Beyond Recycling

An Integrated Waste Management Framework for Local Government

Part B: Recycling in context—the current situation

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For

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1 BACKGROUND

The overall aim of this project is:

> *To make recommendations for councils in their forward planning and decision-making processes relating to recycling,* and *to empower councils to make more pragmatic, 'corporate' decisions about their recycling services, which are well understood and endorsed by their communities.*

The desired outcome is:

> *…a guidance paper to better inform councils of the issues relating to recycling, so that they may be better placed to decide whether to offer a service, what to collect, how to minimise ratepayer costs etc. The study would also look at ways to draft and structure contracts to minimise risk to councils and costs to their communities, and also ways to educate their communities about the reasoning behind council's decisions relating to recycling, to avoid a community 'backlash'.*

The Institute for Sustainable Futures recognises that improved decision-making processes means decisions that:

- are more holistic (both in terms of addressing the various areas of the waste stream and involving all stakeholders);
- maximise overall benefits, by addressing environmental, economic and social costs and benefits; and
- are based on more effective community engagement techniques, which involve the community from early on in the decision-making process.

The output of this project is a 2-part report. Part A provides a 'resource kit' for local government, providing strategic advice for integrated decision-making about waste and recycling service provision. Part B provides the supporting material for Part A, including recycling in context and a snapshot of the current situation of kerbside recycling.

Ideas for best-practice community engagement are incorporated in the integrated waste management framework provided in Part A. Part A also contains a stand alone community information flyer designed for councils to distribute to the community. The specific objectives of the community engagement component are to:

- provide best practice processes for engaging the community in decision-making;
- communicate with the community on council's decision-making processes;
- enable councils to engage the community with the questions "why do we recycle?" and "what else can we do?" and
- gain community support for waste avoidance and other resource-efficient options beyond kerbside recycling.

2 RECYCLING IN CONTEXT

Over the past decade, there has been growing awareness both in Australia and internationally that the environmental impacts of products extend beyond the post-consumer stages as waste, further up the product chain towards production (OECD, 1998, 2001; Commonwealth EPA, 1992; Resource NSW, 2003; ISF, 2004; Nolan-ITU, 2004). There is a general consensus among all levels of government, industry and researchers that a life cycle approach to waste management is required; one that tracks waste from 'cradle to grave', or source to disposal. Despite this growing understanding, sustainable material and resource management options have typically favoured kerbside recycling over waste avoidance and reuse, with little attention to the relative life cycle benefits of the latter two.

2.1 Why do we Recycle?

From an environmental perspective, we recycle to reduce the adverse environmental impacts of waste generation. Recycling is one means to meet this objective, however it is typically not the most cost-effective means of reducing the generation of waste. So why is it so popular among the community, industry and some governments?

Since the early 1990s, residential kerbside recycling has been the focus of waste and resource management practice for Australian local governments. NSW local governments were bound to waste management as assigned by the *NSW Local Government Act 1993*: "the provision, management or operation of waste removal, treatment and disposal services and facilities". However, the responsibility for recycling fell on local government due to significant pressure from the wider community (Flanagan, 1999). The State Government introduced a Waste Levy in the greater metropolitan region of Sydney in 1990, and the resulting money funded a recycling rebate scheme as an incentive for local government to provide separate collection services for recyclables (Woods, 2003). At this early stage, the Waste Levy was set very low and was cost-neutral thus there was no net cost to local government. However, after the used paper market crashed in the early 1990s and then again in 1997 (Flanagan, 1999) the gap began to widen between the cost of local government providing a kerbside recycling service and the revenue from the sale of the collected recyclable materials (known as the "gap"). By 1997, the gap was reportedly at $36 million for the Greater Sydney Region alone (Nolan-ITU, 1998). While the yields and range of materials collected have been steadily increasing, this has come at the cost of increased local government expenditure, increased contamination rates and a highly volatile market for recyclable materials. There has been a major focus on collecting as much used materials as possible, with little attention to ensuring the demand for the increasing supply (Woods, 2003) or cost of collection to councils relative to revenue from selling the used materials. On average, councils are each spending around $1 million per year (ISF, 2001; Nolan-ITU, 1998).

Recent NSW Budget Estimates show that the revenue raised from the Waste Levy in Sydney and outer regions has increased from $4.20 to $19.80 since 1993 (NSW Government, 2004). 55% of this levy is hypothecated to the Waste Fund, as is depicted in Figure 1 below. No funds were guaranteed to the Waste Fund in 2003/04.

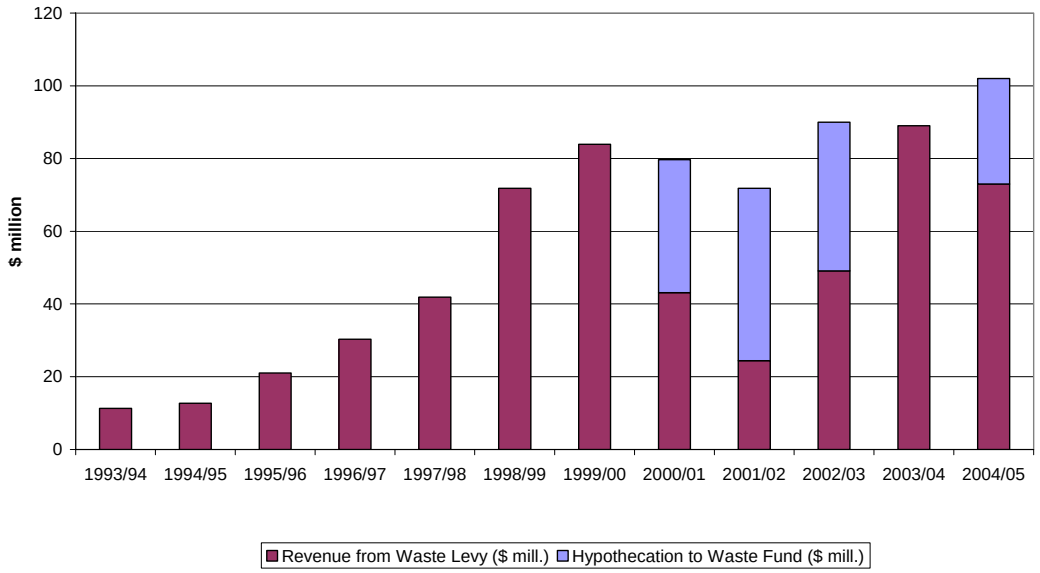

Figure 1: Revenue generated from Waste Levy and amount hypothecated 1993-2005

Source: Provided to 2004 Budget Estimates Committee hearing in response to questions from Ian Cohen MLC and NSW Budget papers 2004/5.

The community in general perceives kerbside recycling to be a highly important initiative towards sustainability. In a survey in Melbourne, 97 percent of those surveyed agreed that kerbside recycling is an essential service (EcoRecycle, 1998). Interestingly, random street surveys by the beverage containers. These results should not be seen as contradictory. Rather, they reflect a well established aspiration in the community to "do the right thing" and ensure that containers are in fact returned for recycling, through whatever means are effective. However, a recent study by DEC (2004) indicated that there might be little awareness and understanding within the community of the difference between recycling and waste avoidance. This indicated a need for greater community engagement in such issues (see Appendix A for community consultation methods).

The following sections provide a context for the popular practice or 'custom' of recycling in a physical sense within the waste stream, in an environmental framework and in the policy context.

2.2 The Waste Stream

The waste stream in NSW can be typically categorised into the 'at-home' and 'away-from-home' sector to reflect the nature of local government waste and resource management approaches. While 1.8 million tonnes of waste was generated in the at-home sector in 2000, 5.77 million tonnes was generated in the away-from-home sector in the same year (Hall, 2004). According to Nolan-ITU (2002) recycling rates in the at-home sector in Australia are high relative to other countries, however, recycling rates in the away-from-home sector are lacking substantially, which is contributing to Australia's poor overall recycling performance on the international stage (Nolan-ITU, 2000; ISF 2004).

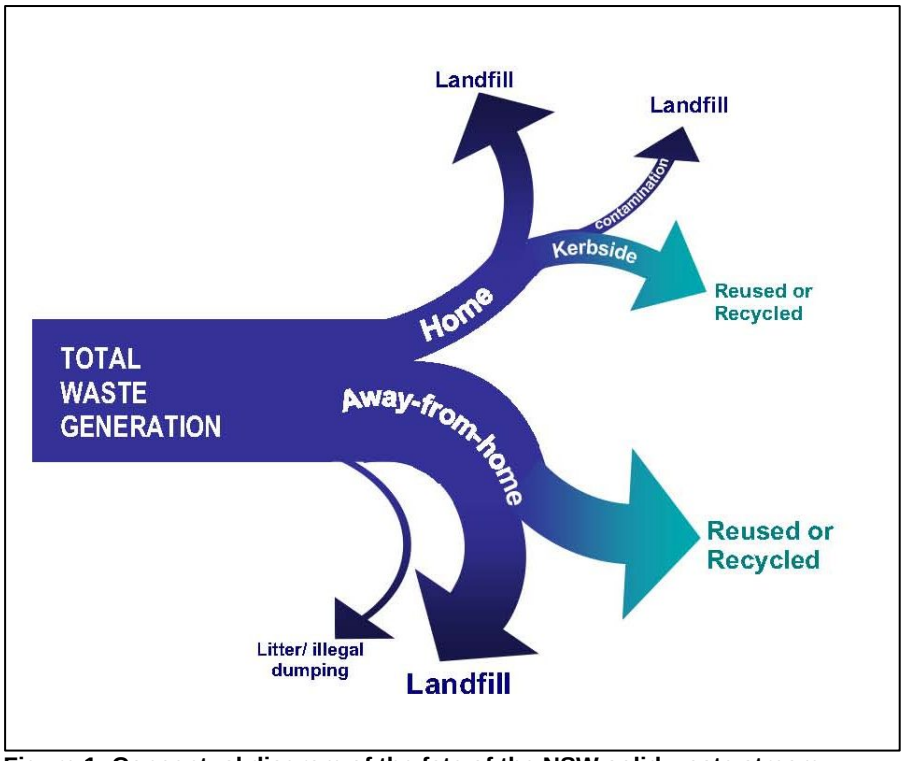

Figure 1: Conceptual diagram of the fate of the NSW solid waste stream.

** the widths of the arrows are indicative only of waste volumes/weight due to lack of relevant data available*

Despite recognition of the waste hierarchy by all level of governments and some industry groups (see *2.4 Policy Context*) and the need for multiple approaches to waste minimisation, there is still a strong emphasis on kerbside collection as a key solution. The Packaging Council of Australia notes: 'recycling is a means of achieving a goal, not a goal in itself and should result in some measurable environmental benefit. It is not always economic and it is not necessarily a hallmark of environmental superiority' (p1, PCA, 1994). However, there is still a need for a comprehensive analysis of the relative cost effectiveness of other more integrated strategies to reduce waste. A Nolan ITU/SKM Economics (2000) study and a Victorian equivalent (Grant et al. 2001), did undertake thorough analyses of the costs and benefits of the collection of waste packaging materials using life cycle assessment. However, the away-from-home sector was excluded from the analysis. The away-from-home sector represents half of the total packaging waste generation for some of the major packaging categories (BIEC, 1997a), such as beverage packaging. The away-from-home sector and other non- kerbside recycling sectors that are not being addressed to the same extent are indicated in Figure 2 above.

If the away-from-home sector is not addressed, there is a risk of over reliance on a sub-system (kerbside recycling) that results in a less than optimal system (minimisation and recovery of waste in total). Two studies (one in Australia, one in the United States) on the use of deposit/refund systems as a means of increasing recovery rates for beverage packaging found that unit costs (¢/container, or $/tonne) in deposit/refund systems were lower than kerbside systems alone and could help to reduce the net costs of kerbside collection (ISF, 2001; Beck et al., 2002).

A deposit /refund system can, in fact, improve the economic viability of kerbside by:

- Setting up an alternative return mechanism for materials where currently, the cost of collection exceeds the returns for the commodity
- Reducing the number of collection services and sorting operations which need to be provided
- Reducing landfill and associated levy costs by increasing return rates and therefore reducing the residual waste stream
- Providing council with potential income from refunds when householders elect to use the kerbside collection system for deposit-bearing materials
- Reduced need for litter management and associated costs.

2.3 Environmental Impacts

It is now widely acknowledged, both in Australia and internationally, that products have environmental impacts beyond the consumer stages further up the product chain towards production. (OCED, 1998; ResourceNSW, 2003; Nolan-ITU, 2004; ISF, 2004). In this context, the overarching environmental benefits associated with more sustainable waste and resource management are reducing resource use and the generation of waste. This means reducing the amount of virgin materials used in consumer products and reducing material disposed to landfill.

Life cycle approaches have been used to address environmental impacts incorporating the impacts of virgin material extraction, energy consumption, greenhouse gas generation from transport, water consumption, generation of by-products, landfilling and illegal disposal, as identified in Figure 3. Each of these environmental impacts has associated economic costs, such as the transportation of materials and products along the chain.

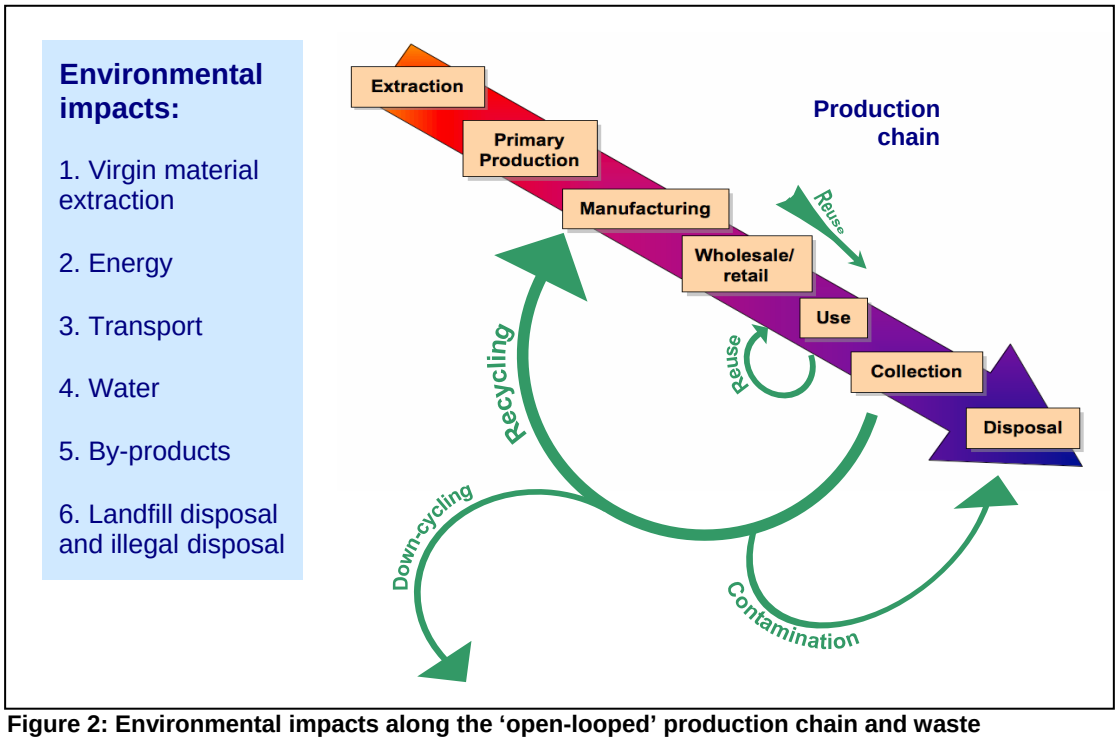

Figure 2: Environmental impacts along the 'open-looped' production chain and waste minimisation options for 'closing the loop'.

Recycling has the environmental benefit of diverting waste from landfill, however, it still requires a significant level of energy input and transportation to recycle the materials into new products. Avoiding the generation of waste in the first place is the most cost-effective, environmentally beneficial and socially responsible way to manage consumer waste (INFORM, 2004). Despite the obvious benefits of waste avoidance over recycling, there has typically been less focus on waste avoidance and more recycling as a tangible means of reducing environmental impacts.

2.4 Policy Context

There is a relatively widespread and shared understanding of the principles of ecologically sustainable development in Australia amongst all levels of government and the community. These very principles can represent overarching societal goals. Figure 4 draws the connection between recycling, other waste minimisation options, consumption and ultimately sustainability. That is, the ultimate goal we are trying to achieve with waste avoidance and resource recovery is one of sustainable consumption. Sustainable consumption is one of several important sustainability principles, along side other issues such as equity and justice. In this context, it becomes clearer that recycling is one option (another might be waste avoidance) to work towards sustainable consumption patterns and should therefore be assessed in terms of performance towards achieving this goal.

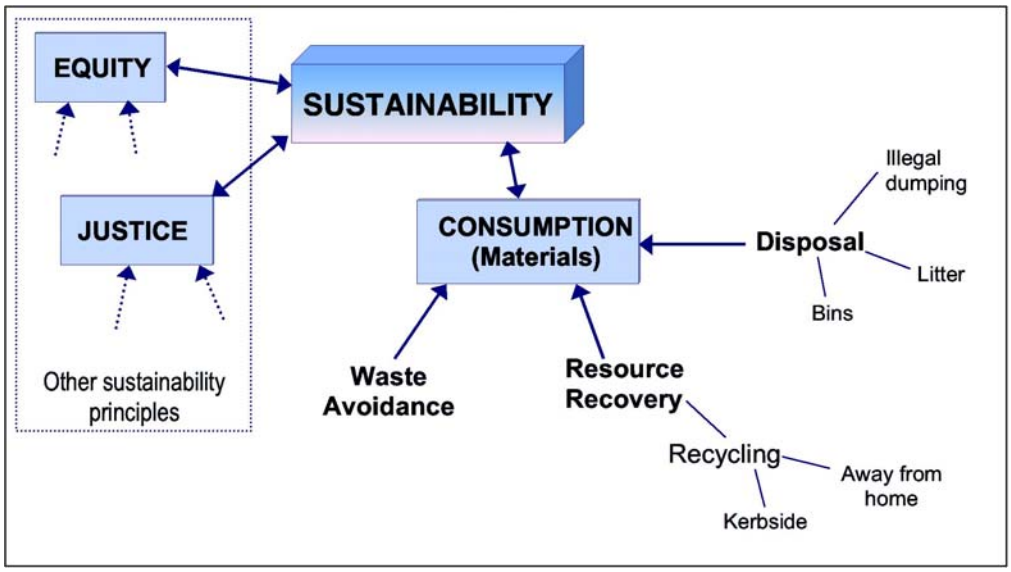

Figure 3: Waste minimisation in the context of sustainability.

In recent years, Australian waste policy has seen the introduction of the National Packaging Covenant (NPC) as a voluntary agreement between 'all spheres of government and the packaging supply chain' to reduce packaging waste (Resource NSW, 2003, p16). The Australian Local Government Association (ALGA) and the Local Government Association and Shires Association of NSW (LGSA) have consistently opposed the NPC because of its focus on kerbside recycling as a solution and its foundation on 'product stewardship' which is seen as weaker than 'extended producer responsibility' (Resource NSW, 2003). Some local government associations (including Queensland and NSW) perceive local government to be 'wearing the cost'[1] (ISF, 2004, p35) of the NPC and that they are at the 'end of the chain of

[1] Bryce Hines, pers. comm, 25/11/03 cited in ISF 2004, p35

decisions with little ability to influence the start of the chain'[2]. This is discussed further in Section *3.4 Recycling Costs* as the "funding gap" for kerbside recycling.

The NSW Government commissioned an independent inquiry into container deposit legislation and a review of the principles, policy and practice of extended producer responsibility (EPR) as part of a broader review of the *NSW Waste Minimisation and Management Act (1995).* The 1995 Act established a target of 60 per cent reduction of waste by 2000, however, this was far from achieved. The review of the 1995 Act informed the development of the *Waste Avoidance and Resource Recovery Act 2001* and the *NSW Waste Avoidance and Resource Recovery Strategy 2003.* These superseding policy tools identify four key outcome areas for future direction, notably:

- avoiding and preventing waste;
- increased use of renewable and recovered materials;
- reduced toxicity in products and materials; and
- reducing litter and illegal dumping.

The *NSW Waste Avoidance and Resource Recovery Strategy* prioritises action further up the waste hierarchy as defined by the OECD (2001) (See Figure 5). Strict avoidance, reduction at source and product re-use are considered higher priority actions than resource recovery (which include recycling, composting, energy from waste) or disposal (Resource NSW, 2003, p30). According to this hierarchy, a focus on kerbside recycling should be a lower priority than waste avoidance measures.

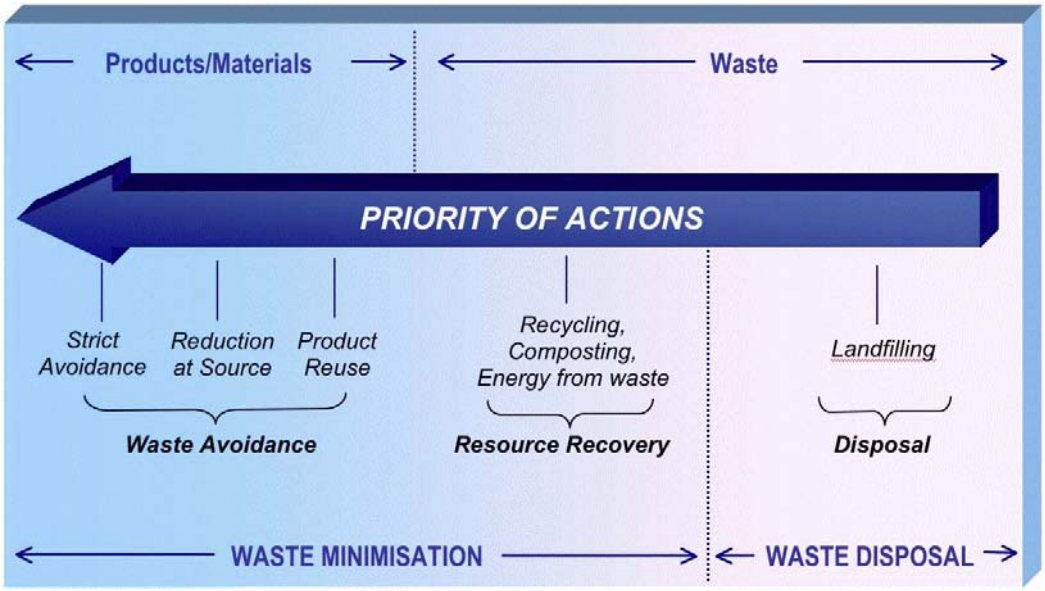

Figure 4: Waste prevention and avoidance in context of the waste hierarchy.

[2] Verhey, R (2003), Verbal submission to the National Packaging Covenant Review from the Local Government and Shires Association, Nolan-ITU Stakeholder Consultation, William Blue Hotel Management School, Sydney, 18/11/03,.

Product stewardship[3] and extended producer responsibility[4] are both identified as key elements of the *Waste Avoidance and Resource Recovery Act 2001*. Both the Act and the Strategy encourage industry to manage their waste under a voluntary scheme and note that EPR schemes may be mandated only where industry is not effectively managing its wastes (Resource NSW, 2003, p96; *Waste Avoidance and Resource Recovery Act* 2001, Part 4). The Department of Environment and Conservation has since released a priority statement on Extended Producer Responsibility, which identified products such as computers, televisions, nickel-cadmium batteries, used tyres and plastic bags that will be the priority for an EPR strategy (DEC, 2004).

The trend towards waste management based on EPR principles in Australia means that the current physical and financial burden on local government to collect end-of-life waste products for recycling needs to be redistributed and placed more firmly with the producers of goods which end their life as waste. The National Packaging Covenant, based on an ethic of shared responsibility in relation to management of packaging waste has failed to effectively ensure that industry assumes responsibility for the financial viability of kerbside recycling system, leaving local government to continue subsidising the increasing cost of providing the service (ISF, 2004). As described in section *3.4 Recycling Costs*, this increasing net annual cost to local government in the Greater Sydney Region reached $36 million in 1997.

[3] An ethic of shared responsibility between all players in the product chain for the lifecycle of the product through to and including its ultimate disposal (ISF, 2001)

[4] Extended Producer Responsibility (EPR) is a policy approach in which a producer's responsibility, physical and/or financial, for a product is extended to the post-consumer stage of a product's life cycle. There are two key features of EPR policy: a) the shifting of responsibility (physically and/or economically, fully or partially) upstream to the producer and away from municipalities, and b) to provide incentives to producers to take environmental considerations into the design of the product (OECD, 2000a, p 20).

3 CURRENT KERBSIDE RECYCLING SERVICES

In Australia, the focus of waste avoidance and resource recovery for local governments has historically been kerbside collection of paper, glass, some plastics and metal containers for recycling. This chapter will therefore concentrate largely on the performance of kerbside recycling – current yields, recovery rates, costs, contamination, community engagement and decision-making. This section draws from two key sources: - literature from state, national and international sources and through discussions with representatives from local government.

3.1 Introduction

According to international and national research, Australia has the second highest per capita rate of waste generation in the world (OECD, 1999, 2000b; Nolan-ITU, 2002; ABS, 2003a). A comparison of waste generation with other industrialised countries shows that Australia generates 690 kg per capita compared with 480 kg/capita for the UK and 390 kg/capita in Denmark (EEA, 2001). The overall domestic recycling rates[5] for these countries are 20%[6] in Australia, 39% in the UK[7] and 29% in Denmark[8] (Nolan-ITU, 2002).

Although Australia has a relatively good[9] kerbside recycling system compared to other countries, the limited away-from-home recycling system is contributing to its poor overall recycling performance internationally. This overall performance is in contrast to the perception that Australia is one of the best recyclers in the world (Nolan-ITU, 2002). A recent Nolan-ITU study (2002) found that EU countries 'superior recycling rates' compared to Australia can be attributed to their use of regulated recycling measures and packaging directives.

Metropolitan and regional councils in NSW are rapidly growing areas and account for a major portion of the waste generated compared to rural councils. Although kerbside recycling currently recovers approximately 20% of domestic waste, the total amount of waste disposed is still significant, as shown in Figure 6.

[5] Domestic recycling rate refers to the proportion of material diverted for recycling from the total waste stream

[6] Data extrapolated from Victoria and adjusted for other states based on known waste diversion rates

[7] Based on 1997 data

[8] Based on 1996 data

[9] Percentage recycling compared to other countries.

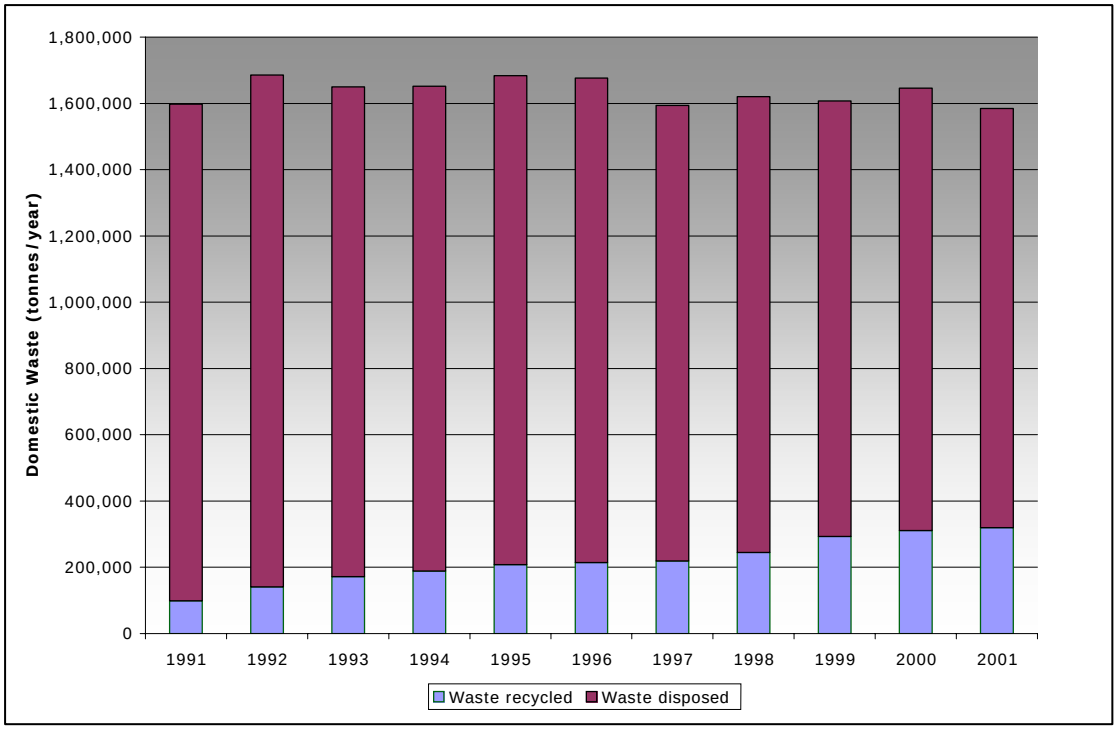

Figure 5: Domestic waste disposed and recovered for recycling in the Sydney Metro Region (SMA) 1991 – 2001.

Source: NSW EPA, (2003) NSW State of the Environment Report

For example, while the total amount of waste recycled increased in Sydney between 1998 and 2000, the total waste disposed to landfill also increased. This has been attributed to strong economic growth including an increase in consumer spending on material goods (Hall, 2004), though others have noted that the figures do not reflect any significant reduction in waste even when the level of economic activity is factored in. Therefore, while recycling is an important mechanism in the reduction of waste to landfill, it is more important to reduce the overall generation of waste. This is reflected in the NSW Waste Avoidance and Resource Recovery Strategy 'Priority of Actions' (Figure 4) which gives kerbside recycling lower priority than waste avoidance measures. The implementation of deposit/refund systems, EPR and product stewardship are important measures in resource recovery.

3.2 Service Provision

Local governments in NSW most commonly offer residential kerbside collection services for 'hard' recyclables and to a lesser extent, green waste, organic waste, commercial waste and public place waste.

Almost all Councils (see below for percentages) currently offer residential kerbside recycling services for different packaging materials including paper, PET, HDPE, glass, steel and aluminium cans and other containers. The recyclables are collected either by the Councils or through waste contractors employed by the Councils. Currently, all metropolitan and regional councils and 75% of rural councils provide recycling services. Green waste collection services are provided by 78% of metropolitan councils, 67% of regional councils and 25% of rural councils (DEC, 2003). Some councils (10% in 2001–02) operate drop-off centres for recyclable material (NSW JRG, 2002).

The current domestic kerbside recycling systems in NSW involve the collection of the material on a weekly or fortnightly basis. In most cases, the material is sorted at material recovery facilities (MRFs) and then sold to markets. The most common receptacles used and

the frequencies of collection include weekly or fortnightly collection of mobile garbage bins (MGBs), weekly collections of split MGBs with garbage and recyclables or weekly/fortnightly collection of crates for recyclables, usually paper. A recent assessment of kerbside recycling systems (Nolan-ITU, 2004) analysed different scenarios for kerbside recycling based on current practices and found that the diversion rate for recyclables was the highest for services operated fortnightly collecting commingled containers in MGBs separately and paper cardboard in MGBs separately. This diversion rate, however, does not account for contamination occurring at the MRF during sorting and might be higher for commingled systems (collecting containers and Paper/cardboard in one bin) (*See 3.5 Contamination Rates*). It is therefore important to clearly distinguish between the diversion rate of kerbside recyclables and the actual recycling rate.

Local government waste and recycling services to the commercial sector include garbage collection (64% of NSW councils) and to a lesser extent, recycling services (35%)) (Resource NSW, 2003a). According to the National Environment Protection Council Annual Report for 2001–2002, there was a 40% increase from 2000/01 to 2001/02, in the number of non-residential premises covered by a kerbside recycling service (NSW JRG, 2002).

There is a large potential for resource recovery in the away-from-home sector. For example, approximately 50% of beverage containers are disposed of in the away-from-home waste stream (BIEC, 1997). However, apart from the 1997 National Recycling and Garbage Bin Audit undertaken by BIEC (1997), there is limited data available on the away-from-home sector.

The focus on the ‘at-home’ sector rather than the ’away-from-home’ sector is further encouraged by the National Packaging Covenant, which places emphasis on residential kerbside collection. Additionally, this focus fails to seriously consider a range of alternative collection mechanisms (drop off, deposit/refund, advanced disposal fees) and avoidance measures, which would provide outcomes more consistent with waste hierarchy priorities. It means that an integrated perspective of the entire waste stream is not being employed in analysis and strategies.

3.3 Recovery Rates

Recovery rates, that is, the percentage of waste generated that is recovered for recycling, differs between the commercial and industrial (C&I) sector, the building and construction (C&D waste) sector and the domestic sector, as shown in Figure 7. While a large portion of C&D waste is recycled, recovery rates in the domestic sector are not as high. The recovery rate for the C&I sector is estimated to be 28% (Resource NSW, 2003b). Much of the waste generated in the household is recyclable, thus recovery rates in theory could potentially approach 100%.

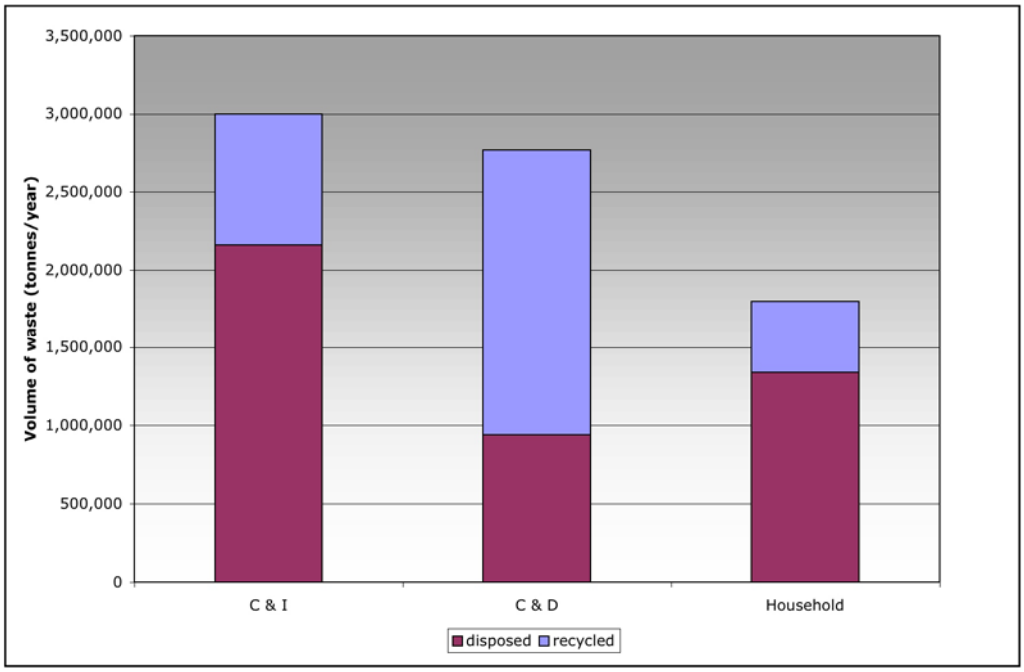

Figure 6: Snapshot of 2000 showing the proportion of waste recycled and disposed across the sectors.

Source: Hall, R. (2004)

Recovery rates for recycling refer to the amount of recyclables collected from the domestic waste stream for reprocessing as a percentage of the total amount of waste generated.

Figure 7 shows the current composition of the domestic recycling stream (in NSW by weight per household). It is important to note that there are significant differences in the percentages of glass and paper collected in the metropolitan and rural areas. While paper dominates the metropolitan recycling stream, glass makes up a significant quantity of the rural domestic recycling stream (DEC, 2003).

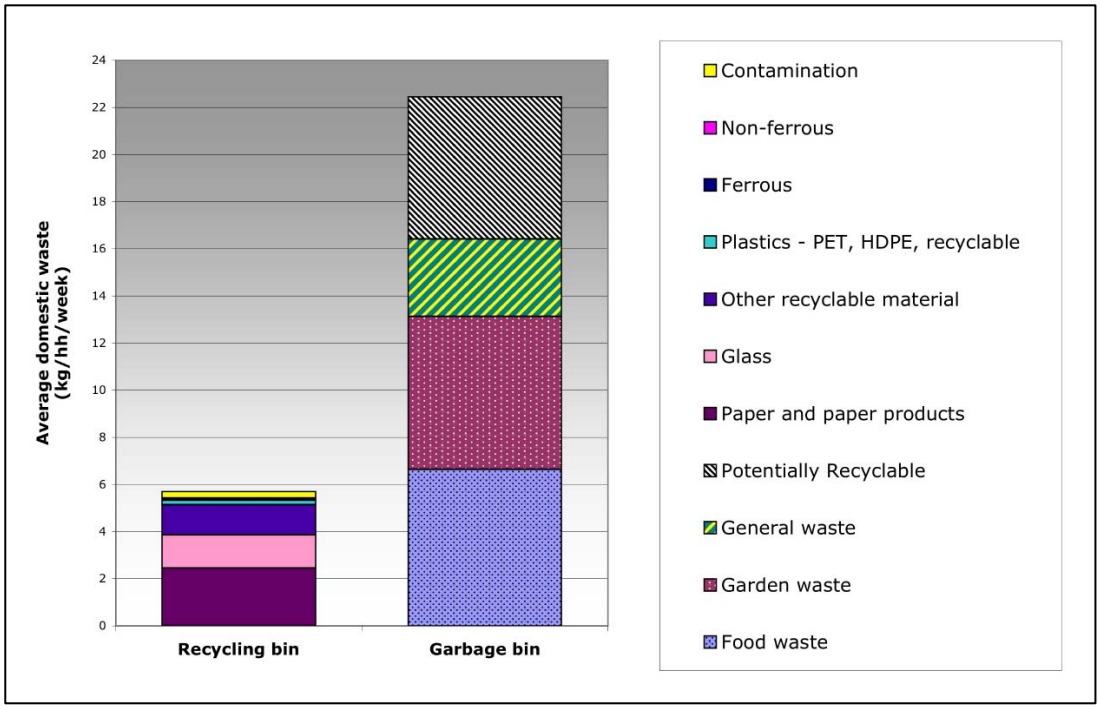

Figure 7: Current breakdown of domestic recycling stream (kg/hh/week) in comparison to domestic waste stream.

Source: DEC, 2003. Data based on analysis of audits conducted by EPA, BIEC, NSW Waste Boards and Councils

Table 1 shows the trend in kerbside collection of material. The information is based on data supplied by councils.

	2000/01	2001/02
Recyclables collected	365,000 tonnes	492,000 tonnes
Material collected /hh/year	221 kg/hh/yr	228 kg/hh/yr
Recycled material*	204 kg/hh/yr	216 kg/hh/yr

**Some of this material results in contamination at the MRF and is sent to landfill. Therefore the 'actual' recycled material (in kg/hh/yr) is less than presented here. Contamination rates at MRFs are currently publicly unknown, but are estimated at between 6%–30% (see Section 3.5)*

Table 1 Comparison of kerbside collections during 2000 – 2002

Source: NEPC Annual Report (2002)

Surveys undertaken by Nolan-ITU with local Councils showed that the net yield per household of kerbside recyclables was an average of 4.7 kg/hh/week or 244 kg/hh/year[10] (DEC, 2004a). This represents a diversion rate of 27%. Although the results have been adjusted for gross contamination, it may not be an accurate representation, as contamination of the material occurring at MRFs is usually not considered. (See 3.5 Contamination Rates).

A more accurate measure would be the percentage by mass of products generated (eg. glass containers) which are actually reused or recycled into new products, rather than simply looking at the percentage of those that are collected with the intention that they might be reused or recycled. This actual recycling rate is difficult to determine due to the lack of

[10] This is based on data collected from the 21 councils in 2002 and 2002–03 NEPM recycling data submitted by Councils.

publicly available and consistent data It is important to consider the trends in total mass of waste generated over time as this is the indicator that we are trying to reduce.

While there are several data sources for recycling rates, reliable data has been a major issue, due in part to the lack of standard reporting procedures, transparency of the assumptions and consistency in the method of data collection. The National Packaging Covenant (NPC) required reporting on recovery rates, however, these have been unclear and non-specific making aggregation of data difficult. This has led to situations where, in a recent review of the NPC by ISF, it was impossible to determine whether the Covenant system is achieving a reduction in overall packaging waste (ISF, 2004). Analysis of other available data sources suggests that packaging waste is increasing and for some materials recovery rates are decreasing despite increases in kerbside collection tonnages in some jurisdictions. For example, glass (recyclate) recovery in NSW has decreased approximately 5% year on year for the 4 years the Covenant system has been operating (Figure 9), despite an increase in production of glass containers (ISF, 2004).

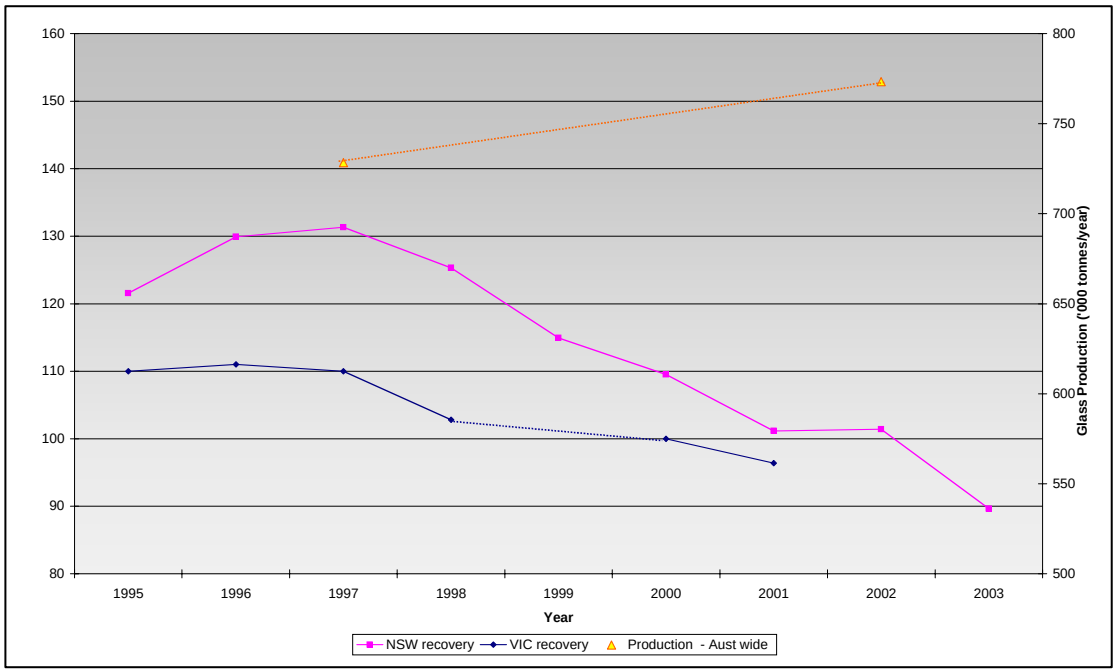

Figure 8: Glass recovery NSW and VIC and production in Australia

Note: left Y-axis is glass recovery, right Y-axis is glass production
** Data on NSW glass recovery ISF 2004.) *Production sourced from Euromonitor (2003a, 2003d).*

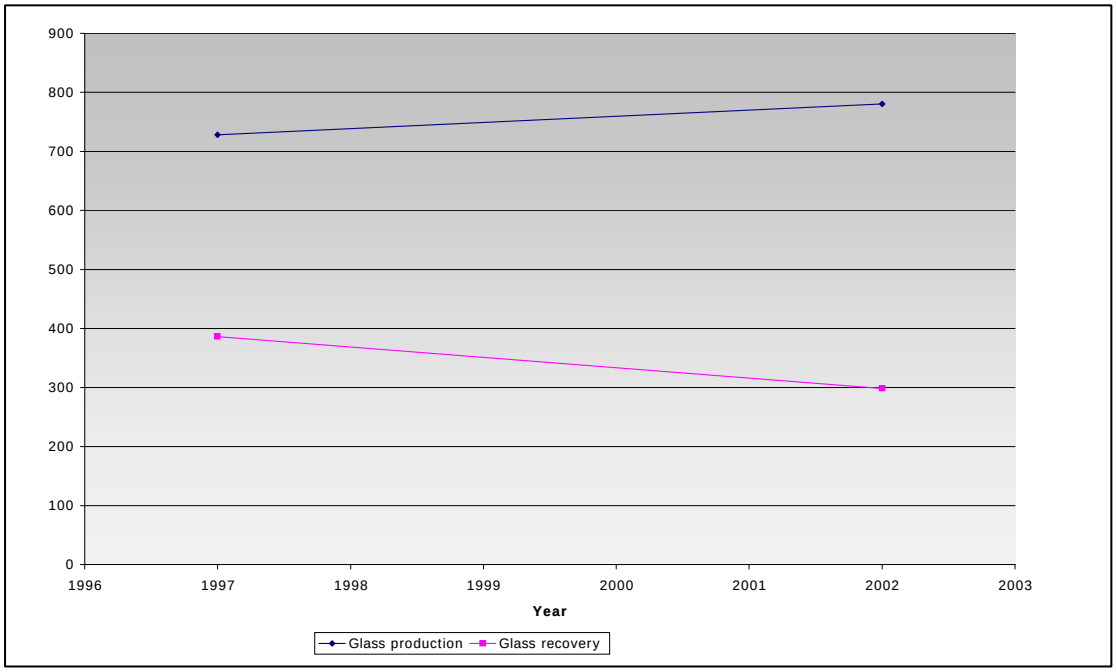

Figure 9: Glass production and recovery in Australia

Sources:
** Data on glass recovery was sourced from VISY for NSW and extrapolated to Australia.*
** Data on glass production was sourced from Euromonitor (2003a, 2003b, 2003d).*

A comparison of Australia's recycling performance to other countries indicates that glass packaging recycling rates in Australia may have dropped below 40%, which is significantly below that of other countries (Nolan-ITU, 2002).

There have been claims by the beverage industry peak body that light-weighting has led to a reduction in the generation of packaging waste (BIEC, 2004). Whilst light-weighting has reduced the mass of glass per litre of beverage by 4% between 1996 and 2002 (BIEC, 2003), this has been overcompensated for by the 10% increase in beverages packed in glass (by volume) leaving a 6% net increase in glass production by mass. This discrepancy highlights the gap in the collection of accurate data which needs to be addressed urgently (ISF, 2004).

3.4 Recycling Costs

The cost of collection, transport and sorting of recyclables is currently approximately $41/hh/yr (DEC, 2004a). Overall, (across all sectors) in NSW recycling is estimated to cost about $300M[11] annually (Wright, 2002, p 17).

The net cost of kerbside recycling, often referred to as the 'gap' (LGSA, 1999), is the difference between the cost of collection of recyclables and the revenue from the sale of recyclable material. The 'gap' has been steadily increasing since the crash of the recycled paper market and is a major issue for local government (Nolan-ITU, 1998; Nolan-ITU, 2004). For example, based on recycling data for 1997 in the Greater Sydney Region, Nolan-ITU (1998) estimated that it cost $67M to collect and sort 296,000 tonnes of recyclables, of which the revenue generated after the sale of 271,000 tonnes amounted to $17M. Taking into account the avoided landfill charges and garbage collection costs, the total marginal cost of recycling or gap, amounted to $36M. The trends in the gap are shown in Figure 11.

[11] Net of market values.

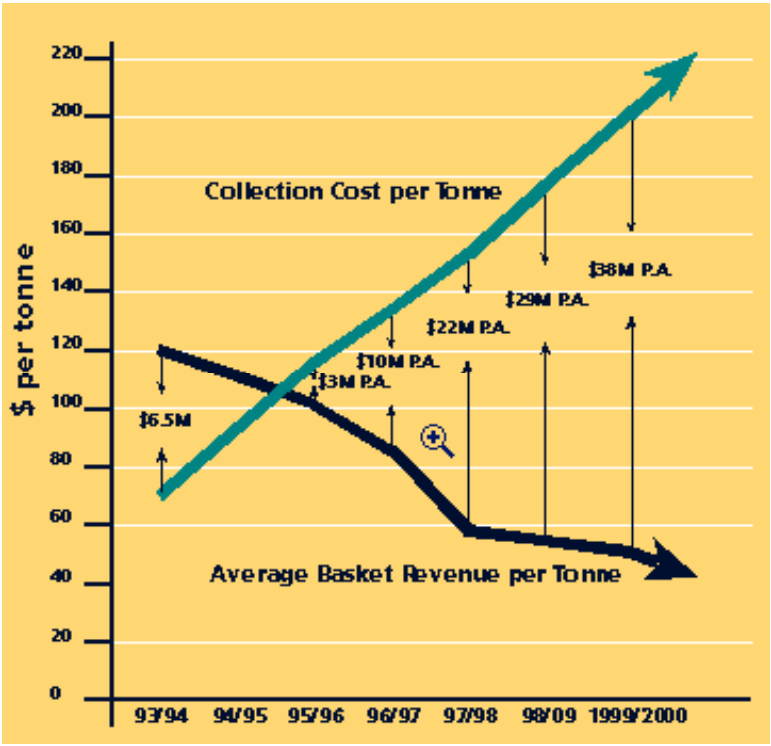

Figure 10: Increasing cost of collection in comparison to decreasing revenue from sale of recyclables

Source: Local Government Recycling Cooperative 1998

From a comparison of the contribution to the kerbside recycling system of industry to that of local government, it is evident that local government still bears a large financial burden, especially in relation to the packaging materials. According to the Nolan-ITU/ SKM Economics (2000), local government's national net expenditure on kerbside recycling is $158m pa[12]. This can be starkly contrasted with the contribution of the brand owners under the terms of the NPC, who have spent a total of $3m pa (based on $7–$10m[13] contribution to NPC Transitional Funds over three years). This is shown in Figure 12. Further, the NPC specifically precludes these inadequate funds being used to fill the 'gap'. Unlike the financial costs and benefits of kerbside collection, which are reasonably well documented and characterised, the net costs to industry associated with support for recycling through the establishment of recycling facilities and over market-value payments for recyclates are more difficult to characterise and verify due to the constraints arising from commercial confidentiality. Clearly, however, industry's contribution represents a very small proportion of the profits generated by the production of their commodities, and their contribution is unlikely to match the contribution of ratepayers (via local government) to kerbside recycling (ISF, 2004).

[12] This figure is a net cost, taking into account the avoided costs of landfilling and the residual value of recyclate.

[13] This figure is estimated, as there is no transparent record of the exact amount that has been collected for the Transitional Fund.

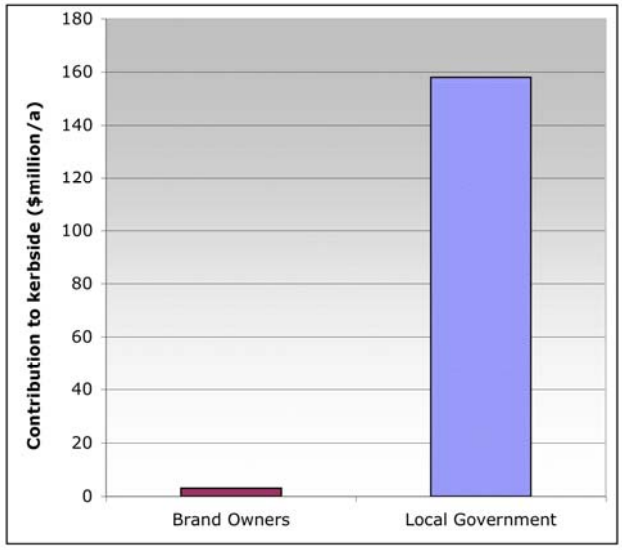

Figure 11: Annual financial contribution to kerbside recycling by brand owners (and local government in Australia.

Source: ISF, 2004.

The NSW State Government along with the LGSA has attempted to increase local government's contribution to the market for recyclables through the implementation of the 'Waste Reduction and Purchasing Policy' and the 'Local Government Buy Recycled Alliance' respectively. A similar initiative has been implemented by the private sector known as the 'Buy Recycled Business Alliance'. However, the recyclables market has been highly unstable due to fluctuating commodity prices and lack of formal market structures for recyclable material (Wright, 2002). There is a need for further development of the market to make recycling more economically viable.

3.5 Contamination

Contamination of recyclable material occurs both at the household level and during transportation and sorting at MRFs. Recycling rates (as opposed to "collection" rates) should ideally be measured net of contamination, that is the amount of recyclable material collected / sent for reprocessing minus the contamination occurring at kerbside and MRFs.

The rate of contamination of recyclable material is poorly characterised due to the method of determination of contamination levels and their classification. Technically, contamination should equal material separated by households for recycling minus material sent for reprocessing. However, the data currently available on contamination rates only takes into account contamination by the householder occurring due to incorrect disposal of recyclable material in the kerbside recycling bins. The levels of contamination are determined by kerbside audits. Contamination occurring during collection or at the MRF is not usually considered in analysis (DEC, 2004a; Nolan-ITU, 2004), however it can be a significant proportion

There is a lack of consistency in the data available on contamination rates. In some instances for example, whilst the NEPC Annual Report (2002) for NSW states that contamination rates were down to six per cent in 2001 (from eight per cent the previous year), data presented in the Independent Assessment of Kerbside Recycling Australia (Nolan-ITU/SKM Economics, 2000, p30) suggests that it is likely to be over sixteen per cent. With respect to glass recovery, there is a major discrepancy (approximately 30%) between the reported glass yields in the NEPC report for NSW (self reporting by local government) and the actual tonnages that are

aggregated at the Visy Botany beneficiation plant, which collects all glass recyclate from MRFs and other sources in NSW.

A recent report (DEC, 2004) on good practice performance measures for kerbside recycling systems, involving a telephone survey with 21 councils in the Sydney metropolitan region found significant differences in the reported contamination rates at kerbside, varying from 1% to 14%, with the median being 5%. It was found that the highest contamination occurs in kerbside collection systems that collect commingled containers and paper/cardboard in a single bin, due to incorrect disposal of recyclables (Nolan-ITU, 2004, p8).

Further research is therefore required into real contamination rates using a consistent method that accounts for contamination occurring at the household level and at MRFs.

3.6 Community Engagement

The provision of kerbside recycling services by local government largely arose out of demand from communities with encouragement from industry (through public awareness programs) and government (through financial incentives such as the kerbside recycling rebate in the early 1990s). The high participation rate is perceived as an opportunity for the community to do something good for the environment.

Studies have shown that, in general, communities are unaware of the financial costs of kerbside recycling and are not well informed about alternatives to recycling (Nolan-ITU/SKM Economics, 2000 p B–13). While kerbside recycling has been a moderately successful mechanism for reducing the amount of waste going to landfill largely due to high community participation rates, it has not been financially viable for local government, and it has almost certainly not maximised the level of diversion, compared to other systems.

The current type of community engagement by local government is often focused on operational issues of waste and recycling service provision (usually prior to developing new waste contracts). Typically, this occurs through survey questionnaires, direct feedback, focus groups, public consultation and feedback on management plans. There has been little consultation on the broader issues of alternatives to kerbside recycling, EPR and waste avoidance with the community. This focus on recycling may have led to the community perception that kerbside recycling is an 'end' in itself and not the 'means' to waste minimisation. A recent study by DEC (2004b) suggests that there is little awareness and understanding of the difference between recycling and waste avoidance. This indicates a need for further community engagement around broader issues of waste reduction and sustainable consumption. Local governments can play a key role in increasing community awareness and understanding of these issues through community education programs, as has been emphasised in 'Action Plan for Local Government' following the NSW Waste Avoidance and Resource Recovery Strategy. Furthermore, consulting the community early on in the decision-making process can increase awareness and understanding of the issues in addition to greater ownership of the resulting strategies in which they will need to participate.

3.7 Waste Management Planning

The responses to an informal survey sent out to local councils by LGSA[14] (May 2004) on planning and decision making about waste management showed that planning for waste services is often in response to the needs of waste and recycling service contracts rather than pro-actively working towards waste avoidance and resource recovery at least cost to council. In some cases, community consultation is undertaken to ascertain community views, however, this consultation often occurs towards the end of the decision-making process, such

[14] This sample of 15 councils is not representative of all councils.

as community preferences about a draft recycling strategy developed by council, and is less likely to involve the community in earlier deliberations about why we recycle and what other ways could we achieve the real objectives of a more sustainable, less wasteful community.

The NSW Waste Avoidance and Resource Recovery Strategy focuses on waste avoidance as a 'priority action', with a target of stabilising waste generation for five years at 2000 levels. The target for resource recovery is to increase levels from 26% in 2003 to 66% by 2014. The Strategy has identified actions for local government to achieve this target through various means including influencing the behaviour of the local community towards waste avoidance and increased resource recovery through education programs and incentives to encourage and reward behaviour changes.

Specifically, the *Action Plan for Local Government*, which is a consultation paper developed by DEC for local councils to agree on actions and targets proposed, identifies four main categories for local government opportunities. These include (DEC, 2003):

Resource recovery – There are enormous opportunities for local government to increase resource recovery by improving the levels of service as well as extending the services to businesses and increasing public place recycling. Improvements in the collection processes as well as contract and facilities arrangements can lead to increased recovery of recyclables from the domestic waste stream.

Waste reduction and procurement – Local government can play a major role in reducing waste by purchasing products containing recycled material, thereby increasing the market for recyclables, which will indirectly reduce the "gap" (*See 3.4 Recycling Costs*). This can be done by participation in the 'NSW Local Government Buy Recycled Alliance', by influencing procurement policies as well as reporting on progress towards waste reduction against targets.

Regulatory framework – Councils have the ability to introduce regulations through DCPs and LEPs in relation to waste reduction and recovery, especially in the building sector.

Community leadership and education – There are opportunities to increase education and awareness in the community and in the business sector in the areas of waste avoidance and alternatives to recycling as well as undertaking targeted programs on littering, illegal dumping and reducing contamination in kerbside recycling.

The above four categories cover key areas of an integrated waste management strategy aimed at waste avoidance and resource recovery. Options within these areas should be explored further in terms of their economic, environmental and social costs and benefits. For example, what waste avoidance (and other) benefits can be expected through extending recycling services to the business and public place and at what cost? Further, where does the ultimate responsibility lie for "improving levels of service" if we are genuinely committed to the principles of extended producer responsibility? With councils? Or with producers?

4 CONCLUSIONS

Increased awareness of extended producer responsibility and of 'whole of life cycle' thinking in relation to managing waste products in Australia has created an opportune moment for local governments to reflect upon and reassess the waste and recycling services that they provide within a broader strategic and political context.

Kerbside recycling is by far the most prevalent waste avoidance and resource recovery service provided by local government in NSW. In part due to industry, community and government pressure to increase recovery rates with little attention to the cost of providing such a service, viable markets, contribution to reducing total waste generation or financial support to local government for providing such a service. There is an opportunity to significantly improve the cost-effectiveness and efficiency of reducing waste generation, that is, reducing virgin materials used in short- and medium-life products and material disposed to landfill through an integrated waste management strategy. Such an integrated strategy requires an integrated decision-making process, including best-practice community engagement at various stages of decision-making.

The following sub-sections discuss the findings from this report under specific topics.

Current situation—recycling services, recovery rates, costs and contamination

Since the early 1990s, NSW local governments have invested significant resources in the development and improvement of kerbside recycling services, particularly in terms of reducing costs and increasing yields. Kerbside recycling services essentially concentrate on diverting paper and packaging waste from the 'at-home' waste stream, with some councils also providing a service of collecting and recycling green or organic waste. Kerbside systems range in terms of collection frequency, size of receptacles, commingled or separate receptacles and contracted or council-operated waste collection. There are trends towards commingled services as means of reducing costs and occupational health and safety issues, where recyclables are placed in a common receptacle and taken to a Material Recovery Facility for sorting. A limitation of this trend appears to be increased overall contamination rates. However, there is little reliable data on overall contamination rates, with estimates ranging from 6% to as high as 30%.

While total yields from kerbside systems are generally increasing, overall recovery rates, that is the mass of material recovered for recycling as a proportion of the total produced, for some materials such as glass, are decreasing. In this case, this is due both to an increase in glass production and decrease in glass recovery. Reliable data to compare recovery rates of other material types is not readily available. Recycling rates for glass in Australia have reportedly dropped below 40%, which is significantly lower than that of other countries (Nolan-ITU, 2002).

The net cost to local governments of providing this kerbside recycling service is increasing annually, largely due to oversupply of recyclables and instability of the recyclables market. In 1997, the 'gap' was $36 million for the Greater Sydney Region (Nolan-ITU, 1998).

Other waste streams

Current kerbside recycling services focus on that part of the waste stream generated at home and predominantly paper and packaging waste within the at-home sector (see Figure 2 in *2.2 The Waste Stream*). For some waste products, such as beverage containers, the away-from-home sector represents 50% of the waste stream. There is significant potential for increased recovery if strategies were developed that address the away-from-home sector (such as public place), in addition to green waste and large waste (such as furniture, large appliances). Options for an integrated waste strategy should consider all major sectors of the waste stream. This is likely to require an increased commitment to extended producer responsibility and a variety of economic and regulatory options.

Extended Producer Responsibility

Historically, local government has had little control over the design and production of products that ultimately result in household waste councils are obliged to collect and manage. There has been a greater awareness generally in the past decade that best practice waste and resource management should involve cooperation and collaboration between all stakeholders in the product chain. This was a major objective of the National Packaging Covenant (NPC), which states that: "Packaging designers should work with the packaging chain (from design to reuse) to ensure that opportunities for waste minimisation, secondary market creation and the reduction of litter are taken" (cl 4, NPC). However, as described in a recent review of the NPC (ISF, 2004), councils and Local Government Associations (including the NSW LGSA) were excluded from negotiations and critical decision-making early on in the process, and more importantly, their political "sign off" was not sought for the Covenant, despite that fact that the Covenant makes significant commitments for the Local Government sector. Furthermore, the notion of 'shared responsibility' was seen as fundamental to the NPC, which stated that it: "includes an ethic of shared responsibility for the life cycle of products, including the environmental impacts of the product throughout and including its ultimate disposal" (cl. 4). However, there is a strong sentiment shared by local government that this is not an appropriate principle to underpin the Covenant, and in any case responsibility is not being shared equally among stakeholders in the product chain, particularly by industry (ISF, 2004 p34; Meindhardt, 2004, p48).

Ideally, an integrated waste and resource strategy should be developed and coordinated at the state and national level, including an EPR strategy where there is an obvious need for a national strategy. In 2003, the NSW Waste Avoidance and Resource Recovery Strategy was published to facilitate and direct waste minimisation and resource management across all stakeholders in accordance with the waste hierarchy.

Lack of data and analysis

There is has been a significant amount of research on the effectiveness of kerbside recycling. However, critical factors have been omitted from some of these significant studies which may impact on the soundness of policy and decisions in relation to waste and resource management. Such omissions include the lack of analysis of the away-from-home sector, reliable estimates of overall contamination rates and actual recovery rates by material type.

A more comprehensive analysis into options beyond kerbside recycling to reduce waste generation and increase resource recovery that take into account environmental, social and

economic costs and benefits within a life cycle framework would allow more cost-effective decisions to be made.

Measurement of the performance of existing waste and recycling systems requires appropriate, accurate, consistent and transparent data to be collected on a regular basis. Whilst some data is being collected by local governments and other stakeholders in the production chain, as a whole these data sets are not consistent or complete such that they can be aggregated and used to track or evaluate progress towards the goal of reducing waste and increasing resource recovery. For example, there are no clear figures for contamination rates which are critical to undertaking a material flow balance and thus the effectiveness of kerbside recycling. However, if local government was expected to collect such data, this would need to be resourced and centrally coordinated, particularly through increased support from the State Government.

Contractual issues

Due to the volatile market for recyclates collected at kerbside, councils deal with a level of risk associated with investing in long-term recycling contracts. In addition to volatile recyclables markets, other contractual issues councils need to address include differential rates for different products and methods for sharing risk. Such risks could be minimised through shorter term, performance-based contracts with appropriately drafted objectives which are consistent with ecologically sustainable development, and seek to optimise the environmental, social and economic outcomes.

Decision-making process

There are significant environmental and social costs associated with the generation and disposal of consumer products (OECD, 1998, 2001; ResourceNSW, 2003; ISF, 2001). A number of NSW councils reportedly consider some environmental, social and technical factors in addition to financial aspects in their decision making around waste and recycling management, according to a recent study funded by the NSW JRG (Nolan-ITU, 2004). This study found that overall, NSW councils value financial performance (32%) only slightly more than environmental performance (25%), operational/technical performance (25%) and social performance (18%). This study did not report on how these preferences are factored into the decision-making process for waste and recycling services. However, the current focus on kerbside recycling as the main form of waste and recycling management in NSW councils, which alone does not maximise environmental or financial outcomes, suggests there is potential to improve methods for considering environmental, social, financial and technical factors

Furthermore, while councils are generally investing more in cost-effective means of delivering kerbside recycling services, there are still other significant parts of the waste steam not currently being addressed, such as the away-from-home sector. This means the overall cost-effectiveness of reducing the generation of waste and increasing recovery is reduced. Determining the costs per tonne of other options beyond kerbside may yield a more cost-effective overall strategy which also addresses the away from home sector in a more effective way.

Other waste management planning tools which suggest there is potential to improve overall cost-effectiveness of the waste and recycling services council provides includes the waste hierarchy and life cycle analysis. According to the NSW Waste Avoidance and Resource

Recovery Strategy (ResourceNSW, 2003), the waste hierarchy prioritises waste avoidance measures (such as strict avoidance, reduction at source and product reuse), above resource recovery (including recycling composting and energy from waste) with disposal (eg. landfill) viewed as a last resort. Councils could consider what further role they could play in waste avoidance measures, as well as questioning the nature of their existing and future involvement in recycling. Life cycle analysis enables costs and benefits to be determined over the entire life of a waste product. This allows environmental impacts of waste beyond landfilling to be addressed, such as the extraction of virgin materials and energy and transport costs during the production of products which end their life as waste. A solution to manage waste might therefore look beyond diversion of waste from landfill as a goal, or even increased recycling, to extend to reducing virgin materials and energy consumption.

Community Engagement

The community are generally concerned about the Environment (NSW EPA, 2000, ABS 2003) and consumer waste and recycling are issues of great interest to the community (ABS, 2003). Further, the Nolan-ITU (2004) study found that the community valued environmental performance of waste and recycling management outcomes significantly more than other factors (44% in metropolitan, 50% in regional/rural). This suggests that there is a need for robust consultation with citizens in general.

Community engagement is increasingly understood to be an integral component to decision-making at any level of government. Community engagement can occur at numerous stages of council decision-making process. Currently, most councils tend to involve the community in decision making in relation to waste management at some stage, typically towards the end of the decision making process where public comment is invited on a proposed strategy, usually to do with service provision. Increasing community engagement through deliberative means (Carson and Gelber, 2001) early on in the decision making process would allow greater ownership, acceptance and typically participation by the community (including ratepayers) in the final outcome. Some councils are already practicing this type of early engagement through LA21 processes that occur at the broader strategic level sustainability planning. These types of processes could be applied to integrated waste management planning.

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APPENDIX A: COMMUNITY CONSULTATION METHODS

There are many innovative community consultation methods by which the community can be involved in the planning process. Different processes may suit different situations. Where representativeness is important or necessary, random selection of the sample is required. This will ensure the sample has the same characteristics as the population (such as age, place of residence, gender, income level, education level). With all methods of community consultation, it is important to remember that bias can occur by asking leading questions or only proposing certain options (Carson & Gelber, 2001).

The following outlines such methods and their relative advantages and disadvantages.

Residents' feedback panels

Residents' feedback panels (RFP) establish a pool of potential respondents who may be called upon for a number of quantitative research methods such as telephone surveys, face-to-face interviews, mail questionnaires, or qualitative research methods such as citizens' juries, deliberative polls or consensus conferences. Participants are representative of the community they are representing. They can involve anywhere from 50 to several thousand citizens. Participants do not have to meet in person. The research findings are publicised (Carson & Gelber, 2001).

Search conferences

Search conferences occur at the start of the process when experts on a particular field are sought to participate in the visioning stage of a plan. Experts are reached and recruited by first asking who people think are the experts in a particular field. The objective of the search conference is to consider a big picture and long-term vision around the issue at hand. Once the big picture vision has been established, the search conference works backwards to develop short, medium and long-term action plans for achieving this big picture vision. The group involved is relatively small (usually 20–50 people) and meets for 1–2 days during which it produces both a big picture vision and a set of solid action plans for reaching the vision. Recruitment is not representative, as it targets individuals with specific knowledge and the ability to be constructively collaborative (Carson & Gelber, 2001).

Deliberative polls

Deliberative polls are an extension of conventional opinion polls. Participants are randomly selected (usually by telephone) and invited to meet for 1–2 days to discuss or deliberate on a particular issue. Participants are commonly asked their views and opinions on the issue under consideration prior to providing them with briefing material. After sufficient time to read the material, the participants are brought together to discuss, deliberate and vote on the issue. This vote may be compared to an initial vote taken before participants being briefed (Carson & Gelber, 2001).

Televoting

Televoting is similar to deliberative polls, the only difference being that participants are not brought together in person. Rather, they are sent briefing material and encouraged to discuss

the issue with friends, neighbours, colleagues and family. A pre and post-briefing opinion poll is taken (Carson & Gelber, 2001).

Citizens' juries

A citizens' jury involves recruiting a representative panel of citizens to deliberate over a particular topic. The jury usually consists of 15–25 participants who meet over a period of 2–4 days. Sometimes concurrent juries are held (known as 'planning cells' in Germany). Participants are provided with written material prior to convening and during the interactive meeting, hear expert witnesses who provide knowledge and experience on the particular topic. Recommendations of the citizens' jury are published in a formal report (Carson & Gelber, 2001).

This method is most useful when the topic is relatively complex and the participants have much to gain from being fully informed by the expert witnesses. It is more useful when there are clear questions related to the topic that are to be deliberated.

Consensus conferences

Consensus conferences are similar to citizens' juries, yet more extensive. Consensus conferences take place over a longer period of time, involving preparatory weekends where the agenda, key questions to be deliberated and key witnesses are all decided on by the participants. The whole process (from conception of the general issues to preparation of recommendations and reports by the participants) can take 1–2 years. Consensus conferences usually involve 12–25 participants who meet once to prepare prior to the deliberative 2–4 day meeting (Carson & Gelber, 2001).

Focus groups

Focus groups comprise interest groups or support groups who tend to have strong views on the subject. It should be used in conjunction with other methods, as it does not provide a representative sample of the community. The focus group can meet anywhere from once to regular intervals depending on the need. Feedback from the group is fed back to the commissioning body through informal verbal or written feedback (Carson & Gelber, 2001).

Charrettes

A charrette involves a dynamic and speedy interchange of ideas between planners, stakeholders and the general community. The charrette begins with a public meeting, which allows the general public to identify options and desired outcomes as a whole and in smaller facilitated groups. A meeting with stakeholder groups is then held to allow for expert input into the process. Options are then drawn together by the conveners, which combine both outcomes from the 'experts' meeting and the community concerns from the public meeting. These options are open for viewing by all. Focus meetings are then held with the stakeholders and interested community members, followed by an intensive workshop to formalise the proposal in terms of preferred outcomes from the workshop. Finally, a meeting is held to present the plan to the community. The conveners may need to refine the plan if there is any strong opposition by the community (Carson & Gelber, 2001).

Summary of methods

The following table outlines the advantages and disadvantages of innovative community consultation methods.

Table A: Advantages and disadvantages of community consultation methods.

Method	Advantages	Disadvantages
search conferences	3 ability to utilise the skills/knowledge of a small group to help define a long term vision; 3 outcomes focused to produce collaborative action which can then be explored and 'tested' with the community.	8 cannot substitute for broader community consultation because it draws on a small number of people who are not representative of community attitudes. A search conference may only be undertaken as a precursor to broader consultation.
deliberative polls	3 Allows for an informed decision/opinion to be made after sufficient briefing time. 3 Extremely representative.	8 can be expensive.
televoting	3 Televoting overcomes the cost issues of deliberative polls	8 Less deliberative than a deliberative poll as participants are not brought together.
citizens' juries	3 allows for greater levels of expertise, experience and knowledge; 3 more intimate therefore can be more in-depth; 3 results are tangible—recommendations and report.	8 Can be expensive, however, due to minimal participation compared to some other methods. This can be overcome.
consensus conferences	3 (Same as citizens jury above); 3 Participants have greater control over agenda, making it more involving and meaningful for participants	8 Greater costs; 8 Can take 1–2 years.
focus groups	3 Views can be explored faster and in-depth because the group has a working knowledge.	8 Potentially timely process to finding and maintaining appropriate participants. 8 Does not invoke same deliberation as other methods.
charrettes	3 Rapid process (i.e. 1 week); 3 Produces concrete results; 3 Relatively cost effective; 3 Community can have input at both beginning and end.	8 The rapid time frame may not allow some participants enough time to feel they have understood and processed the issue at hand. 8 Unrepresentative; 8 May be difficult to involve marginalised groups as public participation relies on attendance at public meeting.
residents' feedback panels.	3 Provides a cross section of citizens in any given area. 3 Allows for changes in community attitudes to be tracked over time. 3 Convenient for participants as they are not required to leave their homes in order to participate.	8 Requires long-term maintenance of a database.

Source: Carson & Gelber, 2001.