemes and recycling certificate schemes should not be considered further. Other industry representatives provided comment on the relative merits of the full list of economic measures, but stated that they should only be considered for implementation after 2010 if the Covenant fails to achieve its objectives. In the short-term some recommended using existing covenant processes to provide incentives to brand owners (for example, better benchmarking and assessment of action plans).

Many felt that the mechanisms with most promise as alternatives to the Covenant would be broad-based and use the discipline of the market. They generally felt that ADFs and trading schemes would be better than subsidies for the reprocessing industry. Some industry representatives felt that development of an alternative to the Covenant, such as introducing the threat of a broad-based MBI, would be effective in getting more active participation from brand owners.

3.4.2 Environment groups

Environment groups felt that the structural barriers report presents a compelling case for the use of financial mechanisms to assist in achieving the objectives of the Covenant. They also sought consideration of mechanisms that could contribute to continuous improvement after the expiry of the current Covenant, and felt that extended producer responsibility take-back schemes should not have been so easily dismissed.

Another key issue of importance to environment groups is the focus of the study on the *overall* recycling target, allowing substitution of materials to meet that target. The environment group representatives expressed the view that the Covenant also includes

individual material targets and focusing on the overall recycling gap ignores the environmental impacts of different packaging materials. Environmental groups prefer mechanisms to be designed to apply to all materials and cover all sectors, (possibly in a differentiated way).

Some comments on individual mechanisms included:

- Support for a deposit-refund scheme on beverage containers to improve glass recycling, and automatically reduce contamination and improve recycling of paper and cardboard.
- Possible support for a performance-based advance disposal fee on paper/cardboard.
- Variable charges are unlikely to impact the recycling of packaging.
- If recycling subsidies are needed, they should be linked to ADFs.
- Recycling certificate schemes are problematic as they would not get full coverage of sources of recyclables.

Additional assessment criteria suggested include longevity (voluntary levies are not necessarily sustainable), flexibility over time, and potential for consumer education and involvement.

3.4.3 Recyclers

The recyclers expressed a similar view to industry, with most mechanisms being considered alternatives to the Covenant rather than complementary mechanisms. Only variable charges for waste disposal and recycling subsidies were considered complementary mechanisms. Their preference is for mechanisms that reward recycling and provide long-term security for recyclers, while minimising long-term risks. They were also concerned that none of the mechanisms involve the retail sector.

The recyclers did not agree with the proposed focus on the commercial and industrial sector as the greatest opportunity to contribute to increased recycling. They feel that there is significant potential to increase recycling of glass from the household sector, for example through optical sorting equipment and expansion of alternative markets for glass fines.

Some comments on individual mechanisms included:

- Do not support ADFs or landfill levies.
- Support tradable recycling certificates applied to specific materials or waste streams.
- Seek subsidies for resource recovery (similar to those provided for virgin resources).

3.4.4 Jurisdictions and local government

A range of differing views were put forward by jurisdictions and local government. Some of the main comments are listed below:

- ADFs have potential, but should be voluntary.
- A recycling certificate scheme would not be complementary, but should be investigated for the future if progress is not adequate.
- Need strategic approach and funding for data collection for these mechanisms.
- Potential for Covenant endorsed recycling logo and public education to get more recyclates and less contamination from existing systems in household sector.
- Potential for deposit-refund schemes to contribute if you look at mechanisms by material/sector rather than a blanket approach.
- May be unintended consequences of mechanisms based on tonnage (for example, move from heavy glass to PET).
- We should build regulatory possibilities into Covenant.
- Need a mechanism that works best for all materials (focus on glass/paper but not at expense of other materials).
- Timing is an important issue for complementarity.
- Best mechanisms may be those that can be implemented on a smaller scale/sector or voluntary basis.
- Need to consider how different mechanisms would impact on the way the current covenant is set up.
- Need to consider impacts of mechanisms on kerbside systems.
- Eco-labelling is important, as it makes education easier.
- In any subsidy scheme there would be value in making funds available for collection of recyclables by local government in regional areas.

3.4.5 Summary of stakeholder views on mechanisms

In discussions of the merits of individual mechanisms, most stakeholders agreed most of the listed mechanisms had some merit for increasing volumes of packaging materials recycled. There was reasonable consensus that performance-based ADFs would be preferred over production-based ADFs. Many argued that ADFs should be applied across all materials, rather than limited to specific materials for equity reasons. There was also general agreement that extending variable charges for waste collection and disposal has less merit than other mechanisms for addressing packaging waste.

There were particularly disparate views expressed on deposit-refund systems. Some stakeholders argued that a national deposit-refund scheme on beverage containers would significantly improve glass recycling, as well as reducing contamination of paper. Others argue that deposit-refund schemes would have a negative impact on kerbside recycling systems and/or they are too costly. It should be noted that in the peer review, Perchards

provided comment on deposit-refund schemes based on European experience. They note that deposit systems operating alongside producer responsibility systems add to overall cost, but not to overall system effectiveness. They also argue that policies which target all packaging are far more effective as a means of conserving resources and minimising the generation of waste.

4 APPLICABILITY OF ECONOMIC MECHANISMS TO COMPLEMENT THE NPC

This section sets out the primary role of the economic mechanisms in the context of this study and lists a number of issues relevant to assessing the applicability of each of the mechanisms to complement the National Packaging Covenant.

4.1 Role of mechanisms

The primary role of the mechanisms to be assessed is to support or complement the Covenant to achieve the performance target of an overall national recycling rate of 65% for post-consumer packaging.

While there is potential for some of the economic mechanisms discussed in Chapter 3 to support the Covenant's broader objectives, these are not the primary focus of this study. Nevertheless, the potential for different mechanisms to contribute will be included as secondary considerations when comparing mechanisms.

4.2 Assessment issues

A number of assessment issues specific to the context of the National Packaging Covenant are discussed in this section. They are:

- Complementarity – which mechanisms are considered complementary?
- Effectiveness in meeting the specific recycling gap – what level of certainty can each measure provide that the recycling gap will be met?
- Performance linkages – what potential is there for each mechanism to be linked to individual performance under the Covenant?
- Institutional fit – how well does each measure fit with existing Covenant arrangements?
- Incentives for product redesign – can any of the measures also provide incentives for product redesign?
- Improving engagement with stakeholders – can any of the measures also improve engagement with Covenant stakeholders along the whole supply chain?
- Target materials and boundary issues – can the measures specifically address the materials that are important for the recycling target? Will the measures pick up non-target wastes, increasing costs unnecessarily?
- Potential to address key barriers – which of the key barriers identified by the Structural Barriers Investigation report could be addressed by each mechanism?
- Reliance on data – how important is good data for the implementation of each mechanism?

- Timeliness – any significant differences in the time required for implementation?

These criteria were chosen as they assist in determining the economic merits of the mechanisms being considered. While there is some discussion below about the likely acceptability of the various mechanisms by supply chain signatories and brand owners, we do not discuss in detail the community acceptability of various measures as there is limited data on the community acceptability of many of the measures. Community acceptability may be considered as part of additional analysis undertaken as part of the mid-term review.

4.2.1 Complementarity

There has been much discussion during the course of the project about what complementary to the Covenant means. Some have expressed the view that complementary mechanisms must not require new regulation as the current Covenant is a co-regulatory framework, and any new regulation would change this balance. Others have stated that any mechanism that mandates a greater contribution from signatories (whether in financial terms or in terms of action), is also not complementary.

However, these two statements would rule out all economic mechanisms, apart from increasing government funded subsidies to increase recycling levels. And indeed this mechanism could also be viewed as not being complementary, in the sense that the Covenant framework implements the concept of producer responsibility and increasing subsidies funded by the community would also upset the balance of this approach[13].

The approach taken in this study is to identify mechanisms with the potential to help close the gap between recycling performance and target levels, and for those that appear most promising, to explore how they could be implemented in a way that could work alongside the Covenant framework.

4.2.2 Effectiveness in meeting specific recycling gap

In general, quantity-based mechanisms provide greater certainty that an environmental outcome will be achieved compared with price based mechanisms. For example, a tradable recycling certificate scheme could be crafted to yield the specific target recycling levels under the NPC. In principle, a recycling certificate scheme should impose the lowest compliance costs, as it provides greatest flexibility in how the recycling target could be met. However, the economic efficiency of the measure depends on the costs of achieving the target rates, which can be highly uncertain.

The ADF, deposit-refund scheme, variable charges for waste disposal and subsidies would set a price/subsidy to encourage recycling, but there would be uncertainty over the

[13] Perchards Consultants, 2007, ibid, stated that "a landfill tax could be introduced without undermining existing Covenant arrangements, and so could variable waste charging for households and a duty of care requirement on business end-users of packaging to ensure that material is sorted and sent for recycling and that records on that are kept". Whilst this may be true, the issue at hand here is whether the economic measures are complementary as understood within the context of meaning of the term under the Covenant. Even landfill taxes or variable waste charges could undermine the intent of the Covenant of placing the emphasis on producer responsibility.

magnitude of the price necessary to promote the desired recycling levels. This is likely to result in some level of under/over shoot of the target. Price incentives could be adjusted over time to align observed recycling levels with the target rate, but this will introduce uncertainty and additional compliance and administrative costs.

The key to choosing between a price or quantity target is the uncertainties inherent in achieving a given recycling rate. Setting a predetermined target rate (such as 65% recycling rate), is based on the notion that the economic benefits (including non-monetary benefits) are aligned with the costs. Whilst the benefits may be known with a reasonable level of confidence, the costs of achieving a target are typically highly uncertain. With a quantity target, there is the risk that the costs end up out of proportion to the economic benefits. A price measure does allow the regulator to manage this risk, even though it may also lead to a level of recycling that is less than the target rates.

4.2.3 Performance linkages

Governments are increasingly using performance-based approaches to environmental regulation and policy making, rather than prescriptive approaches to promote least cost compliance. The current NPC framework does not measure the relative performance of signatories who are complying with the Covenant or reward individual signatory performance. An advance disposal fee has the potential to be performance-based if a means to identify a signatory's performance under the Covenant could be established and linked to fee liabilities. A recycling certificate scheme where credits are assigned to brand owners also has the potential to directly reflect recycling performance, (the more recycling undertaken the more credits generated, and any excess credits can be sold).

4.2.4 Institutional fit

Another important issue to consider is the institutional fit of each mechanism with the existing Covenant arrangements. The Covenant is a co-regulatory arrangement between key stakeholders in the packaging chain and all spheres of government – Australian, State, Territory and Local. The regulatory underpinning is provided by a National Environmental Protection Measure which is applied at the jurisdictional level.

Some mechanisms could be applied more easily at a national level, (across supply chain signatories), whereas others are more suited to implementation at a local level. For example, an advance disposal fee, deposit-refund scheme and recycling certificate scheme could all be applied at a national level. Although a deposit-refund scheme has been implemented in SA (and similar schemes are being considered for other states), it could be implemented at a national level[14]. User charges for waste disposal are imposed by local councils in Australia and it would be more difficult to use this mechanism to achieve a national target.

[14] This may actually reduce the costs and environmental impacts associated with the transport of containers to states with container deposit systems.

A tradable recycling certificate scheme and deposit-refund scheme may require new institutional and legislative arrangements. A mechanism for an industry charge already exists and is administered by the National Packaging Covenant Industry Association. The current contribution system could be replaced with one where contributions relate to signatory performance, (similar to a performance-based ADF). An ADF administered by government would require regulation.

4.2.5 Incentives for product redesign

One of the broader objectives of the Covenant is better product design. Although the primary focus of the assessment of mechanisms is on the potential to achieve the recycling target, the potential to promote better product design provides a secondary consideration. There may be potential for a performance-based ADF to provide incentives for better product design, if the fee varied with reduced packaging or increased recyclability from product redesign.

However, the empirical evidence suggests that the influence on product design is limited at best [15]. Reduced procurement costs and transport costs are usually a bigger incentive for packaging minimisation. A large proportion of packaging is used to transport and store food and drink, and European studies have shown that the resources needed to produce the packaging is only about 10% of the resources needed to produce the contents.[16] The costs to producers of product failure through lighter packaging may be greater than the additional cost of paying waste disposal fees.

If product redesign is a key objective, then direct regulatory measures (such as packaging standards) may be a better approach than economic mechanisms.

There would also be some potential for a recycling certificate scheme to provide incentives for reducing packaging tonnages as well as increasing recyclability. For example, if brand owner obligations were dependent on their share of the total weight of consumer packaging sold, then there would be an incentive to reduce packaging in order to minimise their obligations under the scheme[17]. If the system was brand specific, then they would also have an incentive to make their packaging more recyclable, as it would be easier to meet their own individual recycling obligations.

4.2.6 Improving engagement with stakeholders

Another broader objective of the Covenant is that all signatories demonstrate continuous improvement in their management of packaging. Different mechanisms have differing potential to engage stakeholders along the whole supply chain from suppliers of raw

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15 Perchards Consultants, 2007, ibid.

16 See for example Dr J M Kooijman, 1995, *Environmental Impact of Packaging Performance in the Food Supply System* and *Environmental Impact of Packaging: Performance in the Household* (2000), both published by INCPEN.

17 As Perchards Consultants, 2007, ibid states there may be some instances where material usage and fuel consumption can be reduced through the use of lightweight composite packaging that is relatively difficult to recycle, which may be counter to the overriding goal of the Convenant to improve overall environmental performance.

materials, manufacturers and distributors of packaging, to manufacturers, brand owners, wholesalers and retailers of consumer products.

Variable charges for waste disposal have limited potential to improve engagement with stakeholders along the supply chain, as they are levied at the disposal stage. Subsidies for recycling are generally limited to engaging collectors and recycling businesses. However, subsidy programs could be tailored to engage a wider set of participants.

The mechanisms with the greatest flexibility to engage a range of parties are the performance-based ADF and recycling certificate schemes, which both have the potential to place direct requirements on raw materials suppliers, packaging manufacturers/suppliers, brand owners of consumer products, wholesalers and retailers of consumer products.

4.2.7 Target materials and boundary issues

The primary purpose of the mechanism is to fill the gap between the likely level of recycling of packaging in 2010 and a target of 65% in the Covenant. The analysis in Section C.3 indicates that paper/cardboard and glass from the commercial and industrial sector are likely to be important for achieving the target. Some mechanisms have the potential to specifically target these materials, whereas others have the potential to impact on a wider set of materials/wastes.

An ADF could potentially target specific materials and a performance-based ADF could target signatory performance in relation to the target materials. Deposit-refund schemes have been successful in targeting discrete products such as glass, plastic, aluminium and steel containers from the household sector. However, they are less suited to the C&I sector as end-use containers are not used as much in this sector, and there is limited potential to target paper and cardboard through this mechanism.

In Australia, most private operators collecting commercial and industrial waste already use variable pricing regimes, and so increased charges for disposal of wastes from that sector could be employed. However, increasing charges that were not differentiated by material would pick up other waste materials.

A tradable recycling certificate scheme could easily target particular materials by defining obligations in terms of those specific materials. However, a scheme with certificates issued to recyclers based on total recyclates processed may not be able to easily target particular sources or sectors. A system which attempted to place different values on packaging waste obtained from domestic and packaging waste obtained from C&I sources would be highly vulnerable to fraud,[18] so that complex and costly administrative arrangements would need to be put in place to minimise the prospects for fraud. The packaging waste recovery notes under the UK trading scheme are not source-specific, encouraging reprocessors to recycle materials that can be collected and reprocessed at lowest cost. Under the scheme,

[18] Perchards Consultants, 2007, ibid.

the recycling of paper has focused on the high quantity homogeneous waste paper from the commercial and industrial sector, whereas recycling of glass has focused on the household sector[19].

4.2.8 Potential to address key barriers

Key structural barriers to recycling identified from the Structural Barriers report are outlined in Section C.4.

Dedicated recycling subsidies obviously have the potential to target specific infrastructure issues and could be used to directly address concerns with limited collection services and physical space. The issue of glass breakage has the potential to be addressed by deposit-refund schemes, as the bottles are returned whole under these schemes.

The mechanisms with greatest potential to provide financial incentives for brand owners include the performance-based ADF and the recycling certificate scheme (with certificates assigned to brand owners). All mechanisms that provide an ongoing financial incentive to increase glass recycling would help address the low buyback prices for glass.

The deposit-refund schemes and recycling certificate schemes would have the greatest potential to directly engage recycling businesses.

4.2.9 Reliance on data

Good data on volumes available for recycling, recycling options and their costs is important for mechanism design and enforcement.

In the first instance, data availability may limit how mechanisms are specified, such as the basis for a performance-based ADF, the potential for differentiated charges (for waste collection or landfill disposal) or whether recycling subsidies are provided on gross or net volumes of recyclates processed.

Secondly, the better the availability of data, the more likelihood that pricing mechanisms such as an ADF, deposit-refund scheme or variable charges for waste disposal, can be designed to minimise the level of under/over shoot of the target and the need for adjustment over time.

4.2.10 Timelines

The recycling certificate scheme would require at least a couple of years to develop and implement, given that new institutional and legislative arrangements would be required as well as significant cultural change. A deposit-refund scheme would also need new institutional and legislative arrangements. Changes to user charges would also require significant time, given that a national framework would need to be developed then applied at the local level, and in the case of municipal waste, be accompanied by new collection regimes.

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[19] Barlaz & Loughlin,2005, *Recycling worldwide: Policies to strengthen markets for recyclables.*

The timeframe required for a performance-based ADF would depend on how easily signatory performance could be measured and linked to fee liabilities. A new measurement system would need to be developed, as companies' accounting systems typically measure number of tradable units sold, not weight of packaging placed on the market. This could take some time, as reliable data would need to be collected to ensure the veracity of the measurement system. Recycling subsidies could be applied fairly quickly, even with competitive tenders, as they do not require any new institutional or administrative frameworks.

4.3 Short list of mechanisms

Most mechanisms discussed above appear to have potential to help achieve the recycling target. The two mechanisms that are not considered which are worth considering further are:

- variable user charges
- deposit-refund systems.

Variable user charges will have limited effectiveness for addressing packaging waste, as they are too indirect and there is also limited potential for them to address key barriers to increasing recycling. Variable disposal charges could theoretically induce a higher rate of recycling if the variable charges imposed on waste management companies or local councils were passed back onto waste generators. However, this would require a complete change of the waste collection systems in some cases and new monitoring systems to be set up, both of which are likely to be prohibitively expensive to do in the timeframe required.

Deposit-refund schemes are likely to be a costly way to address the overall 65% packaging waste recycling target, as they are limited to increasing recovery of containers. While they may have merit for increasing glass collection, another mechanism (such as an ADF) would be required for the other target material (paper). As there would be high administrative costs involved in operating a number of different mechanisms, deposit-refund schemes have been excluded from the short list. Other issues with deposit-refund schemes include the high set-up costs for these schemes, the impact they have on the effectiveness of other recycling schemes already established and the lack of flexibility in recycling options[20]. Generally, most studies have found that the cost of deposit-refund schemes exceed the benefits, even where environmental benefits are included. In some regions, where infrastructure has already been established, incremental expansions of an already established deposit-refund scheme may be warranted[21].

Based on the assessment above, the short list of mechanisms to be assessed in the quantitative analysis are:

[20] Appendix G provides a summary of recent literature on the economics of deposit-refund schemes.
[21] For example, South Australia.

- performance based advance disposal fee
- subsidy program using competitive tender
- recycling certificate scheme
- combined ADF and subsidy program using competitive tender.

There are various ways each mechanism could be implemented and this section provides a discussion of options for the key features of each mechanism. A set of key features considered suitable is selected for illustrative purposes only, to allow a quantitative analysis of the options.

4.3.1 Advance disposal fee

An advance disposal fee could be introduced to provide an incentive for source reduction of packaging, as well as to raise adequate revenue to fund activities to close the gap between current recycling and the 2010 target level.

An advance disposal fee could be implemented to support the Covenant in a number of different ways, for example depending on who charges and allocates the fees; who is required to pay the fees; the type of fee structure; how the fee fits in with the current system of financial contributions; and what the fees are used for. Each of these key features are explored below.

Advance disposal fees are generally imposed by government. However, they can also be self-imposed by industry, (for example, the current proposal by Australian beverage companies for a glass recycling levy). If an ADF was imposed by government, this would require a new regulation, within or alongside the existing Covenant framework. Alternatively, government could support the implementation of the industry glass levy and encourage the adoption of similar self-imposed levies for other target materials. However, there would obviously be less certainty for government over recycling outcomes as the levies would be voluntary.

The main options for who pays the ADF are:

- supply chain signatories
- all brand owners
- only supply chain signatories/brand owners not meeting expectations under the Covenant
- only supply chain signatories/brand owners not meeting expectations for target materials (glass and paper) under the Covenant.

The structural barriers report singled out brand owners when discussing the need for financial incentives, suggesting an ADF could be targeted to apply to brand owners. If meeting the overall recycling target is the top priority, then the most efficient approach will be applying the fee to brand owners for target materials. However, this is likely to be

perceived as inequitable and the costs of applying the fee to supply chain signatories for all materials may not be much greater. Limiting fees to signatories or brand owners whose performance under the Covenant has not met expectations is also fraught with difficulties[22]. The Covenant embraces a broad range of environmental objectives, and weighting them to assess contributions from individual entities would be subjective.

The key options for structure of the ADF are:

- a *flat* fee (same level for all fee payers)
- a *variable* fee by size (based on turnover similar to current Covenant contribution schedule)
- a *variable* fee by contribution to packaging problem (for example, based on weight of packaging sold)
- a *variable* fee by performance under Covenant, with better performers rewarded with lower fee levels
- a *variable* fee by performance under Covenant for target materials, with better performers rewarded with lower fee level.

Again, if meeting the overall recycling target is the top priority then the most efficient approach will be a variable fee based on performance under the Covenant for the target materials of paper/cardboard and glass. Options for assessing expectations/signatory performance include:

- yes/no decision (similar to current system for referral to jurisdictions for compliance under NEPM)
- simple scale of performance (for example, met all expectations, exceeded expectations, outstanding contribution to meeting glass/paper recycling targets), perhaps based on a scoring system incorporating all relevant KPIs
- fees tied to particular KPIs for the target materials (for example, amount of on-site glass and paper not recycled, percentage of non-recycled content in glass and paper/cardboard manufactured).

Fees tied to particular KPIs would be the most direct method, however given the problems with data and baselines, there may be reluctance to tie the fees to specific numbers on recycling. The yes/no decision would be the lowest cost option – however, this is still likely to require changes to the current review/auditing process. The simple scale of performance could be a better option, as it would provide a greater incentive for outstanding performance than the yes/no decision. However, it would require development of an assessment approach that brand owners had confidence in. It may also be criticised on the grounds that the data is not available at this level and that the current

[22] Perchards Consultants, 2007, ibid.

set up has absolutely no requirement for individual companies to be responsible for tracking their data to this degree.

There are also various ways an ADF could fit with the current contributions system. For example, the ADF could be payable on top of the current contributions, or it could replace the current contributions system. Signatories are unlikely to be happy with an additional ADF, but if you replaced the current contribution so that the fee was 100% based on performance, you would run the risk that there would not be any revenue for administration. A performance-based ADF payable on top of contributions (but with lower level of contributions) is likely to be most acceptable.

Another variation on the fee structure would be to offer fee offsets where a brand owner/signatory can demonstrate that they have increased recycling. This would mean the performance of all participants does not need to be established, with the onus on those who can cost-effectively promote increased recycling to do so and self-nominate. Fee offset rates could be set slightly lower than the prevailing cost per tonne being spent under NPC project programs, in order to cover the administrative costs of considering the request for a fee offset. There may be some issues if signatory-initiated programs had a negative spillover effect on a NPC project, however, this could be dealt with in offset rules.

Implementation of an ADF would require regulation, which may be possible under the NEPM framework or under other national legislation. It would require variation of the NEPM framework, as it would have ramifications for the treatment of free riders. There is a risk that implementation of an ADF may not be possible under the NEPM unless it was only to apply to free riders. Under the current framework, the NEPM would have to say that a stakeholder must pay an ADF unless they are a signatory to the Covenant. A performance-based ADF is really not consistent with the current NPC set up. The changes would need to ensure that the imposition of the ADF did not provide an incentive for signatories to leave the Covenant. Other key features of the existing framework may also need revision (for example, the threshold for brand owners subject to the NEPM). Such changes would require a major variation of the NEPM, which could take up to 18 months.

For illustrative purposes, Chapter 5 will examine the likely administrative costs of applying a variable ADF to provide an incentive for source reduction and raise revenue to increase recycling. The revenue would be allocated through the existing process for funding of NPC projects.

The administrative costs are estimated under scenarios where the ADF:

- applies to brand owners versus all supply chain signatories
- applies to target materials (of paper/cardboard and glass) only versus all materials
- is based on weight of packaging sold/yes or no decision/simple scale of performance
- is with and without fee offsets.

4.3.2 Subsidies using competitive tender

This option involves increasing the funds allocated to NPC projects to a level that will allow them to purchase additional recycling services to close the gap between current recycling and the 2010 target level, and should make it possible to achieve more incremental recycling per dollar spent. It also involves a change to the scope and approach to funding NPC projects, which may not be deemed to be complementary to the Covenant by some stakeholders. The current funding approach has been developed to help achieve the recycling targets and broader objectives of the Covenant. Projects are approved by the National Projects Group comprising representatives of Australian jurisdictions of EPHC, local government and the packaging supply chain. A cornerstone of the funding arrangement is matched funding between the packaging supply chain and government. The packaging supply chain has committed to raise $3m per annum. This means potential funds of up to $6m per annum, however funding of any individual project is limited by the availability of both industry and government funds. The current funding guidelines give priority to projects that collect or reprocess greater than 5,000 additional tonnes of used packaging material each year and are able to be completed within two years of approval.

A range of different activities in different parts of the supply chain can contribute to the Covenant goals including for example source reduction, improved recyclability of packaging, collection of recyclables, reprocessing of recyclables, and market development. However, given the limited funds available under the current approach, they are generally allocated to research projects and trials and seed funding for infrastructure start-up, establishment or expansion where long-term ongoing viability of recycling can be demonstrated. The funding guidelines also specify that activities that are the core obligations of signatories under the Covenant (for example, reasonable and expected as commitments under action plans) will not be funded.

This option would involve significant additional funding and would open up the scope of the NPC project funding process to allow for *any* projects to be put forward to compete for funds allocated as a direct subsidy per tonne of packaging material recycled, reused or avoided. The options for the source of the funding and changes that may be required to ensure availability of funds are discussed at the end of this section. Thus, the key difference with the current arrangements are twofold: first, funding is not restricted to a small number of options; and second, it could be targeted according to performance achieved. Note, however, that the current framework specifically rules out the provision of subsidies per tonne for any material, so that changes to the framework may be required to allow for this.

The information that government has on the costs of different recycling activities is poor. Reuse and recycling businesses have information on their own unique costs. The aim of competitive purchasing approaches is to overcome this information asymmetry and allow low-cost opportunities to be revealed.

Alternative approaches that could be employed to competitively purchase recycling/reuse services, include by:

- *Bilateral negotiation* – involves the direct negotiation between government and one or more sellers.
- *Competitive tender* – involves a discrete sales process where government retains significant flexibility in how the successful seller will be chosen and can allow negotiation on final terms with that bidder.
- *Auction format* – involves a more structured sales process of a clearly defined commodity with clear rules on how prices will be struck and bidders chosen to complete the sale.

Negotiated outcomes allow the unique circumstances of individual sellers to be considered and factored into price or non-price aspects of contracts. However, the negotiations are only informed by the price information that the participants bring to the negotiations, rather than the collective valuations of all potential sellers. Consequently, tender or auction approaches are more useful when the services – recycling / reuse / avoidance of packaging waste – do not have a fixed or determined market value.

Auctions in particular can be used to maximise price discovery by providing an explicit mechanism that identifies market depth and describes how prices are formed. They can also be less costly and time consuming than a series of individual negotiations. A disadvantage with an auction format is the need for well defined and standardised performance outcomes.

Initially, a competitive tender process is more likely to be suitable. Under the current application process, companies indicate the amount and type of waste material to be recycled as part of their bids and the level of funding sought. In this way, companies would compete against each other for funding and reveal their cost-effectiveness in providing the waste recycling/reuse service. Competition would ensure that successful bidders would receive just enough to facilitate the action, while minimising costs to the subsidy scheme.

If the focus of the program was only on meeting the target recycling percentage (based on volumes of recycling and consumption), the bids would be ranked from most to least desirable based on the cost to the program in terms of $/tonne of waste recycled. There would be potential for other objectives of the Covenant to be taken into account through a weighting process or the use of minimum and maximum caps[23].

Importantly, agreement would need to be struck on how recycling outcomes would be measured, reported and audited, and if appropriate, how risks would be shared. For example, low-cost but risky ventures (such as involving new technology development),

[23] Perchards Consulting, 2007, suggested that "a competitive tendering process could be used as the precursor to a national producer responsibility system. Local authorities could put forward plans for an enhanced collection and sorting system, and the most cost-effective could be part-funded".

may require a greater proportion of support to be provided upon successful recycling/reuse of targeted volumes. Similarly, non-performance conditions for all recipients would need to be specified.

Contracts would require that recycling/reuse actually takes place. Once the recycled products are produced, the likelihood of dumping should be small as long as product quality is competitive. As under current NPC projects, support would only be directed to products assessed as meeting appropriate product standards and market needs.

In order for the competitive allocation process to be credible, legal contracts would need to be established with successful applicants binding them to deliver the outcomes accompanying their bids. The process would need to demonstrate principles such as fairness and impartiality, consistency and transparency, security and confidentiality and identification/resolution of conflicts of interest and compliance with legislation obligations and government policy (as they apply to tendering).

Under this option, subsidies could be funded from general government revenue, greater contributions from supply chain signatories under the existing contribution system, or a combination of both. The source of funding won't impact on the effectiveness of this option, however it obviously has equity implications.

This option may require a more certain funding source than under the current arrangements, perhaps by establishing a Trust holding contributions from both industry and government upfront. The competitive tender process could be implemented by the NPC secretariat (and may require additional resources and skills) with the sign-off for projects remaining the responsibility of the National Projects Group. Alternatively, it may require a separate scheme managed by government with legislative backing.

The funding required will ultimately depend on the level of recycling required to be achieved and the estimated cost of achieving that level.

For illustrative purposes, Chapter 5 evaluates the likely costs of increasing recycling through a competitive tender subsidy program, taking into account possible cost savings compared to the current funding process and the broader scope of applicants, as well as the likely administrative costs of such a program. We also examine the application of the program to all materials versus target materials only (cardboard/paper and glass).

4.3.3 Recycling certificate scheme

A recycling certificate scheme could be implemented in a number of different ways. This section explores some of the key features that could be used for the purpose of the illustrative assessment (i.e. it is not a detailed instrument design).

The recycling gap is estimated at an additional 500,000 tonnes per annum of packaging materials by 2010. A recycling certificate scheme could focus on the target materials of glass and paper/cardboard (given these materials dominate overall quantities), or could be applied to a broader set of materials.

The liable parties in the scheme could include all parties in the packaging supply chain – raw materials suppliers, packaging manufacturers/suppliers, brand owners of consumer products, wholesalers/ retailers of consumer products or it could be limited to brand owners to simplify the system. The UK scheme covers raw material suppliers, packaging producers, packers/fillers, and sellers of packaged goods.

The obligations for liable parties could be stated in terms of recycling of any packaging material or target materials only (i.e. the liable party must meet recycling obligation by recycling glass, paper/cardboard or some of each). The obligations could be allocated according to position in the packaging chain (if liable parties included different parties in packaging chain); in line with share of turnover; or in line with share of packaging handled/supplied/sold (as in the UK scheme).

If obligations applied only to brand owners, the share of the target required to be met could reflect their share of the total weight of consumer packaging sold into the Australian market for the previous year (currently required to be reported on as a key performance indicator in action plans and annual reports).

Credits could be issued to or created by:

- recyclers/reprocessors (as in the UK scheme)
- brand owners.

A recycling certificate scheme with credits assigned to brand owners would be more costly to implement because brand sorting would be required. However, the advantage of brand sorting would be that a direct financial incentive would be provided to brand owners. Brand sorting would add significant complexity and would not be worthwhile if the key focus is the overall recycling gap.

Another issue to consider would be the boundaries of the scheme. In the UK, credits can be created for recycling within Australia as well as overseas. The UK scheme has been criticised as reprocessing of UK packaging abroad has increased, while reprocessing in the UK has declined under the scheme.

Implementation of a recycling certification scheme would require establishing supporting regulation, a new regulatory body, new systems for accreditation, reporting and trading.

For illustrative purposes, Chapter 5 evaluates the likely outcomes of a UK style recycling certificate scheme to increase recycling[24]. The analysis assumes obligations would apply to brand owners based on their share of total weight of packaging sold into the Australian market for the previous year with credits issued to recyclers/reprocessors. We examine

[24] According to Perchards Consulting, 2007, the UK recycling certificate scheme has not been a great success. They go on to say that it is difficult to determine whether the lack of success is due to system design or the fact that a certificate scheme is "intrinsically flawed". The purpose of our study is to illustrate the basic concepts and to provide a broad assessment of the benefits and costs of an indicative sheme. A more detailed cost benefit analysis would need to be undertaken if this type of scheme was pursued further.

the option of applying the scheme to all materials or only the target materials of paper/cardboard and glass.

4.3.4 Combined ADF and subsidies using competitive tender

This option involves combining an ADF with the broader competitive tender subsidy program. For illustrative purposes, Chapter 5 evaluates the likely outcomes of this combination where the program is applied to all materials versus target materials only (cardboard/paper and glass), and brand owners versus all supply chain signatories. This is the basis for the successful Oil Product Stewardship Scheme, which has resulted in a substantial increase in the volume of used oil recycled[25].

[25] Although successful at a national level, the rate of recycling has not increased uniformly across all jurisdictions. In some states, the changing nature of fuel markets has favoured gas at the expense of used oil as a burner fuel, and this affected recycling rates.

5 ASSESSMENT OF SHORT LISTED MECHANISMS

This section provides a quantitative analysis of each of the four short listed mechanisms. The analysis is illustrative only, in order to examine the relative merits of the different mechanisms. A more detailed cost-benefit analysis may be required should the EHPC consider further the recommended economic mechanisms.

Section 5.1 sets out the methodology for the assessment. Appendix H provides more details on the methodology and assumptions used. Sections 5.2 to 5.5 show the quantity of additional material required to be recycled to meet the difference between the current packaging recycling rate and the Covenant's 2010 national recycling target of 65% (the recycling gap) under each option and the likely order of magnitude of associated costs of administration and compliance. Section 5.6 summarises the results across options and also examines the likely outcomes by material and sector.

5.1 Assessment methodology

The purpose of the analysis is to examine the relativities between options and the relative merits of different economic mechanisms. The methodology for the quantitative assessment is a comparison of the incremental costs of implementing each of the options (and variations on options) to achieve the increase in recycling required to meet the recycling gap. The analysis is illustrative only and assumes no progress towards the targets in the absence of the economic mechanisms. The estimated costs of options therefore do not represent forecasts of likely costs in achieving the recycling target. Rather, the analysis has been developed to inform option selection only and more precise cost estimates would need to be developed during detailed design of any individual mechanism.

The assessment of each individual option requires an assumption about the likely level of source reduction, calculation of the resulting quantity of additional recycling needed to meet the recycling gap by 2010, identification of the least cost combination of recycling by material and sector, then estimation of the costs of source reduction, additional recycling (including collection, sorting and reprocessing) and administration for both government and signatories/participants.

The key indicators used for assessing the merits of the options are:

- total costs of the option ($m per annum)
- cost per tonne of overall recycling gap met ($ per tonne)
- volume of waste diverted from landfill (tonnes per annum).

Note that there is no discussion of the financial impact of options, as the analysis is not a basis for setting of fees, obligations or revenue streams. In practice, the costs would be

passed on to consumers and/or taxpayers depending on the incidence of obligations and, in the case of subsidies, how they are financed.

Note also that the analysis assumes a given level of additional recycling achieved under each measure to achieve the stated percentage target of recycling. The percentage rate is likely to increase under existing measures, so that a lower level of recycling may need to be achieved by each mechanism than is assumed in the analysis below. However, the analysis using the assumed additional rates of recycling is still valid for comparing the relative merits of the selected mechanisms.

5.2 Performance-based advance disposal fee

A variable ADF will provide an incentive for source reduction and raise revenue to fund increased recycling. Under this option it is assumed that the revenue would be allocated through the existing process for funding of NPC projects. As discussed in Section 4.3.1 there are various ways to craft an ADF, however we do not have adequate information on the characteristics of brand owners to provide any quantitative assessment of which design would provide the most cost-effective outcome. For the purpose of the assessment of compliance costs, we have assumed that a performance-based ADF could be crafted to encourage source reduction of around 2% between now and 2010.

The administration costs of three different variations of the ADF are examined: a simple scale of performance; a dual fee system for those complying/not complying with the Covenant; and one based on the percentage weight of packaging sold. For the latter two, we have included the opportunity for supply chain signatories to demonstrate recycling or source reduction to access fee offsets in our assessment of the administration required.

Under a scenario with a performance-based advance disposal fee that encouraged source reduction of around 2% between now and 2010, the increase in recycling required to achieve the recycling gap would be around 470,000 tonnes per annum[26]. If the ADF funds were used to fund the cheapest downstream recycling activities for any material, Table 5-1 shows the estimated breakdown of the additional material that would be recycled.

Table 5-1 Additional material recycled under ADF

Material	Additional recycling (tonnes/year)
Paper/cardboard	418,300
Glass	35,100
Plastics	5,900
Steel cans	6,500
Aluminium	1,700
Total	**467,500**

The likely costs of source reduction and additional recycling are shown in Table 5-2 below.

[26] Note the level of source reduction is an assumption for the purposes of assessing the relative merits of the ADF.

Table 5-2 Costs of source reduction and additional recycling under ADF

Type of cost	Cost ($m/year)
Source reduction [27]	1.8
Additional collection infrastructure	2.7
Collection	24.6
Transport	18.1
Sorting	44.5
Processing	50.7
Material revenues	- 62.7
Total costs	**79.8**

We have assumed that the scheme would include around 450 supply chain signatories and require set-up costs of around $500,000 to $700,000 (over eighteen months), depending on the fee structure [28]. This includes the costs of developing a regulation setting fees and the process of varying the NEPM. Ongoing costs would include auditing of 20% of signatories, at a cost of $2,000 to government and $2,000 to the signatory. Other costs to government include $500 per signatory on assessing performance and $200 per signatory for collecting fees.

Where signatories choose to demonstrate source reduction or recycling activities to gain fee offsets, we have assumed extra administrative costs of $3,000 per signatory. Table 5-3 shows the estimated administrative costs of different ADF schemes.

Table 5-3 Administrative costs of ADF schemes

Costs ($m per annum)	Simple performance scale	Yes/no ADF with fee offsets	ADF on % packaging sold with fee offsets
NPC administrative costs	1.2	0.9	0.8
Signatory administrative costs	0.18	0.32	0.32
Total	**1.39**	**1.22**	**1.15**

The total costs of an ADF scheme are therefore expected to be in the order of $80m.

The savings in administrative costs of applying the fee only to brand owners would be around $100,000 to $200,000 per annum. However, from an equity perspective, an ADF applied to supply chain signatories is likely to be preferred.

If the ADF was applied only to target materials, the administrative savings would be around $110,000 to $170,000 per annum, depending on the approach to applying the ADF. Restricting the scheme to target materials would also result in slightly higher compliance costs, (because there is less source reduction and fewer recycling options to choose). The extra compliance costs resulting from this are estimated at $1.5m per annum.

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[27] The total source reduction costs for this and other mechanisms are generally lower than recycling costs because it is assumed that only limited source reduction would occur in Australia as a result of the ADF. Opportunities for light weighting are uncertain, given the higher incidence of product failure that may occur with light weighting.

[28] The reference in this section to set-up costs of applying fees refers to the additional costs of administration. This excludes the fees collected from signatories which are a transfer rather than an economic cost.

5.3 Recycling subsidies by competitive tender

This option involves increasing the funds allocated to NPC projects to a level that will allow them to purchase or establish recycling services to close the gap between current recycling and the 2010 target level. There are two key differences between the current NPC funding program and this mechanism. The first is the use of competitive tender to strictly allocate funds on a cost per tonne recycling basis, and the second is broadening the availability of funds to a wider set of applicants, allowing upstream projects such as source reduction to be funded as well as downstream projects for collection and reprocessing.

It is assumed that the subsidy scheme will encourage source reduction of around 2% between now and 2010. Therefore, the increase in recycling required to meet the recycling gap is similar to the previous option at around 470,000 tonnes per annum. The additional material recycled is shown in Table 5-4.

Table 5-4 Additional material recycled under tender subsidy program

Material	Additional recycling (tonnes/year)
Paper/cardboard	418,300
Glass	35,100
Plastics	5,900
Steel cans	6,500
Aluminium	1,700
Total	**467,500**

The likely costs of source reduction and additional recycling are shown in Table 5-5. The costs of additional recycling are lower than for the ADF scheme above, because the competitive tender process and the broader scope of activities that can be funded is likely to achieve the same overall tonne reduction at a lower overall cost.

Table 5-5 Costs of source reduction and additional recycling under tender subsidy program

Type of cost	Costs ($m/year)
Source reduction	1.8
Additional collection infrastructure	2.7
Collection	18.9
Transport	18.1
Sorting	34.2
Processing	39.0
Material revenues	- 62.7
Total costs	**52.1**

The NPC secretariat has advised that they currently spend around $150,000 per annum for administration on projects, (for a notional total of up to $6m under the current funding process). In addition to this, there are currently costs incurred by jurisdictions and other stakeholders in project proposals as well as the time spent by the National Projects Group approving projects.

Under this option, additional resources would be required for developing the cost-sharing approach, securing funding and possibly establishing a Trust Fund, as well as for implementing the tender process and the greater workload associated with the allocation of more funds.

The administrative costs of the competitive tender subsidy scheme are estimated at around $300,000 for scheme set-up and an extra $250,000 per annum for ongoing administration. The costs of administration for subsidy receivers are estimated at $400,000 per annum. The breakdown of the total costs of the competitive tender subsidy program of around $53m per annum are shown in Table 5-6.

Table 5-6 Total costs of competitive tender subsidy program, $ million per annum

Type of costs	Costs ($m/year)
Administrative costs to government	0.3
Administrative costs to subsidy receivers	0.4
Compliance costs	52.1
Total	**52.8**

The administrative costs of the subsidy program would be similar, whether initiatives relating all materials or only target materials were allowed to be considered for funding. Restricting the scheme funding to target materials would, however, result in slightly higher compliance costs, because there would be a smaller set of initiatives to choose from[29]. The extra compliance costs resulting from this are estimated at $3.8m per annum. Further, there may be other implications resulting from restricting the scheme funding to target material [30].

5.4 Recycling certificate scheme

A UK style recycling certificate scheme with obligations applying to around 375 brand owners based on their share of total weight of packaging materials sold would provide incentives for source reduction (to minimise their obligation), as well as least cost recycling achieved through a competitive market. This section presents the likely outcomes of a scheme covering all materials – paper/cardboard, glass, plastic and metals. We also discuss the impacts of restricting the scheme to the target materials of paper/cardboard and glass.

It is assumed that the obligations under the certificate recycling scheme will encourage source reduction of around 5% between now and 2010 and therefore, the increase in recycling required to meet the recycling gap is around 380,000 tonnes per annum [31]. Table 5-7 shows the likely breakdown of the additional material that would be recycled.

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[29] And may prevent other low cost recycling options for other packaging materials from being adopted.

[30] Perchards Consulting, 2007, ibid, points out that targeted funding may lead to a "situation where users of plastic or metal packaging are criticised for doing less to minimise packaging waste than users of glass or paper and board."

[31] Note that the level of recyling assumed here is less than the level of recyling assumed for the ADF and subsidy schemes. The target was based on a predilection for Governments in Australia to impose percentage targets in increments of 5%.

Table 5-7 Additional material recycled (tonnes/year)

Material	Additional recycling (tonnes/year)
Paper/cardboard	352,600
Glass	22,000
Plastics	200
Steel cans	5,300
Aluminium	600
Total	**380,700**

The creation of a market for recycling activity would ensure that the least cost recycling of materials would result. Table 5-8 provides estimates of the costs of source reduction and additional recycling under this option.

Table 5-8 Costs of source reduction and additional recycling

Type of cost	Costs ($m/year)
Source reduction	4.5
Additional collection infrastructure	2.2
Collection	15.4
Transport	14.9
Sorting	24.7
Processing	27.2
Material revenues	-49.1
Total Costs	**39.8**

The set-up costs for the recycling certificate scheme are estimated at around $2 million over three years with ongoing costs of $1.3 million per annum. The costs of set-up include developing a scheme design, introducing supporting regulation, establishing a new regulatory body, new systems for accreditation, reporting and trading. These estimates of ongoing costs take into account the likely number of participants and costs of registration of certificates, surrender of certificates, lodging of statements, accreditation of recyclers and audit activities.

The costs have been compared to the costs of administering the packaging recovery notes in the UK. In 2003 there were around 5,000 registered producers in this scheme, 300 accredited reprocessors and 100 accredited exporters. Agencies monitor around 33% of registered producers each year. The agency costs of administration, maintenance and enforcement were estimated at up to EUR 15.2 million in 2004. Taking into account the difference in the currency and likely number of registered producers, this translates to around $1.5m per annum, which is reasonably consistent with the estimates above. Table 5-9 summarises the total costs of the recycling certificate scheme of around $44m per annum.

Table 5-9 Total costs of recycling certificate scheme

Cost Component	Costs ($m/year)
Administrative costs to government	2.24
Administrative costs to participants	1.73
Compliance costs	39.80
Total	**43.76**

Restricting the scheme to the target materials of paper/cardboard and glass may slightly reduce administrative costs (by around $300,000 per annum). However, this would also result in extra compliance costs of around $9.7m per annum, as some of the cheaper recycling options for other materials would be excluded.

5.5 Combined ADF/subsidy program with competitive tender

The illustrative combined ADF with the broader competitive tender subsidy program is based on around 450 supply chain signatories paying a performance-based ADF with an opportunity to access funding for upstream projects such as source reduction through the competitive tender subsidy program. As we do not have adequate information on the characteristics of brand owners to provide any quantitative assessment of which ADF design would provide the most cost-effective outcome, we have assumed that a performance-based ADF could be crafted, along with the subsidy scheme, to encourage source reduction of around 5% between now and 2010.

With source reduction of around 5% across all materials between now and 2010, the increase in recycling required to meet the recycling gap is around 380,000 tonnes per annum. Table 5-10 shows the likely breakdown of the additional material that would be recycled.

Table 5-10 Additional material recycled

Material	Additional recycling (tonnes/year)
Paper/cardboard	352,600
Glass	22,000
Plastics	200
Steel cans	5,300
Aluminium	600
Total	**380,700**

The estimated costs of source reduction and additional recycling are shown in Table 5-11.

Table 5-11 Costs of source reduction and additional recycling

Cost component	Costs ($m per/year)
Source reduction	4.5
Additional collection infrastructure	2.2
Collection	15.4
Transport	14.9
Sorting	24.7
Processing	27.2
Material revenues	-49.1
Total cost	**39.8**

The administrative costs and total costs are summarised in Table 5-12 and Table 5-13. The total costs of the scheme are estimated at around $40m per annum.

Table 5-12 Administrative costs of ADF/tender subsidy program

Administrative costs	Costs ($m per/year)
NPC administration costs	1.45
Signatory administration costs	0.18
Admin costs to subsidy receivers	0.41
Total	**2.04**

Table 5-13 Total costs of ADF/tender subsidy program

Cost component	Costs ($m per/year)
Administrative costs	2.04
Compliance costs	39.80
Total	**41.84**

As with other options, restricting the scheme to the target materials of paper/cardboard and glass may slightly reduce administrative costs. However, this would also result in extra compliance costs of around $9.7m per annum, as some of the cheaper recycling options for other materials would be excluded.

5.6 Comparison of aggregate outcomes across options

This section provides a comparative analysis of the different mechanisms, covering the recycling required to meet the target under each option, their administrative and compliance costs, the costs per tonne of the overall recycling gap required to meet the 65% target, and the volume of waste sent to landfill.

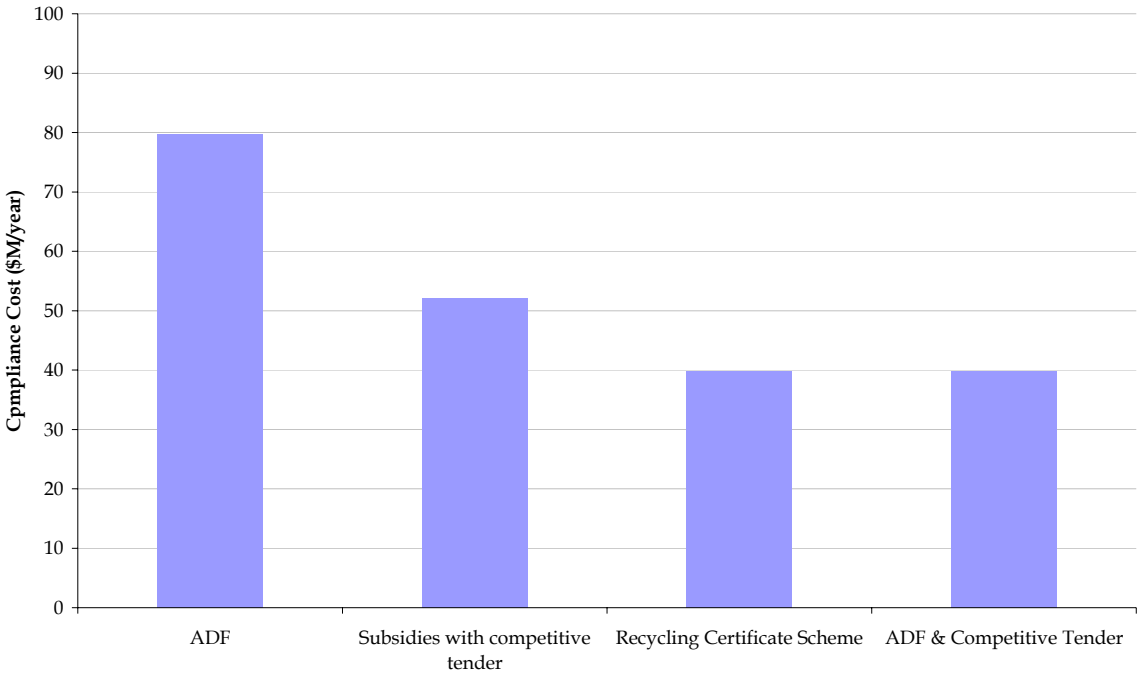
Table 5-14 provides a comparison of the additional recycling required under the main options. The additional material required to be recycled to meet the recycling gap (in the absence of other initiatives), is lowest under the combined ADF/competitive tender subsidy program and recycling certificate scheme because they are likely to lead to higher source reduction compared to the other options.

Table 5-14 Additional material required to be recycled

Mechanism	Additional recycling (tonnes/year)
ADF & existing funding process	467,500
Subsidies with competitive tender	467,500
Recycling certificate	380,700
ADF & competitive tender	380,700

The amount of material required to be recycled to meet the target under each option influences the total compliance costs. Figure 5-1 compares the estimated compliance costs across mechanisms.

Figure 5-1 Estimated compliance costs of mechanisms



The ADF scheme has the highest compliance costs, as existing funding processes are used to subsidise recycling activities and these are limited to downstream activities and do not use strictly competitive processes. The recycling certificate scheme achieves the lowest compliance costs by:

- providing an incentive for source reduction through the setting of recycling obligations related to packaging sold
- creating a market to achieve the recycling gap at least cost.

The combined ADF with competitive tender is thought to achieve compliance at an equivalent cost to the recycling certificate scheme through the source reduction incentive provided by the ADF itself, as well as the use of a competitive tender subsidy approach that allows funding of both upstream and downstream avoidance and recycling activities.

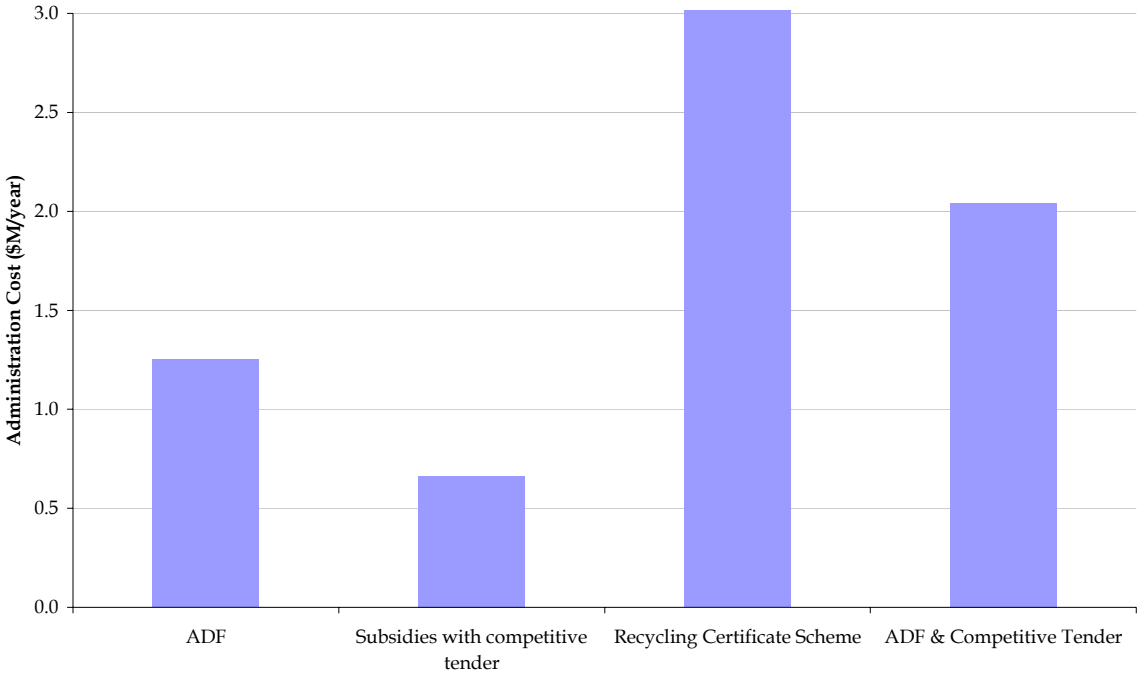
In theory, the recycling certificate scheme and combined ADF with competitive tender would both provide the least cost outcome. In practice, their relative performance would be dictated by attention to design and implementation detail.

The estimated compliance costs under the subsidies with competitive tender are slightly higher than these, because a greater quantity of material is required to be recycled as there is no added incentive for source reduction, (apart from the existence of subsidies to support these activities).

The administrative costs are compared in Figure 5-2 and cover both costs to government and supply chain signatories or participants in each scheme. The administrative costs of the recycling certificate scheme are estimated to be significantly higher than all the other

options, at around $3m per annum. The lowest administrative costs are estimated for the subsidy program using a competitive tender process at an extra cost of around $650,000 per annum.

Figure 5-2 Estimated administrative costs of mechanisms



It should be noted that these costs exclude any costs that would be incurred by both government and scheme participants associated with skilling-up to become familiar and competent in implementing the mechanisms. This would be relevant for all options, but may be greatest for the recycling certificate scheme.

The total costs of meeting the recycling gap using each mechanism are shown in Table 5-15. The ADF option has the highest costs (around $80m per annum) and the combined ADF/competitive tender subsidy scheme has the lowest cost (around $40m per annum). Although the compliance costs of the recycling certificate scheme and combined ADF/competitive tender scheme are expected to be similar, the administrative costs of the recycling certificate scheme are likely to be higher, giving it a higher overall cost.

Table 5-15 Total costs of using mechanisms to meet recycling gap

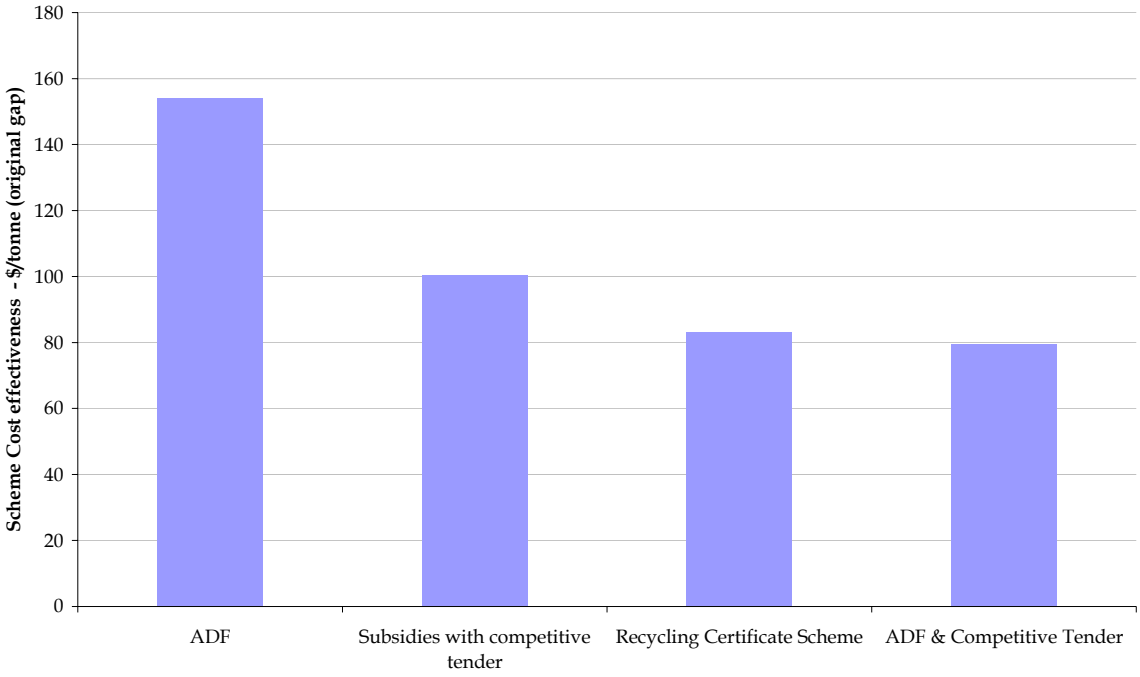
Mechanism	Total cost ($m/annum)
ADF	81
Subsidies by competitive tender	53
Recycling certificate scheme	44
ADF & competitive tender subsidy	42

The results show that the options involving competitive tender and market creation (recycling certificate scheme) significantly reduce compliance costs compared to the straight ADF. Although the lowest cost option is the combined ADF/competitive tender

program, the costs are not much lower than the recycling certificate scheme and only around $10m lower than the subsidy program with competitive tender.

The cost effectiveness of the schemes has also been calculated by dividing the cost of each scheme by the recycling gap. Figure 5-3 provides the results.

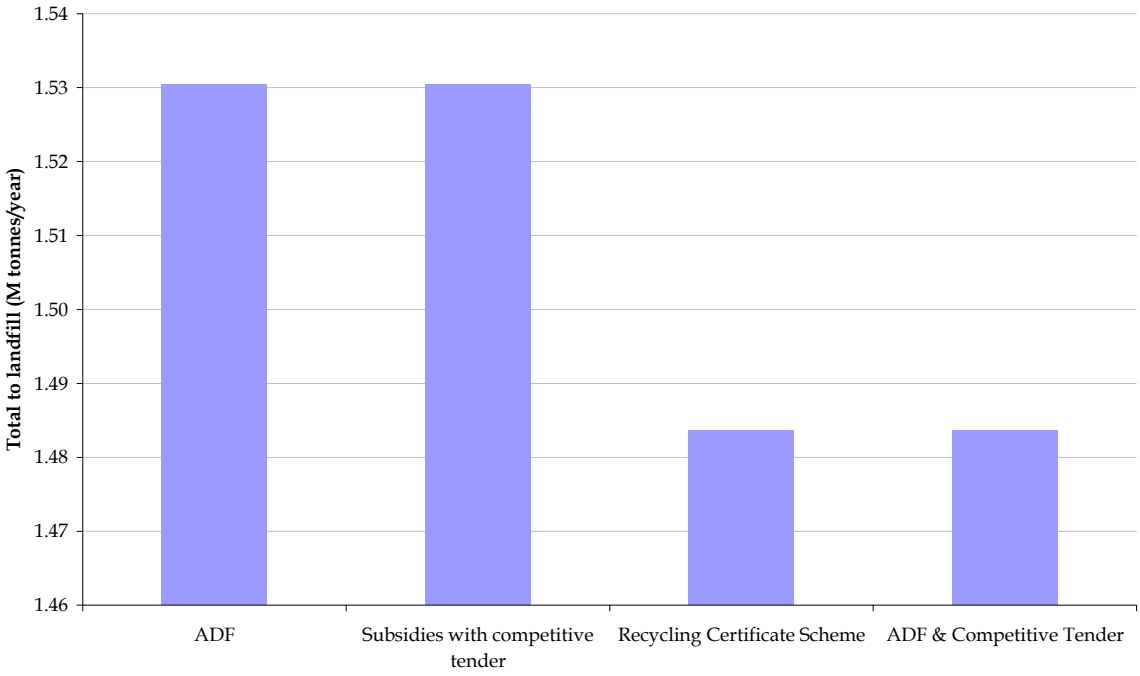
Figure 5-3 Cost effectiveness of economic mechanisms



The combined ADF/competitive tender is the most cost effective mechanism and the ADF is far less cost effective than the other three mechanisms.

The estimated volume of packaging sent to landfill per annum under each mechanism is shown in Figure 5-4. The recycling certificate scheme and combined ADF/competitive tender result in the greatest diversion of materials from landfill through both source reduction and additional recycling.

Figure 5-4 Packaging to landfill under each mechanism



5.7 Outcomes by sector and material

The figures presented in this section are illustrative only, as the analysis has been designed to assess the relative overall costs of different mechanisms. However, the economic modelling has also provided estimates of recycling outcomes by sector and material to meet the overall recycling gap under different mechanisms. There are a number of variables that influence the outcomes including:

- Marginal cost of recycling materials – individual cost functions (curves) for collection, transportation, sorting and reprocessing were developed. In general, C&I collection is more expensive than MSW collection, and the costs of each increase as the amount of waste collected increases.
- Market values for materials.
- Material available for recycling - determined by the gap between the amount consumed and the amount currently recycled in each sector with relevant limits placed on the percentage of recycling achievable for each material. This gap is also affected by the source reduction expected under each mechanism.

Within the operating parameters of each option, the model seeks to minimise compliance costs by selecting the material/sector mix that meets the recycling gap with the lowest cost net of revenues for the materials and while keeping within the recycling limit of each material in each sector.

Table 5-16 shows the additional recycling by material and sector suggested by the analysis under the recycling certificate scheme and combined ADF/competitive tender subsidy program.

Table 5-16 Additional recycling by material and sector

Material	MSW (tonnes/year)	C&I (tonnes/year)
Paper/cardboard	141,031	211,546
Glass	17,473	4,484
Plastics	99	119
Steel cans	0	5,280
Aluminium	0	2,475
Total	**158,603**	**223,905**

Sixty percent of the additional paper recycling to meet the overall target is expected to be sourced from the C&I sector, and around 20% of the extra glass recycled is expected to come from that sector under the recycling certificate scheme and combined ADF/competitive tender subsidy program. The options with less source reduction (the straight ADF and subsidy schemes) and therefore greater tonnages required to be recycled, result in a similar split for extra paper recycling (60% from C&I) and extra glass recycling (30% from C&I).

In Section 2.4 we identified that paper/cardboard and glass from the C&I sector were likely to be the key opportunities for meeting the overall recycling target, due to the extent of material currently not recycled. The modelling suggests that increased recycling from the MSW sector is also expected to contribute significantly to meeting the target, as the cost of collecting the increased volumes from this sector are generally lower than from the C&I sector [32].

Another pertinent issue to examine is whether the individual material recycling targets under the Covenant are likely to be met under the economic mechanisms. Table 5-17 shows how recycling performance compares to the targets for individual materials under the recycling certificate scheme and combined ADF/competitive tender subsidy program.

Table 5-17 Recycling performance and individual material targets

Material	Predicted recycling performance	Target recycling performance
Paper/cardboard	80%	70–80%
Glass	47%	50–60%
Plastics	31%	30–35%
Steel cans	43%	60–65%
Aluminium	72%	70–75%

Under the recycling certificate scheme and combined ADF/competitive tender mechanisms, the target recycling rates for steel cans and glass may not be met. The results are similar for the options with less source reduction, (the straight ADF and subsidy schemes).

[32] This is based on the fact that collection and sorting systems for household waste are relatively well established in Australia, with most areas now having services with multiple bin systems.

A mechanism designed to ensure all individual material targets were met would lead to higher compliance costs. For example, under a recycling certificate scheme designed to ensure all targets were met, as well as the overall 65% packaging recycling target, the compliance costs are estimated to be $42.3m per annum, some 6% higher. The reason the increase is relatively small is that the main material requiring extra recycling under this scenario is steel, and the overall contribution that steel makes to total tonnages is small.

No consideration was given to the contamination levels and marketability of recovered materials in the assessment of the various instruments, as this was considered a second order issue and data to allow for the analysis was scarce. However, further research in this area may be warranted.

The assessed benefits and costs are predicated on the assumed recycling rates. Further research is required on the estimates of the tonnes that can be diverted as a result of implementing each instrument particularly from the C&I sector.

5.8 Implications for structural barriers

Section 4.2.8 discussed in broad terms how different economic mechanisms could potentially address some of the key barriers identified in the *Structural Barriers Investigation Report.*

Some of the key barriers likely to be addressed by the mechanisms examined in this section include:

- extending contracted kerbside collections limited beyond the residential areas (cardboard/glass), through targeting collections systems servicing other areas as part of any subsidy scheme
- reversing the decline in recycling collection service from hotels and clubs (cardboard/glass) by targeting these sectors as part of a subsidy scheme or recycling certificate scheme
- improving financial drivers for brand owners as part of an incentive to avoid ADFs
- providing better recycling data across all materials as part of the compliance process.

6 DISCUSSION AND RECOMMENDATIONS

This section provides a sensitivity analysis for a number of key variables in the analysis presented in Chapter 5. Conclusions are drawn about the merits of the different measures and recommendations made on complementary economic mechanisms for the NPC.

6.1 Sensitivity analysis

Sensitivity analysis has been conducted on a number of key variables for the analysis including:

- level of source reduction and costs
- cost savings from competitive/broader funding programs and market creation
- new reprocessing infrastructure required
- progress towards the recycling target in the absence of mechanisms.

6.1.1 Source reduction

Source reduction has a number of impacts on the costs of achieving the recycling target under different options. Source reduction:

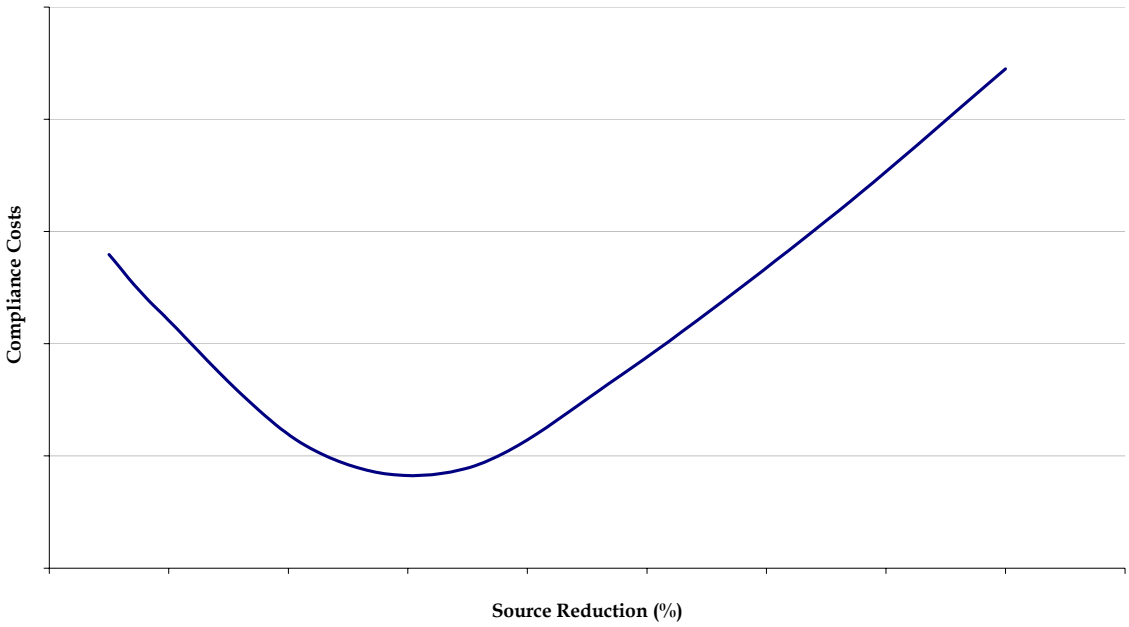
- reduces the quantity of recycling needed to achieve the recycling target, potentially reducing overall recycling costs
- generates costs through the source reduction activities
- potentially increases marginal recycling costs per tonne by reducing the quantity of different materials available for recycling, which in turn may increase overall recycling costs.

At relatively low levels of source reduction, overall costs in meeting the recycling target are estimated to fall. This is because at these levels, the reduced availability of material for recycling was not considered to impact marginal recycling costs, and we have assumed the cost of source reduction is lower than recycling costs for all materials. The impact of this assumption is discussed further below.

At higher levels of source reduction, additional source reduction can actually increase the overall cost of an option in meeting the recycling target. This is because the impact of increases in marginal recycling costs outweighs the savings from the lower quantity of recycling required.

Figure 6-1 summarises the relationship between compliance costs and levels of source reduction.

Figure 6-1 Relationship between compliance costs and source reduction



For example, for the recycling certificate and combined ADF/competitive tender mechanisms, increasing the source reduction from 5% in the base case to 7% actually increases the overall compliance costs of the options by around $10m per annum. This is because the lower availability of materials for recycling requires materials with much higher recycling costs (such as plastics) to be recycled to meet the recycling gap. However, the resulting compliance costs in this scenario remain some $15m per annum less than the cost of the next cheapest option (the competitive tender subsidy scheme).

At higher levels of source reduction it may be possible that mechanisms that encourage source reduction could become more costly than those that don't. This outcome of increasing source reduction leading to higher compliance costs may be considered a perverse outcome of measuring Covenant performance-based on achievement of a specified recycling target rather than landfill diversion target. That is, as shown in Figure 5-4, the mechanisms with source reduction will lead to higher levels of packaging being diverted from landfill. If compared on a cost per tonne of packaging diverted from landfill, those mechanisms with higher levels of source reduction would remain cost-competitive.

And this outcome would hold even if source reduction costs were found to be higher than recycling costs, as under these mechanisms which employ competitive processes or market creation, source reduction would not be pursued.

6.1.2 Cost savings from competitive/broader funding programs and market creation

We have assumed that the cost of recycling projects using the current funding approach would be around 30% more expensive than under a competitive tender mechanism or market creation. As it is a direct relationship, increasing this assumed cost premium does

not affect the relative ranking of options – only the size of the likely cost savings from the competitive tender mechanism, certificate scheme and combined ADF/competitive tender mechanism.

To the extent that this premium could not be realised, the compliance costs associated with these mechanisms would increase, but remain less than those of the ADF to the extent of savings arising from source reduction projects.

6.1.3 New reprocessing infrastructure required

We have assumed that paper and glass reprocessing likely to be required to meet the recycling gap can be reprocessed with current or planned capacity. If new infrastructure is needed, as suggested in stakeholder feedback, then this would increase the compliance costs under all options and possibly by around $10m per annum. Furthermore, if additional capacity is needed, this is unlikely to be completed before 2010. A possibility in the short-term is to export the additional recyclates, as already occurs for some materials collected in Australia.

However, if new infrastructure is needed for the additional reprocessing and the point where it is needed is close to the amount identified to meet the recycling gap, then those options with more source reduction offer the potential to avoid the need for new reprocessing infrastructure. The impact of this would be to significantly increase the cost-competitiveness of the certificate scheme and combined ADF/competitive tender mechanism.

6.1.4 Progress towards targets

The analysis developed for illustrative purposes assumes no increase in recycling levels in the absence of the mechanisms being examined. In practice, there are a number of projects underway under the Covenant that will increase packaging recycling (particularly of glass and plastics), and additional recycling is also likely to be achieved through future NPC projects. The impact of a higher assumed recycling baseline on the analysis will be a smaller recycling gap to meet the Covenant target, and hence lower compliance costs. However, this would not affect the relative merits of the different mechanisms.

6.2 Conclusions

The results show that the options involving competitive tender and market creation (recycling certificates) reduce compliance costs compared to a stand-alone ADF. Although the lowest cost option is the combined ADF/competitive tender mechanism, the savings may not be significantly greater than the recycling certificate scheme or subsidy program with competitive tender.

The assumed level of source reduction is an important determinant of the relative merits of different mechanisms. The analysis assumes that:

- the ADF may achieve source reduction of around 2% as signatories reduce consumption of packaging to pay a lower ADF
- the competitive tender subsidy program may also achieve source reduction of around 2% where funding can be accessed for upstream projects that reduce packaging
- the recycling certificate scheme may achieve a higher level of source reduction (around 5%) through the greater engagement of participants who would seek to reduce their consumption of packaging to minimise their liabilities under the scheme
- the combined ADF/subsidy program may also achieve a higher level of engagement and source reduction on par with that of a recycling certificate scheme (around 5%).

The sensitivity analysis showed that while there is a complex relationship between source reduction and compliance costs in meeting the recycling gap, the relative ranking of options is unlikely to change with different assumptions. Those mechanisms which more effectively engage signatories offer better opportunities for source reduction, higher levels of packaging being diverted from landfill and lower compliance costs.

Another set of key assumptions driving the results relates to the features of subsidy programs: both the type of funding process and the scope of the activities that can be funded. The existing funding program for NPC projects involves a two stage expression of interest process for shared seed funding. As there has been limited price discovery in terms of the marginal cost of increased packaging recycling, opportunities for increased cost-effectiveness are likely to be significant, at least in the short to medium-term. The analysis incorporates the following assumptions about the potential for reducing the costs of recycling through reform of the funding program:

- it may be around 20% more expensive to achieve the recycling gap using the current funding approach compared to a competitive tender program; and
- it may be around 30% more expensive to achieve the recycling gap using the current funding approach compared to one with a competitive tender funding approach as well as a broader scope (including both upstream and downstream projects).

The sensitivity analysis highlighted that to the extent that these savings could not be realised, the compliance costs associated with mechanisms with a reformed funding process would increase, but remain less than those of the ADF to the extent of savings arising from source reduction projects.

Given that both the recycling certificate scheme and combined ADF/competitive tender mechanism are likely to require more time and effort to implement (including new regulations and skilling-up), the subsidy program with competitive tender may be the more realistic short-term option.

There would be many institutional and regulatory issues to resolve to implement a recycling certificate scheme and it is likely to require a set-up and lead-in time of at least three years. As a result, it is probably not a realistic option to assist in meeting the 65%

recycling target by 2010. In addition, it is the most complex mechanism and has a high administrative cost for delivering, at most, a nine percentage point increase in packaging recycling.

The subsidy program using competitive tender could be considered the most complementary, with the best institutional fit in that it may not involve new regulation if signatories agreed to incorporate the reforms under the current Covenant arrangements. That is, if signatories agreed to a higher level of contributions and changes to the scope and approach to project funding.

One of the key issues for consideration is that the current funding process is industry driven and significant changes to the current arrangements would need to be negotiated. Increased funding would be required from industry under the existing industry contribution scheme. There would also be a need for greater certainty over the availability of matched government funding. In addition, the shift to a $/tonne competitive subsidy allocation process would need to be supported by a transparent and auditable framework.

In the absence of signatory agreement to the changes, legislation would be required to introduce an ADF and independent project funding process. If an ADF was pursued, a detailed study would be needed to craft a fee structure that would achieve source reduction while minimising the ongoing costs of administration for both government and signatories. If a new scheme with legislative backing was required, it is likely to be worth the extra effort to move away from the current industry contribution system based on size and make the ADF performance-based.

Importantly, the subsidy program using competitive tender would improve engagement with stakeholders by opening up a funding program to the whole supply chain.

Finally, a more general conclusion is warranted. Implementing any of the measures will take some time. Given that a decision on the choice of instrument will not be finalised until the end of 2008 (after the mid-term review), a scheme is not likely to be in place until mid 2009 at the earliest (and more likely later than this). Thus, there is a real risk that any complementary measure implemented will not have sufficient time to achieve the recycling targets set under the Covenant.

6.3 Recommendations

On balance, the choice appears to be between:

1. **Renegotiate NPC project funding arrangements under current Covenant:** Negotiate new NPC project funding arrangements, including additional funding from government and increased industry contributions (under existing contribution structure). Amend funding approval process to that of competitive tender seeking projects that offer the lowest cost per tonne reduction in packaging volumes, including through either upstream source reduction or downstream recycling activities[33]. The

[33] Note if this option is preferred, there would need to be assurance that any additional funding does not undermine or duplicate other programs already being funded or about to be implemented by various State Government organisations and which are beyond the scope of the NPC.

effectiveness of this arrangement could be enhanced if any financial contributions added specifically for short-term use are directed towards those target materials and sectors in which short-term gains are realistic and achievable. The mid-term review of the Covenant in 2008 would be the most appropriate opportunity to re-negotiate any funding contributions from any of the stakeholder parties.

2. **Establish a parallel ADF and competitive tender subsidy program:** Introduce a legislated mandated ADF (for example, payable based on weight of packaging sold) as well as competitive tender subsidy program to allocate revenue to upstream and downstream recycling activities. Additional regulation would be required, with accompanying regulatory impact assessment analysis and other process requirements, to allow an ADF scheme to be set-up.

If Covenant signatories are unwilling to adopt the first proposal, then stakeholders would need to consider the introduction of new legislation as a means to secure a revenue source for a complementary recycling subsidy program. If this were the case, then as shown under the second proposal, stakeholders should take the opportunity to establish performance-based liabilities to provide maximum incentives for supply chain engagement and source reduction initiatives.

This assessment has been carried out to examine potential economic mechanisms to help achieve an overall packaging recycling target under the Covenant by 2010. The assessment and recommendations may be very different if the focus was on a mechanism to provide incentives applicable to broader Covenant objectives and/or over a longer timeframe. Indeed, given the time limitations for implementing any measure, it may be better to consider the long-term merits of these mechanisms as part of a broader review, which considers the Covenant's successes and limitations, then assesses all options including economic mechanisms to achieve long-term (post 2010) outcomes. Consideration of long-term implications may also result in a range of economic mechanisms being adopted in the long-term to overcome a range of barriers impeding the achievement of Covenant objectives.

Finally, any measures adopted could fundamentally change the structure of the present agreement. Indeed, many stakeholders were of the opinion that adoption of any measure would not be complementary. Adoption of any of the mechanisms discussed in this report would involve significant expenditure and would take about two years to implement, so that even if a measure were deemed to be complementary and should be adopted, there is a real risk that there would not be enough time for the measure to achieve the stated targets in 2010. The issue of complementarity and timing should be considered in more detail as part of the mid-term review, but there is a prospect that only modest proposals will be able to be implemented.

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APPENDIX A BACKGROUND ON THE COVENANT

A.1 The National Packaging Covenant and its review

The National Packaging Covenant was established in 1999 as an agreement between government and industry to work cooperatively to reduce environmental degradation arising from the disposal of used consumer packaging, and to conserve resources. The Covenant aims to minimise the environmental impacts of consumer packaging waste throughout the entire life cycle of the packaging product, and to develop economically viable and sustainable recycling collection systems. The Covenant is supported by a National Environment Protection Measure requiring non-signatories to meet certain standards unless they can show they are achieving equivalent outcomes to those companies implementing the Covenant. Participating companies provide annual financial contributions that are matched dollar for dollar by governments and directed towards the administration of the Covenant, and projects designed to support its objectives. The focus of the first Covenant was packaging material from homes collected in kerbside systems.

The Covenant was extensively reviewed throughout 2004. The evaluation of its performance indicated it had been effective from a process perspective, engaging producers, promoting industry/government collaboration and providing a forum for canvassing reform options. However, from an outcomes perspective, success had been limited and variable. The Covenant has been revised in response to the findings of the evaluation and an associated consultation process and there was general agreement by all stakeholders that the model needed to be significantly strengthened if it was to continue.

A.2 The strengthened National Packaging Covenant

The strengthened Covenant incorporates a number of changes designed to provide a more rigorous compliance and enforcement process with greater accountability, particularly in the areas of demonstrating performance, data collection and reporting.

The Covenant sets out an overarching performance target for 2010 of a national recycling rate of 65% for post-consumer packaging (from a 2003 baseline of 48%). The target is to be achieved with anticipated contributions from:

- paper and cardboard 70-80% (currently 64%)
- glass 50-60% (currently 35%)
- steel 60-65% (currently 44%)
- aluminium 70-75% (currently 64%)
- plastics 30-35% (currently 20%).

The Covenant also specifies no further increase in the amount of packaging waste disposed to landfill over the current (2003) baseline. For materials that are either not currently recycled or are recycled at very low rates (currently 10%), the Covenant specifies a 25% recycling target.

The scope of the Covenant has also been broadened to include the recovery and reuse of packaging materials consumed away from home – workplaces, commercial and industrial premises – as well as material from homes collected in kerbside systems.

A mid-term review will be undertaken by December 2008 to assess the performance of the Covenant, including progress towards its targets.

A.3 Covenant signatories

As of June 2007, there were 507 Covenant signatories. Signatories to the Covenant include brand owners, raw material suppliers, packaging manufacturers, distributors and recovery chain participants such as waste collectors, local governments, recyclers and state, territory and national governments. Brand owners represent the largest section of signatories, with food and beverage brand owners having the largest representation. An estimated 80% of all brands sold in Australia and more than 90% of all packaging manufactured in Australia were signed up to Covenant Mk I. [34]

The break-up of the signatories by sector is shown in Table A-1. Brand owners represent the largest section of signatories. The break-up of brand owners is shown in Table A-2, with food and beverage brand owners having the largest representation.

Table A-1 Covenant Mk II signatories – June 2006[35]

Sector	% of signatories
Brand owners	74
Packaging manufacturer/ supplier	13
Government	5
Industry association	5
Raw material supplier	2
Waste management	1
Community group	0
Wholesaler/retailer	0
Totals	**100**

[34] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
[35] Ibid.

Table A-2 Spread of Covenant signatories by brand owner[36]

State	% of Brand owners
Food	34%
Beverage	17%
Electrical goods/office products	10%
Hardware	10%
Pharmaceutical	8%
Toiletries/hygiene products/cosmetics	7%
Other	6%
Food and beverage	5%
Chemicals/cleaning products	3%

A.4 Complying with the Covenant

As part of their Covenant obligations, signatories are required to submit action plans, annual reports, key performance indicators and baseline data and targets that demonstrate their aims and achievements against Covenant goals and targets. Action plans and annual reports are then sent for assessment against the Covenant and if compliant, placed on the NPC website for public view.[37]

A.4.1 Action plans

The action plan is the basis of a signatory's involvement in the NPC. The action plan outlines what actions the signatories are going to take to meet Covenant goals and targets over a three to five year time period, and ensures that they have targets to report against. The action plan can reference the following sections of the covenant:

- the principles of product stewardship
- the roles and undertakings of Covenant signatories
- the Environmental Code of Practice for Packaging (ECoPP)
- the Key Performance Indicators (KPI's) (outlined in Appendix A).

A.4.2 Annual reports

Annual reports demonstrate what the signatories have achieved in the year against their action plan. It should include an update on each of the actions that they intended to do and provide an update of KPI data.

[36] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
[37] NPC homepage, http://www.packagingcovenant.org.au , last viewed: 26/07/07.

As part of annual reporting industry signatories are also required to complete the Industry Data Aggregation System (IDAS), which is used to aggregate KPI data and provide an understanding of the progress that the Covenant is making towards its goals and targets. [38]

A.4.3 Consequences of non-compliance

The Covenant is supported by the National Environment Protection (Used Packaging Materials) Measure (NEPM) which enables a consistent approach by the jurisdictions to focus on brand owners that do not sign the Covenant, and non-compliant signatories. The NEPM ensures that non-signatories (and non-compliant signatories) do not gain an advantage in the marketplace by not fulfilling commitments commensurate with Covenant signatories. Brand owners with an annual turnover of less than $5 million may choose to sign the Covenant, but will not be subject to the NEPM if they do not.[39]

Action plans and annual reports are assessed by the National Packaging Covenant Council and may also be reviewed or audited at any time. An independent external assessor has been appointed for this purpose and specific criteria have been developed for different types of signatories. If the Council is not satisfied, the non-complying brand owner may be referred to the relevant State or Territory for compliance with its NEPM legislation.

A.5 Assessment of action plans and annual reports

The NPCC has appointed an independent external assessor to review and assess action plans and annual reports. Specific criteria have been developed for each type of signatory: Industry, Industry Association, Government and Local Government. These criteria are used to ascertain whether action plans and annual reports meet the requirements of a signatory under the Covenant. Examples of industry action plan and annual report assessment criteria are shown below.

A.5.1 Industry action plan assessment

The following lists the main assessment criteria for Industry Action Plans:

- plan includes goals / targets consistent with NPC goals 1-3, i.e. optimal packaging, resource recovery, consumer education
- actions demonstrate product stewardship (S4)
- plan implements Environmental Code of Practice for Packaging
- plan identifies relevant Covenant KPI's and includes measurement against them
- company specific performance targets, milestones and indicators evident

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[38] NPC homepage, http://www.packagingcovenant.org.au , last viewed: 26/07/07

[39] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.

- data collection in place for reporting against company-specific indicators and Covenant KPI's
- plan includes working with packaging supply chain, consumers and governments
- summary table with actions/timelines/responsibilities/performance is provided
- actions exhibit improvement over duration of plan
- plan confirms resources that will enable commitments to be met.

A.5.2 Industry annual report assessment

The following lists the main assessment criteria for industry annual reports:

- the report demonstrates product stewardship (S4) commitment achievements
- the report demonstrates the company working with packaging supply chain, consumers and governments
- data for company–specific performance targets, milestones and indicators reported
- reports against summary table actions/timelines/responsibilities/performance measure
- the report details records that track performance achievements
- relevant Covenant KPI's measured and data reported
- report confirms resources available to meet commitments
- environmental Code of Practice for Packaging implemented.

A.6 Key performance indicators (KPIs)

To assist performance reporting, 29 KPIs were developed. Signatories are required to address those that are relevant to them and to establish their own specific base line data that will enable them to refine their individual performance goals and milestones set out in their action plan.

Key performance indicators are included in the National Packaging Covenant to:

- assist with establishing baseline and ongoing performance data for the Covenant as a whole
- to provide a way for individual signatories to demonstrate their own contribution to Covenant outcomes and to demonstrate that they are achieving continuous improvement against their own baseline data.

The KPIs assist the Covenant to:

- deliver quantifiable outcomes
- ensure rigorous assessment of signatory action plans and annual reports and monitor signatory compliance
- deliver a framework for analysing and reporting on its effectiveness.

The 29 KPIs are:

1. total weight of consumer packaging (domestic and imported) sold per annum into the Australian market and the total weight of products packaged
2. resources used to produce packaging : energy (megajoules), water (kilolitres)
3. improvements in design, manufacture, marketing and distribution to minimise the environmental impacts of packaging
4. changes to protection, safety, hygiene, shelf life or supply chain considerations affecting amount and type of packaging used
5. average % per annum, of post-consumer recycled content in packaging manufactured
6. total weight, by type, of non-recyclable consumer packaging sold per annum into the Australian market
7. total weight of consumer packaging disposed to landfill
8. consumer packaging as a % by weight of total waste and relative to other waste stream components
9. total weight of consumer packaging recycled, through:(a) domestic and (b) away from home recovery systems
10. total weight of recycled consumer packaging sold to end-users
11. number of councils operating according to good practice collection principles and state-based benchmarks
12. percentage of households with access to kerbside collection systems
13. percentage of households with access to other domestic collection systems
14. number of commercial and industrial premises with packaging recycling collection systems
15. percentage of councils and government agencies providing public place recycling infrastructure

16. percentage of signatories providing recycling collection facilities for post consumer packaging generated on-site
17. amount and type of consumer packaging in the litter stream
18. contamination rates in consumer packaging recovery systems (for example, kerbside, events, venues, public places, workplaces)
19. improvements in consumer knowledge about the functional attributes of packaging, including recyclability/reuse
20. improvements in littering behaviour
21. estimated tonnage of consumer packaging sent (a) for recycling and (b) to landfill from on-site collection facilities
22. number of signatories who have formally adopted the ECoPP and developed systems for its implementation
23. application of Covenant compliance procedures by NPCC to identify noncompliant signatories
24. implementation of NEPM procedures by jurisdictions
25. enforcement of the NEPM to free-riders and non-compliant Covenant signatories
26. implementation of Buy Recycled purchasing policy or practices
27. establishment of baseline performance data
28. annual reporting against action plan
29. demonstrated improvement and achievements against individual targets and milestones packaging waste management, materials and trends.

APPENDIX B PACKAGING WASTE MANAGEMENT, MATERIALS AND TRENDS

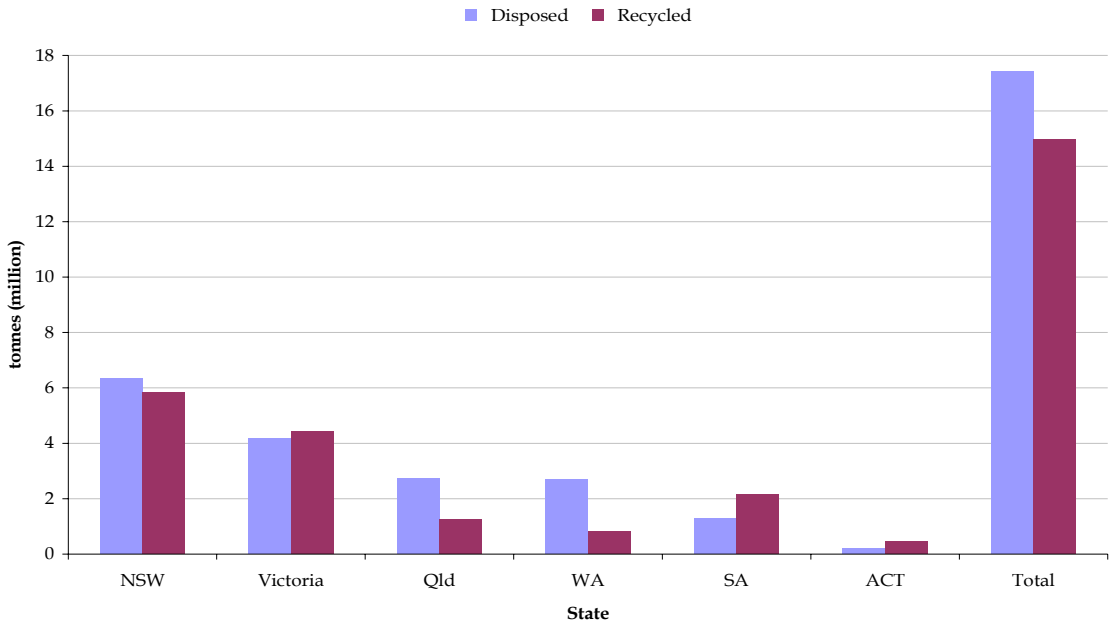
B.1 Current waste management practices - overview

This section provides a brief overview of waste management in Australia, including information on waste generated, recycled and disposed, and the nature of waste management industries in Australia.

B.1.1 Waste generation, recycling and disposal in Australia

Total waste generated in Australia in 2002/2003 (the latest year data is available) is estimated at around 32.4 million tonnes. Of this total, around 15 million tonnes was estimated to be diverted from landfill to recycling and reuse, with the remaining 17.4 million tonnes disposed to landfill. This equates to a per capita solid waste disposal of around 940 kg/year with recycling at 809 kg/year.[40] A comparison of the states' performance against each other is shown in Figure B-1.

Figure B-1 Waste generation and diversion rates for the main states of Australia 2002–03



Source: Hyder Consulting 2006, *Waste and Recycling in Australia*
(1) The total disposal figure for WA is for metropolitan Perth.
(2) The total recycling figure for SA includes meat waste, a prescribed industrial waste.
(3) The total recycling figure for the ACT includes cooking oil and fat, motor oil, salvage and reuse, and paint.
(4) There is currently no data available for Tasmania and the Northern Territory.

[40] Hyder Consulting, 2006, *Waste and Recycling in Australia*,prepared for Department of Environment and Heritage, Canberra.

Solid wastes are generally classified under three subcategories, namely municipal solid waste (MSW), commercial and industrial (C&I), and construction and demolition (C&D). The composition of solid wastes can vary significantly, but across the Australian states, waste composition averages 32% municipal, 29% C&I and 39% C&D[41].

Waste management in Australia is primarily the responsibility of local and state governments, who have pursued varied and distinct programs. Despite these programs, total waste volumes have steadily increased with economic and population growth.

As a catalyst for improved performance, a national per capita waste reduction target of 50% by the year 2000 was adopted by ANZECC in 1992, and formalised in the National Waste Minimisation Act (1992). Since this time, a number of state-level waste minimisation initiatives have been introduced. The guiding principle for all current waste management strategies is to begin with waste avoidance in the first place, followed by minimisation, recycling, and finally disposal as a last option.

Table B-1 Breakdown of materials recycled in Australia by waste stream[42]

Material	MSW	C&I	C&D
Paper and cardboard	41%	59%	0%
Glass	75%	21%	3%
Plastic	45%	55%	0%
Metals	9%	64%	27%

Around 46% of solid waste generated nationally is diverted to a range of recycling and reuse activities. Most of the gains in waste reduction to date have been attributed to increases in recycling rates, particularly with kerbside recycling and the reuse of materials from demolished buildings.

Each Australian household generates about 400 kilograms of waste per annum, placing Australia amongst the top ten generators of household waste in the OECD. Nevertheless, community surveys consistently indicate concern over high disposal rates, the management of landfills and failure to recover the resource value of waste materials – and in response, communities have embraced the call by governments to recycle waste. Household surveys by the ABS show high levels of recycling and reuse in all states and territories, with the levels of recycling and reuse increasing over time.

B.1.2 Solid waste management industries

There are numerous businesses providing waste collection, transport, processing, treatment and disposal services.

[41] Hyder Consulting, 2006, *Waste and Recycling in Australia*, prepared for Department of Environment and Heritage, Canberra.
[42] Ibid.

The key activities in the sector are:

- collection and transport of waste and recyclables
- sorting of waste and recyclables
- reprocessing and reuse
- disposal.

There are also spin-off industries including infrastructure vendors, bin providers, consultants, educators, sales, and marketing staff.

The sector includes private firms, government trading enterprises and the general government sector. Local government is mostly involved in waste collection, transport and landfill activities.

As a share of total revenue from waste management businesses within Australia, the collection and transport of waste is the largest contributor (64%), followed by the processing, treatment and disposal sector (27%) and the transport of recyclables (6%).

B.2 Packaging sector – overview

Packaging uses a vast range of materials, including paper and cardboard, glass, plastics, metals, adhesives, films and wood - either on their own or in various combinations. Packaging design ranges from bottles, cartons, tubes, pouches, corrugated and bulk containers, cans, drums, etc.

There are three broad categories of packaging:[43]

1. Consumer packaging/primary packaging - packaging which constitutes a sales unit to the final user or consumer at the point of purchase.
2. Grouped packaging/secondary packaging - packaging which constitutes, at the point of purchase, a grouping of a certain number of sales units, whether the latter is sold as such to the final user, or consumer, or whether it serves only as a means to replenish the shelves at the point of sale. It can be removed from the product without affecting its characteristics.
3. Transport packaging/tertiary packaging - packaging designed to facilitate handling and transport of a number of sales units or grouped packaging in order to prevent physical handling and transport damage.

[43] Packaging Council Of Australia, 2005, *Australian Packaging: Issues And Trends,* Issue No.18.

B.2.1 Packaging in Australia

There was 4.2 million tonnes of packaging material consumed in Australia in 2005, with packaging on average accounting for 20% of household waste and 11% of commercial and industrial waste (refer to Table B-2 and Table B-3).

Table B-2 Packaging consumption – Australia 2005[44]

Material type	Total consumption (tonnes/year)
Paper/cardboard	2,608,000
Glass	893,031
Plastics	586,840
Steel cans	92,399
Aluminium	50,210
Total	4,230,480

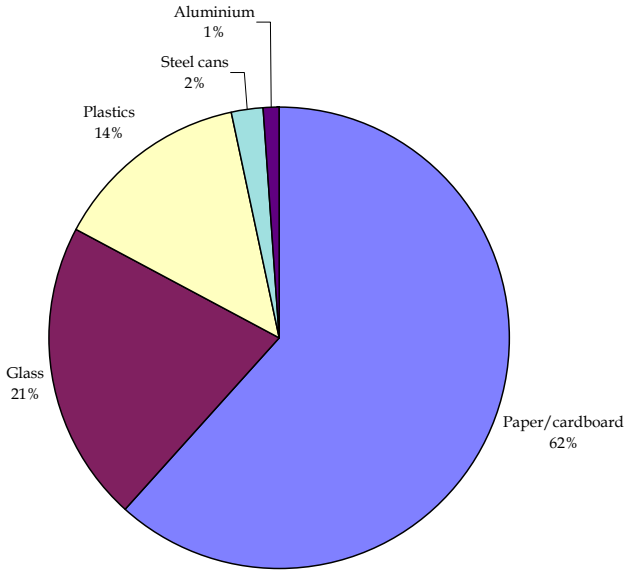
Table B-3 Consumer packaging as a percentage of total MSW and C&I waste[45]

	MSW	C&I
ACT	25%	-
NSW	18%	8%
SA	28%	28%
Weighted average	20%	11%

Paper and cardboard is the most significant packaging material at 62%, followed by glass at 21% and plastics at 14%. Aluminium and steel make up only 3% of total packaging, as shown in Figure B-2.

[44] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
[45] Ibid

Figure B-2 Packaging compositions (tonnes) – Australia 2005



B.2.2 Key sectors

Food, beverage and grocery packaging represents a major component of the total amount of packing covered by the Covenant.

Beverages

Beverages, such as milk, soft drink, water, juice, beer and wine are packaged in a wide range of materials. The total amount of beverage packaging in the Australian market is estimated at 980,000 tonnes/year. These packaging materials include glass, aluminium, steel, PET and HDPE plastics. The overall trend in beverage packaging is a moderate increase, due to population increases, increased beverage consumption and a trend towards single serve packaging. [46]

Food products

Food products including bread, cereals, meats, small goods, take-away meals, fruit and vegetables, confectionery and many other categories are packaged in a wide range of packaging forms and materials.[47] Food packaging includes primary packaging and closures,

[46] Nolan ITU, 2004, *Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis.*
[47] Ibid.

outer packaging and take-away food packaging. There is an upward trend in the amount of food packaging used which is the result of a range of factors: [48]

- increased security and tamper resistant packaging
- a trend towards smaller single serve pack types
- introduction of layers for presentation purposes
- a higher proportion of processed food being purchased relative to fresh produce.

There is an estimated 276,000 tonnes/year of food packaging in the form of glass and steel containers. Aluminium, plastic, paper, LPB, cardboard would be less significant and there are no accurate estimates for just the food packaging sector for these materials.

Table B-4 Beverage and food containers[49]

Material	Beverage container consumption (tonnes/year)	Food container consumption (tonnes/year)
LPB	30,439	-
Glass	778,594	133,372
Plastics	122,449	-
Aluminium	46,759	-
Steel	490	142,608
Total	**978,731**	**275,980**

Source: MMA analysis of beverage container sector

Groceries

Grocery packaging includes packaging for items such as cleaning products, health and beauty, home wares and pet food. In total, the grocery packaging sector is estimated at 163,000 tonnes/year.[50] The grocery sector has a high proportion of flexible plastics and composite packaging. Over the past decade, the grocery sector has consistently had moderate annual increases, with some shift in packaging materials from one material to another and some light weighting of individual packs through improved packaging manufacture or design. [51]

B.2.3 Key materials

As shown in Figure B-2, paper and cardboard is the most significant packaging material in terms of consumption at 62%, followed by glass at 21% and plastics at 14%. Aluminium and steel make up only 3% of total packaging.

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48 Nolan ITU, 2004, *Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis.*

49 MMA analysis

50 Nolan ITU, 2004, *Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis* – SA values converted to national estimates using population numbers.

51 Ibid.

Due to its large volume, paper and cardboard is a key material for recycling in order for the covenant to meet its targets. The rate of recycling of paper and cardboard since 2003 has increased significantly from 58% to 66%. The 2010 target however is significantly higher at 70 to 80%. As paper is such a large contributor to the overall target, the recycling rate would need to approach the recommended 2010 target for the overall target to be met.

The current (2005) recycling rate for glass is 44%, which has significantly fallen from the 2003 rate of 51%. Publicly available Covenant action plans and stakeholder consultations also confirm a drop in glass recycling since 2003.[52] Combined with a drop in glass recycling over the past few years and the fact that glass is the second largest volume packaging material it is also a key material of focus in order for the Covent target to be met.

Plastics are currently being recycled at 31% which is already within the range of 30 to 35% for the 2010 target. Due to their low volume, even a very large increase in plastics recycling would not allow the Covenant targets to be met without the required increases in paper and cardboard and glass recycling. This is also the case for aluminium and steel packaging.

Paper and cardboard

According to the latest NPC annual report, packaging paper and cardboard consumption in Australia amounts to an estimated 2.6M tonnes/year.

Paper and cardboard is the dominant packaging medium for food and grocery items and a significant proportion of it also comes into Australia through the packaging of imported goods. The current recovery rate for packaging paper is 66%.

Paper and cardboard is easily recycled through kerbside recycling collections at high rates, with the lack of knowledge of what can be recycled and the potential for food residue limiting the recycling activity of householders.

Mixed waste paper is primarily used in the manufacture of cardboard packaging. Australia is self-sufficient in the majority of packaging production, with demand for mixed waste paper less than the total quantity recovered.[53] Secondary markets, which are small relative to established primary markets, include moulded packaging, cellulose insulation and animal bedding.

Glass

Along with paper, glass is one of the two main materials recovered in kerbside recycling schemes, with glass constituting around 17% of material recycled by weight according to the latest NPC annual report (2005-2006). Beverage packaging accounts for around 80% of total

[52] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
[53] Nolan ITU, 2001, *Independent Assessment of Kerbside Recycling in Australia*.

glass packaging use, with glass being used to package beer, wine, spirits and smaller quantities of fruit juice, soft drink and cordials. Most glass in non beverage applications is clear glass and is used in products such as health supplements, garden products, perfume and analgesics.

Glass is easily recycled and is collected though the kerbside system from households at high rates. Glass cullet is recycled into new glass containers, with secondary markets for construction/road aggregates and abrasive media.

Plastic

There are a range of flexible plastics used for beverage, food and grocery packaging (LDPE, HDPE, PP and PET) as containers. A significant volume of plastic packaging is also used in freighting goods on pallets between manufacturing and wholesale/retail destinations. This material is in the form of stretch or shrink wrap (LDPE). The recovery of plastic containers is around 30%. In terms of food and beverage packaging most of it ends up in landfill via kerbside garbage. [54]

B.3 Packaging trends

B.3.1 Packaging consumptions

Population growth of an estimated 5% from 2005 to 2010 will have an increase on overall consumption of packaging. Furthermore, good economic conditions are likely to continue, leading to growth of consumer spending and thus an increase in consumption including packaging materials. There are also various packaging trends that are responsible for an increase in the volume of packaging material consumed. These various trends are listed below outlining their drivers and consequences.

1) Smaller/single serve pack types. The drivers for this trend include demographic changes with an increase in the number of single person households, customer demand for convenience and the popularity of small portions for children's lunch. The effect of this trend is to increase the packaging material used per unit product.[55]

2) Growing demand for, and increased range of ready made meals. The drivers for this trend include socio-demographic changes including large workforce participation for women, longer working hours, changing lifestyle priorities, reduced interest and skills in food preparation and an increasing popularity of convenience foods. This trend increases packaging material and in addition most of this material is not currently recyclable.[56]

[54] Nolan ITU, 2004, *Review of Recycling Activity in South Australia Stage 2 - Product Recovery and Analysis.*
[55] Sustainable Packaging Alliance, 2002, *Towards Sustainable Packaging A Discussion Paper.*
[56] Sustainable Packaging Alliance, 2002, *Towards Sustainable Packaging A Discussion Paper.*

3) Pre-packed meat and vegetables in modified atmosphere packaging (MAP). The drivers for this trend include an increased popularity of fresh, healthy and convenient foods, such as bags of salad and stir fry mixes. Furthermore, there is a trend towards centrally pre-packed meat to meet supermarket demands for efficiency and tighter health standards. Not only is most of this sort of packaging currently not recyclable, this trend also increases the packaging material used per unit product.[57]

4) Higher proportion of processed food being purchased relative to fresh produce. The drivers for this trend include socio-demographic changes including large workforce participation for women, longer working hours, changing lifestyle priorities, reduced interest and skills in food preparation and an increasing popularity of convenience foods. This trend increases packaging material and in addition most of this material is not currently recyclable. This results in additional packaging which is mostly non-recyclable.[58]

5) Increased security and tamper resistant packaging. Contamination cases have led to a requirement for tamper proof packaging, resulting in additional packaging which is mostly non-recyclable.[59]

6) Layer of packaging for marketing/logistics purposes. The drivers for this trend include the desire to enhance products visually from a marketing perspective and to save labour in stocking the shelves and encourage bulk buying, for example, shrink wrapped six packs of bottled water.[60]

7) Products with longer shelf life. The trend towards increased consumer convenience, though having to shop less frequently. This trend results in an increase in the consumption of non-recyclable material such as MAP films and multi-layer barrier bottles.[61]

8) Differentiation for premium versus budget products. The trend towards offering customers an expanded choice within the same product types with differing price point results in premium packed products and budget packed products. Premium packed products tend to have more elaborate packaging. This results in a larger packaging variety for the same type of products [62]

9) Prevention of product spoilage/damage. Products are often manufactured far away from where they are consumed and thus packages have to survive automated production lines and the shipping process, so they must be strong and stackable. For food products,

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57 Ibid.
58 Ibid.
59 Ibid.
60 Marshall, 2005, *Good excuses for bad packaging*. New Scientist, Vol. 193, Issue 2598.
61 Sustainable Packaging Alliance, 2002, *Towards Sustainable Packaging A Discussion Paper*
62 Sustainable Packaging Alliance, 2002, *Towards Sustainable Packaging A Discussion Paper*

different materials are needed to tolerate fats and oils, to keep oxygen out, or to provide mechanical strength.[63] This results in many levels of packaging.

B.3.2 Material markets and prices

Once a recyclate material has been through the initial stages of processing, it is usually sold into the market, where quantity of supply, suitability of application and demand play a key role in determining its value. Traditionally, the markets where the price per tonne for end-use products remains high compared to collection costs (such as for paper and metals), recycling rates are high, while recycling rates for products with poor financial returns (such as plastics and glass) remain low.

Paper and cardboard

Prices paid for paper grades have increased substantially over the past year or so due to new plants coming on-line, mainly in China. They are expected to reduce slightly from current levels over time, but to remain relatively high. Prices can differ according to location and destination but as an indication, the price of $120/t ex-plant in Perth or at a main port for mixed papers exported to China is thought to be representative of the current market price. LPB is around $135- $150/t.

According to industry sources, the prices paid for paper meeting specifications is about the same for material collected kerbside in all states. According to the source, this is especially the case at the moment with "the Chinese reportedly willing to take all material, regardless of quality". There may, however, be slightly lower losses if there is less glass in the commingled collection system. This is because broken glass can cut up the paper and may increase losses if the resulting paper sizes are too small. One source has estimated that up to 10% of material can be lost because of this, however, another source has estimated only one tenth of this amount.

Glass

The upper pricing level that a recycler should theoretically be willing to pay, from an economic point of view, is set by the batch cost of using virgin material, with the batch cost taking into account energy savings from using cullet. The lower pricing level should theoretically be set by competition, including any from export.

The batch cost of producing glass from virgin materials, is of the order of $100/t. Based on what is paid currently in South Australia, cullet used for local glass making is around $85/t. The price paid for cullet, for uses other than glass making, could be significantly lower than

[63] Marshall, 2005, *Good excuses for bad packaging*. New Scientist, Vol. 193, Issue 2598.

this, at around $30/t. Furthermore, there appears to be no substantial export market for cullet.

However, glass prices can be different depending on the location within Australia, with limited reprocessing locations and the high costs of freight playing an important role. Material accepted for beneficiation and/or use at glass plants typically has to meet tight specifications. Around 25% or so of recovered glass does not currently meet the required glass specification and would need to be disposed of elsewhere. Part of the problem is that ceramics and plate glass, which are major contaminants if is cullet to be reused as containers, are currently collected with recyclables in some kerbside collections. Such glass is currently being sold as a replacement for sand with no associated revenue.

Plastic

Plastics currently recovered in WA are shipped either interstate or overseas. The price paid is typically approximately export parity – the amount that would be received by the seller if the material was shipped overseas. The price for PET, HDPE and other plastics is around $600/t to $750/t.

Steel cans

Most of the steel generated in Australia is sent overseas. The price paid for steel ex-plant is currently around $135to 180/t, depending on the location within Australia. This price represents a significantly increase over the past few years.

Aluminium

Aluminium currently recovered in Australia is shipped overseas, mainly to mills in South East Asia, or recycled interstate in the Alcoa mill at Yennora in NSW. The price paid for scrap aluminium and used beverage cans (UBC) is generally set as a proportion of the London Metal Exchange (LME) price of primary aluminium. The LME price for primary aluminium was about US$2800/t in May 2007 [64]. This is approximately 50% higher than it was in US$ in 2004. The price paid for secondary metal depends in part on quality, but is generally some 60% to 70% of the price paid for LME. The US$ price paid for packaging cans at this primary price is expected to be of the order of US$1,800/t.

Industry personnel do not expect commodity prices to drop substantially over the next few years. If commodity prices increase, this may well be accompanied by a corresponding increase in the Australian dollar exchange rate which would, in Australian dollar terms, tend to mitigate any increase. The reverse situation would likely apply if prices drop.

[64] http://www.basemetals.com/Aluminium

APPENDIX C COVENANT TARGETS, PROGRESS AND BARRIERS

C.1 Covenant progress towards targets

At the establishment of the Covenant an agreed baseline was established for 2003 consumption and recycling rates (shown in Table C-1). The baseline allows the progress made towards the Covenant targets to be measured.

Table C-1 'Agreed' 2003 baseline consumption and recycling[65]

Material type	Total consumption (tonnes/year)	Total recycling (tonnes/year)	Recycling rate (tonnes/year)
Paper/cardboard	1,709,000	1,097,000	64%
Glass	850,000	300,000	35%
Plastics	659,113	135,569	21%
Steel cans	210,000	92,400	44%
Aluminium	45,741	29,000	63%
Total	**3,473,854**	**1,653,969**	**48%**

The comparison of the three targets set out by the Covenant and the performance against these targets is shown in Table C-2 , Table C-3 and Table C-4 .

Table C-2 Performance against 2003 agreed baseline and 2010 target[66]

Material	2003	2005	2010
Paper/cardboard	64%	66%	70-80%
Glass	35%	44%	50-60%
Plastics	21%	31%	30–35%
Steel	44%	38%	60–65%
Aluminium	63%	71%	70–75%
Overall recycling rate	**48%**	**56%**	**65%**

The packaging recycling rate in 2003 was approximately 48%, and the 2005 recycling rate was approximately 56%. This represents an improvement on the 2003 agreed baseline of eight percentage points. The 2005 recycling rate was nine percentage points below the rate required by 2010.

The target recycling rates for materials that are either not currently recycled or are recycled at very low rates are shown in Table C-3. These materials are referred to as non-recyclable packaging in the Covenant. The recycling rate for Plastics 4-7 (23%) was close to the target of 25%, however, there is no data available on recycling performance for paper/cardboard and composites.

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65 Ibid.
66 Ibid.

Table C-3 Targeted recycling rates for other packaging[67]

Non-recyclable materials	2003	2005	2010
Paper/cardboard	10%	N/A	25%
Plastics 4–7	10%	23%	25%
Composites	10%	N/A	25%
Overall recycling rate	**10%**	**23%**	**25%**

In relation to the packaging to landfill target there was a small increase of 2% in 2005 from the 2003 "agreed" baseline (shown in Table C-4 below).

Table C-4 Packaging to landfill[68]

Packaging(tonnes)	2003	2005	Change
Total consumption	3,473,854	4,230,480	21.8%
Total recycling	1,653,969	2,374,685	43.6%
Total to landfill	1,819,885	1,855,795	2.0%

C.2 Recycling requirements to meet targets

C.2.1 65% Recycling target

The consumption rates for all packaging materials in 2010 are shown in Table C-5 . The increase in consumption for 2005 to 2010 follows a uniform increase in population from 2005 to 2010 for all materials. No other growth/reduction in the consumption of packaging materials is considered.

Table C-5 Assumed packaging consumption

Consumption (tonnes)	2003	2005	2010
Paper/cardboard	1,709,000	2,608,000	2,750,731
Glass	850,000	893,031	941,905
Plastics	659,113	586,840	618,957
Steel cans	210,000	92,399	97,456
Aluminium	45,741	50,210	52,958
Total	**3,473,854**	**4,230,480**	**4,462,006**

As paper/cardboard and glass constitute over 80% of the packaging material consumed, the analysis of the volumes required to meet the 65% recycling target focused on these two material types. There are various combinations of recycling rates that will achieve the 65% recycling target, i.e. if less paper is recycled, more glass needs to be recycled and vice versa. Table C-6 shows the maximum required rate for glass (and thus minium for paper) and the maximum required for paper (and thus the minium for glass). Various points between these two extremes could also constitute a solution, as shown in Figure C-1 and Figure C-2 . To

[67] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.
[68] Ibid.

achieve the 65% overall target, there is a need to recycle between 1.84 and 2.2 million tonnes of paper/cardboard per annum and 436,000 to 794,000 tonnes of glass per annum.

For the comparatively low volume materials of plastics, steel cans and aluminium, it was assumed that the recycling rates remained constant at the 2005 levels. As there was an assumption of increased consumption for plastics and steel and aluminium while the percentage of recycling remained at the 2005 levels, this means that there will be an increase in the tonnage of material required to be recycled.

Table C-6 Maximum required glass and paper recycling rates in 2010 to meet 65% target

Material	**Max required glass recycling in 2010**		**Maximum required paper & cardboard recycling in 2010**	
	%	**tonnes/year**	**%**	**tonnes/year**
Paper/cardboard	67%	1,842,989	80%	2,200,584
Glass	84%	793,964	46%	436,369
Plastics	31%	188,928	31%	188,928
Steel cans	38%	36,662	38%	36,662
Aluminium	71%	37,759	71%	37,759
Total	**65%**	**2,900,304**	**65%**	**2,900,304**

Table C-7 Range of required glass and paper recycling rates in 2010 to meet 65% target

Material	**Range of required recycling (tonnes/year)**		**Range of required recycling (%)**	
	Min	**Max**	**Min**	**Max**
Paper/cardboard	1,842,989	2,200,584	80%	67.0%
Glass	436,369	793,964	46%	84.0%
Plastics	188,928	188,928	31%	31%
Steel cans	36,662	36,662	38%	38%
Aluminium	37,759	37,759	71%	71%
Total	2,900,304	2,900,304	65%	65%

Figure C-1 and Figure C-2 show the different combinations of paper/cardboard and glass recycling rates that will achieve the overall 65% recycling target together with the current recycling rates.

Figure C-1 Required glass and paper recycling rates to reach 65% target (%)

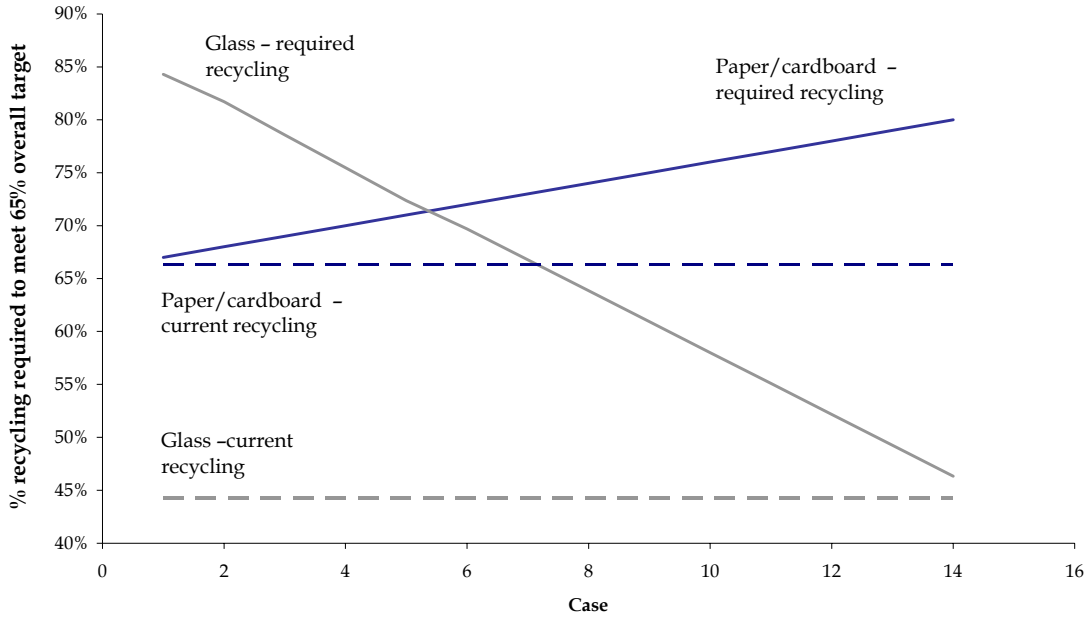
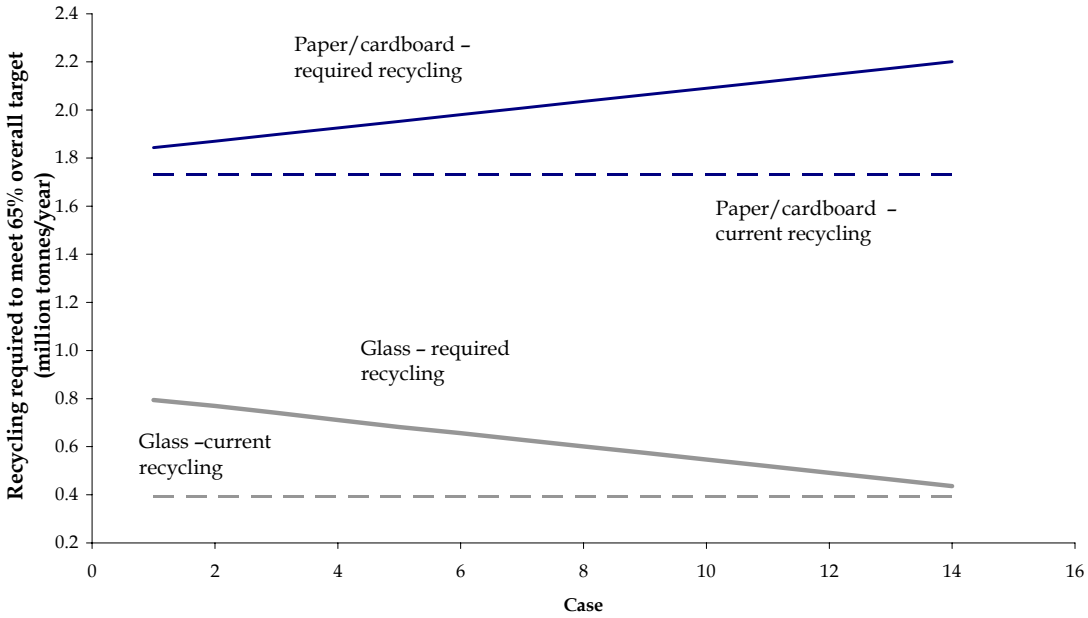


Figure C-2 Required glass and paper recycling rates to reach 65% target (tonnes/year)



C.2.2 Packaging to landfill

Meeting the 65% recycling target is also likely to result in the landfill target of "no further increase in the amount of packaging waste disposed to landfill" being met. Table C-8 presents the estimated amount of packaging material to landfill if the 65% recycling target is met under two scenarios: keeping consumption values in 2010 at the 2005 levels; or adjusting them according to population growth from 2005 to 2010 (around 5%). Under either scenario, the amount of material to landfill will be around 1.5 million tonnes per annum. This represents a significant decrease in packaging going to landfill in relation to the baseline of 1.82 million tonnes per annum.

Table C-8 Packaging to landfill in 2010 with 65% recycling (tonnes per annum)

	2010 (increasing consumption)	2010 (consumption constant from 2005)
Total consumption	4,462,006	4,230,480
Total recycling	2,900,304	2,749,812
Total to landfill	1,561,702	1,480,668

With the recycling rate of 65% met, consumption would need to increase by 23% from 2005 levels before the total to landfill would increase above the baseline value of 1.82 million tonnes. It is therefore considered likely that if the recycling target is met, the landfill target will also be met.

C.2.3 Targeted recycling rates for other packaging material

The recycling rates for other packaging materials were shown in Table C-3. Data is only available for Plastics 4–7, which is close to its target for 2010 of 25% at the current recycling rate of 23%. In order to assess the importance of materials other than Plastics 4-7, Table C-9 shows the quantity of other packaging materials sold in Australia.

Table C-9 Other packaging sold into the Australian market[69]

Packaging Type	Amount	Amount
	kt	%
Plastics—Type 4 (LDPE)	42	27%
Plastics—Type 5 (PP)	29	19%
Composites	26	17%
Plastics—Type 7 (other)	24	15%
Non-recyclable paper/ cardboard	18	12%
Plastics—Type 6 (PS)	16	9%
Unspecified	1	1%
Total	**156**	**100%**

[69] National Packaging Covenant Council, 2007, *The National Packaging Covenant 2005-2006 Annual Report*.

There was about 0.156 million tonnes of other packaging materials sold in Australia in 2005, which makes up around 3% of the total packaging material (around 4.2 million tonnes) [70]. Although it is difficult to judge the current progress of other materials besides plastics 4-7, as plastics 4-7 represent 70% and this category is close to meeting its target, it can be assumed that current Covenant measures together with any secondary effects from the economic mechanisms targeting the 65% recycling rate should be enough to meet the 2010 target.

C.3 Key materials/sectors to meeting target

The three different waste streams of municipal solid waste (MSW), commercial and industrial waste (C&I) and construction and demolition waste (C&D) all have different consumption and recycling rates for packaging materials.

An assessment of the potential to increase recycling of individual materials in specific waste streams will help focus this study on streams and materials that have the greatest impact on the target. Available data indicates that the C&D stream has a relatively low consumption and recycling rate for packaging materials and thus, for the analysis of targets, it has not been included.

Firstly, it is important to establish how much packaging material is available for recycling in the MSW and C&I streams. The available material for recycling is the difference between the total amount of material being consumed and the amount currently recycled, (with the difference between consumption and current recycling, the available for recycling value). The break-up of consumption by packaging material in these two waste streams is shown in Table C-10 .

Table C-10 Packaging material consumed in 2005 by waste stream

Material	MSW	C&I
Paper and cardboard	20%	80%
Glass	40%	60%
Plastic	65%	35%
Steel	45%	55%
Aluminium	45%	55%

Table C-11 shows the assumed recycling splits by packaging material and stream in 2005. It is difficult to obtain accurate data for these splits, however the percentage splits shown are thought to be reasonable estimates. The splits by stream were applied to the recycling rates by material for 2005 from the latest NPC annual report, to come up with the tonnages.

[70] Ibid.

Table C-11 Packaging recycling split in 2005 by waste stream

	MSW		C&I	
Material	**%**	**tonnes/yr**	**%**	**tonnes/yr**
Paper and Cardboard	20%[71]	346,000	80%	1,384,000
Glass	60%[72]	237,000	40%	158,000
Plastic	45%	81,218	55%	97,907
Steel	60%	20,856	40%	13,904
Aluminium	60	21,480	40%	14,320

The required recycling rates and the assumed consumption by stream/material can be used to calculate the volume of recycling needed from each stream/material to reach the 65% target. Because different combinations of materials can meet the target, minimum and maximum rates for each stream/material have been calculated based on the current (2005) recycling volumes and the required 2010 recycling volumes. Table C-12 shows the minimum and maximum incremental recycling required (from 2005 to 2010) for the MSW and C&I streams.

Table C-12 Gap – Required recycling to reach 65% target

Stream/Material	Minimum (tonnes/annum)	Maximum (tonnes/annum)
MSW		
Paper	30,788	103,896
Glass	360	81,364
Plastic	8,190	8,190
Metals	4,096	4,096
C&I		
Paper	82,201	366,688
Glass	41,495	319,546
Plastic	1,552	1,552
Metals	0	0

Note: The minimum and maximum rates refer to the different mix of paper and glass recycling to meet the 65% target, i.e. at maximum paper recycling we have minimum glass recycling and vice versa.

The maximum gap required that needs to be achieved for all materials is shown in Figure C-3. As can be seen from this diagram, paper and glass are the only two materials that play a significant role in addressing the gap in terms of tonnages of material recycled for the Covenant's 2010 target to be met. Plastics and metals are very low in terms of tonnage.

[71] Nolan ITU, 2000, *Waste Management Committee - Survey of Paper and Cardboard Recycling in South Australia*, Note: SA OCC recyling splits (%) between MSW and C&I used as represenative of Australia as a whole.

[72] Hyder Consulting 2006, *Waste and Recycling in Australia*, Note: for glass, plastics and metals, used recycling volumes to arrive at % splits for streams – ignoring C&D and assuming that overall recycling rate reflects packaging recycling rate.

Figure C-3 Maximum required incremental recycling to reach 65% target by sector and material

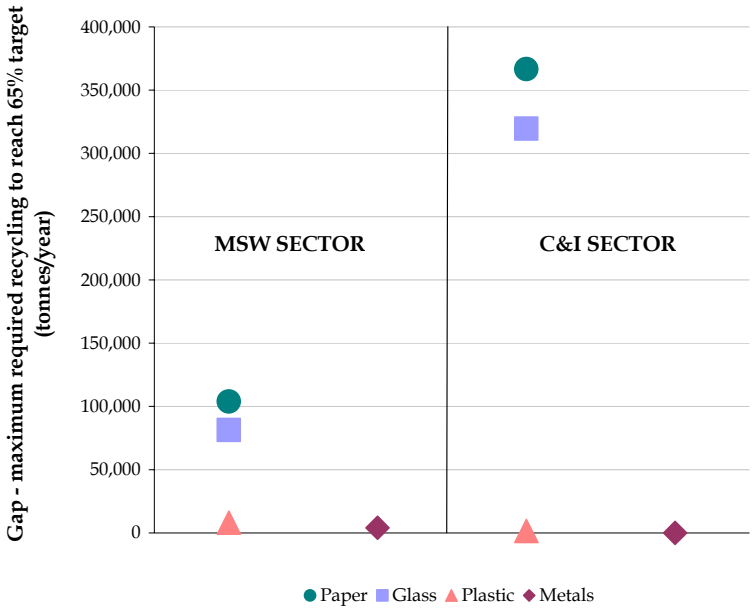
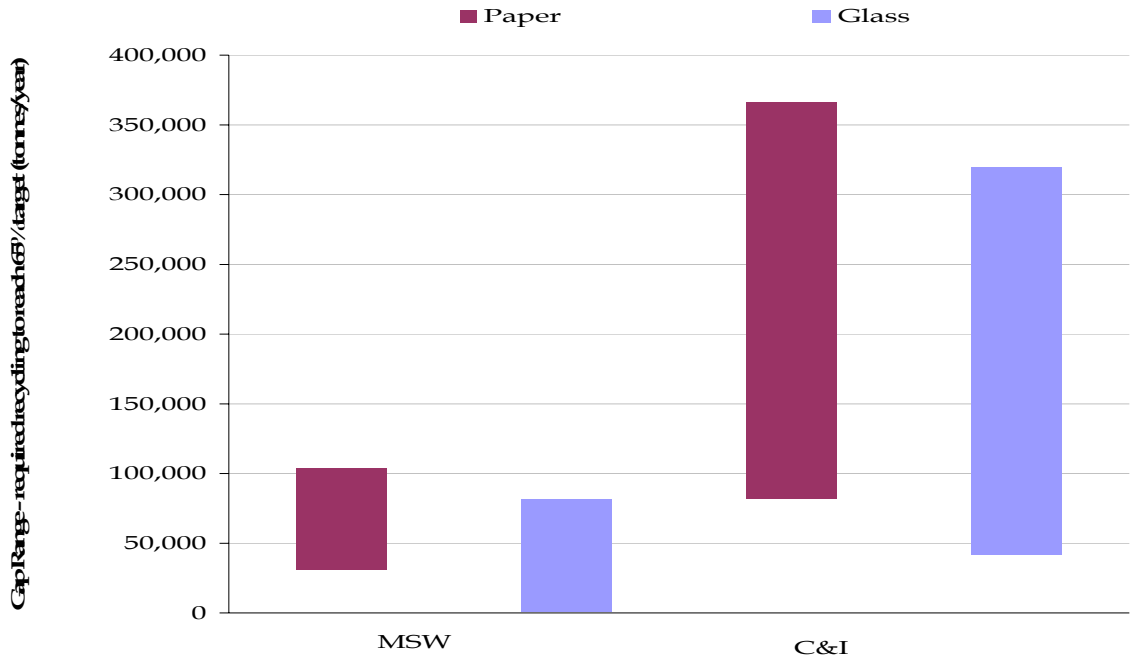


Figure C-4 focuses on the two important materials highlighted in the previous figure. It shows the range of the gap for both the MSW and C&I sector for both paper and glass. Any point on the graph shown in Figure C-1 or Figure C-2 falls within the ranges shown for each of the streams. This graph shows that the most significant contribution to achieving the targets will be from C&I recycling, with paper being the largest contributor followed by glass.

Figure C-4 Gap – range of required incremental recycling to reach 65% target



Note: Each material within each stream has a different consumption volume as well as a different recycling rate. Thus each material in each stream has a different volume of material available for recycling. The only value that is fixed is the total amount of recycling required to reach the 65% target. Within that there is a choice on how to split the tonnage between paper/cardboard and glass and furthermore how to further split those by stream while adhering to the upper limit of consumption for each material in each stream.

C.4 Barriers to reaching Covenant targets

Numerous structural barriers to achieving the Covenant recycling/diversion targets for packaging waste have been identified by the *Structural Barriers Investigation Report* (National Packaging Council, 2007).

The very high to high, moderate and low impact structural barriers as identified by the report are shown in, Table C-13, Table C-14 and Table C-15 respectively. This is followed by a brief description, assertions and conclusions of each of the Rating 4 and 5 barriers as outlined in the report.

Table C-13 Very high to high impact structural barriers to recycling[73]

Structural barriers/risks challenges	Packaging materials of primary focus
RATING 5 – Very high potential impact	
Contracted kerbside collections limited to residential areas*	Cardboard/Glass
Declining recycling collection service from hotels and clubs*	Cardboard/Glass
RATING 4 – High potential impact	
Financial drivers for brand owners	All
Changes in the amount and type of packaging demanded*	Plastics
Lack of physical space to locate additional waste systems*	All
Increased glass breakage from collection and sorting systems*	Glass
Lack of information on the environmental performance of materials	All
Shopping centre / body corporate management inertia	All
Real reduction in some materials "buy back" prices	Glass/Steel/LPB
Lack of consistent recycling data across all materials	All
Minimal engagement with collectors / sorters / reprocessors	All

Notes: * = Top 5 barriers listed as most important by stakeholders surveyed.

Table C-14 Moderate impact structural barriers to recycling[74]

Structural barriers/risks challenges	Packaging materials of primary focus
RATING 3 – Moderate potential impact	N/A
Limits for brand owners to influence what happens to their packaging	Plastics
Redesign of products with poor recycling outcomes	N/A
Lack of full picture on imported packaging	N/A
Lower engagement of retailers in meeting Covenant objectives	Plastics
Inconsistency in the range of materials collected at kerbside	Cardboard
Inadequate recycling bin capacity	All
Community awareness of recycling	N/A
Lower focus on non-beverage household packaging	Cardboard/Steel/Plastics
Low market prices for some packaging materials deters collection	Glass/Plastics
Increased costs relative to garbage only collection	Cardboard/ Glass
Lack of clear responsibility and inconsistent approach to event and public place venue recycling	Beverage
Lower focus on tertiary packaging	Cardboard / LDPE
Increased speed and mechanisation of sorting lines / non-capture of recyclables	All
Lack of incentive for sorters to maximise recovery	All
Large garbage bin capacity	All
Geographic distance of recyclables to market	All
Changing international structure of manufacturing industry	Glass / Steel/Cardboard
Lack of common approach at State level	N/A
Adequacy of NPC funds	N/A
Free rider non signatories	N/A
Lack of enforcement	N/A

[73] National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation.*
[74] National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation.*

Table C-15 Low to minimal impact structural barriers to recycling[75]

Structural barriers/risks challenges	Packaging materials of primary focus
RATING 2 – Low potential impact	
Rising collection costs of recyclables	All
Gaps in residential metropolitan/regional kerbside collections	All
Low cost of waste disposal	All
Increased focus on greenhouse, energy and water issues	N/A
Focus on 'political debate' rather than actions for improvement	N/A
East Coast focus of activity	N/A
Minimal engagement of smaller companies in Covenant goals	N/A
Differing expectations about the role of energy from waste	All
PRIORITY 1 – Minimal potential impact	
Increased packaging requirement due to security and health and safety concerns	Cardboard / Plastic film
Lack of motivating price signal for consumers in relation to cost of disposal	All
Declining levels of scavenging (for example, cans)	Beverage

C.4.1 Very high to high impact structural barriers to recycling

The eleven structural barriers that are thought to have a very high to high impact on recycling as stated in the National Packaging Covenant Structural Barriers Investigation (2007) are outlined briefly in the following section.

C.4.2 Contracted kerbside collections limited to residential areas

While kerbside collection services are provided for 91% of Australian households, kerbside collection for non-residential purposes is limited and uncoordinated. The waste stream at most SME's, including retail outlets, contains a high proportion of recyclables and in the limited cases where collection services are provided, a high yield of recyclables has been achieved.

For SME's, the high cost of the current uncoordinated effort to collect recyclables in comparison to garbage collection is a major barrier in implementing widespread recycling. For local governments the uncertainty of the costs of providing non-residential recycling services, together with its potential complexity is seen as the major barrier to the implementation.

The *National Packaging Covenant Structural Barriers Investigation* (2007) states that the expansion of recycling collections to SME's "offers the most likely outcome to boost the national recycling rate significantly and thus helping achieve the Covenants three main objectives".[76]

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[75] Ibid.

[76] National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation*, p.34.

C.4.3 Declining recycling collection service from hotels and clubs

The diminishing value of the collected material (mostly glass) and the move away from traditional pubs together with a switch from bulk to packaged consumption has led to the demise of recycling collections from hotels and clubs over the past decade in all sates (except SA due to CDL). There is unlikely to be an improvement in recycling from hotels and clubs without intervention or an increase in the price of glass. [77]

C.4.4 Financial drivers for brand owners

Currently, while there is an obligation on brand owners above a certain size to join the Covenant, there is no financial driver for signatories to perform at an optimal level in areas such as design for recycling or use of recycled content materials. Proposed solutions to overcome this barrier include increased financial contribution for signatories not performing at optimum or, alternatively, an award recognition for strong performing brand owners. [78]

C.4.5 Changes in the amount and type of packaging demanded

Demographic and lifestyle changes including greater product protection, greater use of ready-to-eat foods, more easy-open features, and increased single portion product sizes have resulted in an increase in total packaging. The use of flexible plastics and composites that are more difficult to efficiently recover and recycle further exacerbates the problem. The net impact of these trends is more packaging and less recycling. [79]

C.4.6 Lack of information on the environmental performance of materials

There is a lack of information available on the environmental performance of packaging materials, especially new materials and also where multiple materials are used. This can prevent packaging manufacturers and brand owners making an accurate assessment of the environmental impacts of the packaging materials produced and used. [80]

C.4.7 Lack of physical space to locate additional waste systems

Currently there is no requirement for recycling storage at multi-occupancy residential or commercial developments which results in insufficient space for the storage of recycling bins. Storage, access and other collection issues would be most effectively addressed at the planning stage of buildings, as such shortcomings are more difficult to overcome in completed buildings. [81]

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77 National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation*, p.35.
78 Ibid, p.13.
79 Ibid, p.14.
80 Ibid, p.14.
81 Ibid, p.24.

C.4.8 Increased glass breakage from collection and sorting systems

The shift to mechanised collection of recyclables using mobile bins and compaction vehicles has led to a higher level of glass breakage beyond a point of practical recovery. Glass is also broken once delivered to a MRF through robust handling prior to loading on sorting lines. The degree of glass breakage represents a significant risk to achievement of the NPC target for overall recycling. The ideal compaction density of collected recyclate as well as the best alternative uses for glass and the sorting of fractured glass is also being investigated to address these issues.[82]

C.4.9 Shopping centre / body corporate management inertia

The lack of incentive or motivation by building managers, together with higher costs of recycling collection, and the complexity of multi-occupancy sites are all impediments to the uptake of recycling collections at many SME's. As individual businesses at multi-occupancy sites have little ability to achieve a good waste diversion outcome in isolation, a whole of site management is required to achieve the desired levels of recycling. As with multi-occupancy residential sites, there is a possibility for these issues to be addressed at the site planning stage through site approval processes.[83]

C.4.10 Real reduction in some materials buyback prices

Glass, steel and LPB have suffered price drops while cardboard, aluminium, PET, HDPE and mixed plastics have risen in price over the past decade. The recovery rates for each material tend to reflect price trends, with strong growth in cardboard and most plastics and a lower recovery of glass, steel and LPB being recorded. For some materials, the pressure of imported lower cost virgin packaging or packaging material prevents an increase in the buyback price. For glass, the drop in the price was a result of the quality requirement for cullet increasing due to the need of the end users to meet strict packaging quality outcomes. [84]

C.4.11 Lack of consistent recycling data across all materials

The difficulty in gaining accurate data on production, consumption and recovery/recycling, results in the lack of consistent data across all packaging materials, thus preventing an accurate assessment of progress against Covenant targets. An increased focus on data collection methodology, independent verification of data and estimates on imported packaging could help produce satisfactory consumption and recycling data and assist in determining what progress is being made against NPC targets. [85]

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82 National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation*, p.24.
83 Ibid, p.36.
84 Ibid, p.46.
85 Ibid, p.51.

C.4.12 Minimal engagement with collectors / sorters / reprocessors

The Covenant brings together the stakeholders from the packaging chain but does not engage the businesses in the recycling chain. To get the best outcome from the Covenant, it is necessary to address the downstream issues including recycling, collection, scope and cost, sorting losses, reprocessing market requirements with all key parties involved.[86]

[86] National Packaging Covenant Council, 2007, *National Packaging Covenant Structural Barriers Investigation*, p.52.

APPENDIX D RANGE OF EXPERIENCES WITH ECONOMIC MECHANISMS FOR PACKAGING WASTE MANAGEMENT

This appendix provides more detail on the range of experiences with economic mechanisms for waste management.

D.1 Range of mechanisms

Table D-1 lists the menu of market mechanisms available to influence the management of packaging waste and highlights the policy objectives they typically aim to achieve and their points of application in supply chains.

The different mechanisms provide different types of incentives for recycling, reducing virgin material use and for improved product design. Table D-2 summarises the key incentive impacts of each mechanism and has been adapted from OECD 2006 to cover our menu of mechanisms shown in Table D-1 .

Table D-1 Menu of market-based mechanisms applicable to packaging waste

Mechanism	Typical policy objective/s	Point of application
Charges, taxes and subsidies (price based mechanisms)		
Product charge	Raise revenue, and where linked to subsidy programs, promote reuse/recycling	Manufacturer (fee typically based on units or weight of product produced or sold)
Advance disposal fee	Raise revenue to directly fund collection/recycling	Manufacturer (fee could be based on units or weight of product produced or sold or could vary according to cost of recycling different packaging materials)
Deposit-refund scheme	Promote reuse/recycling Promote safe disposal and reduce littering	Consumer (deposit payable at purchase and repaid when returned)
User charges for waste collection and disposal	Recover costs, and often Reduce waste generation	Consumer (charges may be flat per household or vary per bin/bag/kg)
Landfill levies	Reduce disposal impacts Promote reuse/recycling Revenue raising	Landfill (levy rates reflect external environmental costs of disposal)
Recycling/recovery subsidies	Promote reuse/recycling	Recyclers/reusers (per unit or kg of material recycled or lump sum)
Recycling investment tax credits	Increase capacity for recycling	Recyclers (tax credit for investment in infrastructure)
Cleaner production subsidies	Reduce waste generation	Manufacturers
Property rights and market creation (quantity-based mechanisms)		
Tradeable landfill quota	Cap quantity of waste sent to landfill	Landfills
Tradeable landfill diversion certificates	Promote diversion of waste from landfill	Recyclers/reusers
Tradeable recycling certificates	Promote reuse/recycling	Could be assigned to producers or recyclers/reusers
Market friction mechanisms		
Eco-labelling	Waste prevention	Manufacturers, distributors, consumers
Producer responsibility schemes	Promote reuse/recycling and reduce waste generation	Manufacturers, distributors, retailers

Table D-2 Incentive impacts of mechanisms for packaging waste

Mechanism	Incentives for recycling?	Impact on production and consumption?	Incentives to reduce virgin material use?	Incentives for better product design?
Product charge (alone)	No (recycling may even fall as output falls)	Yes, direct	Yes, through output reduction and possible material substitution if fee is per kg (rather than per unit)	Possible light weighting of products if fee is per kg (rather than per unit)
Advance disposal fee (funds used for collection/recycling services)	Yes, direct	Yes, direct	Yes, direct	Direct effect on light weighting, direct impact on recyclability only if fee varies with recycling cost of each product
Deposit-refund scheme	Yes, direct	Yes, direct	Yes[87]	Direct effect on light weighting, indirect impact on recyclability
Variable rate charging systems for waste collection and disposal	Yes, indirect	Yes, indirect	Yes, substitution and output effects reduce use	Indirect impact on recyclability: price signal may encourage light weighting and improved recyclability
Landfill levies	Yes, if passed back to waste generators (indirect)	Yes, indirect	Yes, substitution effect	No
Recycling/recovery subsidies or tax credits (based on units/weight recycled)	Yes, direct	Indirect increase for unit/weight subsidy basis by reducing costs	Yes – substitution effect reduces use, but greater output offsets this	Indirect; sends price signal upstream to producers to make products more recyclable
Recycling/recovery subsidies or tax credits (lump sum grants)	Yes, indirect with no marginal effect	No	No	Possible, but very indirect
Tradable landfill quota schemes	Yes, indirect	Yes, indirect	Yes, substitution effect	No
Tradable landfill diversion certificates	Yes, indirect	Yes, indirect	Yes, substitution effect	No
Tradable recycling certificate schemes	Yes, direct	Yes, direct	Yes, substitution effect	Maximum effect on recyclability if system includes tradable credits that are brand-

[87] Although the effect would not always be loop to loop ie. use of recycled materials may displace virgin material use for an unrelated product.

Mechanism	Incentives for recycling?	Impact on production and consumption?	Incentives to reduce virgin material use?	Incentives for better product design?
				specific
Eco-labelling	Possible small effect	No	Possible small effect	Possible small effect
EPR schemes (collective take back mandate and recycling rate target- PRO model)	Yes, direct	Yes, direct from fees	Yes, substitution effect	Some light weighting if fee is weight-based
EPR schemes (brand-specific individual take back mandate and recycling rate target)	Yes, direct	Yes, by increasing costs	Yes, substitution effect	Direct incentive to make products more recyclable

Source: adapted from OECD 2006.

D.2 Experiences with economic mechanisms for waste management

In most OECD countries, the key waste management consideration for government has historically been disposal, with a policy focus on reducing volumes disposed to landfill. Market mechanisms chosen to promote volumetric reductions in waste disposal have included variable waste collection charges, landfill levies and landfill quota schemes.

More recently, communities have embraced broader sustainability practices, prompting governments to broaden the rationale behind waste policy goals to include upstream lifecycle impacts associated with waste materials. Most waste policy objectives now include goals such as conserving resources, reducing the environmental impacts arising from the use of virgin materials and reducing the toxicity of products.

As well as the drive to ratchet down overall disposal levels, there are increasing efforts to improve the management of specific wastes that lead to significant environmental impacts when disposed, particularly if illegally dumped outside of regulated disposal centres or as a nuisance via littering. To promote better post-consumer management of these products, there has been widespread adoption of *extended producer responsibility* and *product stewardship approaches.* Under these approaches, a number of market mechanisms have been employed, including product taxes, advance disposal fees and deposit-refund schemes, as well as a vast array of subsidy programs and growing interest in recycling certificate approaches.

The experience in the US, EU and Australia with market mechanisms in promoting either targeted recovery of specific wastes or broader volumetric reductions in waste disposal, is briefly described in Sections D.2.1 to D.2.3. Section D.2.4 summarises experiences specifically with packaging waste, including the mix of mechanisms used and D.3 provides some case studies of individual countries' approaches to managing packaging waste and the role of market mechanisms.

D.2.1 United States

US programs have been characterised by ambitious waste reduction goals and supply-side recycling support policies, such as kerbside recycling impositions and grants, leading to a glut of recycled materials. This has prompted demand-side market development subsidies, such as tax credits, low-interest loans, and government purchasing policies[88]. A number of market mechanisms have been employed, including landfill levies, variable pricing programs, deposit-refund schemes and subsidies.

[88] Kinnaman and Fullerton, 1999, *The economics of residential solid waste management*, National Bureau of Economic Research Working Paper No W7326.

Levies on waste delivered to landfills have been imposed in over 20 states[89]. The objectives behind the levies are varied, and include financing landfill closure and contingencies, to provide funds for waste management programs and to promote waste minimisation. In relation to the latter objective, the US EPA argues that it is unclear whether these landfill taxes have produced a significant incentive effect, and cites examples where levies have merely redirected wastes to alternative disposal options.

Landfill levies will maximise the incentive effect if waste disposal operators can pass on the fees to waste generators. This is generally not the case with domestic waste, as variable pricing for household wastes is not widely used, although this is changing. A growing number of communities are now charging for solid waste collection based on the volume generated by the household. Such variable rate (or pay-as-you-throw) programs have been implemented in more than 4,100 communities in 42 states, reaching an estimated 10% of the U.S. population.

The reported success of these mechanisms[90] seems incongruous with empirical studies of the effect of variable pricing. Various US studies argue that demand for garbage collection services is inelastic. For example, Kinnaman and Fullerton[91] cite eleven US studies that all identified waste disposal volumes as being relatively unresponsive to variable pricing regimes. The paradox may lie in the role of other complementary policies, such as the provision of recycling bins, education programs, and the like that have accompanied the introduction of variable pricing regimes.

Deposit-refund schemes are widespread in the US for beverage containers, but have also been used for lead batteries, tyres and pesticide containers and are now being expanded to include office products like photocopier machine toner cartridges.

Beverage containers have been subject to both voluntary and mandatory deposit schemes. In the past, the beverage industry made extensive use of voluntary schemes to recover refillable bottles. However, this practice nearly disappeared following the introduction of cheaper disposable containers. Ten states have passed bottle bills that mandate beverage container deposits ranging from 2.5¢ to 15¢ per container, the most common amount being 5¢ per container. In most states, deposit requirements apply to the full range of container types, including glass, plastic, aluminium, and steel.

The US EPA believes that beverage container deposit laws have significantly reduced litter in several states, results in higher recovery rates of used products and less contamination of

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89 Miller, Edgar M. National Recycling Coalition, undated, *Economic Policy Options to Achieve Sustainable Resource Utilization and Environmental Quality Goals Relative to Resource Management and Waste Reduction*, Report submitted to Economic Policy Cluster, Eco-Efficiency Task Force, President's Council on Sustainable Development.

90 For example, Stavins, 2001, *Experience with market based environmental policy instrume*nts, RFF Discussion paper 01-58, cites some 11 separate studies demonstrating that unit charges have successfully reduced household waste volumes.

91 Kinnaman and Fullerton, 1999, *The economics of residential solid waste management*, NBER Working Paper 7326, Cambridge.

recyclables than kerbside recycling programs. A related phenomenon is the relatively high market share for refillable containers in states with deposit schemes. However, deposit schemes are also believed to cost more to administer than kerbside programs. The US EPA concludes that lack of information makes it difficult to thoroughly evaluate beverage container deposit systems.

A one cent advance disposal fee (ADF) for containers was used in Florida between 1993 and 1995. The fee was performance-based, in that packaging materials that reached a recycling rate of 50% were exempt. Since then, ADFs have been used widely in the US for tyres and beverage containers.

Various types of subsidies, including grants, loans, payments, and tax incentives, have been used extensively in the US for waste management. Most measures have been implemented at state and local levels, particularly grant and loan programs that promote the recycling industry. These range from grants to municipalities and counties to fund various recycling activities, payments to businesses based on the quantity of recycled material used or grants or soft loans for the installation of systems to process recyclates and various tax incentives for businesses that recycle used products.

D.2.2 The European Union

In recent years, there has been a reduction in the percentage of waste being disposed, linked with an increase in recycling rates. The 1994 *Directive on Packaging and Packaging Waste* sets targets for 2008 for the recovery and recycling of packaging wastes and specific materials contained in packaging wastes.[92] The EU *Landfill Directive* (1999/31/EC) promoted the reduction of land filled waste by making provisions that the quantity of biodegradable material to be land filled should be reduced to 35% of 1995 levels by 2016. Biodegradable waste counts for approximately two thirds of total municipal waste quantities. Only a few EU member states have reached this target[93].

Market-based mechanisms employed for waste management in the EU include user charges for domestic waste collection, landfill levies, advance disposal fees, product charges, tax credits, deposit-refund schemes, tradable recycling certificate schemes and tradable landfill quota schemes. Advance disposal fees collected via product taxes have become common as part of the trend towards extended producer responsibility. They have typically been applied to packaging and products that pose special risks in the waste stream.

Disposal charges for wastes to landfill or incineration are common and are now typically weight-based taxes, sometimes differentiated by waste streams and disposal practices employed. However, charges levied directly on the externalities of land filling or incineration

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92 European Union, 1994, *Directive 94/62/EC of the European Parliament and of the Council of the European Union of of 20 December 1994 on packaging and packaging waste*.

93 European Environment Agency, 2002, *Environmental signals 2002*, Chapter 12 Waste and materials flows.

are less common, with the French fees on emissions from incinerators a notable exception. In 2001, 17 countries applied taxes on waste disposal and/or incineration[94].

Domestic waste collection charges are applied across most EU countries. In the past, households typically faced a fixed fee (and so did not face an incentive to reduce waste), while commercial waste charges were generally volumetric. However, variable charging is now being adopted, becoming the norm throughout Ireland and Luxembourg, and is being introduced at a local level elsewhere. UK law will shortly be changed to give local authorities the option of variable charging. Some countries such as Denmark, Germany and the Netherlands are also moving to variable pricing or pay as you throw domestic pricing systems linked to the volume or weight of waste collected[95].

Eunomia Research and Consulting[96] provide an overview of the performance of a number of European variable pricing programs, specifically those on Belgium, Denmark, Germany, Italy, Luxembourg and Sweden. The pay-per-bag schemes were observed to drive both a reduction in waste generation, as well as the diversion of more waste into recycling streams. However, as in the US, it was thought that much of the reduction in waste generation was likely to arise from diversion to other disposal avenues, including illegal dumping.

There has also been a clear trend in the EU towards extended producer responsibility, where industries are being held more accountable for post-consumer waste recovery. Taxes and charges on packaging items are used widely in the EU. Some taxes are general revenue raisers, some are levied on the difference between recycling targets and rates achieved, or levied only if there is no organised return system. Twenty-six EU member states have packaging fees charged by national recovery organizations[97]. The fees are generally paid to collectors. There is also some use of mandatory deposit systems for non-refillable beverage containers, as well as prescribed deposit rates for refillable beverage containers.

Tradable rights approaches are receiving increasing attention, and have been widely used to control air and water emission, manage natural resources such as fisheries, forests and water and to promote the uptake of renewable energy. Their application to waste management to date has been limited to the UK, and include:

- the UK government's packaging waste recovery notes
- UK landfill allowance trading scheme.

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94 Professor Jacqueline McGlade, Executive Director, European Environment Agency, 2004, *European packaging waste trends and the role of economic instruments,* "European Voice" conference PACKAGING OUR FUTURES Brussels, 1-2 March.

95 European Environment Agency, 2000, *Environmental taxes: recent developments in tools for integration*, Environmental Issues Series No 18.

96 Eunomia Research & Consulting (undated), Finan*cing and Incentive Schemes for Municipal Waste Management Case Studies*, Report to Directorate General Environment, European Commission.

97 Perchards, 2007, *Peer review comments on National Packaging Covenant Complementary Economic Mechanisms Investigation - Draft Issues Paper for Consultation with Stakeholders*.

The UK's packaging waste recovery notes are part of a tradable recycling credits scheme which directly supports their producer responsibility scheme. PRNs are traded among obligated companies, reprocessors and compliance schemes with an exchange operating to handle trades. Under this system, the incentive is provided to *reprocessors* to pull more material from the waste stream. This is in contrast to other European countries, where funds from recovery organisations are paid to *collectors* pushing more material towards recycling[98].

The UK also has landfill allowance trading schemes in place or being developed by each of its administrations (except Wales) to assist in meeting statutory landfill diversion targets. Individual allowances based on historical waste quantities have been allocated to waste disposal authorities (county councils). Allowances can be traded with other waste disposal authorities. The system also allows for unlimited banking (saving up) of allowances with borrowing limited to 5% of the following year's allowances.

D.2.3 Australia

A number of market-based mechanisms have been applied to the waste sector in Australia. These include landfill levies, advance disposal fees, a deposit-refund scheme, performance bonds, and user charges.

Most Australian jurisdictions have introduced landfill levies. Most use flat fee landfill levies, although Western Australia has a higher rate for general waste than inert waste. In Victoria, there are different rates for municipal, industrial and prescribed industrial waste. A range of exemptions and rebates provides a coarse differentiation in some other states.

It is difficult to assess how effective landfill levies in Australia have been, given the range of other factors influencing waste disposal volumes to landfill. Available research indicates that the price responsiveness of waste disposal is very low, suggesting the modest success in waste diversion may be attributable to other factors. For many recycled materials, requirements for source separation and the availability of subsidised collection and processing may have had a greater impact than landfill levies. In addition, governments have pursued a range of education and industry specific waste reduction programs, often with legislative backing.

South Australia has operated a deposit-refund scheme for beverage containers since 1975 and Western Australia is also considering a deposit-refund scheme for beverage containers. South Australia's deposit-refund scheme has been effective in recovering beverage containers for recycling. The return rates for the SA scheme in 2002 were 88% for glass, 87% for aluminium and 72% for plastic[99]. These rates are high by international standards, with average container recovery rates in the US of around 75% for states with container deposit schemes (CDS), compared to 25% for non-CDS states.

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98 Perchards peer review of draft issues paper for this project.
99 http//www.epa.sa.gov.au/reporting/human/waste/recycled.html#beverage.

The introduction of container deposits has been the subject of debate in Australia and worldwide for over 30 years. Three early reports: the IAC report[100], the WD Scott report [101] and the BRRU report [102] evaluated the economic costs and benefits of container deposit system legislation in Australia in the 1980s. These studies all found the economic costs of a CDS to significantly exceed the benefits. However, a number of key factors have changed since that time, including the move away from refillable bottles and improved and higher environmental impact valuations, especially in relation to carbon dioxide. The Hudson report in 2000[103] concluded that the CDS in South Australia came at a small net cost to the state, which was offset by litter and landfill reductions, reduced glass accidents, more and better quality recyclate and pollution reductions.

A number of other studies since then have assessed the costs and benefits of a proposed CDS in different states. Most recently, the Productivity Commission examined CDS in its Inquiry into Waste Management in 2006[104] and concluded that such schemes are typically costly and justified only for products with a very high environmental cost of disposal.

Most private operators collecting C&I and B&D waste already use variable pricing regimes. Variable rate charging systems for domestic waste collection are used by some councils in Australia. Community surveys show a high interest in recycling and high participation rates if an appropriate service is provided. An important consideration is that most councils report the incidence of illegal disposal increased significantly when variable rate charges were introduced. Councils have used both enforcement and education programs to manage this.

There has been significant interest in greater use of advance disposal fees for products with high impacts when illegally disposed. A national advance disposal fee has been introduced to assist the management of waste oil.

Under the used oil stewardship scheme introduced in 2001, oil producers and importers pay a levy on new oil of 5.449 cents per litre. The funds are used for benefit payments to used oil recyclers. The benefit payments are volume-based and aim to provide support for a diverse range of recycling options for used oil. The benefit levels reflect the recycling effort and investment required to make products of better quality and with improved environmental outcomes. The Commonwealth Government has also investigated a tradable certificates scheme for used oil.

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100 Industries Assistance Commission Report, 1987, *Glass and Glassware*, Report No 404, 24 June 1987, Australian Government Publishing Service, Canberra especially Chapter 4.

101 WD Scott, 1983, *Study of the economic impact of beverage container deposit legislation*, August 1983, Section 4.7.5.

102 Business Regulation Review Unit, 1989, *Container deposit legislation and the control of litter and waste*, Information paper No 14, June 1989, Commonwealth of Australia.

103 Phillip Hudson Consulting Pty Ltd in association with Cole Solicitors, 2000, *Container deposit legislation. Public report n the review of the economic and environmental impacts of the beverage provisions of the Environment Protection Act 1993*, report to the Environment protection Agency, Department for Environment, Heritage and Aboriginal Affairs, March 2000.

104 Productivity Commission, 2006, *Waste Management*, Inquiry Report No. 38, 10/10/2006 available at http://www.pc.gov.au/inquiry/waste/finalreport/index.html

There has also been increasing interest in product stewardship in Australia. The Environment Protection and Heritage Council released a discussion paper in 2004[105] on co-regulatory frameworks for product stewardship. The discussion paper sets out a spectrum of models including:

- voluntary industry initiatives
- voluntary industry-government agreements
- co-regulatory approaches
- fully regulatory schemes.

Voluntary product stewardship schemes are under development for tyres (including an advance recycling fee) and for televisions and computers.

D.2.4 Packaging waste and market mechanisms

In 2004, the OECD carried out a questionnaire of 16 countries on the mix of mechanisms used to manage household waste. Table D-3 summarises the responses for packaging waste.

Table D-3 Number of packaging products covered by mechanisms for selected OECD countries

Type of mechanism	National level	State/provincial level
Take-back requirements	28	3
Product taxes	26	0
Deposit-refund systems	7	2
Information mechanisms	3	1
Voluntary approaches	3	2
Other mechanisms	2	2

Source: OECD, 2007, *Instrument mixes addressing household waste*, Report from working group on waste prevention and recycling. Country list: Austria, Belgium, Canada, Czech Republic, Germany, Hungary, Japan, Korea, Netherlands, Norway, Poland, Slovak Republic, Spain, Turkey, United Kingdom and United States.

The most common mechanisms are take-back requirements, product taxes and deposit-refund systems. Note that the US has one entry only – when there are numerous deposit-refund systems in place for beverage containers in different states in the US.

The survey also found that take-back schemes are most often financed through either a fee (advance disposal fee) on all the items sold in a certain product category, or through a fee levied by a Producer Responsibility Organisation (PRO) on member firms according to their respective market shares. Public subsidies also contribute to financing of some schemes. There are two cases where a PRO fee is based on recycling costs of each individual product resulting in an incentive for redesign of products.

[105] Environment Protection and Heritage Council, 2004, *Industry Discussion Paper on Co-Regulatory Frameworks for Product Stewardship.*

Table D-4 summarises international experience with market-based mechanisms for packaging waste covered in the menu of mechanisms (Table D-1).

Table D-4 Summary of international experience with market-based mechanisms used for packaging waste

Mechanism	Examples
Advance disposal fees/product charges	Packaging taxes as revenue raiser or disincentive in Belgium, Denmark, Hungary, Ireland, Italy and Norway. Most apply to beverage containers with revenues often used for recycling and/or cleaner production. Packaging taxes levied on the difference between recycling performance and targets in Bulgaria, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania and Slovakia. Packaging taxes payable if there is no organised return system in Belgium and Finland or linked to recycling rates in Norway. Packaging fees charged by national recovery organisations in around 26 EU member States. Many in response to a statutory requirement to take-back packaging, some vary by material according to the cost of recycling/reuse.
Deposit refund scheme	Used for beverage containers in various European countries eg. Germany, Sweden, Denmark and individual US states (eg. California, Conneticut, Delaware, Iowa, Maine, Mass., Michigan, New York, Oregon and Vermont). Deposits on beverage containers in Quebec, Nova Scotia, Newfoundland and New Brunswick. Korea has deposit-refund schemes for beverage containers and Taiwan for PET bottles. Deposit-refund scheme for beverage containers in South Australia.
Variable rate waste charging systems	Over 4,000 communities in the US charge a fee per container or bag for municipal waste. Some cities in the Netherlands charge a fee per kilogram of municipal waste. In New Zealand, as many as 25 percent of communities by 1997 employed volume-based charges for municipal solid waste collection (New Zealand Ministry for the Environment 1997). Some use of variable rate charging by Australian councils.
Landfill levies	Used widely across the world. In 2002, tax rates in Europe varied from around £0.6 per tonne (Italy) to £54 per tonne (Austria). In Australia, landfill levies vary from $1 per tonne (inert waste in WA), to $23 per tonne (for municipal waste in metropolitan NSW).
Recycling/recovery subsidies	Used widely.
Recycling investment tax credits	Used widely.
Cleaner production subsidies	Used widely.
Tradable landfill quota	Landfill Allowance Trading Systems operate in the UK to meet Landfill Diversion Targets for bio-degradable waste.
Tradable landfill diversion certificates	None known.
Tradable recycling certificate schemes	Packaging Waste Recovery Notes are used in the UK to meet statutory Recycling Targets.

A range of mechanisms have been described individually in this section, however they are commonly used together. Choosing an appropriate mix of policy mechanisms depends on many factors, including the degree to which different mechanisms are compatible and collectively are effective in achieving the policy outcome, whether mechanisms are complementary or substitutes, the degree to which mechanisms can be integrated within existing institutions and legislation, geographical variation and ability to target local objectives.

Some mechanisms are necessary as a supporting framework for others (for example, market-based mechanisms generally require a sound regulatory framework to underpin their implementation). Some supporting policies can enhance the effectiveness of others (eg. for example, in Sweden and Finland the product charges for beverage containers were introduced to support existing deposit-refund schemes.). The timeframe in which goals need to be achieved (or the urgency of each problem) will also influence the choice of mechanisms. For example, a number of mechanisms with similar objectives have been introduced in the UK in an effort to meet EU directives in a relatively short timeframe.

Table D-5 shows some examples of the mix of mechanisms used to address packaging waste for selected European countries.

Table D-5 Examples of mixes of mechanisms to address packaging waste

Mechanism	UK	Denmark	Austria	Ireland	Italy
Regulatory/policy mechanisms					
Mandatory producer responsibility scheme	✓		✓	✓	✓
Mandatory collection	✓	✓	✓		✓
Landfill ban		✓	✓	✓	✓
Economic mechanisms					
Deposit systems for beverage containers		✓	✓		
Landfill tax	✓	✓	✓	✓	✓
Packaging/plastic bag tax		✓		✓	
Subsidies for collection of recyclables					✓
Support to cleaner production	✓	✓			

Sources: EEA 2005.

D.3 Country case studies

This section presents more detailed information on the overall approach to packaging waste management and the role of economic mechanisms within that package for three case study countries. The three countries chosen are the UK, Germany and the Netherlands. The UK approach includes legislative recycling and landfill target. It primarily focuses on meeting the recycling target in the EU Directive at the lowest cost by employing a range of economic mechanisms. The UK also has similar characteristics to Australia, with high dependence on landfilling compared to other European countries. Germany has a legislative scheme requiring take-back of packaging, however the means to achieve the requirements is a

collaborative industry run scheme. The approach in the Netherlands involves a voluntary commitment by industry, with a covenant operating similar to that in Australia.

D.3.1 Packaging waste management in the UK

The UK packaging waste system has been developed to meet the European Union (EU) *Directive on Packaging and Packaging Waste*, which requires members to reduce packaging waste and sets minimum recovery and recycling targets. Current EU targets are 60% for overall recovery by 2008 and 55% for overall recycling by 2008. There are also material specific recycling rates ranging from 15% for wood, up to 60% for glass and paper.

The UK has a statutory producer responsibility scheme that apportions recycling obligations among four groups in the supply chain: manufacturers, converters, packer/fillers and sellers. Individual companies that meet minimum thresholds for turnover and amount of packaging handled have requirements under the scheme. Obligated producers must demonstrate compliance with recovery and recycling obligations through the presentation of packaging recovery notes (PRNs), which certify that a particular quantity of post-consumer packaging has been recycled or recovered. Producers have the option of showing they have met the obligations themselves, or joining a compliance scheme. Registered recyclers can produce PRNs when they process a tonne of material and PRNs have now become tradable commodities. Local government continues to play a role in recycling collection, contributing funding at a pre-specified level, with the amount provided being balanced by the value of PRNs in the market.

The UK also has statutory landfill diversion targets for bio-degradable municipal waste applying to landfills in the United Kingdom overall, as well as in England, Scotland, Wales and Northern Ireland. The targets limit the amount of bio-degradable municipal waste that can be sent to landfill to 35% of that produced in 1995 by the year 2020.

There are a number of economic mechanisms used in the UK that influence packaging waste outcomes. These include:

- Tradable recycling credits scheme: The UK producer responsibility scheme is directly supported by the tradable recycling credits scheme. PRNs are traded among obligated companies, reprocessors and compliance schemes with an exchange operating to handle trades.
- Landfill tax: The tax applies to all waste land filled and is differentiated for "inactive" waste (at £2 per tonne) and "active" waste (currently around £24 per tonne on the way to a medium to long-term rate of £35 per tonne).
- Aggregates tax: The aggregates tax is targeted at virgin material and aims at increasing the demand for recycled materials. Some of the revenue from the aggregates levy is contributed to a sustainability fund to minimise demand for primary aggregates,

promoting environmentally friendly extraction and transport, and reducing the local effects of aggregate extraction.

- Landfill Allowance Trading Schemes: Trading schemes are in place or being developed by each of the administrations (except Wales) to assist in meeting the statutory landfill diversion targets. Individual allowances based on historical waste quantities have been allocated to waste disposal authorities (county councils). Allowances can be traded with other WDAs. They system also allows for unlimited banking (saving up) of allowances with borrowing limited to 5% of the following year's allowances[106].

There are also a range of other programs that are part of the packaging waste management system, including mandatory collection programs, subsidies for collection of recyclables, support for cleaner production and improving markets for recyclables and general awareness raising.

The share of municipal waste in England being recycled or composted increased from 12% in 2000/01, to 27% in 2005/06. The introduction of the landfill tax at the outset is considered important to this result, with particular success for construction and demolition waste. Currently, the reduction in land filling is primarily being driven by the gradual tightening of landfill diversion targets.

The overall recovery rate for packaging wastes rose 68% between 1998 and 2004 and material specific recycling rates have jumped between 45% and 137% during that period. The overall recycling target for packaging waste was easily reached in most years. However, the overall recovery rate has fallen short of both the UK and EU targets in every year. In 2004, the overall recycling and recovery rates fell short of targets (by around 10% and 7% respectively), and the material specific targets were met only for paper and wood.

From an economic perspective, the focus on economic mechanisms directed towards local authorities should contribute to reaching targets at lowest cost. However, the efficiency of the approach has been criticised, because several mechanisms overlap (for example, the landfill tax and statutory landfill diversion targets) and due to the lack of incentives facing households to limit waste generation.

It is difficult to assess the impact of the measures on packaging design. Under the UK system, unlike the other European producer responsibility systems, companies do not pay for every tonne of packaging they place on the market, but only for the tonnage on which they have recovery and recycling obligations. Thus the incentive is not large, however, it appears that the UK system does provide some incentives for downsizing, some material switching and dematerialisation as the lower the packaging tonnage for a business, the lower the recycling obligation.

[106] Covec, 2005.

However, there is no incentive to make packaging more recyclable, because there is no brand sorting or tracking of products' recycling costs back to producers as this would most likely be prohibitively expensive. Anecdotal evidence suggests there have been changes in some packaging in response to the system, however it is difficult to say what these are attributable to. In any case, recyclability is not the only environmental goal for packaging design and may often not be the overriding one. Light weighting reduces fuel consumption and sometimes the number of vehicle movements needed.

The UK system of packaging waste recycling has also been criticised for being introduced in order to ensure legal conformity with the EU *Packaging Directive* at least cost, rather than as a means to achieve environmental goals (Wollny, 2002).

Covec (2005) argues that the effectiveness of extended producer responsibility systems depends on the penalties for non-compliance and the practical potential for developing markets for recycled goods. The UK packaging recovery notes system has had initial shortfalls partly because of the lack of maturity of recycling markets.

D.3.2

D.3.3 Packaging waste management in Germany

The key packaging waste management measure in Germany is the Ordinance on the Avoidance of Packaging Waste. The Ordinance requires manufacturers, distributors and retailers to take-back used packaging – both primary and secondary packaging. Compliance schemes have been developed by industry and trade associations as a response to the take-back obligations. The most well known are the Dual System of Germany for consumer packaging and the Resy System for used paper and corrugated board shipping containers. The Dual system is a central non-profit organisation that collects, sorts and recycle post-consumer packaging from both households and small businesses. Manufacturers who participate in the system are able to attach the Green Dot label to their products and consumers can then return the packaging through the Dual System program, rather than return it to the manufacturer or distributor. The Dual system also establishes criteria for product categories, with manufacturers required to meet certain standards for their packaging materials to be awarded the Green Dot.

The program is funded from licence fees paid for the right to use the Green Dot label. The licence fees are graduated and calculated on the basis of items sold, weight and the type of material. Licence fees reflect costs and are reduced if the costs of the system drop. This creates incentives to save packaging and use environmentally friendly materials. In 2005, fees ranged from around 7 EURO cents/kg for glass to 140 EURO cents/kg for plastic. The cost burden for recycling lies solely with industry (local government does not contribute).

Germany also has a deposit system for returning reusable beverage bottles to designated collection points.

The packaging laws have been successful in reducing the amount of waste products and encouraging the use of recycled and refillable packaging. Packaging recovery rates were around 37% in 1991 and by 2000 had risen to 77%, with material specific targets of 60 to 75% routinely met. This compares to US rates in 2003 of 39% (US EPA 2005). The Oko-Institut (2002) reports that packaging volumes in Germany decline by 4% during the period 1990 to 1999, compared to the Netherlands with growth around 15 to 20%.

Another report found an 18% reduction in the quantity of packaging used in 2000, compared to what would have happened without the Packaging Ordinance and investments in recycling capacity, including sorting and processing facilities of around €20 billion (Quoden 2004).

Other countries who have now adopted the Green Dot concept include Belgium, France, Great Britain, Greece, Ireland, Canada, Latvia, Luxembourg, Norway, Austria, Poland, Portugal, Sweden, Spain, the Czech Republic and Hungary.

The German scheme has achieved high rates of recycling, but was criticised for leading to significant exporting of materials in the absence of domestic markets. Reviews of the German EPR system suggest that a similar result could have been achieved by a combination of packaging tax, systematic promotion of research and subsidies for the recycling industry. A report prepared by Resources for the Future for the OECD advises that "a combined advance disposal fee and recycling subsidy would lead to the same outcome as take-back mandates/recycling standards and may be more cost-effective".

D.3.4 Packaging waste management in the Netherlands

The Dutch packaging covenant was a negotiated agreement with material take-back and recycling targets between government and industry under private law. Companies voluntarily signed up to the Covenant and are then legally bound by its conditions. Non-signatory companies had to instead meet the mandatory recycling targets provided for in the EU *Directive on Packaging and Packaging Wastes*.

As part of the third Dutch packaging covenant, the Dutch government and the packaging industry agreed that by the end of 2003, businesses would reduce the number of beverage cans and bottles thrown away by two thirds. If the reductions were not met, a compulsory deposit of 0.25 Euro (US$0.23) would be placed on cans and bottles on 1 January 2004. However, some European governments and industry groups have challenged the mandatory deposit fees, arguing that they are contrary to European Union law and a possible barrier to free trade.

The covenant included the following measures and targets:

- elimination of land filling of packaging waste
- reducing the amount of packaging to the 1986 level by 2000 and an additional 10% reduction (27% was achieved by 2000)
- achieving 70% recycling of disposable packaging in 2005 (62% was achieved by 2000)
- collection of paper and cardboard of 75% by 2005
- deposit schemes for glass and plastic bottles
- performance targets for certain industries.

The Dutch covenants have met with mixed success. In 2001 manufacturers exceeded the recycling target for wooden packaging (+12%), but failed to reach the targets for paper/cardboard (-19%), glass (-12%), metal (-2%) or plastic packaging (-3%) (Europen).

The series of three voluntary agreements was in force in the Netherlands from 1991 to 2005. Packaging Covenant III was not renewed when it expired at the end of 2005. The local authorities had long complained that their packaging waste management costs were not subsidised by industry, as they are in all other EU member states except Denmark and the UK, and Dutch law now requires industry to contribute to local authorities' collection costs for packaging waste. A conventional Green Dot organisation, Nedvang, was set up to collect funding from industry and disburse it to the local authorities.

Legislation adopted in 2005/6 contains enabling provisions relating to a possible mandatory deposit on beverage cans and small PET bottles, but the government decided not to activate this requirement. The rationale for action against small beverage containers was the need to combat litter, but the government subsequently decided that a more holistic approach to litter abatement was needed. Thus, a framework agreement was signed in June 2006, to be followed up with a more detailed action plan.

In July 2007, the Environment Minister reached an accord with municipalities and producers using plastic packaging to double plastics packaging recycling rates to 42% in the Netherlands by 2012. The target is substantially higher than the 22.5% rate required under EU law. While the Covenant was in force, the focus for plastics recycling was very much on commercial and industrial waste, probably because PET bottles above 0.5 litres were refillable and deposit-bearing, so household plastics were not really cost-effective to collect. That has now changed – large non-refillable PET bottles have been permitted since 2006. The increase in the plastics recycling rate which has been demanded will be driven by the introduction of a separate municipal collection system for plastic packaging waste from households.

The municipalities' costs will be refunded through a new EUR 115 million ($180 million) annual Waste Fund to be financed by a packaging tax which will be imposed from the beginning of 2008. The new Waste Fund will also finance litter reduction efforts. This EUR

115 million will be in addition to the EUR 250 million ($392 million) which the incoming coalition government promised to raise from the packaging sector when it took office in February 2007. The tax rates will be based on the estimated carbon footprint of each packaging material.

The government says that this new funding arrangement will make life simpler for industry, in that it will address concerns that it would have to pay separate taxes and recycling fees. But it means that industry will lose control of its funding and it calls into question the future role of Nedvang and the other approved recovery organisations.

There are a number of other economic mechanisms used in the Netherlands that influence packaging waste outcomes. These include:

- charges for household waste collection: Around 20% of all Dutch municipalities have a charge system where households pay per kg, per bag or per waste bin
- landfill tax: the landfill tax is aimed at avoiding land filling of recoverable – or combustible – waste, with a high tax rate of €85 per tonne (almost twice as high as the long-term UK rate). Note that OCED reports that the estimated environmental costs of land filling are only a small fraction of the current tax rate of the Dutch landfill tax
- tax on imported packaging: the tax applies to packaging imported from non-EU nations and varies from 3.1 to 7.2% depending on the type of packaging material.

Other measures include a ban on land filling of most types of combustible waste, and a ban on exports and imports of waste destined for disposal.

The OECD reports that a broad spectrum of often overlapping mechanisms is being applied to household waste in the Netherlands. They note that despite a much more active waste policy in the Netherlands than in the UK over a long time period, total household waste amounts do not seem to be any lower.

APPENDIX E BROAD ASSESSMENT OF ECONOMIC MECHANISMS

E.1 Suitability of mechanisms to promote packaging waste recycling

The suitability of the various mechanisms to manage packaging waste is dependent on the policy goal being pursued. The two key policy issues in waste management include:

- downstream environmental impacts associated with post-consumer waste disposal, including impacts at landfills or incineration, or through littering or illegal dumping
- upstream environmental impacts, such as resource depletion and pollution from production activities.

The objectives of the National Packaging Covenant encompass both the realisation of upstream and downstream benefits. For this study, the extent to which these benefits may be realised through the Covenant is not in question. Rather, specific recycling performance targets have been established under the Covenant, and the focus of this study is on complementary economic mechanisms that could specifically be used to assist achievement of the targets.

Therefore, the suitability of alternative economic mechanisms will be evaluated *in terms of their merits in promoting an increase in the recycling of packaging materials* from current to target levels as outlined in Section 2.2.

To this end, this section provides a qualitative overview of potential mechanisms that could be used to promote the recycling of packaging according to four criteria - effectiveness, efficiency, administrative simplicity and equity. The mechanisms discussed below are those included in the menu of mechanisms listed in Table 3-1.[107]

Note that this is a preliminary overview at a broad level and that a further set of issues specific to the context of the National Packaging Covenant is considered in Chapter 5. Moreover, the selection of a shortlist of mechanisms for more detailed analysis will only be finalised following stakeholder consultation.

E.2 Effectiveness

Effectiveness here refers to how well a mechanism can promote an increase in the recycling of packaging. Key points here are:

[107] Although producer responsibility schemes are listed in Table 3-1 as economic mechanisms, they are not considered further in this analysis as the Covenant itself is considered a voluntary form of this scheme and the focus of this study is on mechanisms to support the existing Covenant rather than to replace it.

- mechanisms that provide incentives directly for recycling will generally be more effective than those targeting other parts of waste management chains (such as disposal or manufacturing)
- quantity based mechanisms will provide more certainty than price based mechanisms that a specific recycling target will be met.

A product charge (alone) payable by manufacturers of consumer packaging on the number of units or weight of packaging sold will not encourage recycling. It may lead to a reduction in production or light weighting of packaging by providing an incentive to reduce the units or weight of packaging sold. However, it provides no direct incentive for the recovery and recycling of packaging waste (indeed recycling could even fall if output is reduced in response to the fee).

An ADF where fee revenues fund subsidies to recyclers/reprocessors would increase the competitiveness of recycling and should lead to increased recycling rates. Identifying fee levels and revenues necessary to prompt a specific increase in recycling levels would present a challenge and may necessitate some adjustments to fee levels over time.

Deposit-refund schemes have been effective worldwide in increasing the recycling of some beverage containers, increasing recovery rates for glass, plastic, aluminium and steel. However, deposit-refund schemes are not well suited to collection of less discrete packaging materials such as paper and cardboard. It should be noted that separate collection of containers may indirectly have a positive impact on paper recovery by reducing contamination.

Variable waste collection charges provide incentives for reducing waste disposal, including via reducing the generation of waste and via diverting waste to recycling. In effect, these charges work to reduce the cost to recyclers of sourcing and collecting recyclate, increasing their cost-competitiveness and promoting increased levels of recycling. Landfill levies will have a similar impact in increasing the competitiveness of recycling.

Like other price mechanisms, establishing user charge or landfill fee levels that would yield any specific level of recycling presents challenges. However, the difficulties will be greater with these mechanisms than say recycling subsidies, as the price signal is not direct. That is, it has to be conveyed through waste generators who have other compliance options including doing nothing (i.e. paying the higher charges) or reducing their generation of wastes, and in the case of landfill levies, illegal disposal. For these reasons, waste generators have been found to be relatively unresponsive to increased waste collection and disposal charges. However, waste managers may respond to higher levies and redirect waste to recycling options.

Recycling subsidies are used widely across the world to promote recycling. The initial National Packaging Covenant funding program provided funding to implement or upgrade

kerbside recycling. The current NPC funding program focuses on collection and reprocessing, particularly for away-from-home sources of packaging material including improving systems and infrastructure and market development. Funding is also used for strategic public awareness and education for collection and strategic litter reduction and prevention programs. Where subsidies are provided according to the quantity of material recycled, price signals will be more direct and the mechanism more effective in promoting desired levels of recycling. Another option is to subsidise local councils and other collectors to improve collection systems, although these are already well established (with multiple bin systems for domestic kerbside collection) in most regions in Australia. In particular, subsidies to improve collection methods for waste generated by commercial enterprises may be considered.

Of the tradable permit systems, a tradable recycling certificate scheme would most directly promote a specific increase in recycling, as requirements under the scheme could be expressed in terms of the specific recycling outcome sought (be that tonnes of recyclates processed or tonnes of recycled product produced). The landfill quota scheme would be less effective as there would be alternative compliance options available, such as source reduction, reuse and illegal disposal.

Eco-labelling of products revealing information to consumers about the use of recycled content for packaging and recycling systems in place for packaging could potentially increase recycling. However, this approach alone is unlikely to have a significant impact on recycling rates for packaging.

E.3 Efficiency

The most efficient mechanisms are those with the potential to increase recycling at the lowest overall cost, taking into account both compliance costs to stakeholders and administrative costs to both stakeholders and government. The necessity to adjust price mechanisms over time until the targeted level of recycling was achieved is also likely to add to compliance and administrative costs.

ADFs based on production or sales provide no incentive for those paying the fee to promote recycling. As these organisations may be able to significantly influence recycling costs, through for example product redesign, extending the ADF incentive to them could reduce overall compliance costs in meeting recycling targets. To this end, an ADF where fees payable are directly linked to the actions of individual organisations in the packaging supply chain[108] to promote recycling would be more efficient. However, the administrative costs in establishing, monitoring and enforcing fee liabilities under a performance-based ADF would need to be considered against potential compliance cost savings.

[108] The packaging supply chain is defined on page v of the *National Packaging Covenant* as each of the organisations that participate in the creation, distribution and sale of consumer packaging and/or products.

The efficiency of deposit-refund schemes is the subject of much debate. The Productivity Commission examined container deposit systems in its *Inquiry into Waste Management* in 2006 and concluded that such schemes are typically costly and justified only for products with a very high environmental cost of disposal [109]. Other commentators argue that deposit-refund schemes are less efficient than an ADF to meet producer responsibility objectives because they impose greater rigidity in terms of where material is returned following use [110]. It is also noted that where industry has been obligated to achieve recycling targets, it has not used deposit-refund schemes but has adopted a broader form of product charge and recycling subsidy. This suggests that industry perceives this approach to be more efficient.

Variable charges for waste collection face two issues that may reduce their efficiency in increasing the recycling of packaging wastes. Firstly, most municipal waste collections do not employ variable charges, and there are administrative complexities involved. In the case of C&I wastes, the costs involved in administrating a tax are also likely to be significant. Secondly, the higher charges imposing on non-packaging wastes collected would impose economic costs while not contributing to the policy target.

Landfill levies would similarly be blunt in targeting packaging wastes, and hence lead to unnecessary economic costs, which would be compounded through any increases in illegal dumping or enforcement costs to prevent it. Imposing such costs would only be justified if the value of the environmental benefits exceeds the economic costs.

Recycling subsidies are an efficient mechanism if they are provided based on the quantity of material recycled. This could most directly be implemented through a fixed payment per tonne of recyclates processed. Alternatively, recycling grants could be allocated through competitive tender mechanisms. While this latter approach would provide a less direct linkage between actual volumes recycled and subsidies provided, it is likely to have lower administrative and enforcement costs.

The recycling certificate scheme should, in principle, impose the lowest compliance costs as it provides greatest flexibility in how the recycling target could be met. In practice, compliance costs will be strongly influenced by how the recycling certificate scheme is structured. For example, the compliance costs of a brand-specific scheme would be higher, given the need for brand sorting. In addition, administrative costs to both stakeholders and government could exceed those of other schemes.

[109] Productivity Commission, 2006, *Waste Management*, Inquiry Report No. 38, 10/10/2006 available at http://www.pc.gov.au/inquiry/waste/finalreport/index.html.

[110] Covec, 2005, *Economic Instruments for Waste Management*, Prepared for Parliamentary Commission for the Environment, New Zealand.

E.3.1 Administrative simplicity

Administrative simplicity is desirable, both from the perspective of government as well as stakeholders. In general, the trading schemes are the most complex mechanisms and charges and subsidies are easier to implement.

An ADF would be relatively easy to implement when based on sales or production data. A performance-based ADF is likely to be more difficult to craft and require information on performance – however defined – to be submitted by stakeholders and verified in order to calculate charges.

Variable waste collection charges or landfill levies require measurement systems for the weight or volume of waste being discharged. As already noted, such systems are not available across all waste streams and/or states, and their introduction would require major changes by some state and local governments, contractors and private waste collectors.

In addition, the introduction of a tax or levy to promote higher charges by private collectors of C&I waste would require institutional and administrative changes with not inconsequential costs.

Recycling subsidies are relatively simple to administer, although greater administrative effort would be required to implement competitive tenders or to allocate subsidies reflective of actual volumes recycled.

Deposit-refund schemes require a system administrator and collections system. The materials covered would need to be established, and the deposit to be charged, the type of collection and sorting system, and the roles and reporting requirements of stakeholders determined. The costs of administration and accounting to distributors under the SA beverage container scheme were estimated at around $1m per annum in 2000[111]. Although a significant ongoing administrative effort is required, a deposit-refund would be less complex than a trading scheme.

Tradeable credit schemes require significant administrative effort by both government and stakeholders. A scheme requires the obligations of liable parties to be established in a regulatory framework, a regulator/administrator, rules for the creation and use of credits, a system for exchange of credits, a compliance and enforcement framework, scheme boundaries and funding arrangements.

[111] Phillip Hudson Consulting Pty Ltd in association with Cole Solicitors, 2000, *Container deposit legislation. Public report on the review of the economic and environmental impacts of the beverage provisions of the Environment Protection Act 1993*, report to the Environment Protection Agency, Department for Environment, Heritage and Aboriginal Affairs, March 2000.

E.3.2 Equity

The equity implications of each mechanism depend on the liabilities and financing arrangements employed.

An ADF would be paid by manufacturers or the broader set of organisations in the packaging supply chain, depending on how the fee was applied. The cost of deposit-refund schemes would be incurred by distributors and consumers.

The costs of variable charges for waste collection and disposal are paid directly by consumers. The costs of landfill levies are also paid by consumers (indirectly through council charges).

Government would bear the costs of recycling subsidies, financed from general revenues or levies and charges in the waste area.

The costs of a tradable landfill quota scheme would be borne by households and industry through their waste disposal charges. The cost of a recycling certificate scheme would be borne by those organisations in the packaging supply chain required to meet recycling obligations under the scheme.

The costs of eco-labelling of products would initially be borne by manufacturers and distributors.

E.3.3 Suitable mechanisms

Based on the, albeit broad, consideration of the likely effectiveness, efficiency, administrative simplicity and equity implications of alternative mechanisms, those considered to have the greatest potential to promote packaging recycling are:

- advance disposal fee
- performance-based advance disposal fee
- deposit-refund schemes
- variable charges for waste collection and disposal
- recycling subsidies provided by competitive tender
- recycling certificate scheme.

APPENDIX F LIST OF STAKEHOLDER ORGANISATIONS CONSULTED

Members of the project team received feedback on the issues paper from the following organisations either through meetings, phone interviews or written comments:

- EPA Victoria
- NSW Department of Environment and Climate Change
- ZeroWaste SA
- EPA Queensland
- DPIW Tasmania
- DEWR (formerly DEH)
- Municipal Association of Victoria
- Australian Food and Grocery Council – Packaging Stewardship Forum
- PACIA
- Australian Council of Recyclers
- Foster's Group
- Coca Cola Amatil
- Visy
- OI Glass Packaging Australia
- Environment Victoria Inc
- Total Environment Centre
- National Packaging Covenant Secretariat.

The following organisations were also provided with an opportunity to comment on the issues paper:

- WA Department of Environment and Conservation
- Packaging Council of Australia
- AMCOR
- Coles Group
- National Packaging Covenant Industry Association.

APPENDIX G ECONOMICS OF DEPOSIT-REFUND SCHEMES

The efficiency of deposit-refund schemes has been the subject of much debate in Australia and worldwide for over 30 years. Some of the studies considered most relevant to the current research are:

- Three early reports, the IAC report[112], the WD Scott report[113] and the BRRU report,[114] which evaluated the economic costs and benefits of container deposit system legislation in Australia in the 1980s. These studies all found the economic costs of a CDS to significantly exceed the benefits. However, a number of key factors have changed since that time, including the move away from refillable bottles[115] and the start of environmental emission valuations, especially carbon dioxide.
- The Hudson report,[116] which in 2000 concluded that Container Deposit Legislation in South Australia came at a small net cost to the state which was offset by litter and landfill reductions, reduced glass accidents, more and better quality recyclates and pollution reductions. The costs of administration and accounting to distributors under the SA beverage container scheme were estimated at around $1m per annum.
- The White report,[117] which in 2001 assessed the costs and benefits of a number of container deposit systems for New South Wales. This study found that the economic (including environmental) benefits of container deposits significantly exceeded the costs for NSW and proposed a point of sale return system for NSW. There have also been a number of responses and counter-responses to this report.
- The Nolan-ITU[118] and Perchards[119] reports to the Victorian EPA, which in 2002 found that the financial costs of container deposit systems in three Victorian communities exceeded the benefits. There have also been some responses and counter-responses to these reports.
- The Boomerang Alliance report,[120] which in 2006 assessed various costs and benefits of container deposit systems and recommended a particular model.

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112 Industries Assistance Commission Report, 1987, *Glass and Glassware*, Report No 404, 24 June 1987, Australian Government Publishing Service, Canberra especially Chapter 4.

113 WD Scott, 1983, *Study of the economic impact of beverage container deposit legislation*, August 1983, Section 4.7.5.

114 Business Regulation Review Unit, 1989, *Container deposit legislation and the control of litter and waste*, Information paper No 14, June 1989, Commonwealth of Australia.

115 The economics of deposit systems with refillable bottles are quite different to those with non-refillable bottles. However, the Australian market is now virtually non-refillable.

116 Phillip Hudson Consulting Pty Ltd in association with Cole Solicitors, 2000, Container *deposit legislation. Public report n the review of the economic and environmental impacts of the beverage provisions of the Environment Protection Act 1993*, report to the Environment Protection Agency, Department for Environment, Heritage and Aboriginal Affairs, March 2000.

117 Dr Stuart White, Institute for Sustainable Futures, UTS, 2001, *Independent Review of Container Deposit Legislation in NSW*, report to the NSW Minister for the Environment, November 2001.

118 Nolan-ITU, 2002, *Container deposit legislation financial impact assessment for three Victorian case studies*, report to EPA Victoria EPA, July 2002.

119 Perchards, 2002, C*ontainer deposit legislation. Peer review of a financial impact assessment for three Victorian case studies*, report to EPA Victoria EPA.

- The Nolan ITU and SKM report,[121] which in 2001 provided initial valuations of avoided environmental emissions for material collected kerbside.
- The Stakeholder Advisory Group to the Western Australian Minister of the Environment,[122] which in 2007 examined various parameters of best practice container deposit systems.
- The Productivity Commission report,[123] which in 2006 examined CDS in its inquiry into Waste Management and concluded that such schemes are typically costly and justified only for products with a very high cost of disposal.
- Three reports relating to financial costs and benefits and parameter impacts of a number of deposit schemes operating in Canada.[124],[125],[126]
- The BEAR report,[127] which in 2002 examined the financial costs and benefits of several container deposit systems operating in the USA.

Commentators have also argued that deposit-refund schemes are less efficient than an ADF to meet producer responsibility objectives because they impose greater rigidity in terms of where material is returned following use[128].

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120 `Boomerang Alliance, 2006, *Container deposits, the common sense approach*, report prepared by D West, September 2006.

121 Nolan ITU and SKM Economics, 2001, *Independent assessment of kerbside recycling in Australia.*

122 Stakeholder Advisory Group on best practice container deposit systems for Western Australia, 2007, *Investigation into best practice container deposit systems for Western Australia,* final report for the Minister for the Environment, January 2007

123 Productivity Commission, 2006, *Waste Management,* Inquiry Report No. 38.

124 CM Consulting, 2006, *Who pays what, an analysis of beverage container recovery and costs in Canada, 2004-2005*, available at www.env.gov.bc.ca/wepd/epdpa/ips/resources/pdf/who_pays_what.pdf

125 CM Consulting, 2003, *Evaluating the relationship between refund values and beverage container recovery*, prepared for the Beverage Container Management Board, available at www.bottlebill.org/assets/pdfs/legislation/deposit%20levels.pdf
CM Consulting, 2003, *Who pays what -. an analysis of beverage container recovery and costs in Canada. 2001-2002*, available at www.solidwastemag.com/PostedDocuments/PDFs/WPWDec03.pdf

127 BEAR (Businesses and environmentalists allied for recycling), 2002, *Understanding beverage container recycling. A value chain assessment prepared for the multi-stakeholder recovery project*, available at http://www.globalgreen.org/bear/Projects/index.html#Files

128 Covec, 2005, Economic *Instruments for Waste Management, Prepared for Parliamentary Commission for the Environment*, New Zealand.

APPENDIX H METHODOLOGY AND ASSUMPTIONS FOR QUANTITATIVE ANALYSIS

This section provides the modelling methodology and key assumptions used. The purpose of the analysis is to examine the relativities between options and the relative merits of different economic mechanisms. The methodology for the quantitative assessment is a comparison of the incremental costs of implementing each of the options (and variations on options) to achieve the increase in recycling required to meet the overall 65% recycling rate by 2010. The analysis is illustrative only, and assumes no progress towards the targets in the absence of the economic mechanisms. The costs of options are therefore not meant to represent the actual costs of achieving the recycling target.

The analysis has been developed at a national scale (using national averages), with the best information available to inform option selection only. More detailed work would be required for the development of detailed design of any individual mechanism.

H.1 Modelling methodology

There were four schemes modelled:

1) ADF (3 variants)

2) subsidies using competitive tender process

3) recycling certificate scheme

4) combined ADF with competitive tender subsidy program.

Each scheme was modelled for all materials (paper, glass, plastics, steel and aluminium) and also for the target materials only (paper and glass).

The scheme costs are the total of the compliance costs faced by brand owners and signatories and the administrative costs faced by government, brand owners, signatories and any other scheme participants:

Scheme costs = compliance costs + administrative costs

The compliance costs are made up of two components: the costs of increased recycling and the costs of source reduction:

Compliance costs = recycling costs + source reduction costs

The general methodology for the calculation of the recycling costs was as follows:

1. Determine consumption – based on consumption assumed for 2010 and adjusted for any source reduction for each material type.

2. Reduce consumption according to level of source reduction expected under each option (detailed in Section H.3.1).
3. Determine split of consumption for MSW and C&I for each material type.
4. Minimise the overall cost of recycling ($/year) by alternating the % of each material type recycled as well as the split between MSW and C&I for each material type. This has to be done while adhering to the limits set for the model:
    - 65% overall recycling rate has to be achieved
    - the recycling rates for each of the C&I and MSW cannot exceed set limits (see Table H-1)
    - the "base" tonnages recycled are the current recycling rates (i.e. recycling rate for each material cannot fall below that).
5. The modelling comes up with the quantity of recycling required under each option to meet the 65% target and the cost of achieving this for each material.

Table H-1 Limits for MSW and C&I sector recycling

Material	Recycling target range	Recycling limit
Paper/cardboard	70–80%	90%
Glass	50–60%	80%
Plastics	30–35%	60%
Steel cans	60–65%	80%
Aluminium	70–75%	90%

The source reduction costs are calculated simply by multiplying the estimated level of source reduction under each option by the cost per tonne of source reduction.

The administrative costs were calculated for each model taking into account the costs of:

- setting up the schemes
- assessing performance
- collecting fees
- performing audits
- data collection (brand owners and signatories)
- compliance reporting (brand owners and signatories).

Where an option involves a change to a current administrative program under the Covenant (for example, the project funding program), the *incremental* administrative costs of changes to the program are included.

The modelling framework provides the following indicators for the comparison of options:

- total costs of the option ($m per annum)
- cost per tonne of overall recycling gap required to meet 65% target ($ per tonne)
- volume of waste diverted from landfill (tonnes per annum).

H.2 Determining recycling costs

The recycling costs are based on material revenues, additional infrastructure costs, collection costs, sorting costs, transport costs and processing costs:

Net costs of recycling = additional infrastructure costs + collection costs + sorting costs+ transport costs + reprocessing costs - material revenues

H.2.1 Material revenues

Material revenues were calculated based on the tonnage of material recycled and its assumed recyclate value. It was assumed that all materials had an available market and could be sold into the market. Material prices were assumed to be constant throughout Australia. The recyclate price was taken into account for the net cost of recycling.

Table H-2 Material values

Material	Material values ($/tonne)
Paper/cardboard	120
Glass	30
Plastics	700
Steel cans	150
Aluminium	2100

Source: MMA analysis.

H.2.2 Additional Infrastructure Costs for Collection

For the MSW waste stream it was assumed no significant infrastructure would be required for additional collection. There would be extra collection vehicles/labour to collect more recyclate, however this is included in collection costs (see Section H.2.3).

For the C&I sector there is currently insufficient or non-existent infrastructure for recycling collection. Some costs for recycling infrastructure are likely to be accrued, such as recycling bins for hotels, bars and other small enterprises. The costs are estimated to be in the order of $10 per tonne for all materials.

H.2.3 Collection costs

For both the MSW and C&I stream cost curves were developed for each material type showing how collection costs vary with total tonnes collected. The costs were based on

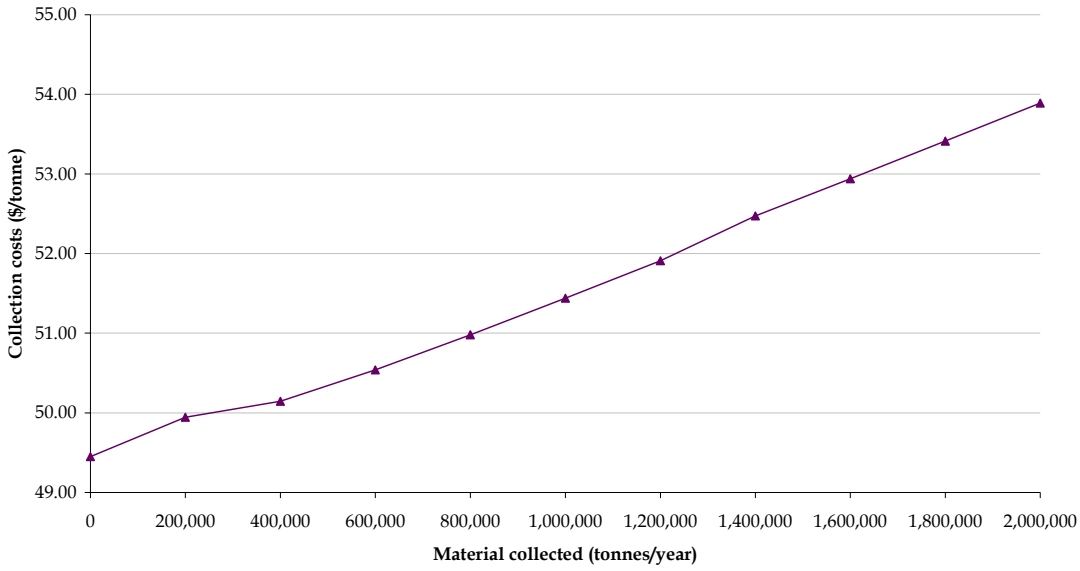
variables such as material density, recycling truck capital costs, truck capacity, labour costs and distances travelled.

For MSW collection costs it is assumed that collection programs continue as they would in the absence of the mechanisms, but more recyclates may be collected. For C&I it is assumed that the more material collected, the further the distance travelled and thus the higher the costs.

The cost curve for collection takes into account this factor, applying a linear cost premium of 0% to 10% depending on the recycling % collected. This cost premium for longer distance travelled is applied in addition to the extra cost of labour and the capital cost for garbage trucks. C&I costs are assumed to be more expensive than MSW due to the greater distances traveled for recyclate pick-up and higher frequency of collection required.

Figure H-1 provides an example cost curve for the collection of paper from the C&I sector.

Figure H-1 Paper collection costs - C&I

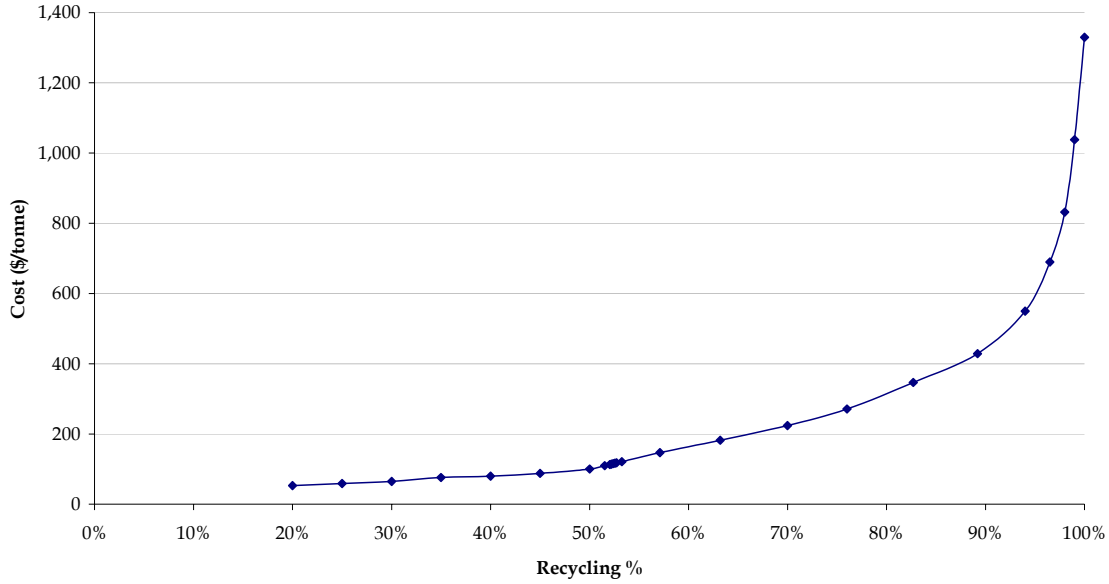


Source: MMA analysis.

H.2.4 Sorting costs

Sorting costs are assumed to be independent of the waste stream and are therefore the same for the MSW and C&I sectors. However, sorting costs increase with the percentage of material to be recycled. Figure H-2 shows the sorting cost curve for glass and the general shape is the same for all materials. The costs increase as the percentage of recycling increases, as the material to be sorted is more contaminated and lower quality and requires more effort to sort.

Figure H-2 Glass sorting costs



Source: MMA derivation based on Australian Council of Recyclers 2005, *Rewarding Recycling: Eco-services from the Resource Recovery Industry – A Market Based Approach, Discussion paper,* page 14 and discussion with key stakeholders.

H.2.5 Transport costs

The costs of transport of waste from transfer stations/MRFs to reprocessing facilities are likely to increase as the overall quantity of waste recovered for recycling increases. For example in the C&I sector, initially additional material may be able to be recovered in large cities near reprocessing facilities, but moving to regional centres or remote areas would significantly increase costs.

A formula was developed from transport data to derive transport costs:

$y = -8E\text{-}07x^2 + 0.0011x + 0.006$

y = transport costs ($/tonne)

x = distance (km)

This formula was used to set up a table that related the % recycling with the average distance travelled. Table H-3 and Figure H-3 show the resulting costs.

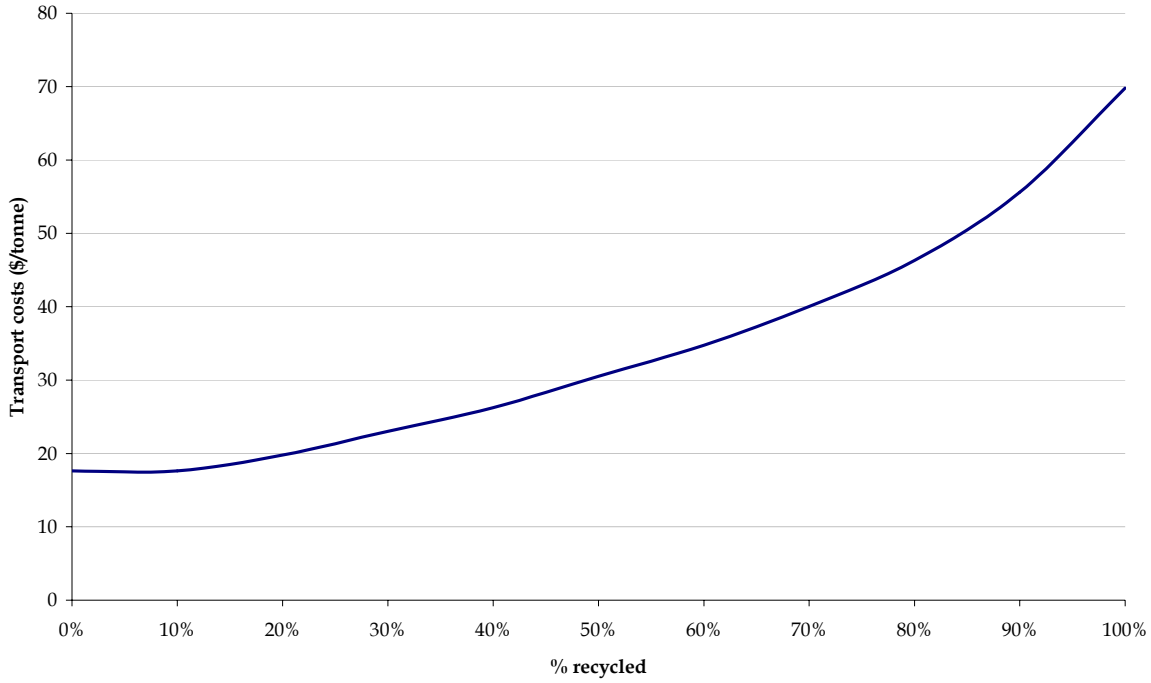
Table H-3 Transport costs

% Recycled	Average distance transported (km)	Costs($/tonne)
10%	10	17.62

20%	12	19.78
30%	15	23.02
40%	18	26.24
50%	22	30.51
60%	26	34.76
70%	31	40.03
80%	37	46.30
90%	46	55.61
100%	60	69.82

Source: MMA analysis of industry recycling trucking rates provided by Statewide Recycling SA.

Figure H-3 Relationship between transport costs and percentage recycled



Source: MMA Analysis.

H.2.6 Reprocessing costs

Reprocessing costs were assumed to be the same irrespective of material source whether it came from MSW or C&I. The costs are shown in Table H-4. These are average figures used for the analysis at a national level, however it is recognised that these actually vary across states.

Table H-4 Reprocessing costs

Material	Reprocessing costs ($/tonne)
Paper/cardboard	60
Glass	108
Plastics	1,000

Steel cans	98
Aluminium	1,200

Source: Nolan ITU, 2004, *Review of Recycling Activity in South Australia Stage 1 - Quantification of Future Expansion Priorities*.

It is assumed that as recycling increases in materials such as plastics, steel and aluminum are not expected to be large, there will be enough reprocessing capacity to deal with the recycling increases.

From industry sources it is understood that there "may" be a need for capacity expansion for paper reprocessing. However, it is has not been possible to ascertain at what volume of paper recycling that would need to occur. Also, there is export demand for recovered paper. As such ,it is assumed that all paper can be reprocessed with the current reprocessing capacity.

In terms of glass reprocessing, there are no large-scale glass reprocessing plants in WA or Tasmania at present (resulting in either landfilling or transport to Adelaide or Melbourne). However, there are several Covenant projects underway relating to new infrastructure for glass reprocessing (in Victoria, NSW and Far North Queensland) aimed at accommodating 120,000 tonnes/year. This is predominantly glass fines which are unsuitable for glass manufacture. With this new infrastructure, it is assumed that there will be sufficient capacity to deal with extra glass reprocessing likely to be required to meet the 65% target.

In the sensitivity analysis in Chapter 6 of the report where we examine the likely impact on the costs of options, we are already at capacity for glass reprocessing. In this case, it is assumed that the capital costs of a new glass reprocessing facility would be in the order of $10m per annum.

H.3 Determining source reduction costs

H.3.1 Amount of source reduction

Some of the options considered provide an additional incentive for reduction of consumption of packaging materials by manufacturers and brand owners. The likely magnitude of this reduction is difficult to estimate.

A study by Sturgess et al (2004) funded by industry in the UK included case studies of reductions in packaging material, with consumption decreasing 21% for soft drink packaging, 38% for cat food containers and 7% for detergent packaging in recent years. The packaging regulations in the UK are not necessarily responsible for these changes, for example they may reflect other factors such as shifts in product markets. However, it does provide a guide to the magnitude of reductions that may be possible.

The extent and cost of source reduction in response to price incentives has also been estimated in a study of the SA Waste Strategy 2005 to 2010. In this study, price elasticities of demand for disposal of waste were postulated for each waste stream (shown below in Table H-5). Based

on these price elasticities, a demand curve for disposal of waste was derived for each waste type and waste stream. The current tonnage of waste disposal and the marginal cost of waste disposal to landfill were used to form an initial quantity/price point on the curve.

Table H-5 Price elasticities of demand for disposal of waste in South Australia

Type of waste	Elasticity
MSW	-0.13
C&I waste	-0.13

Source: BDA Group and EconSearch, 2004, *Analysis of financial instruments for waste management in South Australia.*

For the purpose of this illustrative analysis, we have assumed that a reduction of 5% in consumption could be achieved by the incentives for source reduction provided by a recycling certificate scheme (with obligations dependent on consumption) or combined ADF/subsidy program that can be accessed by brand owners. A reduction of 2% is assumed for the straight ADF, where there is some incentive to reduce consumption of packaging to pay a lower ADF, but the subsidy program cannot be accessed for source reduction initiatives and fee offsets would only apply for recycling programs. The same level is also assumed for the competitive tender subsidy program, where there is some incentive through the broader scope of the program to consider applications from brand owners.

The assumed level of source reduction under each option is shown in Table H-6. These percentages are used to reduce the assumed consumption as outlined in step 2 of the methodology outlined in Section H.1.

Table H-6 Source reduction

Material	Source reduction
ADF	2%
Recycling subsidies	2%
Recycling certificate scheme	5%
ADF with competitive tender	5%

Source: MMA analysis.

For scenarios where an option involves all materials the source reduction was applied to all materials. For the paper and glass cases only, the source reduction was applied to only glass and paper packaging.

H.3.2 Source reduction costs

This cost would be borne by brand owners for redesigning packaging (for example, light-weighting of glass bottles) to reduce the amount of packaging material used. There are numerous examples of initiatives that have been developed by brand owners to reduce packaging materials. In many cases, the upfront costs of these initiatives are recovered over time through reduced costs of packaging. However, there may be more that can be done to

reduce consumption that would have a net cost, but would be cheaper than additional recycling. We have assumed an average cost of source reduction of $20/tonne for all materials.

The cost of source reduction was also estimated in the study of the SA Waste Strategy 2005 to 2010. Table H-7 shows the results assuming price elasticities of demand for disposal of waste as shown in Table H-5.

Table H-7 Source reduction costs

Material	1% Source reduction ($/tonne)	2% Source reduction ($/tonne	5% Source reduction ($/tonne
Paper/cardboard	78.8	84.5	101.4
Glass	66.2	70.9	85.1
Plastics	113.0	121.0	145.2
Steel cans	90.3	96.7	116.1
Aluminium	85.6	91.7	110.1

For the sensitivity analysis we have assumed costs around the level shown in Table H-7. This results in no source reduction under any of the mechanisms, as the net cost of increasing recycling is cheaper.

H.4 General assumptions

H.4.1 Waste streams

There are two waste streams assumed in the modelling. Municipal solid waste (MSW) and Commercial and Industrial (C&I). It was assumed that all packaging material is split into these two waste streams.

H.4.2 Packaging material consumption

It was assumed that packaging material consumption grew linearly from 2005 to 2010 according to population growth. The split of packaging consumption by material type and sector is shown in Table H-8.

Table H-8 Packaging material consumed by sector

Material	MSW	C&I
Paper and cardboard	40%	60%
Glass	40%	60%
Plastic	65%	35%
Steel	45%	55%
Aluminium	45%	55%

Source: MMA analysis.

H.4.3 Current packaging material recycling

The estimated current split of recycling between the MSW and C&I sectors is shown in Table H-9. These figures have been used to derive the amount of material available for recycling in each sector.

Table H-9 Current recycling by sector

Material recycled by stream	MSW	C&I
Paper and cardboard	40%	60%
Glass	60%	40%
Plastic	45%	55%
Steel	60%	40%
Aluminium	60%	40%

Source: MMA analysis.

H.4.4 Paper and glass vs. all materials

For scenarios where options only apply to the target materials of paper and glass, it is assumed that the volume of other materials recycled (plastics, aluminum and steel) remains at current levels. This also means that the actual percentage of material recycled/consumption for those non-target materials may fall.

For scenarios where options ally, to all materials then it is assumed that the tonnages recycled have to be equal to or greater then the 2005 values for each stream.

H.4.5 Outcomes from subsidy programs for recycling and source reduction

There are two key features of subsidy programs relevant for the short list of economic mechanisms. The first feature is the type of funding process. The second is the scope of the activities that can be funded. This section outlines the assumptions made about the outcomes of different programs.

The existing funding program for NPC projects involves a two stage expression of interest process for shared seed funding, where applicants describe how their proposal contributes to the objectives of the Covenant and its deliverables (as well as risk management, competitive market and discounted cash flow analysis). The costs of achieving increased recycling under

the competitive tender approach with direct $ per tonne subsidy is likely to be lower than that of the existing funding process.

A study comparing the cost-savings achievable through a competitive tender trial for biodiversity conservation in Victoria found that a traditional fixed price subsidy approach would have required a budget of seven times that used with the competitive auction approach to secure the same outcomes.[129] Similar tender pilots under the National Market-based Instruments Pilot Program in Western Australia and South Australia found costs could be reduced by 66% and between 23% and 34% respectively[130].

In the context of the NPC, the cost per tonne of recycling estimated for current Mark II projects varies significantly. For example, the project to upgrade Wangara MRF costs around $160 per tonne (for paper and plastics), and the project on processing of residual waste glass fines for new markets cost around $30 per tonne recycled.

As there has been limited price discovery in terms of the marginal cost of increased packaging recycling, opportunities for increased cost-effectiveness are likely to be significant, at least in the short to medium-term. For illustrative purposes, we have conservatively assumed it may be around 20% more expensive to achieve the recycling gap using the current funding approach compared to a competitive tender program.

The other key difference in programs is the scope of the activities funded. The current NPC funding process is limited to funding downstream projects (i.e. collection and reprocessing). A subsidy scheme that can provide funds to a broader set of applicants, for example also including upstream projects such as source reduction, is also likely to be cheaper than the current approach. For illustrative purposes, we assume it may be around 30% more expensive to achieve the recycling gap using the current funding approach compared to one with a competitive tender funding approach as well as a broader scope (including both upstream and downstream projects).

[129] Stoneham, Chaudri, 2002, Ha and Strappazzon, *Auctions for conservation contracts: an empirical examination of Victoria's BushTender trial*, paper presented to the Environrmental Economics Network Conference, ANU 2-3 May 2003, Canberra.

[130] Grafton, 2005, *Evaluation of Round One of the National Market-based Instruments Pilot Program*, Canberra.