POLICY BACKGROUND PAPER

CONTAINER DEPOSIT LEGISLATION – FINANCIAL IMPACTS

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FOREWORD

Container deposit legislation (CDL) has been one of the options considered for managing the environmental impacts of packaging for many years and in many places; yet very few governments have implemented it. In Australia, only South Australia has legislation to impose a refundable deposit on beverage containers, which it recently extended. In the United States a number of States have CDL in place, the most recent of which is Hawaii where it was introduced in 2002.

The use of economic devices to achieve policy objectives is common. The recoverable deposit on beverages in a CDL system is intended to encourage consumers to return the containers to the retailer or other collection centre for recycling. By providing a monetary incentive for proper disposal, it is also expected to reduce litter.

The success of an economic instrument depends on how well it is designed. If consumers can satisfy their needs by substituting an alternative product or service for the one on which the additional cost is imposed, they may do so. If the purpose of the instrument were to raise revenue, this response would result in a failure to achieve the objective. A deposit that is intended to encourage behavioural change but which is too low to trigger different behaviour would also fail to achieve its objective. The elements in the design of a CDL system reviewed in the reports in this publication were:

- a 10 cent deposit on each beverage container;
- containers returned to the point of sale;
- operation in parallel with the kerbside recycling system.

The introduction of CDL would incur establishment costs. These include the cost of setting up and operating collection points and the costs of sorting materials. Running costs are expected to be met from the deposit revenues, but there may be other costs that may be indirect or hidden. These include the impacts on competing systems.

The kerbside recycling system reaches almost every home in Victoria and is regularly used by more than 70% of households. Victoria leads the world in designing and operating such systems. Very large investments have been made in the system over more than two decades including the cost of system infrastructure such as bins, collection vehicles and sorting facilities. There have also been less visible investments in community education. The kerbside system recovers very large amounts of material for recycling. If CDL were introduced, the kerbside system and the CDL system would compete for recyclable materials. How much material went through which route is an important uncertainty, the answer to which could determine the financial viability of one or both

systems. If the strong support that the community gives to the kerbside system is adversely affected and CDL does not simultaneously provide an effective substitute, the environment could sustain a loss in its level of protection.

The two reports in this publication are the result of EPA's desire to understand these issues fully.

MICK BOURKE

CHAIRMAN

OVERVIEW AND KEY POINTS

This publication is comprised of two reports. The first is a study into the financial impacts of container deposit legislation on three Victorian communities. This was undertaken by Nolan-ITU. The second is a peer review of the Nolan-ITU report undertaken by Perchards. These studies were commissioned against the following background.

In 2001 the New South Wales Minister for the Environment commissioned Dr Stuart White of the Institute for Sustainable Futures to undertake a review of options for container deposit legislation in New South Wales.

Dr White argued that a system comprising a deposit of 10 cents per container with a return system based on return to the point-of-sale could successfully operate in parallel with kerbside recycling services.

However, Dr White also identified significant constitutional issues relating to the legal capacity of the States and Territories to impose charges such as container deposits that could be deemed excises. He recommended to the New South Wales Minister that a container deposit system should be considered at the national level. The New South Wales Minister subsequently referred this recommendation to the Environment Protection and Heritage Council, comprised of the Environment Minister from each jurisdiction, which established a working group to examine the matter.

To gain an understanding of the effect that the introduction of a national CDL system of the type recommended by Dr White might have on Victorian communities, Nolan-ITU was commissioned by EPA Victoria to review Dr White's recommendations in a Victorian context. They were asked to examine the practical ramifications of a parallel kerbside recycling/ point-of-sale CDL system and in particular the financial effects in three typical Victoria communities. This approach was taken because CDL is often portrayed as a cost-free option matched with a high success rate in terms of materials recovered. The communities studied were Mildura (representing a remote/ rural centre), Ballarat (representing a provincial centre) and Manningham (representing a metropolitan area).

Any comprehensive study of complex issues that potentially impact on business and the community inevitably employs a number of working assumptions to simplify analysis. Of particular interest to Victoria in the case of CDL was that the costs used in Dr White's study were costs in New South Wales. A number of those costs were known to be different between the two States. Amongst them were key waste management costs.

Nolan-ITU's findings were that the introduction of a national CDL system in Victoria in parallel with the existing and successful kerbside recycling system would increase the overall cost of beverage consumption and beverage container recycling by a substantial amount, ranging from $111 to $157 per household per annum in the three communities studied. This compares with the current average cost of kerbside recycling services in Victoria of about $28.85 per household per annum.

In view of the significance of the costs to the community identified by Nolan-ITU, a peer review process was commenced to test the Nolan-ITU findings. This was undertaken by Perchards, a United Kingdom-based company that has undertaken a significant amount of similar work throughout Europe.

Although Perchards have previously undertaken work for the Packaging Council of Australia and for the National Environment Protection Council, the company is not routinely involved in evaluating waste management options in Australia. This was felt to provide maximum objectivity and a broad world view.

Perchards' task did not include reviewing Dr White's report. Nevertheless they identified a number of issues with Dr White's report as well as with the Nolan-ITU report.

The issues relating to Dr White's report include the assumption that 92% of containers would be redeemed through a CDL system. Perchards believe that the rate might be closer to 80% and that Nolan-ITU's assumption of 85% redemption is a better guide than Dr White's.

Perchards also agree with the approach adopted by Nolan-ITU in valuing retail space which differs from Dr White. This is a key issue. A CDL system with a return of containers to the point of sale means that some of the space that would otherwise be used to generate income from retail sales has to be given over to the non-revenue generating deposit refund service. Dr White's analysis used the lease cost of retail space. Nolan-ITU used an opportunity cost approach. In simple terms, this means that Dr White used the cost for which retail space could be rented in his calculations, while Nolan-ITU used the value of the space to a retailer in theirs. A retailer adds value to the rental cost of floor space through the use to which the space is put. The Perchard/ Nolan-ITU view is more "real world".

Perchards have expressed a significant reservation about Nolan-ITU's methodology in allocating payment of deposits as a cost to brand owners. In reworking the costs, and characterising deposits as short-term loans by consumers to the system, Perchards' calculations indicate that the increased cost of beverages resulting from a CDL system might be 3.5 to 4.5 cents per container, rather than the 13.5 to 14.5 cents indicated by Nolan-ITU as the consumer generally reaps the benefits of the deposit. The key difference in approaches is that Nolan-ITU treat the deposit on returned containers as a cost to industry and its redemption as a benefit to the consumer. Perchards, on the other hand, believe the deposit is only of economic significance if it is *not* redeemed. Unredeemed deposits then become a cost to the consumer and a benefit to industry. Thus Perchards estimate a lower retail cost and a higher financial impact on households. However, the overall effect is similar.

Perchards have also halved the "consumer labour cost" in its re-workings on the grounds that Nolan-ITU's assumption that 30% of materials will be returned through a special journey seemed rather high to them.

Conversely, Perchards identified several points where they believe Nolan-ITU could have underestimated the additional costs of CDL. These include the effects of reduced yield from kerbside recycling collections generally, lower beverage collection rates, more expensive retailer handling and elimination of minor products/ brands from retailers' shelves. None of these have however been quantified or included in Perchards' reworked cost calculations.

Perchards calculate that in the three communities studied, the total costs to those communities of parallel kerbside recycling and CDL waste management services would range from approximately $73 per household per

annum to approximately $81.50 per household per annum over and above existing costs. While these are significantly less than the Nolan-ITU calculations, they are nevertheless considerable and still much higher than average kerbside recycling costs ($28.85 per household per annum).

Perchards also comment that [in the case of Ballarat, for example] the incremental cost of recycling an additional 1,516 tonnes of packaging material would be $1,708 per tonne. Current best practice parameters for kerbside recycling for Councils to attract National Packaging Covenant funding support are – a per tenement cost in the range $25 - $35 per household per annum and an overall collection cost no greater than $150 per tonne. This suggests that there may be more economical ways of capturing additional materials for recycling than introduction of CDL.

The outcome of a comprehensive review of the kind undertaken by Dr White, Nolan-ITU and Perchards depends to a critical degree on the accuracy of the assumptions that underpin the analytical model and the costs injected into it. It was initially clear that the costs that pertain in New South Wales used by Dr White are not directly related to Victorian experience. There are also differences in the assumptions adopted by Dr White, Nolan-ITU and Perchards. From a Victorian perspective, the Nolan-ITU and Perchards work is more relevant.

Although there are considerable differences in the financial outcomes predicted by Nolan-ITU and Perchards, they both indicate that the introduction of a parallel CDL system with the existing kerbside recycling system would incur substantially increased costs to the community. Other studies (for example, Nolan-ITU study of the costs and benefits of kerbside recycling system undertaken for the National Packaging Covenant Council) have demonstrated that kerbside recycling incurs major environmental benefits to the community (largely in air and water quality). A key question is how much the community is prepared to pay to realise the benefits. EcoRecycle Victoria conducts periodic community surveys that include questions about preparedness to pay for recycling services. These and the reports by Dr White, Nolan-ITU and Perchards will continue to inform policy decisions on recycling in Victoria.

CONTENTS

EXECUTIVE SUMMARY

For at least thirty years there has been considerable debate of the merits of introducing Container Deposit Legislation (CDL) in Australian jurisdictions. CDL is the mechanism most often considered by governments to implement a mandatory container recovery and recycling system.

Container deposit systems involve a deposit on certain beverage containers that is refunded on their return to producers, who then become responsible for either refilling or recycling the returned containers.

FINANCIAL IMPACT ASSESSMENT OBJECTIVES

Nolan-ITU has been engaged by EPA Victoria to undertake a study of the *Financial Impacts of a Container Deposit System* on the Kerbside Recycling Collection and Sorting System for three Victorian municipalities. These represent typical kerbside recycling scenarios of remote/ rural communities, major provincial centres and metropolitan areas. The municipalities studied include the City of Manningham (metropolitan), the City of Ballarat (provincial); and the Rural City of Mildura (rural/remote).

The objective of this study is to understand the financial impacts of a parallel kerbside and CDL system on residents, local government, and industry stakeholders as it would apply to typical Victorian communities if CDL were introduced. This would better position the community to make informed judgements about the amount of benefit obtainable at a particular cost.

The CDL system advocated by Dr Stuart White from the Institute for Sustainable Futures in the *Independent Review of Container Deposit Legislation in New South Wales (2001)*, a report commissioned by the NSW Minister for the Environment, is adopted in this study. This is a point of sale (POS) 10 cent container deposit system applied to post-consumer beverage containers. This study also assumes that the current kerbside recycling systems operating in each of the three municipalities are maintained. The impact assessment considers financial impacts only, hence does not investigate environmental impacts. Extrapolation of the study outcomes to other systems is cautioned as many of the assumptions adopted only apply to a POS system.

Key Findings

The introduction of a parallel CDL system in conjunction with existing kerbside recycling systems would result in an increase in the retail cost of beverages from between 13.4 and 14.6 cents, which would result in an increase in average annual household expenditure of between $181 and $219. This would be offset by a decrease in the cost of kerbside services of between $32 and $37 per household per year. The increase in expenditure on beverages would also be offset by the value of the deposits redeemed by households at POS locations, which, after subtracting the cost of transport and time to households in taking containers to POS locations, is between $30 and $33 per household per year.

The net financial effect to households, as rate payers and beverage consumers, is an increase in the average cost per household per year of between $111 and $157.

While there would only be a minor reduction in the actual cost of providing kerbside collection services, the CDL deposits recovered by the sorter will increase their revenue significantly. This will result in a significant reduction in the net cost to the local governments of providing kerbside services, as sorters will be willing to provide their services at lower cost. This cost reduction for the individual councils studied would range between $0.75 million and $1.24 million.

Charities, non-profit organisations and low income earners could benefit by between $0.25 million and $0.64 million if they are able to receive 10% of the available CDL deposits.

The major cost factor in operating a POS CDL system is the lost opportunity value of front of house space in retail outlets, used for the receipt and sorting of containers. With the front of house space cost of $12,000 per m^2, as valued by retailers, the total cost of front of house POS space is $2,400,000 for Manningham, $1,920,000 for Ballarat and $1,080,000 for Mildura. If the front of house space cost could be reduced to $4,000 per m^2, the net cost of the CDL system would decrease by between 45% and 52%.

The assumption that 92% of away from home CDL material is recovered by the CDL system does not have a major effect on the total cost of the CDL system. When the assumption is changed to 85% of away-from-home CDL material being recovered by the CDL system, the cost of the CDL system increases by between 1% and 2%.

In the current kerbside recycling system yields and costs range between 5.1 kilograms per household per week at a cost of $31 per household per year in Manningham to 2.7 kilograms per household per week at a cost of $63 per household per year in Mildura. With CDL the recycling yields in Manningham and Mildura would increase by 42% and 77% respectively while costs (including the cost of operating the at home and away-from-home CDL systems) would increase by 482% in Manningham and 177% in Mildura. Recycling yields and costs, with and without CDL, for Ballarat are predicted to be similar to Manningham.

CONTAINER DEPOSIT LEGISLATION FINANCIAL IMPACT ASSESSMENT FOR THREE VICTORIAN CASE STUDIES

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1. INTRODUCTION

For at least thirty years there has been considerable debate of the merits of introducing Container Deposit Legislation (CDL) in Australian jurisdictions. CDL is the mechanism most often considered by governments to implement a mandatory container recovery and recycling system.

Container deposit systems involve a deposit on certain beverage containers that is refunded on their return to producers, who then become responsible for either refilling or recycling the returned containers.

There are numerous container deposit system configurations. For example, containers may be returned to producers via intermediaries such as collection centres, retailers, reverse vending machines or through existing waste or recycling streams. Systems may be voluntary or mandatory. Each option has different costs and benefits.

In 2001, the NSW Minister for the Environment commissioned Dr Stuart White of the Institute for Sustainable Futures to undertake an *Independent Review of Container Deposit Legislation in New South Wales* (the White report). The purpose of the review was to "describe and assess the effectiveness of container deposit legislation in litter and waste management" in the NSW context by assessing:

- stakeholder and community attitudes to container deposit legislation;
- costs and benefits of container deposit legislation on both a whole of society basis and in respect to key stakeholder groups; and
- the feasibility of container deposit legislation given the current NSW industry, institutional and legislative frameworks (White 2001).

Dr White's report argues that a container deposit system based on a deposit of 10 cents on a range of beverage containers refunded through retail outlets (point of sale) could successfully operate in parallel with a kerbside recycling and collection system. The review theorises that such a parallel system would:

- produce financial savings for local government;
- would not harm existing collection/ sorting systems;
- would not impose costs on retailers; and
- would produce enhanced environmental benefits over existing arrangements.

1.1 Prevalence of CDL

Historically CDL has been introduced to reduce the incidence of litter; but the system can increase the recovery of containers through improved product stewardship arrangements. There are no known cases of a CDL system being introduced where an established kerbside recycling system is in place.

Container deposit systems (mandatory or voluntary) exist in many countries, such as the USA, Canada, Austria, Belgium, Denmark, Finland, Germany, Norway, Sweden, Switzerland, Israel and Australia. CDL has been introduced in the majority of Provinces in Canada. Container deposit systems also exist in 10 states and one local municipality in the USA.

CDL was introduced in South Australia in the 1977 to reduce litter. It is the only Australian state with CDL. The deposit is 5 cents which is refunded, at

approximately 120 collection depots. Depots deliver the containers to four super collectors, each of which have contracts with brand owners. All metropolitan Adelaide Councils, except Onkaparinga, introduced kerbside recycling as a parallel system to CDL in the 1990's.

Although CDL currently applies to beer and soft drink containers, the SA Government has introduced legislation to expand CDL to all beverage containers other than those used for wine and plain milk. The expanded provisions come into effect on January 1, 2003.

1.2 Purpose of this Report

Nolan-ITU has been engaged by EPA Victoria to undertake a study of the *Impacts of a Container Deposit System on the Kerbside Recycling Collection and Sorting System* for three Victorian municipalities. These represent typical kerbside recycling scenarios of remote/ rural communities, major provincial centres and metropolitan areas. The municipalities studied include the City of Manningham (metropolitan), the City of Ballarat (provincial); and the Rural City of Mildura (rural/remote).

Previous studies have indicated that the benefits of recycling outweigh the costs (for example, Nolan-ITU & Sinclair Knight Merz 2001). The extent to which the costs and benefits are realised tends to be proportionate to the levels of recovery of containers. Under CDL systems higher levels of recovery of packaging tend to occur. This results largely from better capture of the away-from-home waste stream that emanates from clubs, hotels, restaurants and events. Cost/ benefit studies of recycling evaluate the costs and benefits by converting both costs and benefits to dollar amounts. In practice however while the costs are "hip pocket" costs to the community, the benefits are intangibles such as improved air or water quality. The objective of this study is to understand the financial impacts of a parallel kerbside and CDL system on residents, local government, and industry stakeholders as it would apply to typical Victorian communities if CDL were introduced. This way the community would be better positioned to make informed judgements about the amount of benefit obtainable at a particular cost.

Dr White's report has been referred by the NSW Minister for the Environment to the EPHC who have in turn referred it to a working group of officials. For this study the CDL system advocated by Dr White, a point of sale (POS) 10 cent container deposit system applied to post-consumer beverage containers, has been assumed. This study also assumes that the current kerbside recycling systems operating in each of the three municipalities are maintained (also as advocated by Dr White).

1.3 Terms of Reference

The Terms of Reference for this study are to evaluate:

i) Any changes in kerbside collection costs that might be realised under a parallel system;

ii) Any changes in sorting costs at MRFs that might be associated with parallel recovery/ recycling systems;

iii) Establishment costs at retailer level associated with refunding deposits through retail outlets;

iv) Any new transport costs associated with the return of containers by consumers to retailers;

v) Any sorting costs incurred at retail level associated with the return of containers to retailers;

vi) Any new transport costs associated with transfer of containers from retailers to sorting/ reprocessing agents;

vii) Any community health/OHS issues associated with co-location of retailing operations and deposit refund systems;

viii) Infrastructure needs/ costs at household level for the storage and transport of containers to retailers;

ix) Community attitudes towards the storage and transport of containers to retailers in private vehicles vs the use of kerbside collection systems;

x) Likelihood of reprocessors paying sorters aggregated unit values of containers recovered through the kerbside recycling system vs the market commodity cost of the material.

1.4 Consultation

In undertaking the study, the three Councils, collectors and sorters, as well as the Australian Retailers Association and the Australian Food and Grocery Council have been consulted.

2. DESCRIPTION OF A PARALLEL CDL/KERBSIDE RECYCLING SYSTEM

The financial impact of CDL in parallel with a kerbside recycling system will be influenced by the materials attracting the deposit, the deposit value, the return system functionality and consumer behaviour. This section of the study report describes the parallel system configuration and the critical assumptions used for the financial impact assessment as proposed in the White report.

Generally the recommendations and assumptions made in the White report have been used. Variations between the assumptions used in this study and those identified in the White report are explicitly identified. Any changes in the assumptions have been adopted only because more specific information about the Victorian context is available.

2.1 Containers

For the purposes of the study milk, wine, beer, other alcohol, soft drinks, fruit drinks, sport drinks and cordial beverage containers made of the following materials are assumed to be included in the container deposit system:

- Steel;
- Aluminium;
- Glass;
- PET;
- HDPE;
- PVC/PP/other plastic; and
- LPB

This list of materials is consistent with the White report recommendations.

2.2 Deposit

The study investigates a compulsory deposit of 10 cents on all of the above beverage containers; as recommended in the White report.

2.3 Return System Configuration

The study assumes that householders return containers to Point of Sale (POS) outlets (as recommended in the White report), and that containers collected away-from-home are returned to a super collector facility located within the municipality. The study recognises that in practice some beverages consumed away-from-home will be returned to POS outlets, and that POS systems are sometimes augmented by non-retail collection centres. However, the net financial impact of these study simplifications is not significant in the overall context of this study.

The containers accumulated at POS outlets are also returned by the retailer to a single super collector. POS outlets considered in this study are super-markets with a floor space of more than 900 m^2.

The super collector is assumed to be contracted by brand owners to sort the recovered containers and to sell them to reprocessors.

It is assumed that the super collector's facility is located alongside the kerbside recyclables MRF serving the municipality. It has also been assumed that the MRF separates containers by material type, but not by brand, and separates deposit bearing material from non-CDL material, returning the CDL material to the super collector for the deposits. It is possible if a CDL system were introduced the super collector would enter into a contract with the MRF operator to assume its local responsibility.

The number and size of retail outlets has been determined from Australian Retailers Association data, local Council information and Coles, Woolworths, Independent Grocers of Australia and Fishers data sources.

The White report considers that a POS return system is a superior return system compared to other possible return systems such as drop off depots. This is based on an assumption that consumers regularly travel to these locations, imposing less inconvenience on consumers than some other options and resulting in higher container recovery rates.

2.4 Return System Operation

Under the CDL system, the at-home consumer has the following options:

- return beverage containers to a POS outlet and receive a 10 cent deposit;
- set beverage containers out for kerbside recycling collection and forfeit the deposit; or
- dispose of beverage containers in the kerbside garbage system and forfeit the deposit.

Beverage containers returned to POS outlets are manually sorted into the materials types by the retail outlet. The sorted material is then collected from the outlet by, or under contract to, the super collector.

Beverage containers that are consumed away-from-home are either disposed of as garbage or returned through the container deposit system. CDL

beverage containers will be collected from away-from-home locations such as hotels, restaurants and hospitals and taken to the super collector's local facility. Collectors from those premises are likely to include commercial waste service providers and volunteer groups, such as scouts.

2.5 Material Flows

2.5.1 Total Beverage Container Consumption

This study uses the NSW beverage container consumption figures, as presented in the White report, converted to per capita estimates for each of the three Victorian municipalities (Table 2.1). Table 2.1 presents the annual consumption figures in kilograms per capita and containers per capita. The number of containers is derived separately for each material using White report estimates of the number of uncompacted CDL containers per tonne of the material.

Table 2.1: CDL Packaging Consumption Estimates

Material	Annual Consumption	
	kg/capita	Containers/capita
Steel	0.15	2.1
Aluminium	2.04	136.3
PET	4.04	118.0
HDPE	2.30	46.0
PVC/PP/other	0.64	12.8
LPB	1.67	42.8
Glass	40.79	195.1
Total	51.63	553.1

Total beverage container consumption is estimated by multiplying the per capita estimates by the municipal population.

The White report used 2003 as the base year for modelling the impacts of container deposit legislation. Beverage consumption data was used to estimate beverage container consumption. The proportion of consumption that occurred at-home compared to away-from-home were estimated. The trends were then extrapolated to provide an estimate of future beverage container consumption.

Kerbside Material Flows

Total tonnage of material collected by the kerbside recycling system was estimated using data obtained from each of the three Councils. The percentage of each material category recovered via the kerbside recycling system, obtained using local audit data for Ballarat and Mildura was used to estimate the total tonnes of each material in the kerbside recycling stream. BIEC (1997) audit data was used for Manningham as recent local data was not readily available.

Container deposit systems invariably focus on beverage containers, but many of the materials in the bottle and can recycling streams are used for both food and beverage packaging. A ratio of each material is assumed to be for beverage packaging and therefore deposit carrying. This ratio is based on two factors:

- the known market share for each packaging material in key beverage and food packaging applications; and

- the prevalence of this packaging in the recycling stream as identified in recycling audits undertaken in all states of Australia.

These ratios are, of necessity, estimates as the market size of food and beverage products is constantly changing, as is the market share of each material as a packaging medium.

The percentage of each material that is estimated to be used for beverage containers, (for example, 90% of aluminium products are estimated to be used for beverage cans) is presented in Table 2.2.

Table 2.2: Estimated % Material Reporting as CDL Containers

Material	% CDL
Steel	10
Aluminium	90
PET	95
HDPE	70
PVC/PP/other	50
LPB	80
Glass	75

Each of these percentages was then multiplied by the relevant tonnage of material in the kerbside recycling collection. This gave the tonnage of each type of beverage container in the kerbside recycling stream.

The tonnage of beverage containers currently disposed of to landfill through the kerbside garbage system was estimated using BIEC 1997 data for the percentage of each of the different materials in the garbage stream. Again, this was adjusted for each material based on the percentage of that material that is estimated to be used for beverage containers, giving the tonnage of each type of beverage container in the kerbside garbage stream.

Consumption at-home was estimated by adding the tonnage of beverage containers estimated in the kerbside garbage stream to the tonnage of beverage containers estimated in the kerbside recycling stream. This differs from the White report's assumption that at-home consumption of beverage containers is 50% of total consumption. The approach adopted in this study is considered a more appropriate estimation of at-home consumption as it makes use of confirmed municipal data.

Away-from-home Material Flows

Away-from-home beverage container consumption was estimated by subtracting at-home consumption from total consumption.

The White report estimated that 26% of beverage container material consumed away-from-home is currently recycled while 74% is currently disposed of as garbage. These estimates were assumed in this study, due to difficulty in obtaining local data. When multiplied by the estimated total tonnage of beverage container material consumed away-from-home, they provide an estimate of the tonnage of away-from-home beverage containers recycled and disposed of to landfill.

Material Flows with a Container Deposit System

Containers Attracting the Container Deposit and Garbage

The assumed CDL container material flows under the proposed container deposit system are shown in

Table 2.3 for both at-home and away-from-home consumption.

Table 2.3: Assumed Beverage Container Recovery Rates

	At-home	Away-from-home
CDL	57%	92%
Kerbside Recycling	35%	0%
Garbage	8%	8%

This study assumes that 35% of at-home CDL material would remain in the kerbside recycling system. This fraction is significantly higher than the White report estimate of approximately 6% as the current kerbside system is well established and supported by the community. This estimate is also consistent with the results of face-to-face interviews with 252 South Australian residents across a range of socio-economic backgrounds which revealed that 37% of residents recycle solely through kerbside, 37% recycle through a combination of kerbside and CDL and only 26% recycle solely though collection depots (C4ES, 2000).

The White report assumption of 8% of CDL material being disposed of as garbage, was adopted in this study. The remaining percentages (92% of away-from-home CDL material and 57% of at-home CDL material) were assumed to be recovered via the CDL return system.

Non Deposit Containers and Paper

It is assumed that CDL will reduce the non-deposit items set out for kerbside recycling by households by 15 percent. This is based on a belief that a shift in resident behaviour would result from the introduction of CDL. As households will not have as much material to set out for kerbside recycling collection they may be less motivated to set out non-deposit containers for every collection.

The White report assumes that there will be no change in residents' behaviour toward the recycling of non-beverage containers and newspaper. In this study, it was considered appropriate to acknowledge the current difference between South Australian (with CDL) and Victorian (without CDL) paper recycling rates with the assumptions made above. It is assumed that the recovery of paper and cardboard through the kerbside recycling system will decrease by 10 percent. This percentage is adopted because it is the current difference between the average South Australia and the Victorian newspaper recovery rates.

Both the paper and non-beverage recyclables losses from the kerbside recycling stream are assumed to be diverted to the kerbside garbage system.

2.6 System Costs

2.6.1 Current System Costs

The current kerbside system and landfill disposal costs in this study are contract rates provided by the three Councils. Away-from-home costs are based upon commercial rates for collection.

Victorian litter costs were estimated using costs derived in the Eco-Recycle Victoria 'Municipal Data Collection 2000-2001 Kerbside Waste Management Services' (2002) report. These were then proportioned according to the population of each municipality. Victorian litter costs, assumed to be

municipal street sweeping and municipal litter bin and litter trap service costs, were estimated in the Eco-Recycle report to be $41.3 M per annum. This equates to a per capita cost of $8.52 per annum.

2.6.2 Container Deposit System Costs

Kerbside Collection, Processing and Disposal

The assumed variation in kerbside collection costs under a parallel CDL and kerbside recycling system from the current kerbside recycling only costs are:

- A 10 percent reduction in the cost per tenement of kerbside recycling collections. This assumes that the collection frequency remains the same and there is a reduction in set out rates and recovery of 15 percent. (A reduction in frequency would result in reduction in yield). The White report also assumed that the collection frequency remained at current levels.
- A 55 percent increase in the kerbside sorting cost per tonne based upon a reduction in facility throughput, the removal of many higher value materials, and the need to separately sort CDL material returned into material types.
- No change to the garbage kerbside collection costs/tenement as the assumed reduction in yield is minor.
- A reduction in litter control costs of 5% (based upon the White report).

Containers that are disposed of as litter are assumed to end up as either landfill or part of the recycling stream recovered through the CDL system.

Away-from-home Garbage and Recycling

Both this study and the White report modelled the away-from-home costs associated with beverage containers alone (rather than the entire garbage and recycling streams).

The net cost of the away-from-home CDL container recycling collection with revenue sales is assumed to be zero with the cost of collection being compensated by the revenue received from the sale of the product.

The cost of collection of CDL materials in the garbage stream is assumed to be $42 per tonne based upon a pick up cost of $7 per m^3 and an average density of 200 kg per m^3. This is assumed to remain $42 per tonne with the introduction of CDL. However the total cost per year will change. This is due to a change in the tonnes of away-from-home garbage when only 8% of away-from-home beverage containers are disposed of as garbage.

The cost per tonne of disposal of away-from-home CDL materials to landfill is obtained for each municipality. The total cost of disposal will reduce as the tonnes of CDL in the away-from-home garbage stream is reduced. The White report estimates the marginal cost of landfill across NSW at $60 per tonne. Victorian landfill charges are known to be considerably lower. Consequently, local landfill costs are considered more appropriate to use for the purpose of this study.

Container Deposit System

The key cost elements of the POS container deposit system are:

- householder costs;

- POS outlet costs;
- transport from POS outlets to a super collector;
- collection and transport from away-from-home sites to the super collector;
- operations at the super collector facility; and
- transport to reprocessors.

The costs of each of these elements, and the underlying assumptions are discussed below.

Householder Costs

It is assumed that there are two major components of the cost to householders associated with a CDL system. They are:

- the cost of transport of containers to a POS outlet; and
- the cost of consumer time, or labour, in transporting containers to a POS outlet.

It is assumed that 30 percent of at-home CDL material is returned to POS outlets for the sole purpose of obtaining the deposit refund and hence this is valued as they are not associated with shopping. It is also assumed that the number of CDL containers per trip is 60 as this number of containers can easily be transported in a car boot. The vehicle cost of these trips is assumed to be 59 cents per km based upon ATO vehicle allowance rates for an ordinary car engine with a capacity up to 2.6 litres (2600 cc). The White report did not include the cost of consumer time due to difficulties in placing a value upon it.

A labour cost of $12.37 per hour was assumed, based on the White report's estimate of the award rate for cleaning services. A travel time of 15 minutes for a 2 km round trip to and from the POS outlet was assumed. If the average travel distance from households to their closest POS outlet was less or greater than 2km, the travel time was adjusted pro rata.

This study adopts the assumptions made in the White report that there are no costly structural requirements by household consumers in order to participate in the CDL return system and that consumer time rinsing and sorting beverage containers in the house is insignificant.

POS Outlet Costs

It is assumed that there are four major costs incurred by POS outlets receiving containers and making refunds of deposits under a CDL regime. They are:

- the costs of space required to accommodate the delivery of containers;
- the cost of space required to store containers;
- the cost of labour required to handle the containers; and
- the cost of operating a container return system (including extra cleaning costs, pest control and interest on a 30 days cash float).

The White report does not specify where the receival point for CDL containers is located in the POS return scenario as it only allows for the cost of the storage space required for returned containers and not for the cost of the receival point space. In Convenience Centre options 4d and 4e in the White report it is specified that the receival point is "usually located at or near supermarket car parking areas" (p.122). In order that the POS options 5a and 5b,

recommended as the best options, are distinguishable from these options it is assumed that the receival point must be located inside the POS outlet. As the White report states that the options vary by level of convenience (p.86), it follows that the receival point in the POS options be located at or near the store entrance. There it is convenient to the consumer returning containers and also avoids exit aisles becoming crowded by consumers returning containers but not shopping.

In addition to a front-of-house receival point, POS outlets will require a storage space at the back of the facility (or in the carpark).

It is assumed that within each municipality an equal quantity of material is handled by each POS, and that the peak daily storage capacity is twice the mean daily rate. It assumed that the-away-from home CDL material is returned direct to the super collector, and not through POS outlets.

The back-of-store space required to store containers is estimated based on estimated peak daily receival rates. To determine the storage requirements, the density of each material (cubic metres per tonne) was obtained from the Waste and Recycling Cost Model and applied to the amount of at-home beverage container material returned to each POS outlet per day.

At the front-of-house an area of 10 m^2 of retail floor space is considered necessary for handling of incoming containers and short term storage. This would include a counter, walk up area, and space for short term storage. Containers would then be placed in a purpose built roll-on roll-off bin with separate compartments for each material.

It is assumed that the space required to accommodate the delivery of containers at the front-of-house would otherwise be used as retail floor space, convenient to the consumer returning containers. The opportunity cost of this space per square metre was estimated as $12,000 per m^2 per annum. This estimate was obtained from the average of Victorian Safeway stores. This was considered a more appropriate estimate of the cost of floor space at POS outlets than the $2,227 per metro store space lease cost assumed in the White report, as that accounts for storage space only. Despite indicating that the opportunity cost of space is an appropriate cost measure (p.124), the White report did not take the lost opportunity cost of retail space at POS outlets into account.

The annual cost of space required to store containers at the back of the retail outlet is estimated to be $600 per m^2. This is based on estimates for this type of floor space obtained from ARA.

The labour required to handle containers was estimated using the White report assumption that each container requires 3 seconds of handling time. Applying the handling cost to the number of containers handled and converting the result to hours allows the labour cost to be calculated.

An average hourly labour cost estimate was obtained from Victorian Safeway stores of $20 per hour was used. The White report assumes an average labour cost of $12.05 per hour, the award level for a shop assistant. However, the award rate indicates only direct labour costs and does not account for on costs to cover management and superannuation payments.

A further overhead of $2,800 per store was also added using the White report assumptions. This covers $1,400 for cleaning, $1,000 for pest control and $400 for interest on the 30 days cash float.

As in the White report, it is assumed that the implementation of a CDL system will not cause any market distortion. In reality there may be some form of market distortion between POS outlet stores and other retailers selling beverage containers. For example under a CDL system consumers may be more likely to shop at major retail outlets at which they can also redeem their container deposits. There may also be a market distortion between CDL products and non-CDL products, for example, consumers may purchase more beverages in takeaway cups, such as milkshakes and post-mix soft drinks rather than their substitute CDL products such as flavoured milk in cartons and soft drink in cans. CDL may also influence consumers towards buying beverages in bulk more often, as deposits are by container rather than volume.

Transport from POS Outlets to a Super Collector

The collection cost from POS outlets and transport to super collectors is calculated assuming that there is a daily collection of one roll-on roll-off bin and an average distance of 6 km from the POS outlets to the super collector facility. The beverage containers are transported at a cost of $80 per day for 365 days of the year. This results in a transport cost of $29,200 per POS outlet per year. This cost covers the bin hire, transport, administration, and drop off at the super collector's depot.

The White report assumes the material is transported directly from the POS to a reprocessor. Only the environmental cost of this transport is considered in the White report (and not the actual cost to either the POS outlet or the reprocessor).

Collection and Transport from Away-from-home Sites to a Super Collector

The cost of away-from-home collection and transport to a super collector is assumed to be equivalent to the cost of transport to landfill (ignoring the deposit income) at $42 per tonne.

The White report also assumes that the CDL material is collected at the same cost as garbage.

Operations at the Super Collector Facility

The major financial factors associated with operations at the super collector's premises are assumed to be:

- the cost of sorting and baling the container deposit material; and
- the revenue received from the sale of material to reprocessors.

The cost of sorting and baling is assumed to be $30 per tonne of material, remembering that the material will have already undergone a primary sort at the POS outlets, and away-from-home CDL containers undergoes a basic sort as it is returned to the super collector gate.

The tonnage of each material is estimated using the percentage break up of material in the total kerbside system (garbage plus recycling) multiplied by the estimated total tonnes of material recovered via CDL. The price of each material multiplied by the tonnes results in a revenue estimate for each material.

Revenues from the sale of materials assumes that the large increase in the supply of recyclables due to the implementation of CDL will not reduce the price of these materials. This assumption is also adopted in the White report.

Transport to Reprocessors

The cost of transporting the baled CDL material to the reprocessor is estimated based on a return trip distance to the reprocessor of 13 cents per tonne per km for Ballarat and Manningham. The current actual transport cost per tonne to the reprocessor for each material, provided by the Mildura Bottle Exchange, is used in the case of Mildura.

2.6.3 Revenue from Sale of Product

The revenue from the sale of beverage containers to reprocessors, excluding the deposit, is based on current market rates for Ballarat and Manningham. These are presented in Table 2.4. The Mildura Bottle Exchange provided the market rates that it receives for the sale of beverage container material to reprocessors. These are presented in Table 3.26. The Mildura market rates differ from those for Ballarat and Manningham as reprocessors are a considerably greater distance from Mildura.

Table 2.4: Current Beverage Container Material Market Rates (Ballarat and Manningham)

Material	Price ($/tonne)
Steel	75
Aluminium	1,100
PET	400
HDPE	500
PVC/PP/other	250
LPB	150
Glass	72

2.7 Refund and Administration Arrangements

It is assumed that POS outlets refund the 10 cent deposit to people bringing containers, and transfer the cost to the super collectors. It is also assumed that collectors of away-from-home waste streams, as well as the sorter providing services under kerbside recycling arrangements will receive a refund of 10 cents for each container from the super collector.

In addition, the super collector is assumed to pay the POS outlets a handling fee to compensate for the additional labour and time required to handle and sort the containers.

Brand owners would pay the super collector the 10 cent deposit per container collected. They would also pay the super collector a handling fee per container based on the revenue from sorted recyclates and cost associated with the super collector's agreed activities. These would include the handling fee paid by super collectors to POS outlets, as well as super collectors' sorting and storage costs, and their transport costs to a reprocessor.

Brand owners are likely to increase the wholesale price of their beverage products by an amount sufficient to cover the costs they incur in paying super collectors. Retailers will in turn pass on such cost increases to consumers.

2.8 Other Considerations

It is recognised that if a CDL system were introduced in one state but not an adjacent state that the potentia l for fraudulent claims for refunds where deposits had not been paid in the first place would need to be considered. However for the purposes of this study, it is assumed that the CDL system

introduced entails no cross border issues (i.e. it is introduced across all state jurisdictions).

Some CDL material set out in the kerbside system may be scavenged. This material will not reach the MRF and this will reduce the deposits obtained by the MRF, increasing the estimated cost of running the kerbside system under CDL. For the purpose of this study, it has been assumed that scavenging will not occur to any major extent.

Administration costs, ongoing educational costs, labelling costs and reporting costs are assumed to be insignificant on a per capita basis and the responsibility of State government rather than local council.

Other assumptions adopted and consistent with the White report are:

- implementation and transitional costs (including education etc.) per capita are not significant; and
- MRFs are able to collect the deposits associated with CDL material collected through the kerbside system by sorting CDL material and physically returning it to the super collector.

3. CDL COST IMPLICATIONS

This section describes the existing garbage and recycling systems and the costs associated with them and compares this to the situation and costs that would be expected to arise under a parallel CDL system. For each municipality, relevant socio-demographic features are provided and the current consumption of CDL material estimated. The kerbside system that is currently in place is described, detailing the waste management services, the composition of kerbside material collected, the material flows and the costs involved. Finally the changes to material flows that are expected to arise under a CDL system are provided, and the resulting changes in costs to POS and non-POS stakeholders estimated.

For this financial impact assessment the system costs only, with and without CDL, are considered. The financial impact on stakeholders, taking into consideration the impact of the redeemable deposit, are considered in Section 4. The only exception is away-from-home locations.

The CDL cost implications to Ballarat are evaluated first, followed by those to Manningham and then those to Mildura.

3.1 Ballarat

Socio-Demographics

The City of Ballarat has a total population of 82,000 with some 31,750 residential tenements. The median weekly family income is $750 per week. About 92 percent of the population are Australian-born. The urban area is approximately 64 km^2.

CDL Consumption Data

The estimated consumption of CDL packaging materials is estimated to be 4,234 tonne per annum. This is based upon the White report estimates as discussed in section 2.5.1 and presented in Table 3.1.

Table 3.1: CDL Packaging Consumption Estimates (Ballarat)

Material	Total Consumption (tonne)
Steel	13
Aluminium	168
PET	331
HDPE	189
PVC/PP/other	53
LPB	137
Glass	3,345
Total	**4,234**

Current System Costs

Waste Management Services

The City of Ballarat provides regular kerbside collection services for both recyclables and garbage. The contract details are presented in summary form in Table 3.2 below.

Table 3.2: Kerbside Contracts Summary Details (Ballarat)

Parameter	Containers		Paper	Garbage
	Collection	Sorting	Collection & Sorting	
Contractor	Ballarat Waste Line	CBM Waste	Goldfields	Ballarat Waste Line
Contract expiry	2002	2002	2003	July 2003
Collection contract rate	20c/bin/week	$110/tonne	$6,057/week	20c/bin/week
Bin description	240L MGB		Bundled/Loose	40L (97%) 80L (3%)
Collection frequency	Fortnightly		Monthly	Weekly
Number of services	31,750		31,750	31,750
Collection centroid to MRF	8 km		8 km	
Area serviced	40 km²		40 km²	40 km²

The containers collected by the recycling contractor are PET, aluminium, HDPE, glass, and steel.

Composition of Kerbside Collected Material

The total quantity of garbage and recyclables (containers) collected in 2001 was 20,000 tonnes and 3,380 tonnes respectively.

The composition of CDL containers in the recycling and waste stream presented in Table 3.3 is based upon a compositional audit conducted by the City of Ballarat in 1998 (recycling) and BIEC Victorian audit results from 1997 (garbage).

Table 3.3: CDL materials in the Existing Kerbside System (Ballarat)

Material	Recycling		Garbage		Total
	%	t/yr	%	t/yr	t/yr
Steel	18.5	63	2.3	46	109
Aluminium	11.6	353	0.2	36	389
PET	12.3	395	0.3	57	452
HDPE	9.5	225	0.5	70	295
PVC/PP/other	0.0	0	0.1	10	10
LPB	0.0	0	0.5	80	80
Glass	37.3	945	2.8	420	1,366
Contamination	10.2	0	93.3	0	
Totals	**99.4**	**1,981**	**100.0**	**719**	**2,700**

The quantity of CDL within the away-from-home stream is 1,534 tonne per annum - the difference between the total consumption and that within the kerbside system. Of the away-from-home CDL material, 399 tonnes (26%) is assumed to be recycled, and 1,136 (74%) is assumed to be disposed of in the garbage stream.

Current Material Flows and Costs

The current material flows and costs for the provision of kerbside collection services, litter management, and away-from-home garbage and recycling services are presented in Table 3.4 below. The away-from-home quantities and costs are for CDL materials only.

Table 3.4: Current Material Flows and Costs (Ballarat)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$0.2/ten.wk	3,380	330,200
			Sorting	$110/tonne		371,800
		Paper	Combined	$6,057/wk	2,370	314,964
	Sub Total					1,016,964
	Kerbside Garbage		Collection	$0.2/ten.wk	20,000	330,200
			Disposal	$31/tonne		620,000
	Subtotal					950,200
Away-from-home	CDL Recylables		Combined	$0/tonne	399	0
	CDL Garbage		Collection	$42/tonne	1,136	47,695
			Disposal	$31/tonne		35,204
Litter						698,900
Total					**27,285**	**2,748,963**

All kerbside data as well as landfill disposal costs have been provided by the City of Ballarat. The away-from-home CDL estimates are discussed in Section 3.1.3 above. Away-from-home costs are estimated according to the assumptions described in Section 2.6.2.

Using the ABS 2001 Victorian population estimate of 4,844,200 and Ballarat's estimated population of 82,000, the total litter cost in Ballarat is estimated at $698,900 based on a per capita cost of $8.52 per annum (see Section 2.6.1).

In summary the net cost for the current non-CDL system for comparison purposes is estimated to be $2.75M per annum.

Costs Under a CDL System

Material Flows under a CDL System

The destination of CDL material under the POS system is presented in Table 3.5 together with the current destinations.

Table 3.5: Changes in CDL Material Flows (Ballarat)

Destination	Path to Destination	Without CDL		With CDL	
		%	Quantity (tonne/yr)	%	Quantity (tonne/yr)
Recycling	At-home kerbside – recycling	47	1,981	22	945
	Away-from-home – recycling	9	399	0	0
	At-home – POS	0	0	37	1,539
	Away-from-home – Super collector	0	0	33	1,412
	Recovery Total	*56*	*2,380*	*92*	*3,896*
Garbage	At-home kerbside garbage	17	719	5	216
	Away-from-home- garbage	27	1,135	3	123
	Garbage Total	*44*	*1,854*	*8*	*339*
Total		**100**	**4,234**	**100**	**4,234**

Under a CDL POS system, the annual quantity of CDL containers collected is estimated to be 3,896 tonne; being comprised of 1,539 tonne from POS outlets, 945 tonne from the kerbside recycling system, and 1,412 tonne from away-from-home. The assumptions behind the percentages shown in Table 3.5 are discussed in Sections 2.5.2 and 2.5.3.

Estimated Non-POS Related Costs

The estimated non-POS related costs are presented in Table 3.6 together with the assumed material flows and unit rates.

Table 3.6: Material Flows and Costs with CDL (excluding POS Components) (Ballarat)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$0.18/ten.wk	2,134	297,180
			Sorting	$170/tonne		362,833
		Paper	Combined	$6,057/wk	2,133	314,964
	Sub Total					974,977
	Kerbside Garbage		Collection	$0.2/ten.wk	19,944	330,200
			Disposal	$31/tonne		618,260
	Subtotal					948,460
Away-from-home	CDL Recylables		Combined	$0/tonne		0
	CDL Garbage		Collection	$42/tonne	123	5,156
			Disposal	$31/tonne		3,805
Litter						663,955
Total (excluding CDL)					**24,334**	**2,596,353**

In summary the effect of a parallel CDL system on kerbside recycling and garbage costs, excluding POS elements, is to reduce them from $2,748,963 to $2,596,353, a reduction of approximately $153,000 per annum.

The variation in volumes from the current arrangements are:

- The volume of kerbside recyclables reduces from 3,380 tonnes per annum to 2,134 tonnes per annum (37% reduction). This is comprised of 1,189 tonnes per annum of non CDL materials (an assumed 15% reduction), and 945 tonnes per annum of CDL material (a reduction of 52%).
- The volume of paper collected at kerbside reduces from 2,370 tonnes per annum to 2,133 tonnes per annum (10% reduction). This assumes a shift in resident behaviour as described in section 2.5.2 resulting from demotivation associated with the introduction of CDL.
- The volume of kerbside garbage reduces by 56 tonnes per annum as a result of CDL. This change in quantities is based upon a diversion of 503 tonnes of CDL material from landfill, an increase in paper to landfill of 237 tonnes per annum, and an increase in non CDL recyclables to landfill based upon a 15% (210 tonne per annum) reduction in kerbside recycling of these materials.

The variation in unit costs from the current arrangements are:

- A reduction in the cost of kerbside recycling collections from 20 cents per tenement per week to 18 cents per tenement per week (see Section 2.6.2).
- An increase in the kerbside sorting cost from $110 per tonne from $170 per tonne (see Section 2.6.2).
- No change to the garbage kerbside collection costs per tenement as the assumed reduction in quantity is only 0.3%.
- A reduction in litter control costs of $34,945 (see Section 2.6.2).

Estimated POS Related Costs

Resident Costs

A search for POS outlets within the City of Ballarat identified 16 outlets with an estimated trading area floor space over 900 m^2. Across the urban area of 64 km^2, the average travel distance (return trip) was estimated as 2 km.

The total number of CDL containers returned to POS outlets was estimated at 30,788,000 per annum based upon 1,539 tonnes per annum, and the number of containers per tonne (Table 2.1). Using the assumptions discussed in Section 2.6.2, the number of return trips is 153,940.

For an estimated average 2 km round trip between households and POS outlets in Ballarat, residents' cost of transport is estimated to be $181,648 (see Section 2.6.2 for assumptions).

Each return trip is estimate to require 15 minutes of labour. The total resident labour cost for the 153,940 return trips is estimated to be $476,059 per annum (see Section 2.6.2 for assumptions).

POS Outlet Costs

The peak daily mass of CDL material returned to individual outlets is estimated to be 520 kg.

At an average uncompacted density of 28 m^3 per tonne, the peak daily capacity is estimated to be 14.6 m^3. Therefore the back of outlet storage space is estimated to be 15 m^3. The material would be placed in a purpose built roll-on roll-off bin with separate compartments for each material.

The estimated total annual costs for all 16 POS outlets are presented in Table 3.7.

Table 3.7: POS Outlet Annual Costs (Ballarat)

Cost Element	Rate	Unit	Cost
Front of store space	\$12,000/ m^2	10 m^2/store	\$1,920,000
Back of store space – storage	\$600/ m^2	15 m^2/store	\$144,000
Salary	\$20/hr	1,603 hr/store	\$513,000
Operating costs	\$2,800/store		\$45,000
Total			**\$2,622,000**

Transport from POS Outlets to a Super Collector

The collection cost from POS outlets is calculated according to assumptions discussed in Section 2.6.2. The assumed transport cost of \$29,200 per year per POS outlet results in a total cost of \$467,200 per year. This cost covers the bin hire, transport, administration, and drop off at the super collector's depot.

Collection and Transport from Away-from-home Sites to the Super Collector

CDL material collection from away-from-home locations and transport to a super collector (ignoring deposit income) is assumed to be equivalent to the cost of collection of CDL material and transport from away-from-home locations to landfill at \$42/tonne (see Section 2.6.2). The 1,013 tonnes of CDL material removed from the away-from-home garbage stream is assumed to cost \$42,539 to transport to the super collector. This is equal to the savings in away-from-home garbage collection, \$47,695 (Table 3.4) less \$5,156 (Table 3.6).

Operations at the Super Collector Facility

A total of 3,896 tonnes is assumed to be recovered in total by CDL, resulting in an estimated sorting and baling cost of \$116,866 per year (at \$30 per tonne, see Section 2.6.2).

The reprocessor is assumed to pay the prices shown in Table 2.4 for each of the materials sold to it by the super collector. This results in an estimated \$1,226,000 payment from the reprocessor to the super collector (Table 3.8).

Table 3.8: Revenue from Sale of Product (Ballarat)

Material	Percentage (based upon kerbside)	Tonnes	Price ($/tonne)	Total Revenue ($)
Steel	4.2	164	75	12,319
Aluminium	13.6	531	1,100	583,999
PET	16.0	624	400	249,524
HDPE	10.8	422	500	210,769
PVC/PP/other	0.5	18	250	4,428
LPB	3.6	142	150	21,253
Glass	51.2	1,996	72	143,685
Total	**100.0**	**3,896**		**1,225,976**

Transport to Reprocessor

The cost of transporting the baled CDL material to the reprocessor is estimated based on a 120 km return trip to Melbourne at 13 cents per tonne per kilometre. This results in an estimated transport cost of $60,770 per year to the reprocessor.

Summary of CDL System Costs

The annual costs of operating the CDL are summarised in Table 3.9.

Table 3.9: Annual Cost Summary of CDL System Operation (Ballarat)

Stake holder	Cost Element	Cost $M	
Householder	Transport to POS outlet	0.182	
	Labour	0.476	0.658
Away-from-home collector		0.043	0.043
POS outlet	Front of store space – delivery point	1.920	
	Back of store space – storage	0.144	
	Staffing	0.513	
	Operating costs	0.045	2.622
Super collector	Collection from POS outlet	0.467	
	Sorting and baling	0.117	
	Transport to reprocessor	0.061	
	Revenue	(1.226)	(0.581)
Total			**2.742**

These costs do not include any costs within the distribution chain. This is discussed in Section 4.

Conclusions

With the introduction of a POS based CDL system in Ballarat, it is estimated that there will be a net cost reduction of approximately $153,000 per annum saving in the costs of providing kerbside recycling and garbage services The estimated annual additional net cost for the CDL system is $2.74M. The overall financial effect is to increase the cost of total recycling services by $2.59 million – equivalent to an increase of $81.48 per household per year.

The most significant component of the CDL system costs are the lost opportunity cost of the front of house receival area (at the retail outlet), the resident labour cost of transporting CDL material to the POS outlet, and the retail outlet labour costs.

3.2 Manningham

Socio-Demographics

The City of Manningham has a total population of 116,000 with 39,206 residential tenements. The median weekly income is $368 per week. There are approximately 2.9 persons per household. The urban area is approximately 114 km^2.

CDL Consumption Data

The estimated consumption of CDL packaging materials is estimated to be 5,990 tonne per annum (Table 3.10). This is based upon the White report NSW estimates.

Table 3.10: CDL Packaging Consumption Estimates (Manningham)

Material	Total Consumption (tonne)
Steel	18
Aluminium	237
PET	468
HDPE	267
PVC/PP/other	75
LPB	193
Glass	4,732
Total	**5,990**

Current System Costs

Waste Management Services

The Manningham City Council provides regular kerbside collection services for containers, paper and garbage. The contract details are presented in summary form in Table 3.11 below.

Table 3.11: Kerbside Contracts Summary Details (Manningham)

Parameter	Collection	Sorting	Garbage
	Containers and Paper Combined	Containers	
Contractor	Citywide	Visy	Citywide
Contract expiry	2006	2006	2006
Collection contract rate	$27.70/tennement, $1,086,200/yr	$18.16/tonne	$1,687,000/yr
Bin description	240L split MGB (50/50)		80L or 120L
Collection frequency	Fortnightly		Weekly
Number of services	39,206		39,206
Collection centroid to MRF	8km		
Area serviced	114 sq.km		114 sq.km

The containers collected by the recycling contractor are PET, Aluminium, HDPE, glass, steel cans, liquid paper board, and PVC.

Composition of Kerbside Collected Material

The total quantity of garbage and recyclables (containers) collected in 2001 was 20,191 tonnes and 2,956 tonnes respectively.

The composition of the recycling and waste stream, presented in Table 3.12, is based upon BIEC Victorian audit results from 1997.

Table 3.12: CDL materials in the Existing Kerbside System (Manningham)

Material	Recycling		Garbage		Total
	%	t/yr	%	t/yr	t/yr
Steel	9.6	27	2.3	46	73
Aluminium	1.7	44	0.2	36	80
PET	7.0	186	0.3	58	243
HDPE	6.1	120	0.5	71	190
PVC/PP/other	0.3	4	0.1	10	14
LPB	2.3	52	0.5	81	133
Glass	73.0	1,538	2.8	424	1,962
Totals	**100**	**1,971**	**6.7**	**726**	**2,695**

The quantity of CDL within the away-from-home stream is 3,293 tonne per annum; the difference between the total consumption and that within the kerbside system. Of the away-from-home CDL material, 856 tonnes (26%) is assumed to be recycled, and 2,437 (74%) is assumed to be disposed of in the garbage stream. This is based upon estimates provided in the White report.

Current Material Flows and Costs

The current material flows and costs for the provision of kerbside collection services, litter management, and away-from-home garbage and recycling services are presented in Table 3.13 below. The away-from-home quantities are for CDL materials only.

Table 3.13: Current Material Flows and Costs (Manningham)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$7.82/ten	2,956	306,433
			Sorting	$64.37/tonne		190,280
		Paper	Combined	$19.89/ten	7,522	779,807
	Sub Total					1,276,521
	Kerbside Garbage		Collection	$43.03/ten	20,191	1,687,000
			Disposal	$22.40/tonne		452,278
	Subtotal					2,139,278
Away-from-home	CDL Recylables		Combined	$0/tonne	856	0
	CDL Garbage		Collection	$42/tonne	2,437	102,361
			Disposal	$26/tonne		63,366
Litter						988,688
Total						**4,570,214**

All kerbside data as well as landfill disposal costs have been provided by the Manningham Council. The away-from-home CDL estimates are discussed in Section 3.2.3 above. Away-from-home costs are estimated according to the assumptions described in Section 2.6.2.

Using the estimated population of Manningham of 116,000, the total litter cost is estimated at $939,254 based on a per capita cost of $8.52 per annum (see Section 2.6.1).

In summary the net cost for the current non-CDL system for comparison purposes is estimated to be $4.6M per annum.

Material Flows with a CDL POS System

The destination of CDL material under the POS system is presented in Table 3.14 together with the current destinations

Table 3.14: Changes in Material Flows (Manningham)

		Without CDL		With CDL	
Destination	Path to Destination	%	Quantity (tonne/yr)	%	Quantity (tonne/yr)
Recycling	At-home kerbside recycling	33	1,971	16	944
	Away-from-home – recycling	14	856	0	0
	At-home – POS	0	0	26	1,537
	Away-from-home – Supercollector	0	0	50	3,030
	Total Recovered	*47*	*2,827*	*92*	*5,511*
Garbage	At-home kerbside garbage	12	726	4	216
	Away-from-home- garbage	41	2,437	4	263
	Total Garbage	*53*	*3,163*	*8*	*479*
Total		**100**	**5,990**	**100**	**5,990**

Under a CDL POS system, the annual quantity collected is estimated to be 5,511 tonne; being comprised of 1,537 tonne from POS outlets, 944 tonne from the kerbside recycling system and 3,030 tonne from away-from-home. The assumptions behind the percentages shown in Table 3.14 are discussed in Sections 2.5.2 and 2.5.3.

Estimated Non-POS Related Costs

The estimated non POS related costs are presented in Table 3.15 together with the assumed material flows and unit rates.

Table 3.15: Material Flows and Costs with CDL (excluding POS Components) (Manningham)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$7.04/ten	1,781	276,101
			Sorting	$99.77/tonne		177,724
		Paper	Combined	$19.89/ten	6,770	779,807
	Sub Total					1,233,542
	Kerbside Garbage		Collection	$43.03/ten	20,581	1,687,000
			Disposal	$22.40/tonne		461,011
	Subtotal					2,148,011
Away-from-home	CDL Recylables		Combined	$0/tonne	0	0
	CDL Garbage		Collection	$42/tonne	263	11,066
			Disposal	$26/tonne		6,850
Litter						939,254
Total (excluding CDL)					**9,030**	**4,338,723**

In summary the effect of a parallel CDL system on kerbside recycling and garbage costs, excluding POS elements, is to reduce them from $4,570,214 to $4,338,723; a reduction of approximately $231,000 per annum.

The variation in volumes from the current arrangements are:

- The volume of kerbside recyclables reduces from 2,956 tonnes per annum to 1,781 tonnes per annum (40% reduction). This is comprised of 838 tonne per annum of non CDL materials (an assumed 15% reduction), and 944 tonne per annum of CDL material (a reduction of 52%).
- The volume of paper collected at kerbside reduces from 7,522 tonnes per annum to 6,770 tonnes per annum (10% reduction).
- The volume of kerbside garbage increases by 390 tonne per annum as a result of CDL. This change in quantities is based upon a diversion of 512 tonnes of CDL material from landfill, an increase in paper to

landfill of 752 tonne per annum, and an increase in non CDL recyclables to landfill based upon a 15% (147 tonne per annum) reduction in kerbside recycling of these materials.

The variation in unit costs from the current arrangements are:

- A reduction in the cost of kerbside recycling collections from $7.82 per tenement per annum to $7.04 per tenement per annum (see Section 2.6.2).
- An increase in the kerbside sorting cost from $64.37 per tonne from $99.77 per tonne (see Section 2.6.2).
- No change to the garbage kerbside collection costs per tenement as the assumed increase in quantity is only 1.9%.
- A reduction in litter control costs of $49,434 (see Section 2.6.2).

Estimated POS Related Costs

Resident Costs

A search for POS outlets within the Manningham municipality resulted in a council estimate of 27 outlets and an internet and telephone book search estimate of 16 outlets. It is assumed that the council estimate included some smaller stores than the 'larger' POS outlets considered as potential CDL return points in this study and the other search missed some suitable POS outlets. A total of 20 outlets were approximated. Over the urban area of 114 km^2, the estimated average travel distance (return trip) was estimated to be 2.5 km.

The total number of CDL containers returned to POS outlets has been calculated to be 17,726,287 per annum based upon 1,537 tonnes per annum, and the number of containers per tonne of each material (Table 2.1). Using the assumptions discussed in Section 2.6.2, the number of return trips is 88,631.

For an estimated average 2.5 km round trip between households and POS outlets in Manningham, the resident's cost of transport is estimated to be $130,731 (see Section 2.6.2 for assumptions).

The labour involved in each return trip is estimate to be 15 minutes. The total resident labour cost for the 88,631 return trips is estimated to be $342,614 per annum (at $12.37 per hour, see Section 2.6.2).

POS Outlet Costs

The peak daily mass of CDL material returned to individual outlets is estimated to be 421 kg.

At an average uncompacted density of 59 m^3 per tonne, the peak daily capacity is estimated to be 7.13 m^3. Therefore the back of outlet storage space is estimated to be 10 m^3. The material would be placed in a purpose built roll-on roll-off bin with separate compartments for each material.

The total annual costs associated with the POS system for all outlets is presented in Table 3.16.

Table 3.16: Outlet Annual Costs (Manningham)

Cost Element	Rate	Unit	Cost
Front of store space	$12,000/ m²	10 m²/store	$2,400,000
Back of store space – storage	$600/ m²	10 m²/store	$120,000
Salary	$20/hr	923 hr/store	$369,200
Operating costs	$2,800/store		$56,000
Total			**$2,945,200**

Transport from POS outlets to a Super Collector Facility

The collection cost from POS outlets is calculated assuming that the beverage container material is transported at $80 per day, for 365 days of the year (see Section 2.6.2). This results in a transport cost of $29,200 per POS outlet per year, or $584,000 in total per year. This cost covers the bin hire, transport, adminstration, and drop off at the super collector's depot.

Collection and Transport from Away-from-home Sites to the Super Collector

CDL material collection from away-from-home locations and transport to a super collector (ignoring the deposit income) is assumed to be equivalent to the cost of collection of CDL material and transport to landfill at $42 per tonne (Section 2.6.2). The 2,174 tonnes of CDL material removed from the away-from-home garbage stream is assumed to cost $91,300 to transport to the super collector. This cost is equal to the savings in away-from-home garbage collection, $102,361 (Table 3.13) less $11,066 (Table 3.15).

Operations at the Super Collector

A total of 5,511 tonnes is assumed to be recovered in total by CDL, resulting in an estimated sorting and baling cost of $165,323 per year (at $30/tonne, Section 2.6.2).

The reprocessor is assumed to pay the prices shown in Table 2.4 for each of the materials sold to it by the super collector. This results in an estimated $938,367 payment from the reprocessor to the super collector (Table 3.17).

Table 3.17: Revenue from Sale of Product (Manningham)

Material	Percentage (based upon kerbside)	Tonnes	Price ($/tonne)	Total Revenue ($)
Steel	3.0%	167	75	12,540
Aluminium	3.2%	174	1,100	191,070
PET	8.9%	492	400	196,451
HDPE	7.3%	402	500	200,810
PVC/PP/other	0.6%	33	250	8,261
LPB	5.5%	301	150	45,126
Glass	71.5%	3,943	72	283,868
Total	**100%**	**5,511**		**938,367**

Transport to Reprocessor

The cost of transporting the baled CDL material to the reprocessor is estimated based on a 24 km return trip to the reprocessor at 13 cents per tonne per kilometre. This results in an estimated transport cost of $17,194 per year to the reprocessor.

Summary of CDL System Costs

The annual costs of operating the CDL are summarised in Table 3.18.

Table 3.18: Annual Cost Summary of CDL System Operation (Manningham)

Stake holder	Cost Element	Cost $M	
Householder	Transport to POS outlet	0.131	
	Labour	0.343	0.474
Away-from-home collector		0.091	0.091
POS outlet	Front of store space – delivery point	2.400	
	Back of store space – storage	0.120	
	Staffing	0.369	
	Operating costs	0.056	2.945
Super collector	Collection from POS outlet	0.584	
	Sorting and baling	0.165	
	Transport to reprocessor	0.017	
	Revenue	(0.938)	(0.172)
Total			**3.338**

These costs do not include any costs within the distribution chain. This is discussed in Section 4.

Conclusions

With the introduction of a POS based CDL system in Manningham, it is estimated that there will be a net cost reduction of approximately $231,000 per annum saving in the costs of providing kerbside recycling and garbage services. The estimated annual additional net cost for the CDL system is $3,338,000. The overall financial effect is to increase the cost of total recycling services by $3,107,000 – equivalent to an increase of $79.25 per household per year.

The most significant component of the CDL system costs is the lost opportunity cost of the front of house receival area (at the retail outlet). Also significant are the collection costs from the POS outlet to the super collector, and the labour costs, both to residents of transporting CDL material to the POS outlet and to retail outlets.

3.3 Mildura

Socio-Demographics

The Rural City of Mildura has a total population of 45,416 with 20,300 residential tenements serviced with a recycling collection. The median weekly income per household is $493 per week. There are approximately 2.6 persons per household. The urban area covers Mildura, Merebin, Irymple and Red Cliffs and is approximately 12 km^2.

CDL Consumption Data

The estimated consumption of CDL packaging materials is estimated to be 2,345 tonnes per annum. This is based upon the White report NSW per capita estimates as presented in Table 3.19.

Table 3.19: CDL Packaging Consumption Estimates (Mildura)

Material	Total Consumption (tonne)
Steel	7
Aluminium	93
PET	183
HDPE	105
PVC/PP/other	29
LPB	76
Glass	1,853
Total	**2,345**

Current System Costs

Waste Management Services

The Mildura Rural City Council provides regular kerbside collection services for containers, paper and garbage within the metropolitan Mildura area. The contract details are presented in summary form in Table 3.20 below.

Table 3.20: Kerbside Contracts Summary Details (Mildura)

Parameter	Containers and Paper	Garbage
	Collection and Sorting Combined	
Contractor	Mildura Bottle Exchange	Mildura Waste Management Business Unit
Contract expiry	5 year fixed term	Internal Best Practice Continual Contract
Collection contract rate	$33.00/m^3	$872,430 per year
Bin description	55 Litre Crates	240L MGB and 120L MGB
Collection frequency	Weekly	Weekly
Number of services	20,300	22,000
Collection centroid to MRF	15km (Mildura)	5km
Area serviced	Metropolitan Mildura	Mildura, Merebin,Red Cliffs, Irymple, Ouyen, Murrayville, Underbool and Walpeup

The containers collected by the recycling contractor are aluminium, glass, PET, HDPE, liquid paper board and steel cans.

Composition of Kerbside Collected Material

The total quantity of garbage and recyclables (containers) collected in 2001 was 11,373 tonnes and 1,735 tonnes respectively.

The composition of the recycling and waste stream presented in Table 3.21 is based upon Mildura Council yield data (1/7/00 to 30/6/01) and BIEC Victorian audit results from 1997 respectively.

Table 3.21: CDL materials in the Existing Kerbside System (Mildura)

Material	Recycling		Garbage		Total
	%	t/yr	%	t/yr	t/yr
Steel	5%	8	2.3	26	34
Aluminium	3%	54	0.2	20	74
PET	2%	31	0.3	32	64
HDPE	4%	46	0.5	40	86
PVC/PP/other	0%	0	0.1	6	6
LPB	1%	8	0.5	45	53
Glass	86%	1,115	2.8	239	1,353
Totals	**100%**	**1,262**	**6.7**	**409**	**1,671**

The quantity of CDL within the away-from-home stream is 675 tonnes per annum; the difference between the total consumption and that within the kerbside system. Of the away-from-home CDL material, 175 tonnes (26%) is assumed to be recycled, and 499 (74%) is assumed to be disposed of in the garbage stream. This is based upon estimates provided in the White report.

Current Material Flows and Costs

The current material flows and costs for the provision of kerbside collection services, litter management, and away-from-home garbage and recycling services are presented in Table 3.22 below. The away-from-home quantities are for CDL materials only.

Table 3.22: Current Material Flows and Costs (Mildura)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$26.73/ten	1,753	542,521
			Sorting	$109.67/tonne		190,223
		Paper	Combined	$26.73/ten	1,121	542,521
	Sub Total					1,275,265
	Kerbside Garbage		Collection	$42.98/ten	11,373	872,430
			Disposal	$8/tonne		90,984
	Subtotal					963,414
Away-from-home	CDL Recylables		Combined	$0/tonne	175	0
	CDL Garbage		Collection	$42/tonne	499	20,967
			Disposal	$20/tonne		9,984
Litter						387,089
Total					**14,903**	**2,656,719**

All kerbside data as well as landfill disposal costs have been provided by the Mildura Rural City Council, the away-from-home CDL estimates are discussed in Section 3.3.3 above. Away-from-home costs are estimated according to the assumptions described in Section 2.6.2.

Using Mildura's estimated population of 45,416, the total litter cost in Mildura is estimated at $387,089 based on a per capita cost of $8.52 per annum (see Section 2.6.2).

In summary the net cost for the current non-CDL system for comparison purposes is estimated to be $2.7M per annum.

Material Flows with a CDL POS System

The destination of CDL material under the POS system is presented in Table 3.23 together with the current destinations.

Table 3.23: Changes in Material Flows (Mildura)

Destination	Path to Destination	Without CDL		With CDL	
		%	Quantity (tonne/yr)	%	Quantity (tonne/yr)
Recycling	At-home kerbside recycling	54	1,262	25	585
	Away-from-home – recycling	7	175	0	0
	At-home – POS	0	0	41	952
	Away-from-home – Supercollector	0	0	26	621
	Total Recovered	*61*	*1,437*	*92*	*2,158*
Garbage	At-home kerbside garbage	17	409	6	134
	Away-from-home- garbage	21	499	2	54
	Total Garbage	*39*	*908*	*8*	*188*
Total		**100**	**2,345**	**100**	**2,345**

Under a CDL POS system, the annual quantity collected is estimated to be 2,158 tonnes; being comprised of 952 tonnes from POS outlets, 585 tonnes from the kerbside recycling system and 621 tonnes from away-from-home. The assumptions behind the percentages shown in Table 3.23 are discussed in Sections 2.5.2 and 2.5.3.

Estimated Non-POS Related Costs

The estimated non POS related costs are presented in Table 3.24 together with the assumed material flows and unit rates.

Table 3.24: Material Flows and Costs with CDL (excluding POS Components) (Mildura)

Parameters				Current Quantities and Costs		
				Unit Rate	Tonnes	$
At-home	Kerbside Recyclables	Containers	Collection	$24.06/ten	987	488,418
			Sorting	$169.99/tonne		167,708
		Paper	Combined	$26.73/ten	1,009	542,521
	Sub Total					1,198,647
	Kerbside Garbage		Collection	$42.98/ten	11,281	872,430
			Disposal	$8/tonne		90,246
	Subtotal					962,676
Away-from-home	CDL Recylables		Combined	$0/tonne	0	0
	CDL Garbage		Collection	$42/tonne	54	2,267
			Disposal	$20/tonne		1,079
Litter						367,734
Total (excluding CDL)					**13,331**	**2,532,403**

In summary the effect of a parallel CDL system on kerbside recycling and garbage costs, excluding POS elements, is to reduce them from $2,656,316 to $2,532,403; a reduction of approximately $124,000 per annum.

The variation in volumes from the current arrangements are:

- The volume of kerbside recyclables reduces from 1,735 tonnes per annum to 987 tonnes per annum (43% reduction). This is comprised of 402 tonnes per annum of non CDL materials (an assumed 15% reduction), and 585 tonnes per annum of CDL material (a reduction of 54%).
- The volume of paper collected at kerbside reduces from 1,121 tonnes per annum to 1,009 tonnes per annum (10% reduction).
- The volume of kerbside garbage decreases by 92 tonnes per annum as a result of CDL. This change in quantities is based upon a diversion of 275 tonnes of CDL material from landfill, an increase in paper to landfill of 112 tonnes per annum, and an increase in non CDL recyclables to landfill based upon a 15% (71 tonne per annum) reduction in kerbside recycling of these materials.

The variation in unit costs from the current arrangements are:

- A reduction in the cost of kerbside recycling collections from $26.73 per tenement per annum to $24.06 per tenement per annum (see Section 2.6.2).
- An increase in the kerbside sorting cost from $109.67 per tonne from $169.99 per tonne (see Section 2.6.2).
- No change to the garbage kerbside collection costs per tenement as the assumed decrease in quantity is only 0.01%.
- A reduction in litter control costs of $19,354 (see Section 2.6.2).

Estimated POS Related Costs

Resident Costs

A search for POS outlets within the Mildura Rural City Council area has identified 9 outlets with an estimated trading area floor space over 900 m^2. The average travel distance (return trip) for residents in the Mildura region to a POS outlet was estimated as 3 km.

The total number of CDL containers returned to POS outlets was estimated to be 9,918,897 per annum based upon 952 tonnes per annum, and the number of containers per tonne (Table 2.1). Using the assumptions discussed in Section 4.1.7, the number of return trips is 49,594.

For an estimated average 3 km round trip between households and POS outlets in the Mildura Rural Council area, the residents' cost of transport is estimated to be $117,891 (see Section 2.6.2 for assumptions).

Each return trip is estimated to require 23 minutes of labour. The total resident labour cost for the 49,594 return trips is estimated to be $230,060 per annum (at $12.37 per hour, see Section 2.6.2).

POS Outlet Costs

The peak daily mass of CDL material returned to individual outlets is estimated to be 578 kg.

At an average uncompacted density of 13 m^3 per tonne, the peak daily capacity is estimated to be 7.5 m^3. Therefore the back of outlet storage space is estimated to be 10 m^3. The material would be placed in a purpose built roll-on roll-off bin with separate compartments for each material.

The total annual costs associated with operation the POS system for all 9 outlets is presented in Table 3.25.

Table 3.25: Outlet Annual Costs (Mildura)

Cost Element	Rate	Unit	Cost
Front of store space	$12,000/m²	10 m²/store	$1,080,000
Back of store space – storage	$600/m²	10 m²/store	$54,000
Salary	$20/hr	918 hr/store	$165,240
Operating costs	$2,800/store		$25,200
Total			**$1,324,440**

Transport from POS outlets to a Super Collector Facility

The collection cost from POS outlets is calculated assuming that the beverage container material is transported at $80 per day, for 365 days of the year (Section 2.6.2). This results in a transport cost of $29,200 per POS outlet per year, or $262,800 in total per year. This cost covers the bin hire, transport, adminstration, and drop off at the super collectors depot.

Collection and Transport from Away-from-home Sites to the Super Collector

CDL material collection from away-from-home locations and transport to a super collector facility (ignoring the deposit income) is assumed to be equivalent to the cost of collection of CDL material and transport from away-from-home locations to landfill at $42/tonne (Section 2.6.2). The 445 tonnes of CDL material removed from the away-from-home garbage stream is assumed to cost $18,700 to transport to the super collector. The cost is equal to the savings in away-from-home garbage collection, $20,967 (Table 3.22) less 2,267 (Table 3.24).

Operations at the Super Collector

A total of 2,158 tonnes is assumed to be recovered in total by CDL, resulting in an estimated sorting and baling cost of $64,727 per year (at $30 per tonne, see Section 2.6.2).

The Mildura Bottle Exchange supplied the price per tonne estimates currently received for PET, HDPE, liquid paper board, PVC/PP/other plastics and glass shown in Table 3.26. Liquid paper board and PVC/PP/other plastics are currently stockpiling as there is no market for them from Mildura at present. The prices for steel and aluminium are Nolan-ITU assumed estimates (Table 2.3). This results in an estimated $350,060 payment from the reprocessor to the super collector (Table 3.26).

Transport to Reprocessor

The cost of transporting the baled CDL material to the reprocessor is estimated based freight cost per tonne estimates supplied by the Mildura Bottle Exchange shown in Table 3.26. As no estimate was supplied for steel a

cost of $25 per tonne was assumed. This results in an estimated transport cost of $55,275 per year to the reprocessor.

Table 3.26: Revenue from Sale of Product (Mildura)

Material	Percentage (based upon kerbside)	Tonnes	Sale Price ($/tonne)	Total Revenue ($)	Freight Cost ($/tonne)	Total Freight Cost ($)
Steel	2.3%	50	75	3 722	25	1,241
Aluminium	4.5%	97	1,100	106,563	10	969
PET	4.1%	88	400	35,020	22	1,926
HDPE	5.4%	116	400	46,582	22	2,562
PVC/PP/other	0.4%	9	stockpiling	0	Stockpiling	0
LPB	3.7%	79	stockpiling	0	Stockpiling	0
Glass	79.7%	1,719	92	158,173	30	51,578
Total	**100%**	**2,158**		**350,060**		**55,275**

Summary of CDL System Costs

The annual costs of operating the CDL are summarised in Table 3.27.

Table 3.27: Annual Cost Summary of CDL System Operation (Mildura)

Stake holder	Cost Element	Cost $M	
Householder	Transport to POS outlet	0.118	
	Labour	0.230	0.348
Away-from-home collector		0.019	0.019
POS outlet	Front of store space – delivery point	1.080	
	Back of store space – storage	0.054	
	Staffing	0.165	
	Operating costs	0.025	1.324
Super collector	Collection from POS outlet	0.263	
	Sorting and baling	0.065	
	Transport to reprocessor	0.055	
	Revenue	(0.350)	0.033
Total			**1.724**

These costs do not include any costs the distribution chain. This is discussed in Section 4.

Conclusions

With the introduction of a POS based CDL system in Mildura, it is estimated that there will be a net cost reduction of approximately $124,000 per annum saving in the costs of providing kerbside recycling and garbage services. The estimated annual additional net cost for the CDL system is $1,724,000. The overall financial effect is to increase the cost of total recycling services by $1,600,000 – equivalent to an increase of $72.73 per household per year.

The most significant components of the CDL system costs are the lost opportunity cost of the front of house receival area (at the retail outlet), the collection costs from the POS outlet to the super collector and the labour cost to residents of transporting CDL material to the POS outlet.

3.4 Sensitivity Analysis

The opportunity cost of retail space, estimated in this report as $12,000 per m^2 using Safeway data, is considerably more than the $2,227 storage space lease cost that the White report assumes for a metro retail outlet redeeming 10,000 containers per week. While discussions with Victorian retailers reveal that this cost grossly underestimates the opportunity cost of space in retail outlets, a sensitivity analysis on this cost was performed. The opportunity cost of front of store space was reduced to $4,000 per m^2 and the change to the cost of the CDL system per household and for the whole municipality estimated. The results are shown in Table 3.28.

The White report assumed that 92% of away-from-home CDL material would be recovered via the CDL system. Given the considerably lower CDL recovery rates experienced in South Australia and in other countries with a container deposit system in place, this assumption is quite ambitious. A sensitivity analysis on this assumption was also performed. The cost of the CDL system per household and in total for each municipality was estimated assuming 85% of away-from-home CDL material was recovered, rather than 92%. Results are presented in Table 3.28.

Table 3.28: Sensitivity Analysis Results

Variable Changed	Ballarat		Manningham		Mildura	
	Cost $/hh/yr	Total Cost $M/yr	Cost $/hh/yr	Total Cost $M/yr	Cost $/hh/yr	Total Cost $M/yr
No variable change	$81.48	$2.590	$79.25	$3.107	$72.73	$1.600
POS Front of Store Cost: $4,000 m^2	$41.23	$1.309	$38.44	$1.507	$40.00	$0.880
Away-from-home Recovery: 85%	$82.94	$2.633	$80.68	$3.163	$73.36	$1.614

Table 3.28 highlights the importance of the cost of front of store space, with the cost of the CDL system approximately halving when the cost per square metre is dropped from $12,000 to $4,000. At $4,000 per m^2 the POS front of store cost remains the most costly item in the CDL system.

The overall cost of the CDL system is not as sensitive to changes in the away-from-home CDL recovery rate. When the away-from-home recovery rate is dropped from 85%, the CDL system is estimated to cost between $56,000 (Manningham) and $14,000 (Mildura) more than the current system. This is due to the decrease in super collector costs being outweighed by the decrease in revenue, and an increase in away-from-home garbage collection and disposal costs.

4. STAKEHOLDER IMPACTS

The financial impact analysis for the introduction of a 10 cent deposit POS container deposit system in parallel with the existing kerbside services, as presented in Section 3, reveals a consistent pattern for each of the three Council areas. The financial analysis indicates that there would be a minor reduction in existing recycling and garbage collection costs, but that this would be insignificant compared with the cost of operating the container deposit system. In each case, the introduction of a CDL system would result in a cost equivalent of between $73 to $81 per annum for each household in the three municipalities studied. However, the actual impact on stakeholders must consider where the impacts fall. These impacts are identified below together with the costs of operating the parallel system.

4.1 Brand Owner

For the purpose of this study, it is assumed that the net POS outlets costs of operating the container deposit system are ultimately transferred to brandowners and are subsequently passed to consumers through increased retail prices for brand owner products. Brand owners' costs of operating the CDL system, based upon the above assumptions are presented in Table 4.1.

The number of containers consumed in total in each municipality has been estimated based on an average of 10,713 containers per tonne of CDL material. This was derived using the number of containers per tonne of material estimated in the White report. Using this and the White report consumption per capita figures for each CDL material (Table 2.1) the average number of containers per tonne of CDL material consumed was estimated. This method was used rather than estimating the number of containers of each material separately as municipal audit data was not available for away-from-home consumption or at-home material in the garbage stream. It was considered more appropriate for the purpose of this study to estimate the total number of containers consumed in each municipality on a generic basis. The number of containers recovered via CDL is those recovered through the kerbside recycling system, POS outlets and super collectors.

Table 4.1: Brand Owner Costs

Cost Element	Ballarat	Manningham	Mildura
No of containers consumed	*45,357,995*	*64,169,672*	*25,121,516*
Payment of Deposits - 92% return ($M)	4.173	5.904	2.311
POS Outlets ($M)	2.622	2.945	1.324
Super collectors ($M)	(0.688)	(0.271)	0.036
Total Cost ($M)	6.107	8.578	3.671
Cost/ container consumed (cents)	13.5	13.4	14.6

The unit cost of beverages subject to CDL will rise by about 14 cents across the board and that this will be passed on in full to consumers. This recognises that 8% of deposits will be unredeemed, and that operating costs add about 30 percent to the costs. There is a question about the circumstances in which these costs would actually be experienced since there is no clear price differential between South Australia (which already has a CDL system) and Victoria (which does not). This is explained by the pricing policy of beverage manufacturers who operate on a national basis and chose to apply pricing policies on this basis also. In effect therefore beverage consumers in South Australia are subsidised by beverage consumers in other parts of the country. If Victoria were to introduce a CDL system but other jurisdictions did not, it is a matter for conjecture whether Victorian consumers would enjoy the same subsidised beverage prices that South Australians currently do. However, if a national system were introduced, and national beverage pricing policy continued, Victorian and all other Australian beverage consumers would be expected to experience price rises attributable to CDL as indicated above.

4.2 Consumers

There is a high degree of overlap between ratepayers as consumers of municipal recycling and garbage services and consumers of beverage products. There are financial implications for consumers in both roles. The estimated costs and benefits of a container deposit system to consumers are presented in Table 4.2.

Table 4.2: Cost Implications for Consumers ($)

Cost Element	Ballarat	Manningham	Mildura
No of containers consumed	*45,357,995*	*64,169,672*	*25,121,516*
No of tenements	*31,750*	*39,206*	*20,300*
Increase in cost of beverages ($M)	6.107	8.578	3.671
Reduction in kerbside service cost ($M)	-0.153	-0.231	-0.124
Deposit benefit transfer from kerbside MRF operator	-1.012	-1.011	-0.627
Transport to POS outlets and labour	0.658	0.474	0.348
Deposit refund from POS outlet	-1.649	-1.647	-1.020
Total cost	3.951	6.163	2.248
Increase in cost/tenement/yr	$124	$157	$111

4.3 Other Stakeholders

This study assumes that local government cost savings associated with the provision of kerbside services and reduced litter collection and management cost are passed onto residents. For this reason they are not considered independently.

Implementing CDL in parallel with the current kerbside system may require that existing waste and recycling contracts be renegotiated due to changes in yields, material revenues and handling fees. As the real cost implications for the provision of kerbside services under a parallel system are not significant, financial penalties to local government associated with contract renegotiations are expected to be negligible and hence are not considered further.

It is expected that the State Government would incur some administration costs. The administration cost of CDL to the South Australian Government is understood to be two person years per annum. A similar CDL administration cost is anticipated for Victoria.

While this study assumes that the introduction of CDL has no market distorting effect, in practice there may be an impact at non-POS outlets such as convenience stores and milk bars. These may face a small reduction in sales matching a possible increase in sales at POS outlets due to shopping associated with container refund-influenced trips. Within the scope of this study it is not possible to quantify the impact of changes in consumer purchasing habits associated with the operation of the container deposit system.

No attempt has been made to assess the impact on away-from-home venues where beverages are consumed. Away-from-home venues may choose not to pass the full ten cent deposit on to consumers as they will redeem the deposits directly or via reduced collection costs.

Charities and non-profit organisations would be beneficiaries of a container deposit system if they engaged in the collection of CDL deposit bearing containers via activities including:

For at-home consumption

- running collection centres as a business activity (for example, Scouts Recycling in South Australia);
- household collection service (for example, through 'bottle drives')
- kerbside collection service (for example, Scouts Recycling carry out five percent of Adelaide's collection in South Australia)
- providing conveniently located collection bins; and
- providing a collection service from other charities and non-profit organisations.

For away-from-home consumption

- Operating collection services from commercial outlets;
- Collection at or after special events, such as football matches; and
- Placing permanent secure collection bins in public places.

(the White report, p.172).

The White report CDL Televote Survey found ten percent of respondents said they would donate CDL containers to charities. The White report estimated that ten percent of CDL containers would be diverted to low income earners through activities such as litter collection, kerbside and public bin pilfering, and collecting as donations from neighbours, restaurants etc. If 10% of CDL deposits from the three municipalities are redeemed by charities, not for profit organisations and low income earners, these groups will share an income of around $1.3M per year.

4.4 Kerbside Contractors

The impact on kerbside garbage collectors is expected to be insignificant given that the reduction of CDL material is minor relative to the total amount of garbage collected and some additional newspaper and non-beverage items are diverted to household garbage by those consumers who stop using the kerbside recycling system. It is assumed that the cost of garbage collection will stay the same, however the cost of disposing garbage to landfill, paid by the tonne, will decrease slightly, but this will not be a significant cost reduction and the income derived by garbage collectors will remain roughly the same.

The impact on kerbside recycling collectors will be a reduction in income as CDL containers, 10% of paper and cardboard and 15% of non-beverage recyclable material is diverted from the kerbside recycling system.

Kerbside recycling sorters, while experiencing reduced throughput and lower value material, are compensated by an increase in sorting costs.

5. OVERALL CONCLUSIONS

The primary objective of this study has been to assess the financial impacts of a parallel kerbside and container deposit system on households, local government, and industry stakeholders as it would apply to a range of typical Victorian communities. The three case studies considered are the cities of Ballarat (provincial), Manningham (metropolitan), and Mildura (rural/remote).

The impact assessment considers financial impacts only, hence does not investigate environmental impacts. In other studies, the environmental benefits of recycling both through kerbside or through CDL (or both) have been shown to exceed costs. Although generally expressed in dollar terms for the sake of comparison with costs, the benefits that have been identified have been predominantly in improved air and water quality. The question that has not been addressed is how much benefit the community wants to acquire at the costs indicated.

Whilst there are many possible variations of container deposit systems, this study has been applied only to a 10 cent point of sale (POS) container deposit system as recommended in the White report which is currently being studied by a working group of Environment Protection and Heritage Council officials. Extrapolation of the study outcomes to other systems is cautioned as many of the assumptions adopted only apply to a POS system.

The conclusions presented below are provided as key findings firstly, and as specific responses to the terms of reference secondly.

The key findings of the three case studies are presented in Table 5.1.

Table 5.1: Key Findings

Finding	Unit	Ballarat	Manningham	Mildura
Increase in the retail cost of beverages due to a parallel CDL system (based upon full cost recovery and includes operating and administration costs).	Cents per beverage	13.5c	13.4c	14.6c
Net financial impact on households (as ratepayers and as beverage consumers). This is comprised of:	$/hh/yr	$124	$157	$111
▫ an increase in the cost of beverages	$/hh/yr	$192	$219	$181
▫ a decrease in the cost of kerbside services	$/hh/yr	-$37	-$32	-$37
▫ a benefit from the deposits redeemed after deducting the cost of transporting CDL material to POS outlets.	$/hh/yr	-$31	-$30	-$33
Reduction in the net cost to local government of providing kerbside services. This includes a reduction in the actual cost of kerbside collection, sorting and disposal and the deposit income transferred back by the sorter.	$M/yr	$1.17M	$1.24M	$0.75M
Charities, non-profit organisations and low income earners based upon receiving 10% of available CDL deposits	$M/yr	$0.45M	$0.64M	$0.25M
Decrease in net cost per household of the CDL system if the front of house space in retail outletsis reduced to $4,000 from $12,000/sq m.	% change	-49.4%	-51.5%	-45.0%
Increase in the cost of the CDL system if 85% of CDL material returned rather than 92%.	% change	1.8%	1.8%	0.9%

The current and estimated recycling yields and costs in each of the three municipalities are presented in Table 5.1.

Table 5.1: Recycling Yields and Household Costs – Current vs. POS CDL System

System	Parameter	Ballarat	Manningham	Mildura
Current System:	Yield (kg/hh/wk)	3.5	5.1	2.7
	Cost ($/yr)	32	31	63
With CDL:	Yield (kg/hh/wk)	5.7	7.3	4.8
	Cost ($/yr)	156	190	174
Increase with CDL:	Yield %	63	42	77
	Cost %	387	482	177

The costs for "with CDL" include the cost of kerbside recycling service plus the incremental cost of operating the at home and away-from-home CDL services.

6. RESPONSE TO TERMS OF REFERENCE

Responses to the ten Terms of Reference (see Section 1.3) are provided below.

Changes in Kerbside Collection Costs

A 10% reduction in the cost to Councils of providing recycling collection services is estimated to occur, resulting in a $42,000 cost reduction in Ballarat, a $43,000 cost reduction in Manningham and a $77,000 cost reduction in Mildura. This cost reduction would increase to $1,054,000, $1,054,00 and $703,000 respectively if the sorter transferred the full value of the redeemable deposits back via reduced contract prices.

The cost of the kerbside garbage system would reduce by $2,000 in Ballarat, $9,000 in Manningham and $1,000 in Mildura. This cost reduction is entirely due to a reduction in the tonnes of garbage to landfill, there is no change in the cost of collecting household garbage.

Changes in Sorting Costs at MRFs

Bottle and can sorting costs are estimated to increase by 55% per tonne of material sorted. However, the total material sorted decreases to 35% of at-home CDL material consumption resulting in a cost saving to sorters of $9,000 in Ballarat, $12,500 in Manningham and $22,500 in Mildura.

Establishment Costs at POS Outlets

For the purposes of this study it is assumed that there are no initial set-up costs at POS outlets. The space and storage costs required by POS outlets in order to accommodate the CDL system are recurrent costs per year, based on opportunity costs of the space. Structural requirements, such as the purpose built roll-on roll-off bin with separate compartments for each material are also assumed to be amortised over a number of years as a rental charge included in the collection cost of CDL material.

By far the greatest POS outlet cost relates to front of store space which is valued by retailers at $12,000 per m^2. For the Ballarat POS outlets the front-of-store cost totals $1,920,000, for Manningham $2,400,000 and for Mildura $1,080,000.

Consumer Transport to POS Outlet Costs

The two major costs associated with consumer transport of CDL material to POS outlets are assumed to be the vehicle cost of transporting containers and the cost of consumer time. Assumptions that 30% of the at-home CDL material is returned to POS outlets for the sole purpose of obtaining the deposit refund and sixty deposit-bearing containers are returned per trip, the number of trips in each municipality are estimated. Assuming vehicle costs are 59c per km and consumer time is valued at $12.37 per hour, the total cost of consumer transport to POS outlets is estimated as $630,000 in Ballarat, $454,000 in Manningham and $330,000 in Mildura.

Sorting Costs at POS Outlets

Sorting at POS outlets is assumed to be undertaken manually. The cost of sorting is estimated to be the additional labour required at POS outlets. This is calculated assuming each container requires 3 seconds of handling time (as in the White report) and the average cost of labour (including overheads) is $20 (estimate provided by Woolworths, see Section 2.6.2 for more detail). Based on these assumptions the sorting costs at POS outlets are estimated to be $513,000 in Ballarat, $369,000 in Manningham and $263,000 in Mildura.

Container Transfer Costs from POS Outlets

In the CDL system set out in this study, containers are collected from POS outlets by the super collector. Based on assumptions discussed in Section 2.6.2, the CDL material is transported at $80 per day, equivalent to $29,200 per POS outlet per year. In total, this amounts to $467,000 in Ballarat, $584,000 in Manningham and $263,000 in Mildura.

Community Health/OHS Issues Associated POS Outlets

Community health and OHS issues associated with POS outlets as a result of the adoption of a CDL system are assumed to be incorporated in the additional cleaning and pest control costs per POS outlet. The additional amount spent on pest control and cleaning is assumed to negate the potential for increase in work cover premiums and other community health and OHS issues by reducing any increased risk if such issues caused by a CDL system. Pest control costs are assumed to be $1,000 per year for each POS outlet and cleaning costs are expected to rise by $1,400 per year for each POS outlet based on estimates given in the White report.

Infrastructure Needs/ Costs at Household Level

For the purpose of this study, no additional infrastructure needs or costs at a household level are assumed to occur with the introduction of a CDL system. Household consumers are assumed to store containers in the same way as they currently do for return via the kerbside recycling system. Section 2.6.2 discusses the assumption that trips are made by households to POS outlets with 60 containers, as this amount fits comfortably in an average car boot. Therefore, it is assumed that no additional major structural requirements exist for the transport of containers to POS outlets. In practice, some residents may utilise the existing kerbside crates, others may use household crates, small garbage bins, bags or boxes, and some residents may purchase a crate specifically for the purpose of returning CDL containers.

Community Attitudes

The kerbside recycling collection system is well established, widely supported and participated in in Victoria. Due to the positive attitude of the community towards the kerbside system this study has not adopted the assumption made in the White report that households would reduce their kerbside set out of CDL containers to 6% of at-home CDL consumption. Rather, it is assumed that consumers would continue to set out 35% of at-

home CDL material in the kerbside system. Section 2.5.3 contains a more detailed description of the assumed beverage container recovery rates.

However, the 35% of at-home CDL material that this study assumes would be set out in the kerbside system is a reduction from current set out rates, which are generally around 60% to 70%. The reduction in the use of the kerbside system for CDL material would also cause some households to reduce or stop their use of the kerbside recycling system for paper and cardboard and non-CDL bottles and cans. Some households may also continue to use the kerbside recycling system exclusively choosing not to participate in CDL. This study assumes that the set out rates of paper and cardboard will be reduced by 10% and non-CDL bottles and cans will be reduced by 15%, see Section 2.5.2 for further discussion.

Considering the positive community attitudes that currently exist in South Australia toward the CDL system, and given the finding of the White report that NSW residents have a positive attitude toward CDL, it is assumed that, in general, the community would respond positively to CDL in Victoria. It is assumed that this positive community attitude would result in the return of 57% of at-home CDL material to POS outlets and 92% of away-from-home CDL material to super collector centres.

Likelihood of reprocessors paying sorters aggregated unit values of containers

After speaking to sorters in the municipalities it has been assumed that sorters would accommodate an increase in sorting costs in order to separate and return the CDL containers collected via the kerbside recycling system to super collector facilities and receive a 10 cent deposit per container. The super collector is required to pay a 10 cent deposit per CDL container returned to it by the sorter, it then owns the container, and is free to sell all material to a reprocessor. See Section 2.3 for a detailed description of the CDL system configuration assumed.

7. REFERENCES

Beverage Industry Environment Council (BIEC) (1997), 1997 National Recycling Audit and Garbage Bin Analysis

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CONTAINER DEPOSIT LEGISLATION: PEER REVIEW OF A FINANCIAL IMPACT ASSESSMENT FOR THREE VICTORIAN CASE STUDIES

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CONTENTS

1. BACKGROUND

1.1 The White Report

The New South Wales Minister for the Environment commissioned Dr Stuart White and his team at the Institute for Sustainable Futures in Sydney to carry out a cost-benefit analysis of the introduction of CDL in New South Wales. The White report, entitled *Independent Review of Container Deposit Legislation in New South Wales,* was published in November 2001.

The report notes that CDL would probably be unconstitutional if implemented in individual jurisdictions, so it recommended that CDL should be introduced as a national programme. The NSW Environment Minister decided to refer this recommendation to the Environment Protection and Heritage Council, which in turn referred it to a working group for further study.

1.2 The Nolan-ITU Report

To test the validity of the White report's findings in the Victorian context, EPA Victoria engaged Nolan-ITU Pty Ltd to undertake a study of the *Financial Impacts of a Container Deposit System* on the Kerbside Recycling Collection and Sorting System for three Victorian municipalities. These represent typical kerbside recycling scenarios of remote/ rural communities, major provincial centres and metropolitan areas. The municipalities studied include the City of Manningham (metropolitan), the City of Ballarat (provincial); and the Rural City of Mildura (rural/remote).

The objective of this study was to understand the financial impacts of a parallel kerbside and CDL system on residents, local government, and industry stakeholders as it would apply to typical Victorian communities if CDL were introduced. This would better position the community to make informed judgements about the amount of benefit obtainable at a particular cost.

The Nolan-ITU study assumed that the CDL system to be applied would be that advocated by Dr White, namely a point of sale (POS) 10 cent container deposit system applied to post-consumer beverage containers. This study also assumed that the current kerbside recycling systems operating in each of the three municipalities are maintained. The impact assessment considered financial impacts only, and did not investigate environmental impacts. Nolan-ITU cautioned against extrapolation of the study outcomes to other systems, as many of the assumptions adopted only apply to a POS system.

1.3 The Peer Review

EPA Victoria have now asked Perchards to conduct a peer review of the Nolan-ITU report. The purpose of this latest exercise is not to carry out another examination of the White report but to take an independent look at how Nolan-ITU have carried out their brief of applying White's recommendations to the Victorian situation.

Perchards is a UK-based consultancy which has been tracking the progress of packaging legislation worldwide and analysing its implications since 1987. The author of this report has been involved with the subject even before that, since 1974. Thus, although we have an outsider's view of the Australian situation, we have been following the development of CDL almost since it began. We also

have some knowledge of the Australian context, having carried out a review of ten alternative policy options and contributed to the impact assessment on the proposed NEPM for used packaging materials commissioned by the National Environment Protection Council in 1998.

Perchards are not competent to verify or challenge any of the NSW or Victorian data used, and we have not attempted to do so. However, it is our responsibility to draw attention to any data that seem surprising, whether this is an unexpectedly large discrepancy between NSW and Victorian data or whether any of the Australian data seem seriously out of line with experience elsewhere in the world.

2. CDL WORLDWIDE

2.1 Reasons for Introducing CDL

The Nolan-ITU report states that *"Historically CDL has been introduced to reduce the incidence of litter; but the system can increase the recovery of containers through improved product stewardship arrangements."* It is true that the original focus in the US, Canada and South Australia was on litter abatement, but some more recent measures in Europe were always aimed at promoting recycling or protecting refillables. The White report explains this well.

Sweden's Act on Certain Beverage Containers (PET bottles) (1991:336), which dates from 1991, requires bottlers and importers to have a handling permit which is obtainable only if the bottles are included in a reuse or recycling system which achieves 90% reuse or recycling, the consumer pays a deposit, and the label declares that the bottle is included in an approved recovery system.

Germany's Packaging Ordinance, adopted the same year, requires that the market share of beverages sold in refillable containers remains at the 1991 level (72%). If the quota were not met, CDL would be imposed. The market share of refillables has indeed fallen, and the German Government has announced that CDL will be introduced from January 2003 – though this is being challenged in the courts.

2.2 Coexistence of CDL and Kerbside Collection Systems

The White report comments that *"determining the impact of CDL on kerbside is made more difficult by the fact that most places in the world where CDL has been introduced have done so at a time prior to the introduction or expansion of kerbside recycling. Therefore empirical results are not available for the situation which would apply in the case of NSW where, if CDL were introduced, it would be following the establishment of one of Australia's oldest and best performing kerbside recycling systems."*

The Nolan-ITU report makes a similar point – *"there are no known cases of a CDL system being introduced where an established kerbside recycling system is in place."* At the time of writing this is true, but it will change if and when the proposed German CDL is adopted.

DSD, the industry-funded organisation which finances the segregated collection of used packaging from German households, has expressed concern that by taking beverage containers out of the system, there will be unnecessary duplication of effort and economies of scale will be lost. Beverage container material tends to have a much higher scrap value than other forms of packaging, so the loss of income from this source will be disproportionately high. Loss of revenue from the sale of collected material is expected to exceed the cost savings arising from collecting less material from each residence.

Also, once beverage containers have been diverted into the parallel deposit-and-return system, the fees charged to non-beverage producers of packaged goods will have to increase substantially. 15% of DSD's income comes from packaging to be covered by the CDL – thus 300 million euros (A$540 million, or A$6.60 per head of population) would be diverted away from the funding of multi-material kerbside collection.

Deposits generate higher-quality material for recycling than kerbside collections, and a higher beverage container collection rate – but once beverage containers have been diverted from the kerbside collection system, there may be less economic justification for collecting other types of packaging. Thus, the overall diversion rate might not increase by much, and might even fall. The White report focuses on the likely cost savings resulting from less material being collected at the kerbside, and does not consider the possibility of CDL being counterproductive in waste diversion terms; the Nolan-ITU report discusses a possible reduction in consumer motivation but does not address the possibility that local authorities might decide to discontinue their kerbside service if the economics no longer stack up. Ironically, the higher the percentage of CDL material that remains in the kerbside system, the less the danger that this will happen.

2.3 Voluntary Deposit Systems

Nolan-ITU says that mandatory or voluntary container deposit systems exist in many countries. Voluntary deposit systems exist almost everywhere refillable bottles are used, as an incentive to the purchaser to return the bottle for reuse. (The only refillable bottle system that we know of which works effectively without a deposit, is the British milk bottle system, where bottles are delivered and collected from the doorstep daily – though this is in decline as a result of changes in lifestyles.)

Deposits on refillables are intended to cover the cost of replacing the bottle if it is not returned, whereas deposits on non-refillables are intended to provide an incentive for return which will inevitably exceed the scrap value of the material. Mention of voluntary deposits on refillables unnecessarily confuses the issue.

2.4 Effectiveness of CDL as a Collection Mechanism

The Nolan-ITU report comments that *"under CDL systems higher levels of recovery of packaging tend to occur. This results largely from better capture of the away-from-home waste stream that emanates from clubs, hotels, restaurants and events."* This is certainly true of the traditional New World CDL systems, which coexist alongside recycling systems

for non-beverage packaging which are governed more by market forces than by regulatory targets.

In the EU, however, where recycling targets are imposed on *all* packaging, it has been demonstrated that provided heavy investment is made in kerbside or close-to-home collection systems, collection rates equal to those obtainable by CDL can be achieved for *all* consumer packaging.

Whether the benefits of this outweigh the costs, is another matter. In Belgium, for instance, the cost of separate collection of used packaging from households in 2001 was 10 euros (A$18) per head. This is additional to the entirely separate cost of garbage collection.

Belgian households have a monthly kerbside collection of paper and board along with old newspapers and magazines, and a twice-monthly multi-material kerbside collection of the lightweight fraction (metals, PET and HDPE bottles and beverage cartons). As is usual in Europe, glass is collected through "bottle banks" situated in supermarket car parks and other public places. There are also some 400 guarded container-parks, where all three fractions can be brought, and metals are mechanically extracted from the municipal waste incinerators which deal with 50% of household waste in Belgium. This widespread availability of waste diversion facilities resulted in an 80% recycling rate for consumer packaging in 2001.

3. DESCRIPTION OF A PARALLEL CDL/KERBSIDE RECYCLING SYSTEM

3.1 The System

The Nolan-ITU report describes the system recommended in the White report which was used as the basis of the Victorian study. We have no comments on this, other than to note that the Nolan-ITU report assumes that beverage containers returned to POS (point-of-sale) outlets will be manually sorted into material types. As White makes clear, reverse vending machines which automatically read bar codes are the norm in Scandinavia and in the proposed new German system.

3.2 Material Flows

We support the methodology which draws upon data and assumptions in the White report and relates them to the Victorian situation:

(1) White's estimated NSW beverage container Consumption per capita	=	*assume equal to*	=	**(2)** kg of material consumed per capita in the 3 Vic municipalities
(3) White estimates of number of uncompacted CDL containers per tonne of material	x	**(2)** kg of material consumed per capita in the 3 Vic municipalities	=	**(4)** number of CDL containers per capita consumed in the 3 municipalities
per capita estimates **(2)** and **(4)**	x	**(5)** population of 3 Victorian municipalities	=	**(6)** kg & number of CDL containers in the 3 municipalities
(7) Data from 2 councils + Victorian audit data for 3rd			=	**(8)** tonnage of each material in kerbside collections
(9) market share of each packaging material in key beverage & food applications	+	**(10)** prevalence of this packaging in recycling stream from audits in all states	=	**(11)** proportion of deposit-bearing containers in each material stream
(11) proportion of deposit-bearing containers in each material stream	x	**(8)** tonnage of each material in kerbside collections	=	**(12)** tonnage of each beverage container type in kerbside collections
(13) BIEC 1997 data on % of each material in the garbage stream	x	**(11)** proportion of deposit-bearing containers in each material stream	=	**(14)** tonnage of each beverage container type disposed of to landfill
(12) tonnage of each beverage container type in kerbside collections	+	**(14)** tonnage of each beverage container type disposed of to landfill	=	**(15)** estimated at-home consumption
(4) number of CDL containers per capita consumed in the 3 municipalities	-	**(15)** estimated at-home consumption	=	**(16)** estimated away-from--home consumption
(17) White estimates of %age of away-from-home beverage container material currently recycled	x	**(16)** estimated away-from-home consumption	=	**(18)** estimated tonnage of away-from-home beverage container material recycled in the 3 municipalities

Nolan-ITU believes that estimating at-home consumption by adding the estimated tonnage of beverage containers in the kerbside garbage stream to the estimated tonnage of beverage containers in the kerbside recycling stream, is a better way of estimating at-home consumption than the White report's assumption that at-home consumption of beverage containers is 50% of total consumption.

The White report admits that the away-from-home sector is "highly heterogeneous", the model is "vastly simplified" and the results "are estimates only". However, data on waste is notoriously imprecise, whatever the methodology used, and adding together two waste estimates does not necessarily produce a more reliable result than drawing upon a variety of production and waste data and market estimates as White did. The Nolan-ITU report does not explain why at-home beverage consumption represents 71% of total consumption in Mildura and 64% in Ballarat, but only 45% in Manningham.

3.3 Effectiveness of Away-from-home Collections

The Nolan-ITU report suggests that having regard to the considerably lower CDL recovery rates experienced in South Australia and in other countries with a container deposit system in place, the White report's assumption that 92% of away-from-home CDL material would be recovered via the CDL system is "quite ambitious", though Nolan-ITU accepts that CDL systems achieve higher away-from-home collection levels as a result of better capture of used containers from clubs, hotels, restaurants and events.

We agree with Nolan-ITU's reservations. Casual purchases of beverages for drinking in the street or on the beach are likely to result in a very low rate of return by consumers, and littered containers will be too widely scattered for commercial collectors to be able to gather up a high proportion economically. Voluntary groups, which would not have to cover their own labour costs, would probably achieve a rather higher collection rate, but would only be operating in a limited number of localities.

It would be interesting to see Australian market research data quantifying on-premise consumption as a proportion of total away-from-home consumption, in order to get a fix on how important out-of-doors consumption is.

However we note that the Nolan-ITU report contains a sensitivity analysis comparing the baseline assumption of 92% returns against an alternative assumption of 85% returns, and that this shows that the overall cost of the CDL system is not particularly sensitive to changes in the away-from-home CDL recovery rate. Super collector costs fall, but this is marginally outweighed by a reduction in revenue from the sale of secondary material, and an increase in away-from-home garbage collection and disposal costs.

3.4 Convenient disposal of at-home material versus deposit redemption

At first sight, it would seem unlikely that 35% of at-home CDL material would remain in the kerbside recycling system rather than being returned for redemption for the deposit. The White report suggests only 6%.

However, experience shows that collection systems which fit in with how people live enjoy far better consumer co-operation than those which require consumers to make a special effort. This is why across the world, kerbside collection systems achieve a collection rate of 60%-75%, far higher than the rate achieved by "bring" systems in any other than the most environment-conscious cultures. It also explains why the British refillable milk bottle

system has survived even without a deposit – bottles are delivered to the doorstep and the empties are collected from there – whereas a deposit equal to 29 Australian cents was not sufficient to encourage British consumers to return refillable soft drink bottles to the store. Also, Nolan-ITU's 35% assumption is supported by the findings of a consumer survey in South Australia.

For better transparency, we would have preferred the Nolan-ITU cost calculations to have shown the results from both sets of assumptions, but if we had to choose between the two, Nolan-ITU's 35% looks far more plausible.

3.5 Overall collection rates under CDL

The cost calculations in the Nolan-ITU report are based on the assumption that 92% of beverage container material will be collected and recycled under a CDL. For the purposes of comparison it is fair to use the assumptions in the White report, but we believe this is unduly optimistic.

The SA recovery rates quoted by White are very high by comparison with North American data, Michigan and Oregon excepted. The uniform round numbers cited for Michigan (99% for all materials) and Oregon (90% for all materials) are improbable and seem more likely to be the result of guesstimates than measurement; we think they should have been ignored. Leaving these two US states aside, SA's much better performance than the North American deposit states cites may be the result of different calculation methodologies, some factor peculiar to SA or some factor peculiar to Australia. Even so, White does not claim that SA has achieved a 92% return rate for all CDL materials.

It is true that best-practice deposit systems can yield 90%-95% returns, but these are in the Nordic countries – which are much more environment and litter conscious than anywhere else – and they only cover aluminium and PET for beer and soft drinks. The more packs covered, the lower the participation rate. There is a trade-off between avoidance of market distortions (wider CDL coverage) and system efficiency (restriction of CDL to the most valuable materials and a limited range of products).

3.6 Impact of CDL on kerbside collection of non-deposit-bearing material

Whereas the White report assumes no change in residents' behaviour toward the recycling of non-beverage containers and newspapers, Nolan-ITU assumes that the collection of paper and cardboard through the kerbside system will decrease by 10%.

Consumers who put CDL material into the kerbside system will not be expected to change their behaviour as regards non-beverage packaging and newspapers, so it follows that the higher the proportion of residents who ignore the new deposit system, the smaller the change in the non-beverage material collection rate.

Nolan-ITU's selection of a collection rate midway between the current South Australian and Victorian newspaper collection rates seems a reasonable starting-point, but there may be a case for analysing the impact if there is no reduction in the kerbside collection of paper and cardboard.

The Nolan-ITU report does not mention the other non-beverage packaging collected through the kerbside system – food cans and plastics. Whereas used cartonboard and newspapers are more or less clean, food and petfood cans and plastic packaging may well be seen as garbage, and consumers may conclude that they are excluded from the deposit system because they have no real value. We would expect a reduction in the collection of these materials which may even exceed 10%.

3.7 System costs: waste management costs and secondary material prices

We have no reason to challenge the assumed variation in kerbside collection costs under a parallel CDL and kerbside recycling system set out in the Nolan-ITU report. These assumptions seem fair.

Lacking detailed knowledge of waste management costs and material prices in Australia, we cannot comment on the assumption that the cost of collecting away-from-home CDL material will equal the revenues from selling it.

3.8 System costs: consumers' costs attributable to CDL

The consumer time and cost allocated to return of at-home CDL material to POS outlets is always arbitrary, and always challengeable. Nolan-ITU's assumption that 30% of materials will be returned through a special journey seems rather high. Even if these returns are not part of a shopping trip, might they not be made on the way to or from work, school or some leisure activity? We would have liked the Nolan-ITU report to substantiate this assumption.

If as much as 30% of material is taken back when no shopping is involved, it follows that dedicated redemption centres may be needed to supplement the retailer network. This is allowed for in White's description of Option 5, but is not covered by the Nolan-ITU report's simplified assumptions: Nolan-ITU says that in order to distinguish White's POS options 5a and 5b, recommended as the best options, from his Convenience Centre options 4d and 4e, it is specified that the receival point is "usually located at or near supermarket car parking areas". In our recalculations in sections 5.2 and 6.1, we have halved the "consumer labour cost".

3.9 System costs: costs falling on retailers

We agree with the Nolan-ITU report that the average cost of selling space at Victorian Safeway stores is more representative of the opportunity cost of the space devoted to CDL container returns than the metro store space lease cost used in the White report. Nevertheless, we welcome Nolan-ITU's sensitivity analysis which tests the impact on costs of assuming an opportunity cost of $4,000 per m² rather than $12,000 per m² (the Nolan-ITU assumption) or $2,227 per m² (the White report's assumption). This makes a big difference, since even at $4,000 per m² the POS front-of-store cost remains the most costly item in the CDL system.

As we have previously pointed out, the latest CDL systems in preparation in Europe – the system just introduced in Denmark and the one about to be introduced in Germany – will be based on a high degree of automation.

Cheap labour is not readily available in Europe. The investment subsidies to Denmark's grocery stores to cover the cost of automating their bottle return and sorting systems, shall not exceed 260 million DKr (A$70 million, or $12.60 per head) over a six-year period. German industry claimed in 1999 that the installation of reverse vending machines for the return of used beverage containers would cost between DM 3000 and DM 4000 million (A$2785 – A$3715 million, or $34.30 - $45.70 per head). The White report comments that *"reverse vending machines are considered a potential cost saving option for retailers when utilised as an alternative to labour and storage, where this is cost-effective."*

Nolan-ITU does not challenge the White report's assumption that retailer handling time is 3 seconds per container returned. Retailer handling time per container returned was shown as 12 seconds in a 1978 study, 7.5 seconds in 1980 and 5 seconds in 1986. ISF assumes 3 seconds, due to "major improvements in labour productivity". This needs much more discussion. Cans are quicker to handle than PET, because containers fill up more slowly. Both are far easier to handle than glass. What was the packaging mix for the earlier studies, and what is it now? Our feeling is that major savings will have arisen from the move away from glass, but since then, the only time-saving opportunities come from reverse vending. A discussion on the time and capital cost implications of automatic handling would have been useful.

We agree with Nolan-ITU that implementation of a CDL system may introduce some or all of the market distortions suggested in the report. These distortions may shift business from one type of producer or retailer to another, but they will not have much impact on overall costs. It is therefore legitimate to ignore them for the purposes of this study.

3.10 Refund and administration arrangements

Although the material flows under the proposed system are well described in the Nolan-ITU report, it does not explain at all clearly how money would flow between the various players. We understand from the EPA that the following financial transactions are envisaged:

Brand owner holds the deposit money until he reimburses the super collector

Brand owner sells beverages in CDL containers and

charges deposit & any agreed handling fee to POS return retailer

↓

Retailer pays deposit to brand owner. POS CDL return sites receive handling cost, may be through the super collector but funded by brand owners

POS return retailer includes deposit & any handling fee in retail price of beverage containers purchased by consumers	Away-from-home retailer includes deposit in retail price of beverage containers purchased by consumers

↓

Consumers are only reimbursed if they return CDL material to POS.

Kerbside collection operators and commercial operators & volunteer groups picking up CDL material from bars etc receive the deposit value from super collectors

Consumers return empties to retailer and receive deposit refund	Kerbside collection operator picks up CDL material without money changing hands	Commercial operators & volunteer groups pick up CDL material left at or around the place of consumption Away-from-home retailers do not redeem deposits from consumers or receive the deposit value from collectors.

↓ ↓ ↓

Super collector pays deposit value to first collector, plus handling fee for POS return outlets

Retailer transfers material to super collector and is paid the deposit	Collector transfers material to super collector and is paid the deposit	Collector transfers material to super collector and is paid the deposit Commercial operators reflect the value of the deposits in their waste collection contracts with away-from-home retailers

↓ ↓ ↓

Super collector reimbursed for deposit value by beverage producer

Super collector sorts and bales CDL material and sells it to a reprocessor; he charges the brand owner the deposit fee plus an agreed handling cost.

The value of the material, based on revenue received from reprocessors, will be reflected in the contract price between the super collector and brand owners

Like retailers offering POS return facilities, retailers selling beverage containers for away-from-home consumption (for example restaurants, hotels, hospitals and sporting venues) would pay brand owners or wholesalers a deposit on the beverages purchased.

When they sell the beverage to the customer, away-from-home retailers would pass this deposit on. Customers

would have the option of returning the container to POS and collecting the 10 cent deposit, but as they are away from home this is unlikely to be convenient so in most cases they are likely to forfeit the deposit, leaving the container at or around the place of consumption. If containers are left at the away-from-home retailer, these retailers would put them containers out for collection.

The idea is that this would provide an increased incentive for collectors – whether commercial operators or voluntary organisations such as scout groups – to collect littered or properly disposed of containers in order to receive the value of the deposit from the super collector.

There would also be an incentive for away-from-home retailers to put out CDL containers for collection, as their collection cost would be reduced: the value of the deposits that commercial collectors receive from super collectors would be reflected in the contract rates that they charge to collect from these places.

3.11 Cross border issues

Nolan-ITU make the simplifying assumption that cross-border issues need not be considered. If the constitutional position is that NSW cannot unilaterally adopt CDL, then the relevance of cross-border trade is that a national CDL would eliminate any *existing* problems on the border between Victoria and South Australia. In other words, is it unprofitable for South Australian shopkeepers near the border with Victoria to sell beverages because local consumers are in the habit of buying deposit-free beverages in Victoria?

Of course, the pattern of trade will have settled down over the 25 years since the South Australian CDL was introduced, and if there is a distortion, the market will have got used to it. Nevertheless, if cross-border shopping does currently take place, the impact of a national CDL would be to benefit SA by removing the distortion, with a corresponding disbenefit to the Victorian economy.

However, our understanding is that there are no large towns on the Victoria/ SA border and the communities in the border region are widely separated. In any case, the Nolan-ITU report says that there is no clear price differential between South Australia and Victoria, as beverage manufacturers choose to operate a national pricing policy. There have been suggestions periodically that rural recyclers make the journey to SA to recover deposits, but we are told that this is nothing serious.

On balance, therefore, we accept that Nolan-ITU is right not to take cross-border issues into account.

3.12 Scavenging

There is anecdotal evidence from the US, particularly from New York, that scavenging leads to an increase in litter. Scavengers rummage through litter-bins and garbage sacks to look for deposit-bearing material, and leave the rest of the waste lying on the ground.

This could even be the case if voluntary groups are collecting CDL containers from away-from-home consumption sites.

The impact on litter ought to be addressed, and the best way of establishing whether or not this is a problem in the Australian context is by reference to experience in SA.

4. CDL COST IMPLICATIONS

4.1 Nolan-ITU assumptions

Subject to the caveats made elsewhere, we accept the Nolan-ITU report's assessment that the introduction of CDL would

- reduce the cost of kerbside recycling collections by 10%;
- increase the kerbside sorting cost by 55%;
- leave the garbage kerbside collection costs per tenement unchanged;
- reduce litter control costs by 5%.

Reduced kerbside collection costs are very marginal. The same number of pickups would have to be made (newsprint and non-beverage packaging collection), but each pickup would be a little quicker. Each household would generate less material, so each vehicle could service more households. How far the number of vehicle trips would reduce, would depend on whether the limiting factor for each vehicle is its being loaded to capacity or the length of the operators' working day. The number of vehicle trips will only fall if the limiting factor is the vehicle's being loaded to capacity. If the limiting factor is the length of the operators' working day, it will not. That depends largely on how much driving time there is between stops and between the pickup area and the depot.

In section 6, we have calculated the impact of a 5% rather than 10% reduction in kerbside collection costs, but this only amounts to an addition 52 cents per household in Ballarat and $1.33 in Mildura.

We agree with the White report's view that CDL would not make a great deal of difference to overall littering: White comments that *"the number of containers lost to litter is a relatively small component of total litter flows"*.

4.2 Ballarat

Ballarat kerbside collects for recycling 73% of the CDL materials available from households, but only 26% of away-from-home CDL materials are assumed to be recycled. Under CDL, the total amount of CDL materials collected is expected to increase from 56% to 92%, from 2,380 tonnes per year to 3,896 tonnes per year.

Meanwhile the total cost of recycling services would increase by $2.59 million, or $81.48 per household per year. This means that the incremental cost of recycling an additional 1,516 tonnes would be $1,708 per tonne. As, according to Nolan-ITU, the market rates for beverage container material range from $72 per tonne for glass to

$1,100 for aluminium, the non-monetary benefits of CDL would need to be very large indeed to justify the introduction of this measure (Nolan-ITU comments that in other studies, the environmental benefits of recycling through kerbside, CDL or both have been shown to exceed costs).

4.3 Manningham

Manningham kerbside also collects for recycling 73% of the CDL materials available from households, but only 26% of away-from-home CDL materials are assumed to be recycled. Under CDL, the total amount of CDL materials collected is expected to increase from 47% to 92%, from 2,827 tonnes per year to 5,511 tonnes per year.

Meanwhile the total cost of recycling services would increase by $3.11 million, or $79.25 per household per year. Thus the incremental cost of recycling an additional 2,684 tonnes would be $1,159 per tonne. This is a little higher than the market price of used aluminium beverage containers, but nearly three times the value of used PET bottles, eight times the value of liquidpaperboard and fifteen times the value of steel cans or glass bottles.

4.4 Mildura

Mildura kerbside collects for recycling 76% of the CDL materials available from households, but only 26% of away-from-home CDL materials are assumed to be recycled. Under CDL, the total amount of CDL materials collected is expected to increase from 61% to 92%, from 1,437 tonnes per year to 2,158 tonnes per year.

Meanwhile the total cost of recycling services would increase by $1.6 million, or $72.73 per household per year. Thus the incremental cost of recycling an additional 721 tonnes would be $2,219 per tonne. This is even more expensive than in Ballarat or Manningham.

5. STAKEHOLDER IMPACTS

5.1 Brand owners

We do not understand why payment of deposits is entered as a cost to brand owners. This is a *repayment* of a deposit which the brand owner originally charged to the retailer when he sold the filled container. Instead of entering the 92% of deposits redeemed as a debit, the 8% of deposits *not* redeemed should be entered as a credit to brand owners. This will defray some of the costs of the system.

If Nolan-ITU's Table 4.1 is amended as suggested, it would read as follows:

Cost Element	Ballarat	Manningham	Mildura
No of containers consumed	*45,357,995*	*64,169,672*	*25,121,516*
Deposits unredeemed - 8% not returned ($M)	(0.363)	(0.513)	(0.201)
POS Outlets ($M)	2.622	2.945	1.324
Super collectors ($M)	(0.688)	(0.271)	0.036
Total Cost ($M)	1.571	2.944	1.159
Cost/ container consumed (cents)	3.5	4.6	4.6

This result is of the same order of magnitude as the findings of the Temple, Barker & Sloane study *(Economic Impact of a National Beverage Container Deposit Law)* undertaken in the US in 1991. Temple, Barker & Sloane concluded that the cost to the beverage industry would be US 2.3¢ (4.1 Australian cents) per container once scrap values had been taken into account.

When CDL was first introduced in the US, retailers responded to the additional space requirements of deposit-bearing beverages by reducing the total shelf-space for these products. This resulted in elimination of minor products or brands, to the detriment of these companies and of consumer choice. This issue (which probably does not apply to return-to-depot systems) is not discussed in the Nolan-ITU report. It should be added to the brand owners' costs, but we are not in a position to quantify it.

5.2 Consumers

It follows from the above that Table 4.2 would need to be amended to take account of our recalculation of the increased cost of beverages.

Table 4.2 should also be amended to delete the deposit refund entry. The deposit is paid when the drink is bought and refunded when the container is returned, so the only effect on the consumer's bank balance is that he gives the system a small interest-free loan while he is in possession of the container. However, Table 4.2 needs an entry to show the cost to consumers of the 8% of containers whose deposit is *not* redeemed.

Also,

- as indicated in section 3.8 above, we have halved the "consumer labour cost" allocated in the Nolan-ITU report, and

- as in section 4.1, we have reduced the kerbside collection cost savings to 5%..

The amended table would read as follows:

Cost Element	Ballarat	Manningham	Mildura
No of containers consumed	*45,357,995*	*64,169,672*	*25,121,516*
No of tenements	*31,750*	*39,206*	*20,300*
Increase in cost of beverages ($M)	1.571	2.944	1.159
Reduction in kerbside service cost ($M)	(0.136)	(0.216)	(0.097)
Deposit benefit transfer from kerbside MRF operator	(1.012)	(1.011)	(0.627)
Transport to POS outlets and labour	0.329	0.237	0.174
Cost of unredeemed deposits	0.363	0.513	0.201
Total cost	1.115	2.467	0.810
Increase in cost/tenement/yr	35.12	62.92	39.90

US experience appears to be strong support for CDL in deposit states, but strong opposition in neighbouring non-deposit states. This is generally attributed to a concerted effort by everyone (government and industry) to convince people of the value of the system, so that it works as well as possible.

5.3 Other stakeholders

As noted in section 2.2, it is possible that once the relatively valuable CDL material has been diverted from the kerbside system, the cost per tonne of kerbside collections might rise to an extent that local authorities come under economic pressure to discontinue the service.

Thus we think it is not quite safe for Nolan-ITU to conclude that *"as the real cost implications for the provision of kerbside services under a parallel system are not significant, financial penalties to local government associated with contract renegotiations are expected to be negligible and hence are not considered further."*

For the same reason, Nolan-ITU may possibly be understating the potential impact on kerbside garbage collectors.

6. OVERALL CONCLUSIONS

6.1 Reworking of Nolan-ITU calculations

By way of illustration, we have presented Nolan-ITU's Table 5.1, showing the effect on their findings of the suggestions made in this review. Both the White report and the Nolan-ITU report assume that 92% of container deposits will be redeemed, but we would not be surprised if the actual return rate were closer to 80%. We have not recalculated the costs on this basis, but we believe that Nolan-ITU's alternative assumption of 85% return is a better guide than the baseline 92% assumption.

For reasons of space, we have confined this comparison to the example of Ballarat:

Finding	Unit	Nolan-ITU	Perchards	References to review
Increase in the retail cost of beverages due to a parallel CDL system (based upon full cost recovery and includes operating and administration costs).	Cents per beverage	13.5c	3.5c	Section 5.1
Net financial impact on households (as ratepayers and as beverage consumers). This is comprised of:	$/hh/yr	$124	$35	Section 5.2
❑ an increase in the cost of beverages	$/hh/yr	$192	$49	Section 5.1
❑ a decrease in the cost of kerbside services	$/hh/yr	-$37	-$4	Section 4.1 – but see also sections 2.2 and 5.3
❑ a benefit from the deposits redeemed after deducting the cost of transporting CDL material to POS outlets	$/hh/yr	-$31		Section 5.2
❑ cost of deposits unredeemed plus cost of transporting CDL material to POS outlets	$/hh/yr		$11	
❑ cost of transporting CDL material to POS outlets	$/hh/yr		$13	

Reduction in the net cost to local government of providing kerbside services. This includes a reduction in the actual cost of kerbside collection, sorting and disposal and the deposit income transferred back by the sorter.	$M/yr	$1.17M	$1.15M	Section 4.1
Charities, non-profit organisations and low income earners based upon receiving 10% of available CDL deposits	$M/yr	$0.45M	$0.45M	
Decrease in net cost per household of the CDL system if the front of house space in retail outlets is reduced to $4,000 from $12,000/sq m.	% change	-49.4%	-49.4%	
Increase in the cost of the CDL system if 85% of CDL material returned rather than 92%.	% change	1.8%	1.8%	**Preferred option** (section 6)

Similarly, we have revisited Table 5.2 to show the current and estimated recycling yields and costs in Ballarat:

System	Parameter	Nolan-ITU	Perchards
Current System:	Yield (kg/hh/wk)	3.5	3.5
	Cost ($/yr)	32	32
With CDL:	Yield (kg/hh/wk)	5.7	5.7
	Cost ($/yr)	168	158
Increase with CDL:	Yield %	63	63
	Cost %	425	394

We assume that the "cost with CDL" entry is obtained from the sum of the totals in Tables 3.6 and 3.9, in which case we calculate the Nolan-ITU estimate to be $168 rather than $156. We have recalculated their percentage cost increase accordingly. On the basis of our own assumptions, the result would be $158 per household, which is very close to the published Nolan-ITU figure.

The above table overstates our view of the benefits involved in introducing CDL in Ballarat, as we do not believe that the assumed 92% return rate would be achieved. We would expect 80%-85% to be more likely. However, we have not tried to work through the implications of this for overall system costs.

6.2 Final assessment

In section 5.1, we raise a major concern about Nolan-ITU's methodology allocating payment of deposits as a cost to brand owners. Under our approach, the additional cost per container would be reduced from the 13½-14½ cents in the Nolan-ITU report to 3½-4½ cents. This change would significantly reduce the estimated cost to consumers.

Similarly, in our section 5.2, we disagree with Nolan-ITU's allocating the value of the deposit refund as a benefit to consumers – this is only repayment of a loan to the system.

As regards the additional waste management costs of the system, however, our conclusions are very close to those in the Nolan-ITU report. We have tested a number of alternative assumptions, but they make very little difference.

Thus the comment that we made on Nolan-ITU's estimates on Ballarat stand*: "The total cost of recycling services would increase by $2.59 million, or $81.48 per household per year. This means that the incremental cost of recycling an additional 1,516 tonnes would be $1,708 per tonne. As, according to Nolan-ITU, the market rates for*

beverage container material range from $72 per tonne for glass to $1,100 for aluminium, the non-monetary benefits of CDL would need to be very large indeed to justify the introduction of this measure." The same is equally true of the other two municipalities studied.

Insofar as we do not believe that the projected 92% return rate for CDL materials would be achieved, we believe that if anything these estimates err on the side of optimism.

DAVID PERCHARD

27 November 2002