NSW Container Deposit Scheme: Discussion paper

Published on behalf of the State of New South Wales by:

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EPA 2015/0826
ISBN 978 1 76039 193 5

December 2015

Have your say

Stakeholder consultation will be open until 5:00 pm on **Friday 26 February 2016**. Written submissions are encouraged from the general public, community groups, local councils and all industry sectors. The release of this discussion paper demonstrates the commitment of the NSW Government to delivering better waste and recycling outcomes.

For more information, or to provide comment, contact the EPA or visit http://www.epa.nsw.gov.au/waste/container-deposit-scheme.htm

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Introduction

On 21 February 2015, the Premier, the Hon. Mike Baird MP, announced that, if elected, the NSW Government would implement a container deposit scheme (CDS) by 1 July 2017.

The scheme aims to reduce drink container litter. Introducing a world's best practice, state-based CDS will greatly help the government to reach its target to reduce the volume of litter in NSW by 40% by 2020 (based on the 2013–14 litter volume). The government wants to implement a scheme that:

- is cost efficient
- gives people an incentive to return their drink containers
- targets drink containers used away from home
- complements, rather than competing with, existing kerbside services
- uses modern technology such as reverse vending machines[1] where appropriate.

This discussion paper explores the key elements that will shape the design of the CDS and presents two possible models.

To make sure that the scheme is well suited to NSW, the government has committed to broad consultation with the community and key stakeholders throughout the development process. We encourage you to express your views on the introduction of a CDS in NSW and the issues raised in this discussion paper. Written submissions will be accepted until 5pm on **Friday 26 February 2016**. See page i for details of how you can make a submission.

Overview of container deposit schemes

Definition

CDSs use incentives to encourage the community to return empty drink containers to specific collection sites. When the container is returned, the person returning it receives a reward. The incentive can be cash or cash-equivalent, for example a 10-cent refundable deposit per container as is used in the South Australian and Northern Territory schemes. It can also be non-cash/cash equivalent, such as discount coupons, entry into a prize draw or the opportunity to direct funds to a charity or local community group.

CDSs are a way to reward environmentally responsible behaviour, reduce drink container litter and increase recycling. They work on littering behaviour by encouraging the person consuming the drink to hold onto the empty container for later redemption. Likewise, they provide an incentive for other people to pick up littered containers to receive the reward.

In general, consumers cover the cost of the scheme in the price of the drink when purchasing it. In this regard, CDSs are based on the 'polluter pays' principle, shifting waste management and litter collection costs away from local councils and land managers and on to consumers.

[1] Reverse vending machines are machines that receive empty drink containers and give a reward to the user in return.

Where have container deposit schemes been used?

CDSs operate in about 40 jurisdictions around the world, including in South Australia and the Northern Territory.

The concept is simple, but CDSs can be designed and implemented in a number of different ways, depending on the issues they are intended to address and the legal, economic and social context in which they operate. Common scheme objectives include reducing litter, increasing the recycling of single-use containers and increasing the collection and reuse of refillable containers.

There is strong evidence to indicate that CDSs are effective at achieving positive social and environmental outcomes, in both the short and the long term, including drink container litter reduction (P Bragge and B Wright, 2015).

Approach taken in NSW

The NSW Government is committed to implementing a scheme that is both environmentally effective and economically responsible. The government is also committed to developing a scheme that is based on expert advice, sound evidence and comprehensive community consultation.

In June 2015, the Minister for the Environment established a nine-person CDS Advisory Committee, with expertise spanning environmental matters, recycling, innovation and litter management. The Advisory Committee membership and Terms of Reference can be found at http://www.epa.nsw.gov.au/waste/container-deposit-scheme.htm. The Advisory Committee was specifically asked to provide advice on:

- incentives for community participation
- the scope of containers to be redeemable under the scheme
- involvement of local government and the recycling industry in the scheme
- suitable locations for reverse vending machines.

To help the Advisory Committee to develop informed advice on scheme design and implementation, the NSW Environment Protection Authority (EPA) commissioned a number of research studies between June and October 2015. These studies included reviews of schemes in other jurisdictions; audits of drink containers in NSW household and public place bins; assessments of potential impacts on the recycling industry and existing kerbside services; and evaluations of collection infrastructure and the current costs of managing litter. The results of this research is presented within the “Designing a scheme” chapter

The EPA also invited over 100 stakeholders to participate in six Working Groups to address key issues and to provide further input for the CDS Advisory Committee. Working Group membership can be found at http://www.epa.nsw.gov.au/waste/container-deposit-scheme.htm. The Working Groups covered:

- resource recovery and industry engagement
- environmental protection
- retailer engagement
- community and local government engagement
- business and financial model development
- technology and innovation.

The Advisory Committee's meeting minutes and summaries of the issues discussed in the Working Groups can be found at http://www.epa.nsw.gov.au/waste/container-deposit-scheme.htm. The aim of the initial phase of this work has been to develop and release this discussion paper for broad-scale public consultation.

On the basis of the advice from the Advisory Committee, as well as feedback from the community on this discussion paper and a cost-benefit analysis, in the first half of 2016 the NSW Government will draft legislation (and supporting Regulations) for a preferred CDS model. Work will also start on industry engagement initiatives, infrastructure implementation, and the establishment of relevant governance arrangements. This transition period will operate for up to 12 months while NSW prepares for the introduction of the CDS by 1 July 2017.

Objectives

The NSW Government is serious about reducing litter.

On 14 September 2015, the NSW Premier announced a new priority target to achieve a 40% reduction in litter volume by 2020 (see the NSW Premier's Priorities at https://www.nsw.gov.au/making-it-happen).

In 2014–15, the contents of an estimated 4.2 billion drink containers were consumed in NSW. Based on currently knowledge, the EPA estimates that around 64% of these containers (by number) were recycled, 32% went to landfill and the remaining 4% were littered. This represents close to 160 million containers ending up littered in the NSW environment.

Although a relatively small percentage of containers end up being littered, drink containers make up a large proportion of the litter stream. According to the National Litter Index (an annual survey of litter in the environment), drink containers make up the largest proportion of litter volume in NSW, at 44%. Drink containers also represent almost twice the volume of the next largest category, which is take-away cups and food containers.

The primary objective of introducing a CDS in NSW is to reduce drink container litter to help achieve the NSW Government's litter reduction target. Another objective is to make sure that containers that are diverted away from litter, or that would have otherwise been landfilled, are recycled.

Litter reduction

What is litter?

Litter is anything unwanted that has been thrown, blown or left in the wrong place. Common litter items are drink containers (plastic and aluminium), glass bottles and pieces, bottle caps, plastic straws, fast-food packaging, chip and lolly wrappers, small pieces of paper and cigarette butts.

As shown in Table 1, a littered environment has many consequences that may not be obvious straight away.

Table 1: Consequences of littering

Visual	Litter makes places look unsightly and uncared for, and attracts more litter. It can also potentially affect property values.
Environmental	Litter damages natural environments and harms terrestrial and marine wildlife.
Human	Litter like broken glass and syringes can injure people. The presence of litter makes it more likely that other antisocial behaviours will occur, like graffiti and property damage (Spehr and Kurnow 2015).
Resource	Easily recyclable and valuable resources, like drink bottles, are lost when people litter. Even if littered items are subsequently collected, they are often too contaminated to be recycled.
Economic	In NSW, a 2015 survey of local government, state agencies, private land managers and community groups found that more than $162 million a year is currently being spent on managing NSW litter (MRA Consulting 2015). That is money that could be spent on other things.

Litter reduction strategies

In general, litter reduction strategies can be thought of as either:[2]

- **preventive**: behavioural interventions designed to prevent material from entering the litter stream, or
- **reactive**: reactive interventions designed to remove litter once it has entered the litter stream.

Both approaches have a place within a comprehensive litter reduction strategy. Reactive approaches can be an effective way to minimise the impact of litter if the litter can be captured before it becomes too dispersed. Reactive approaches such as stormwater traps and litter boom nets on rivers can help to concentrate litter in the environment and reduce the cost of locating and collecting it. However, once it has escaped such devices, litter can break up and move deeper into the terrestrial or the marine environment, where it can become increasingly difficult and expensive to capture through further reactive approaches, such as litter picking, and can cause significant harm to ecosystems.

Preventive approaches, such as incentives and behaviour change programs, can help to reduce the tide of litter being generated in the first place and therefore reduce the downstream costs of capturing and collecting it later. Although preventive approaches can reduce littering behaviour, they are not expected to eliminate it completely, so reactive approaches will also be needed.

How much litter is in NSW?

Since 2005-06, the NSW Government has commissioned Keep Australia Beautiful to survey litter in NSW twice a year (in November and May) and report its findings as part of its annual National Litter Index. This index provides a snapshot of the amount of visible litter on the ground when and where the surveys are done, in terms of numbers of observable items and volume. This information is broken down by the type of littered item and the type of site and then averaged and normalised on the basis of 1000 square metres. Every year the same sites are surveyed, providing a consistent time series of litter observations over time.

The survey does not take into consideration littering behaviour, population density or litter-reduction activities, such as clean-ups. Nor does it consider weather events, such as rain or wind, which can move littered items. The National Litter Index only gives a snapshot of the stock of litter in the environment at particular sites at a moment in time.

Therefore, the information derived from the index provides no indication of whether residents of a particular region litter more or less frequently than those in a different region.[3] Nor can the index be used to make interstate comparisons. However, the index does provide insight into the relative presence or absence of observable litter at specific sites and the resulting trends over time.

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[2] Anti-littering strategies might be more formally described in the literature as ‘antecedent’ strategies (e.g. influencing behaviour before littering) or ‘consequence’ strategies (e.g. addressing littering after it has occurred). See Huffman K, Grossnickle W, Cope J, Huffman K 1995. Litter reduction: a review and integration of the literature. Environment and Behaviour, 27(2): 153–83.

[3] The NLI is currently being independently reviewed to check its statistical rigour and its ability to meet the NSW Government’s data needs. This review will be completed in the first quarter of 2016. It may be that, following the review, a revised national litter method will be implemented.

An analysis of the NSW National Litter Index data shows that there is wide fluctuation in NSW in both the average number of littered items and the litter volume. Despite this fluctuation, the index shows that the average number of littered items in NSW is trending downward. Over time this has resulted in a 40% reduction in the average number of littered items in NSW since 2005-06 when NSW survey results were first included in the National Litter Index.

The index also shows that litter volume (i.e. the size of littered items, not the number of littered items) in NSW has also fallen over the same period, but by a smaller amount. Almost all of this decline occurred between 2005 and 2008 (Figure 1). Since then, litter volume has remained largely steady over time, taking into consideration the substantial year-to-year fluctuations. Since 2008-09, litter volume has declined by less than 1%.

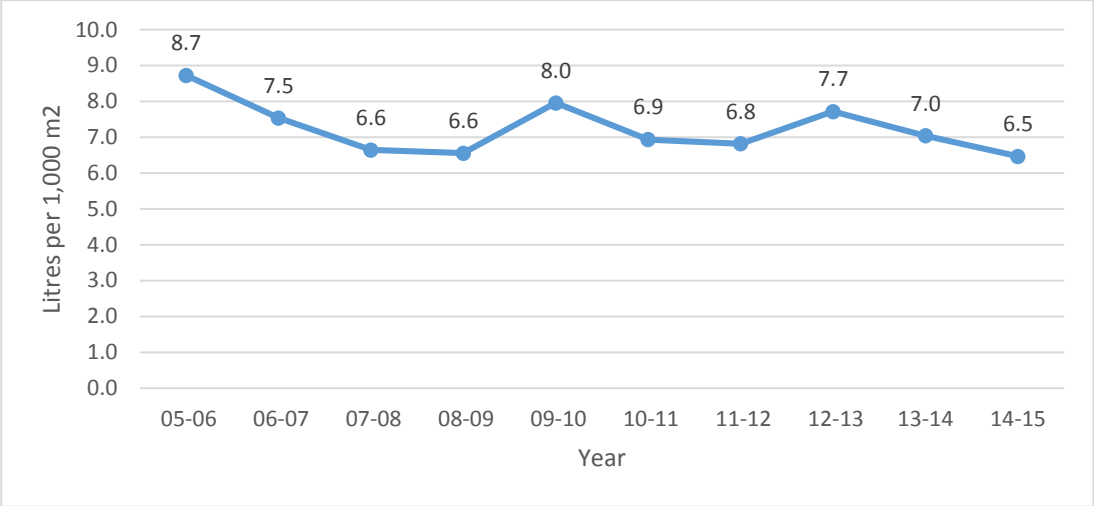

Figure 1: Average volume of litter (measured in litres per 1000 m^2) (excluding illegal dumping) in NSW from 2005–06 to 2014–15 (Source: Keep Australia Beautiful – National Litter Index)

How much do drink containers contribute to the volume of litter in NSW?

In 2014–15, drink containers made up 44% of the volume of litter in NSW and were the single biggest category (Figure 2) (In comparison, they made up 11% of the number of littered items).

Takeaway cups and takeaway food containers of all types (e.g. plastic, metal, cardboard and coffee cups) are the next largest category, making up 23% of the NSW litter volume (Keep Australia Beautiful – National Litter Index, 2014–15).

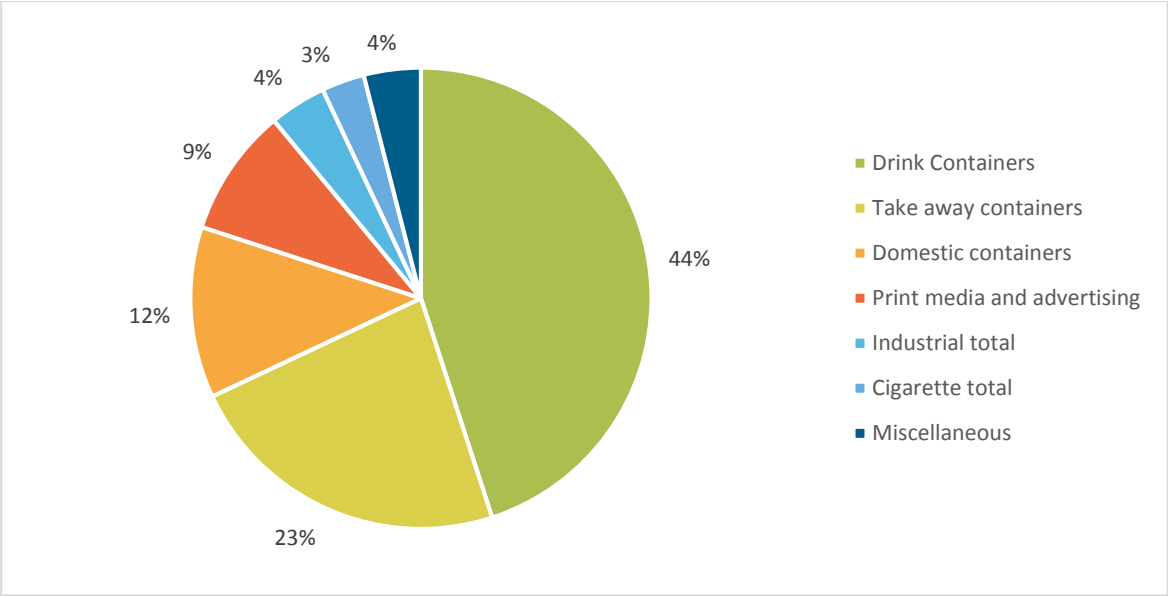

Figure 2: Estimated volumes of litter (measured in litres per 1000 square metres) by item type in NSW in 2014–15 (Source: Keep Australia Beautiful – National Litter Index)

According to the National Litter Index, drink containers are found at all types of sites (Figure 3). They are most prevalent (by number) on highways (39%), at industrial sites (23%), and in car parks (15%). Drink containers are also the major component of litter volume at these sites, representing 48% of the volume on highways, 49% at car parks and 57% at industrial sites.

Litter volume is relatively low at beaches and recreational parks, reflecting the substantial investment in litter management at these sites. Despite this, drink containers make up 34% of litter volume at beaches and 46% of litter volume at recreational parks.

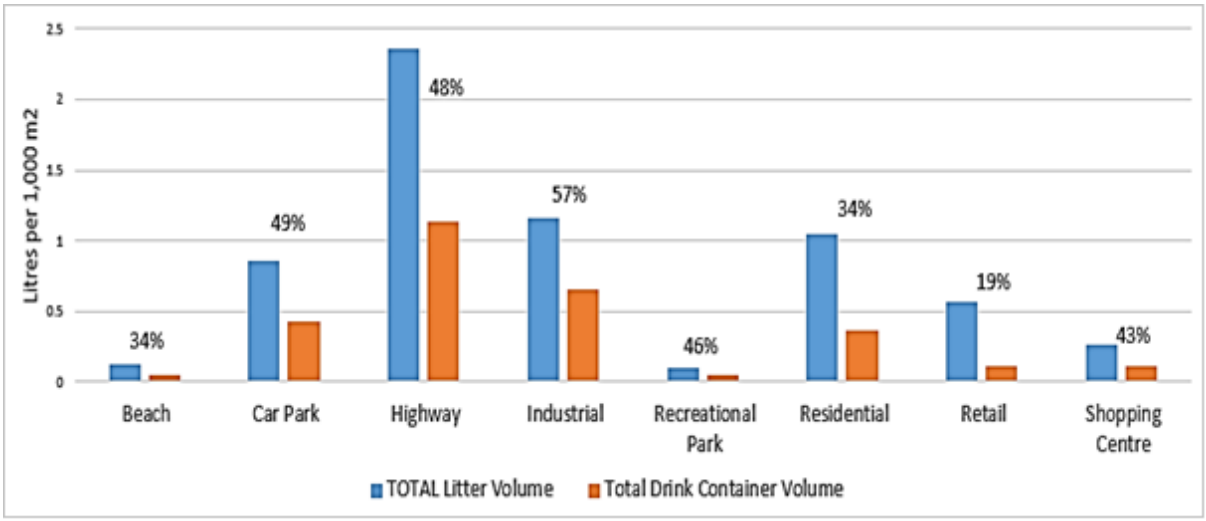

Figure 3: Average volumes of litter and percentages of drink container litter at NSW sites per 1000 m^2 in 2014–15 (Source: Keep Australia Beautiful – National Litter Index)

How will a container deposit scheme reduce litter?

CDSs provide an incentive for the return of empty drink containers to specific collection locations. When people bring the empty container to the collection point, they receive a small reward, which could be financial or non-financial.

These schemes work whether the consumer of the drink holds onto the empty container and exchanges it for the reward, or whether another person finds a discarded container and exchanges it for the reward. For some people, the value of the reward will be enough to prevent them from littering - that is, the incentive will reduce littering behaviour. For others, the value of the reward will provide an incentive to clean up. In either case, litter will be reduced.

Evidence from South Australia, where a CDS has been operating since 1977, shows that schemes like this can substantially reduce drink container litter volumes. The CSIRO marine debris project, which audited litter on beaches and offshore waters all around Australia, found that South Australia has less plastic bottle and aluminium/steel can litter than any other state (Hardesty *et al*. 2014).

What else is being done to reduce litter in NSW?

The government's commitment to introducing a CDS is a key part of its broader approach to litter reduction in NSW.

Through the Waste Less, Recycle More program the government has currently committed $20 million over 5 years to revitalise anti-littering efforts across the state. This includes new education and community awareness campaigns, new and upgraded litter infrastructure and targeted enforcement programs (refer to www.epa.nsw.gov.au/wastestrategy/waste-less-recycle-more.htm).

Research into the factors that influence littering has identified that no single approach will 'solve' the litter problem, so an integrated approach is being adopted (Figure 4).

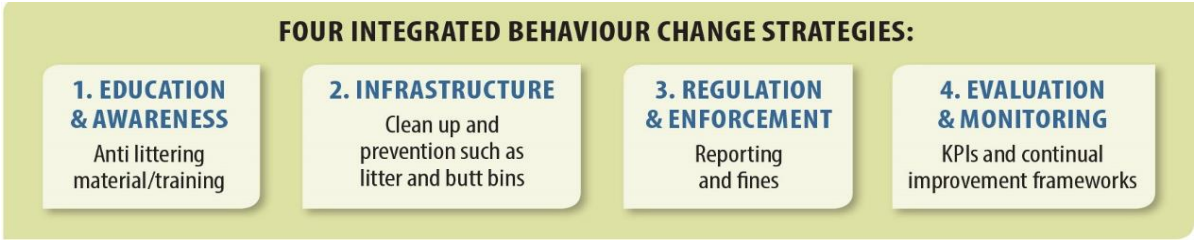

Figure 4: The integrated approach to changing littering behaviours

1. Education and awareness

Community education and engagement are critical for changing behaviour. They raise awareness and build the norm that littering is not the right thing to do.

The NSW Government continues to support its litter prevention campaign, **'**Hey Tosser! It's a dirty look'. The EPA is working with Keep NSW Beautiful to develop and implement a litter prevention module for schools as part of the existing EnviroMentors program.

2. Infrastructure

Clean, well-maintained litter and recycling infrastructure helps the community to dispose of litter correctly. It also reinforces the attitude that litter doesn't belong. Since 2013, the NSW Government has made over $500,000 available to community groups and has given over $2.67 million to councils as part of council and community litter-prevention grants. From 2015-2017, a further $2.8 million in grants will be available to local government and at least $500,000 for community groups.

3. Regulation and enforcement

Enforcing litter offences is part of reinforcing the 'Hey Tosser! It's a dirty look'' message that 'every bit of litter gets noticed'. It's important for changing the social norm around littering.

The EPA has established a new 'Report to EPA' system for members of the public to report littering from vehicles to the EPA. From 1 March to 31 April 2015, 3,972 fines were issued by the EPA, compared with 492 fines in the whole of 2013-14.

4. Evaluation and monitoring

Anyone tackling litter needs to know what works and why, and what does not work. Litter volume results are driven by a range of influences, including weather, state/local government programs, site clean-up regimes and levels of use of sites by the public.

The NSW Government is investing in a range of evaluation and monitoring activities, including the EPA's Local Litter Check, annual NSW-wide community surveys, litter audits of targeted areas, and the National Litter Index litter survey in NSW.

Increased resource recovery

The secondary objective of a NSW CDS is to make sure that containers that are diverted away from litter, or that would have otherwise been landfilled, are recycled.

Reducing the amount of waste going to landfill and keeping materials circulating in the economy are important priorities for NSW.

The NSW Waste Avoidance and Resource Recovery Strategy 2014–21 sets clear priorities for reducing waste generation and increasing recycling across all waste streams. The strategy includes a target to increase the amount of waste diverted from landfill from 63% (in 2010–11) to 75% by 2021-22 (http://www.epa.nsw.gov.au/wastestrategy/warr.htm).

We are already achieving good recycling results at home, with 92% of the NSW population able to recycle through local council-provided kerbside recycling services and an average of 79% of drink containers that are consumed in NSW households that have kerbside recycling being recovered for recycling (NSW EPA 2014).

The NSW CDS will complement the existing household recycling system by focusing on drink containers consumed away from home, where only 32% of containers are recycled and where the majority of littered containers are generated.

In addition, experience with respect to existing CDSs shows that materials collected through such schemes have lower levels of contamination than materials collected through kerbside recycling. In general, better quality materials can command higher prices and be used in a broader range of applications, giving them more stability in recycling markets.

Designing a scheme

Introduction

There are a number of key elements in the design of a CDS. How the scheme will operate and its potential outcomes depend on the objectives of the scheme and how these elements are addressed.

Key design elements

For the NSW CDS to achieve its litter-reduction objective but also be cost efficient and complement the kerbside recycling system, decisions must be made about the following design elements.

1 Incentives

- How strong should the incentive be?
- Should the incentive offered be a financial or non-financial one? Why?

2 Interaction with kerbside recycling

- How should the scheme interact with the kerbside recycling system?
- Should it actively divert containers from the existing kerbside system or try to keep them in it?
- Should containers collected through kerbside recycling systems be eligible to receive the incentive?

3 Scope of containers

- Which containers should be covered by the scheme?
- Should the scheme focus only on the types and sizes of drink containers found in the litter stream in the largest amounts?
- What advantages/disadvantages would there be if the NSW scheme aligned its scope of containers with those utilised in existing Australian CDSs (in South Australia and the Northern Territory)?

4 Collection infrastructure

- What type of collection infrastructure should be used to collect containers as part of this scheme?
- Where should this infrastructure be located?
- How convenient should this infrastructure be for people to access?

5 Governance and the role of government

- How should the scheme be coordinated and by whom?

- What requirements should be placed on the administration of the scheme?
- What checks and balances are needed?
- How will the scheme make sure that drink manufacturers and importers participate?
- How can the scheme be designed to prevent fraudulent activity?
- How will disputes be resolved?

All of these design elements are interrelated. Decisions on one question will influence the outcomes of other elements. For example, the strength of the incentive and the location and convenience of the collection sites are directly linked. If the incentive is strong, then people will be motivated to participate in the scheme and will return empty containers even if the collection network is relatively inconvenient. Conversely, if the incentive is relatively weak, the same return rates may be achievable if the collection network is pervasive and very easy to access.

Similarly, the way the scheme will interact with the kerbside system will depend on the strength of the incentive and the convenience of the collection network. A strong incentive and a very convenient collection network would be expected to divert a large proportion of containers out of the kerbside recycling system. A weaker incentive and a collection network that is less convenient for householders is more likely to result in containers from drinks consumed at home remaining in the kerbside system.

Competing objectives will need to be managed by balancing these design elements. For example, if the overriding objective is litter prevention, and removing containers from the kerbside system is not a concern, then a strong incentive and very convenient collection infrastructure could be used to reach that outcome. However, if part of the objective is to minimise the diversion of containers out of the kerbside system, then a strong incentive and a convenient collection network are likely to encourage, not minimise, this diversion.

Although the main objective of the scheme is to reduce litter, the government has set out further parameters for how the scheme should operate and what it should deliver. These specifications are a guide to how the key design elements will need to be balanced. To reiterate the government's criteria, the NSW CDS should:

- be cost efficient
- provide an incentive for people to return drink containers
- target drink containers consumed away from home
- complement, rather than compete with, existing kerbside services
- use modern technology, such as reverse vending machines, where appropriate.

Existing Australian schemes

In designing a CDS, we need to examine the existing Australian schemes in South Australia and the Northern Territory. Although NSW does not have to adopt the design of these schemes, there may be advantages to having consistent elements, particularly if it will reduce costs and increase operational efficiencies without undermining the overall objectives.

Aligning the NSW scheme with the existing Australian schemes has the potential advantages of:

- streamlining the regulatory burden on industry

- minimising the scheme's transition costs associated with any required labelling of drink containers
- preventing community confusion and misunderstanding, particularly if there are differences in the scope of containers covered and labelling indicates that certain containers are recoverable in some places but not in others
- if applicable, reducing the cost of separating deposit and non-deposit containers collected at the kerbside at material recovery facilities
- if applicable, reducing cross-border market distortions between jurisdictions where schemes are operating.

The South Australian scheme was established in 1977 and is now administered under the state's *Environment Protection Act 1993*. Its original objective was to reduce the littering of steel cans. Over time, the scope of the scheme was expanded as new types of single-use drink containers (aluminium, plastic, glass and liquid paperboard[4]) were introduced into the South Australian market, replacing refillable bottles. The South Australian legislation is relatively simple. Over time the South Australian scheme has developed a number of conventions to drive cost efficiencies, such as minimising the sorting of containers by brand, rather than relying on the law to ensure these.

The results of the South Australian scheme show that it has been effective in terms of both litter reduction and resource recovery. Currently, 79% of drink containers (by number) are collected; this is above the national average. South Australia also has low levels of drink container litter.

In 2011, the Northern Territory introduced a CDS under the *Environment Protection (Beverage Containers and Plastic Bags) Act 2011*. The Northern Territory aimed for consistency with the South Australian scheme, and matched its legislative requirements.

At this point, the Northern Territory scheme is relatively new and has not yet developed the conventions and cost efficiencies that currently operate in South Australia.

Key design elements in existing schemes

The South Australian and Northern Territory schemes address the NSW key design elements in the following ways:

1 Incentives

These schemes use financial incentives; people receive 10 cents for every drink container returned to a collection point.

2 Interaction with kerbside recycling

The South Australian scheme was introduced before the introduction of kerbside recycling. Currently, about 12% of drink containers are redeemed through the kerbside system. These containers are sorted in materials recovery facilities and then delivered to dedicated drink container collection depots. These containers are each eligible for the 10-cent refund.

In the Northern Territory, kerbside recycling systems were relatively limited (except in Darwin) and much of the Territory was too sparsely populated to support kerbside recycling.

[4] Liquid paperboard is a packaging material made out of cardboard, layers of plastic and sometimes aluminium foil (http://recyclingnearyou.com.au/milk-juice-cartons/)

A lack of recycling opportunities was one of the drivers for introducing a CDS, together with reducing litter. In 2010 in the lead up to introducing CDS, the Northern Territory had a recycling rate of 3.5% (compared to 52% in NSW at the time) (Environment Protection and Heritage Council 2010). Containers recovered through kerbside recycling receive the 10-cent refund (personal communication from Statewide Recycling, one of the supercollectors in the Northern Territory CDS).

3 Scope of containers

The South Australian and Northern Territory schemes cover the following drink containers:

- drinks in containers up to and including 3 litres in the case of water, carbonated soft drinks, non-carbonated soft drinks, cider, beer, and flavoured alcoholic drinks with a wine or spirit base.
- drinks in containers less than 1 litre in the case of flavoured milk and fruit juices

These schemes exempt the following drinks:

- plain milk
- wine and spirits in glass containers
- pure fruit juice and flavoured milk in containers of 1 litre or more.

Water containers over 1 litre are not included in the Northern Territory Scheme (http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0007/135754/factsheet_regulated_containers.pdf). This is due to the limited access to clean drinking water in the remote Northern Territory and the need for large water containers in these communities. There are also some slight differences in the alcohol containers included in the South Australian and Northern Territory schemes[5].

4 Collection infrastructure

In both South Australia and the Northern Territory, collection points are mainly depots established on a 'hub and spoke' model. Smaller depots collect containers in outlying areas and then return them to a central hub, where they are compacted and baled to reduce further transport costs. The hubs can also act as collection depots themselves, not only for containers but also for other problem and recyclable products.

The use of reverse vending machines has been, and continues to be, trialled in South Australia and the Northern Territory, but these machines have so far not been taken up in significant numbers. High-speed counting machines have been introduced in both jurisdictions, where they are used in a few of the higher volume depots and hubs.

5 Governance and the role of government

The South Australian and Northern Territory schemes require drink manufacturers to have a waste management plan for their containers. In practice, this requirement is met by manufacturers joining a 'supercollector', which runs a collection scheme on behalf of its member companies. In South Australia, there are currently three supercollectors in operation. In the Northern Territory, there are five supercollectors (http://www.ntepa.nt.gov.au/container-deposits/industry).

[5] Spirits in plastic containers up to 3 litres are included in the Northern Territory Scheme and not the South Australian Scheme. The Northern Territory restricts flavoured alcoholic beverages in aseptic packs or cask to less than 1 litre. This condition is not applied in the South Australian scheme.

Having multiple supercollectors running parallel schemes has the potential to create inefficiencies in the system, particularly if collection points need to separate containers by brand and separately invoice the supercollectors. This is one of the key efficiencies that has developed over time in the South Australian scheme, where the number of supercollectors has been reduced. The remaining supercollectors in South Australia collaborate to reduce the number of separate sorts required at the depot level. These efficiencies are underpinned by convention rather than by legal requirements and so far have not been adopted to the same degree in the Northern Territory.

Funding

Both schemes pass all costs of the schemes back to the manufacturers and ultimately consumers. The costs of coordinating the system, building and maintaining the collection infrastructure, and transport and logistics are covered through handling and administration fees. These fees are paid by the supercollectors and charged to manufacturers, which pass some or all of these costs on to consumers. These costs are not redeemable by the public.

Payments by manufacturers to supercollectors are made on the basis of what is returned. The supercollecter charges manufacturers a total cost based on the sum of the deposit plus administration and handling fee per container minus the value of recovered materials.

Manufacturers can also use unredeemed deposits to help reduce the cost of handling and administration fees and therefore what is passed through to retailers and consumers.

The manufacturer negotiates with retailers whether and how much of this cost they pass through in wholesale pricing. Retailers then set the final retail price to consumers.

In reality, what is actually paid at the cash register depends on a range of other factors. These include the major retailers' national pricing policies and decisions made by manufacturers about how they will spread their costs across their product ranges.

Role of government

In both South Australia and the Northern Territory, the government is responsible for making sure that manufacturers comply with the schemes' requirements - in other words, that they have an arrangement with a supercollector. These governments also have a role in approving the types of containers that can be supplied to the market. This requirement allows the government to make sure that only containers that can be recycled are used.

The Queensland government is currently investigating the introduction of a CDS and will be issuing a discussion paper in early 2016. It has determined that the scheme will involve a refundable deposit at the point of sale, with several objectives (https://www.ehp.qld.gov.au/waste/container-deposit-scheme.html):

- Objective 1: Reduce the litter impact of beverage containers used away from home.
- Objective 2: Improve resource recovery (especially in regions) and provide benefits to jobs and the economy.
- Objective 3: Enhance social benefits by encouraging community-based enterprises to participate in the scheme.

NSW and Queensland would seek to harmonise their schemes as far as possible.

The ACT has also expressed an interest to examine opportunities to participate in, or align with, the NSW CDS. (http://www.canberratimes.com.au/act-news/canberra-likely-to-follow-nsw-into-refunds-for-drinks-containers-20150105-12i7m0.html)

Key design element 1: Incentives

Introduction

The core feature of a CDS is the use of an incentive to encourage people to return empty drink containers to specified collection points. In other jurisdictions, consumers pay a small amount extra (comprising a deposit and an administration or handling fee that covers the cost of the system) on drink containers at the point of purchase. The empty containers can then be exchanged for a small reward (equivalent to the deposit amount) when they are returned for recycling at designated collection points.

By providing a reward, CDSs create a disincentive to litter and an incentive to pick up littered items. In doing so, in most cases they also shift waste management and litter collection costs away from local councils and land managers, and on to drink manufacturers and consumers.

Most existing CDSs provide a financial incentive (which may be in the form of physical cash or an electronic credit; P Bragge and B Wright 2015). In Australia, the South Australian and Northern Territory schemes use a 10-cent deposit, which can be redeemed on each eligible container returned.

Incentives can also be non-financial, such as prize draws, discount vouchers and charitable donations. Non-financial incentives have been used in overseas schemes and used in trials in Australia. For example, the City of Sydney and 7-Eleven service stations are trialling the use of non-financial rewards dispensed through reverse vending machines.

Some overseas schemes also use differentiated incentives within the same scheme, such as different deposit amounts on refillable and single-use containers, different sizes of containers, different materials, or differences in the type of product to which schemes apply (P Bragge and B Wright 2015).

The key question for any CDS is how effective the incentive is at encouraging participation in the scheme, particularly over the long term. A weak incentive may need a larger investment in collection infrastructure to achieve a particular objective, or it may not be strong enough to achieve the objective. A strong incentive may be able to achieve its objective with a much lower investment in infrastructure or with infrastructure that is located less conveniently. However, a strong incentive combined with an extensive collection network may negatively affect the viability of existing recycling collection services and infrastructure.

Evidence

As part of the NSW CDS development process, the EPA commissioned BehaviourWorks Australia to review the literature on the effectiveness of different incentives in CDSs around the world. Evidence of effectiveness was drawn from published reviews and primary studies on legislated and non-legislated schemes, as well as trials. In all, the literature review examined 693 citations covering 40 legislated schemes, five trials and two non-legislated schemes (P Bragge and B Wright 2015).

The evidence showed that providing a reward for recycling is a strong driver for positive recycling behaviour. A Sydney City Council survey of the public mirrored these findings, with most people surveyed (93%) saying they would recycle *more* if a reward were offered (City of Sydney 2014, *Project Recycler; Reverse Vending Machines* (unpublished)).

The incentives offered through CDSs can be particularly effective at motivating long-term, environmentally responsible behaviour in:

- people who don’t already recycle
- people who describe themselves as ‘non-environmentalists’

- lower-income households (if the incentive offered is a financial one) (P Bragge and B Wright 2015).

In many areas, these changes in behaviour have led to significant reductions in litter and increases in recycling rates.

Financial incentives

The literature review found that all of the legislated schemes examined used a financial incentive and that these schemes demonstrated high levels of drink container recovery. Recovery rates varied depending on whether containers were single-use[6] or refillable (Table 2) and on the size of the financial incentive.

Table 2: Recovery rates across legislated CDSs (Source: P Bragge and B Wright 2015, page 9)

	Non-refillable Containers (%)	Refillable Containers (%)	Combined (%)
Mean	74.8	95.7	76
Median	75.5	95	81
Standard Deviation	13.3	1.7	13.3
Range	55-99	94-99	41-95
Number of schemes reporting data	10	9	23

Recovery rates are higher in areas with schemes that offer financial incentives than in areas with no CDS (P Bragge and B Wright Australia 2015). Data from 2008-09 show that South Australia's drink container recycling rates are higher than the national average for glass bottles (85% compared with 36%), aluminium cans (84% compared with 63%) and polyethylene terephthalate (PET) plastic bottles (74% compared with 36%). Likewise, over the 26 years of its CDS, California has increased its drink container recycling rate from 52% to 80%.

Container deposit schemes that offer financial incentives are also effective at reducing litter (P Bragge and B Wright Australia 2015). After 1 year of implementing a scheme, New York reduced its drink container litter by 70% to 80%. Similarly, drink container litter was reduced by 69% to 83% in seven states that introduced CDSs with a financial incentive in the United States.

Drink container return rates vary with the size of the financial incentives offered in the CDS (Hog D et al 2015). In general, small financial incentives are less effective at encouraging drink container returns, whereas larger incentives result in higher return rates. However, this relationship is not linear, because high-value incentives generate smaller increases in return rates after a certain point (Figure 5), noting that other variables such as the location of collection infrastructure also play a role in this regard.

[6] As the NSW scheme will focus on single-use or non-refillable drink containers, the results achieved by schemes focused on these container types are the best indicator of the scheme's potential impact.

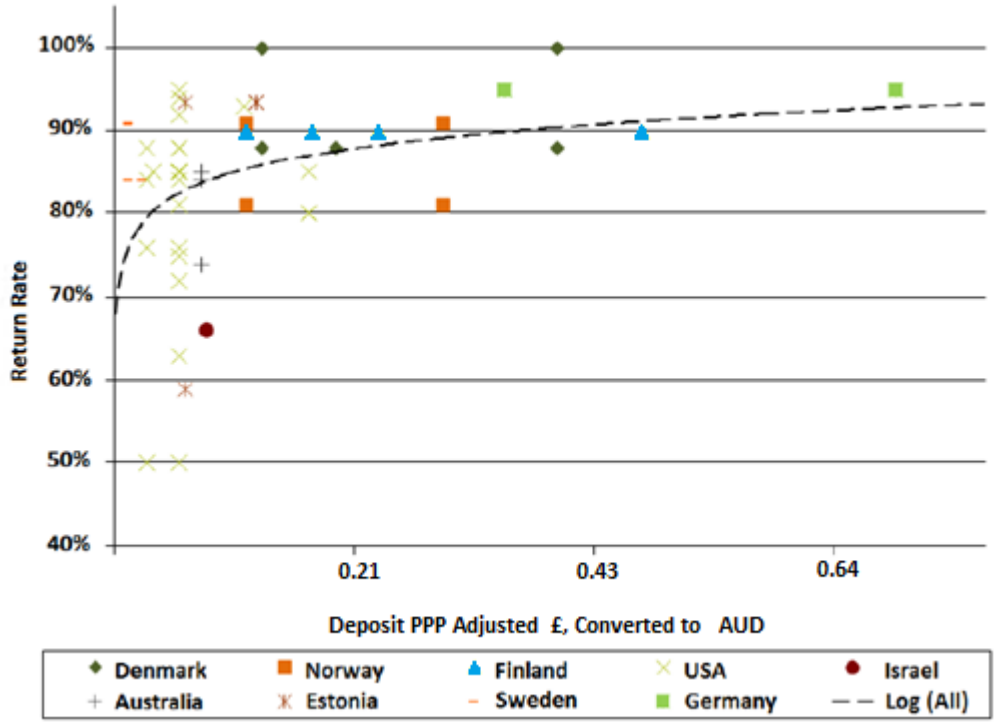

Figure 5: Return rates as a function of deposit, converted to AUD (Source: Eunomia Research & Consulting 2015. *A Scottish Deposit Refund System*: Final Report to Zero Waste Scotland, page 11)

The five trials examined in the literature review explored a range of financial and non-financial incentives, including donations, prizes and discount coupons. The trials demonstrated results that are consistent with higher value incentives generating higher return rates. One trial also found that scheme participants would prefer a financial incentive, with 80% of respondents indicating they would recycle more if a cash refund were offered (City of Sydney April 2014. Project Recycler – Reverse Vending Machines; unpublished).

Community responsiveness to the size of the financial incentive is also demonstrated by the South Australian scheme, which was introduced in 1977 with a 5-cent deposit. Over time, with the effects of inflation, the value of the deposit diminished, collection rates dropped and littering of drink containers increased. In 2008, South Australia increased the deposit to 10 cents, resulting in an immediate increase in collections and decrease in litter volume back to its former level.

The literature review also looked at the longevity of CDSs to determine whether the effectiveness of incentives continued over the long term or whether they experienced an initial spike of interest before losing relevance. The review found that the legislated schemes, which all had financial incentives, continued to be effective over time. Worldwide, CDSs have been in operation for an average of 25 years (between 3 and 43 years), with many in operation since the 1970s and 1980s (P Bragge and B Wright 2015). The evidence demonstrates that legislated, financial-based CDSs are not typically short-lived.

Non-financial incentives

The literature review found that there is limited evidence available to determine whether non-financial incentives in CDSs are effective.

Schemes that have relied exclusively on non-financial incentives have tended to be small in scale and have rarely survived for more than a few years. All of the non-legislative schemes examined in the literature review used non-financial incentives. Unfortunately, there was little

or no published information on their effectiveness against their stated objectives. The typically short duration of these schemes may be related to the fact that they were non-legislative schemes, rather than to the type of incentive they used.

The two non-financial schemes examined in the literature review were the 'Reimagine' program in Texas and the 'Dream Machine' program running in a number of states in the United States (P Bragge and B Wright Australia 2015). The review found that both of these schemes were industry funded and used non-financial incentives such as prizes, discount vouchers and donations to local schools to incentivise the community to return empty containers.

The Reimagine scheme ran for 4 years between 2010 and 2014 at a handful of sites in the Dallas/Fort Worth area in Texas. The scheme used reverse vending machines located in supermarket parking lots and collected an estimated 300,000 plastic bottles and aluminium cans each month. It's unclear why the scheme was discontinued.

The 'Dream Machine' scheme began in 2010 and is still running. The scheme has reportedly recycled 94 million cans over the 5 years it has been in operation and has a goal to increase the United States' national drink container recycling rate from 34% to 50% by 2018. However, as the scheme only operates in limited areas, the volumes recovered are reportedly less than one-fortieth of 1% of the drink containers purchased in the United States.

There is no published information on the effectiveness of either scheme at reducing drink container litter.

In NSW, the City of Sydney has trialled the use of non-financial incentives, dispensed through reverse vending machines. Over 16 months, and via four reverse vending machines in the CBD[7], the City of Sydney has had over 104,000 drink containers returned through the system. Average monthly throughput has varied between 4300 and 8300 containers, with higher returns while the scheme was novel and during a high-profile marketing campaign period (the first 6 months; personal communication, Council of the City of Sydney). Research commissioned by the City of Sydney has shown that trial participants prefer rewards that are instant and flexible (if cash is not an option), and convenient to use. When drink containers were redeemed, 72% of participants opted for a prize draw or instant win, and 28% chose for a charitable donation to be made on their behalf (Figure 6).

[7] Two machines were installed in June 2014, with two more to follow in June 2015.

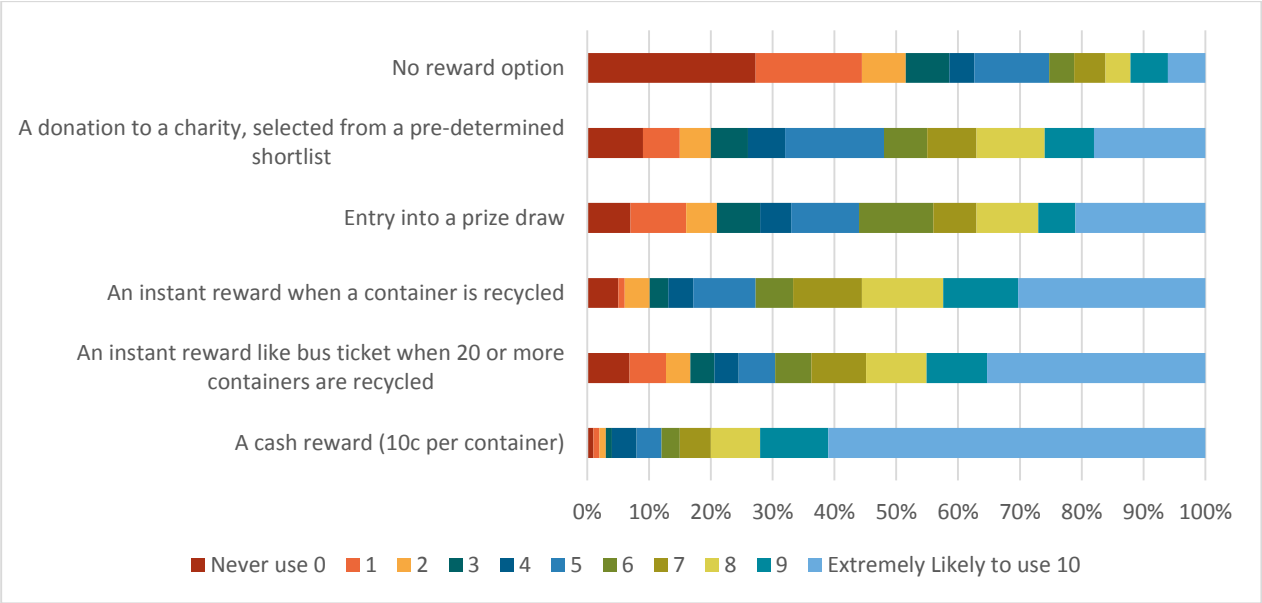

Figure 6: Types of incentives preferred by Sydney CBD CDS trial participants (Source: City of Sydney April 2014. Project Recycler – Reverse Vending Machines: unpublished)

Discussion

Literature on the effectiveness of CDSs is limited, particularly for voluntary schemes and those that use non-financial incentives. Although it's clear that financial incentives are effective at motivating people to return containers for recycling and reduce litter, there is a lack of definitive evidence to determine whether non-financial incentives would generate the same level of effectiveness.

Beyond the literature, anecdotal evidence provided by reverse vending machine operators indicates that machines that use financial incentives collect between 10 and 100 times more containers than those that operate only in non-financial incentive schemes (NSW EPA, personal communication with reverse vending machine operators). Although this evidence is not the result of a scientific trial and there are a range of other factors that influence recovery rates, this anecdotal evidence supports the conclusion that financial incentives are likely to be stronger than non-financial ones.

Risks of having a financial incentive

Increased costs

Compared with schemes based on non-financial incentives, financial incentive-based CDSs need more complex systems to manage deposits and pay refunds. Assuming that the financial incentive provides a strong incentive to return containers, it can add to the overall cost of managing the additional volumes of containers and the logistics for moving them around (National Environment Protection Council Service Corporation 2014).

Financial schemes also need structured, transparent and monitored governance systems to make sure they cannot be corrupted. These arrangements usually require third-party oversight, which further adds to the overall costs of scheme implementation.

Potential for market distortion

State-based container deposit systems that use financial incentives may lead to market distortion. As the deposit is applied only to drink containers sold in the state where the scheme operates, it can be attractive for retailers to purchase wholesale quantities of these products in non-participating states if the cost of transporting it interstate is lower than the

cost of paying the deposit into the scheme. This means that those drink containers will not have had the rightful deposit pre-paid into the scheme, yet could be redeemed by the consumer. If this happened on a large enough scale, it could lead to significant additional costs to manufacturers, with more deposits being redeemed than eligible containers sold in the state.

In addition to this, there is also the risk that people will import empty containers into NSW to redeem the financial deposit. If these containers have been purchased and consumed outside the state, then they will not have contributed the deposit into the scheme. This could similarly lead to significant additional costs to manufacturers.

This sort of activity is more likely with high-value financial incentives and can seriously affect the financial sustainability of a CDS. This is a particular risk for NSW, as it borders two very populous states, Victoria and Queensland.

These issues and strategies to address them are discussed further below in 'Governance'.

Reduced sales

Financial incentives can increase the cost of the product at the point of sale, even if the consumer can recoup the majority of that cost by redeeming the empty container. Depending on the size of the financial incentive, as well as the degree to which it is passed through to the consumer and the price elasticity of the product, implementing a financial incentive-based scheme can theoretically reduce sales of the products covered by the scheme, which may impact beverage manufacturing profitability, investment and employment. Evidence of this effect in other places has been mixed, indicating that there are a range of other factors influencing sales too.

Risks of having a non-financial incentive

Lack of financial sustainability

Non-financial incentive schemes often struggle to generate enough funds to cover the cost of the scheme. Because they do not rely on a financial deposit up front, they must generate funds in other ways, such as by using the surfaces and screen on reverse vending machines for advertising space and recovering the value of the materials collected. These strategies are often not enough to cover costs, and these schemes must rely instead on government subsidies or corporate funding through corporate social responsibility programs (personal communication, TOMRA Collection Solutions).

Relying on subsidies makes these programs susceptible to financial pressures and changing priorities. This reinforces the tendency for them to be small in scale and short lived. Separate from the literature review, the reverse vending machine industry identified an additional 16 voluntary schemes and trials implemented overseas that have relied on non-financial incentives. These initiatives have been limited in scale and achieved low levels of recovery; 10 of them are no longer operating. However, it may be possible to address these issues by mandating participation to ensure longevity and financial sustainability.

Advisory Committee recommendations

- The evidence in the literature shows that financial incentives in CDSs have a positive effect.
- There is not enough research evidence to assess whether non-financial incentives in container deposit recycling schemes have been effective.
- The evidence indicates that a financial incentive should be the starting position for a CDS.

- A secondary choice to donate any money received from the financial incentive at the time of the refund could be considered if it is technically feasible and does not affect the cost-effectiveness of the scheme.

Key questions

- What type of incentive do you think the CDS should have?
- Do you think the financial incentive should be consistent with the ones in South Australia and the Northern Territory?
- If you think the scheme should be based on a financial incentive, what format would you prefer the reward to be in (e.g. cash, credit or your choice)?
- If you think the scheme should offer a non-financial incentive, what sort of rewards do you think should be offered?
- Do you support the idea of providing a choice in the type of reward at the point of refund (e.g. cash or a charitable donation)?

Key design element 2: Interaction with kerbside recycling

Introduction

A key parameter set by the NSW Government for the new CDS is that it should complement, rather than compete with, the existing kerbside recycling system.

Many existing CDSs were introduced before kerbside recycling existed or in places where it was relatively immature. For example, the South Australian scheme was set up before kerbside recycling was established. A kerbside system has now been introduced, but most containers are still recovered through the CDS.

In NSW, the kerbside recycling system is well established and many drink containers are already recovered through the system. Introducing a CDS could divert a substantial number of these containers from the kerbside system into the new scheme; this could then increase costs because of the need to scale up the new scheme to handle these containers.

A certain amount of diversion is inevitable. A CDS, by its nature, provides an incentive for people to change their behaviour and try to redeem the reward. The incentive by itself does not distinguish between containers consumed at home and recovered via the kerbside versus those consumed away from home and potentially littered.

Because at-home consumption of drink containers is not seen as a major source of litter, the question of how the scheme should interact with the existing kerbside system is less about how to achieve the primary objective of reducing litter and more about the potential overall costs of the scheme, and how those costs are distributed among the key stakeholder groups.

The scheme can be specifically designed to encourage people to divert containers from the kerbside into the new scheme or to keep containers in the kerbside system. By adjusting key design elements such as the strength of the incentive, the accessibility and convenience of the collection infrastructure and the scope of the containers covered, as well as through community education programs, the scheme can be designed to deliver either outcome.

How the scheme should interact with the existing kerbside system is therefore a critical question: the answer to this question will determine many of the other design elements.

Evidence

The kerbside recycling system

The kerbside system is more than just the collection of waste and recycling bins from in front of people's homes. It also includes purpose-built materials-recovery facilities that have been set up to sort through and separate materials from mixed recycling streams. These facilities represent substantial capital investments in industrial infrastructure.

There are currently 48 identified materials-recovery facilities (MRFs) in NSW with a total estimated available capacity of 1,193,544 tonnes a year. These facilities process household, commercial and public-place recycling (Figure 7), and in 2014 they had a combined estimated throughput of 804,339 tonnes (KMH Environmental 2015).

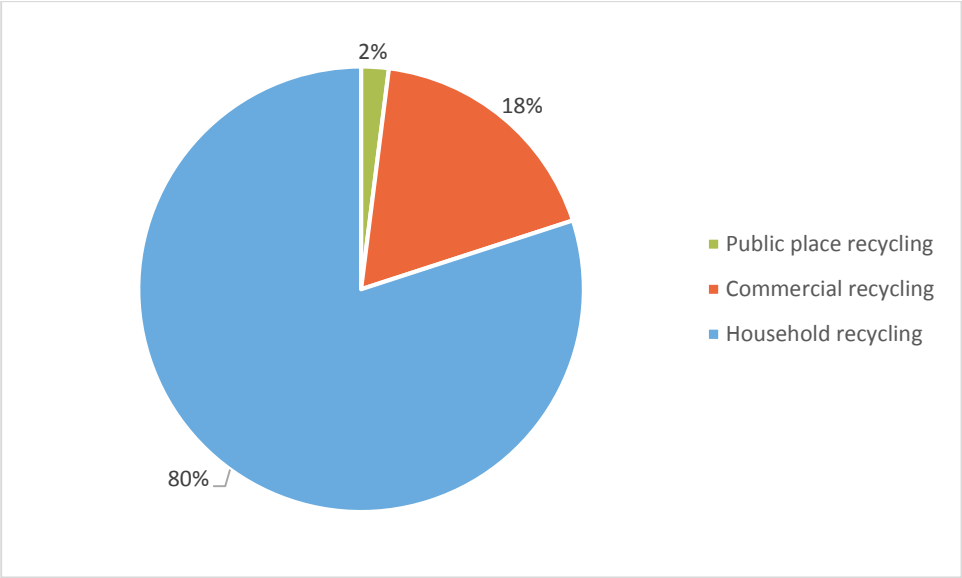

Figure 7: Sources of recycling processed by NSW materials-recovery facilities (Source: KMH Environmental 2015)

The kerbside recycling system also represents a financial balance between the cost savings associated with bulk collections versus the marginal materials losses from breakage and the marginally lower materials value from cross-contamination. When glass is broken in kerbside, it can become un-recyclable and can contaminate other materials in the bin. Containers are less likely to break when they are returned in a CDS. CDSs are therefore efficient and cost-effective systems for collecting recyclable materials from households.

Cost-effectiveness is important, because generally the value of the material recovered through the kerbside system does not cover the cost of collecting it. This is particularly true when global commodity prices fall and demand for materials dries up. Commodity prices offset some of the kerbside collection and processing costs, the bulk of which are covered by local government domestic waste management charges. These charges are paid directly by ratepayers and indirectly by non-ratepaying residents through their rent. For councils in regional areas, with lower density populations and long distances to recycling markets, providing a kerbside recycling service can put a substantial financial strain on the community - to the point where it becomes uneconomic to offer the service in remote areas.

Despite these constraints, the kerbside recycling system is well established in NSW, with 130 of the 152 councils in NSW providing a yellow-lidded bin for recyclable containers and with 93% of NSW households having access to the system. Currently, the kerbside system recovers 46.5% of all household waste.

The recovery rate of empty drink containers is even higher. Audits of household kerbside bins have found that NSW households with access to a recycling service already recover on average 79% of the drink containers consumed at home (NSW EPA 2014). This household-only rate is similar to the overall drink-container return rate of 79.5% in the South Australian CDS (http://www.epa.sa.gov.au/environmental_info/container_deposit).

Diversion from the kerbside

Introducing a CDS in NSW will affect the number of drink containers placed in the kerbside system. Introducing an incentive to return empty containers to designated collection points - no matter how weak the incentive is - will motivate some people to divert containers that

would otherwise go into the kerbside system. However, it's difficult to estimate the scale of the potential diversion.

In the national Packaging Impacts Decision Regulatory Impact Statement, which examined CDSs and other measures to increase the recovery of packaging and reduce packaging litter, the CDS options were designed to divert containers into a new CDS collection system. The analysis therefore assumed that the majority of containers would be rapidly diverted away from the kerbside into a new collection system. Only 7% of containers would remain in the kerbside system (National Environment Protection Council Service Corporation 2014).

In South Australia, 12% of all eligible containers recovered through the CDS come through the kerbside system (personal communication with Statewide Recycling, one of the supercollectors in the South Australian CDS). If we assume that, as in the Packaging Impacts Decision Regulatory Impact Statement, 70% of drink containers are consumed at home, this would equate to about 17% of the containers consumed at home being recovered through the kerbside system[8]. This is driven largely by socioeconomic factors: in wealthier council areas more containers come through the kerbside system, probably because the 10-cent deposit provides less of an incentive to change behaviour in these areas (personal communication with Statewide Recycling, one of the supercollectors in the South Australian CDS).

As indicated above, the South Australian scheme started before the introduction of kerbside recycling. Therefore, taking empty containers to a collection depot would have been the established behavioural norm when kerbside services were introduced. In NSW, this would be the other way around: the established norm is to use the kerbside system. We can therefore assume that, if all other design elements were the same, the number of containers remaining in the kerbside system would potentially be higher in NSW, at least for some time while new behaviours are being established.

Benefits of removing containers from the kerbside

A number of studies around Australia have examined the impacts of introducing a CDS on the kerbside system. This includes the national investigation of measures to reduce packaging impacts that culminated in the Packaging Impacts Decision Regulatory Impact Statement, as well as state-based studies in NSW, Tasmania, Victoria and Western Australia. All of these studies assumed that the scheme would have a 10-cent deposit and that the majority of containers would shift from the kerbside system to the new CDS collection infrastructure.

In almost all cases, the studies found that local governments and materials recovery facility operators would be better off under a CDS as long as they could redeem the deposits on the remaining containers in the kerbside system. Redeeming the deposit increased the overall value of the remaining drink containers in the kerbside system, and this value was greater than the revenue lost by the decrease in the amount of overall materials recovered.

In addition, a number of the studies have found that kerbside systems would also have fewer costs: there would be fewer truck journeys, because each truck would be able to service more households before it became full, and there might also be less cross-contamination, for example, fewer broken glass bottles would be mixed in with paper, leading to more efficient and effective paper sorting and recycling. However, if councils can redeem deposits only on containers that are fully intact, they may not be able to reduce their truck runs to the same

[8] A sensitivity analysis will be done as part of a cost-benefit analysis to test the impacts of different assumptions of at-home and away-from-home consumption on the flow of drink containers through the waste stream.

extent, as they would need to keep kerbside recycling materials relatively uncompacted to avoid breaking glass bottles (Impact Environmental 2015).

The ability for councils to receive these benefits and pass them back to ratepayers and residents in the short term would depend on their current contracts for waste services. These vary between councils: some own and operate their own collection vehicles and materials recovery facilities, while others outsource these services under contract. These can be single contracts for all services or separate contracts for collection on the one hand and with the materials recovery facility operators on the other.

Under the current arrangements, ownership of the materials can shift as the materials move through the system. For example, while the container is being used, the householder owns it. When the householder puts the container in their bin and puts the bin out on the kerb for collection, ownership passes to the council (section 743 of the *Local Government Act 1993*) (Local Government NSW 2015). Once the bin is collected and the container is in the back of the truck, ownership either remains with the council, or may pass to the collection contractor (in 50% of cases). Ownership is passed on to the materials recovery facility operator when it is delivered to the facility in 62% of cases. The ownership of containers at each phase of this process will depend on the council contract.

If a CDS is introduced in NSW with a financial incentive and containers in kerbside are allowed to be redeemed, and the materials recovery facility is designated as a redemption point, then it would be the materials recovery facility operator under the current arrangements that would be able to redeem and keep the value of the deposit. Whether and how this is passed back to councils or other organisations providing containers to materials recovery facilities will vary depending on the terms of individual contracts.

At least 64% of council waste services contracts have *force majeure*[9]clauses in their contracts that allow them to be renegotiated when there is a change in the law (Impact Environmental 2015). However, 29% of these types of contract include penalty provisions if changes to the law result in a contract variation (Impact Environmental 2015). Overall, 30% of contracts between councils and waste services contractors will expire in the next 2 years (before the CDS is implemented), whereas 31% will expire in more than 5 years (Impact Environmental 2015).

When councils are able to realise the benefits of redeeming drink containers collected through the kerbside, and MRFs agree to pass on redeemed deposits to councils, these benefits should flow back to ratepayers and residents. Under section 504 of the *Local Government Act 1993*, councils must not charge fees for domestic waste management services that 'exceed the reasonable cost to the council of providing those services' (*Local Government Act 1993*, section 504 – Domestic waste management charges (http://www.austlii.edu.au/au/legis/nsw/consol_act/lga1993182/s504.html)).Therefore, if the costs of providing kerbside recycling services are reduced, local councils will have to either reduce their domestic waste management charges or expand their range of waste services offered. If a council chooses to reduce the domestic waste management charge, ratepayers will directly benefit via reduced council rates. Non-ratepaying residents may also indirectly benefit if their rent is proportionally reduced (or if future rent increases are postponed). If councils choose to expand their range of waste services, all residents will benefit.

There is however a risk that scavenging from kerbside bins would limit the kerbside redemption available to councils, and therefore their ability to pass the value of the

[9] 'Force majeure' is "a phrase used particularly in commercial contracts to describe events possibly affecting the contract and that are completely outside the parties' control". (A Dictionary of Law, Oxford, 2009)

redemption on to ratepayers and residents. According to South Australian supercollector representatives participating in the NSW CDS Working Groups, scavenging from household bins is not considered a problem in South Australia, although this does not mean it would not happen in NSW.

Costs of removing containers from the kerbside

The benefits discussed above are those related to particular stakeholder groups. They do not take into account the overall economic cost of the system or the impacts of distribution on other stakeholder groups, such as consumers and the beverage industry.

The cost-benefit analysis in the national Packaging Impacts Decision Regulatory Impact Statement found that the CDS options considered resulted in substantial overall economy-wide costs to the community, even if the distributional impacts indicated that councils, ratepayers and materials recovery facility operators might be financially better off (National Environment Protection Council Service Corporation 2014.)

We therefore need to look at the factors driving up the overall economic costs of the CDS options. A major cost driver is the additional handling and infrastructure costs associated with transferring containers from the kerbside system to the new scheme for only marginal benefits.

As noted above, the kerbside system is an efficient and cost-effective way of gathering bulk quantities of materials for recycling, including drink containers. However, the system has an impact on the quality of the materials collected. This is particularly true for glass, which is often broken when being thrown in the bin by the householder or during collection, transport and delivery to the materials recovery facility. Once it is broken it is hard to sort into different colours, resulting in a low-value mixed-colour material with only limited end-markets. Very small particles of glass (‘glass fines’) become mixed in with other small contaminants (dirt, crockery and other types of non-recyclable glass), limiting the material’s use even further. This material often ends up being landfilled. Broken glass also causes wear and tear on the equipment at materials recovery facilities and can contaminate paper and cardboard, lowering the value of these materials.

CDSs avoid these problems by separating materials at the collection point before they are mixed. This gives cleaner, higher quality materials. Evidence from South Australia indicates that these materials sell for higher prices (personal communication with Statewide Recycling, one of the supercollectors in the South Australian CDS). However, these are marginal benefits compared to the costs associated with setting up a whole new collection and processing infrastructure. Even if the new system is highly automated by using reverse vending machines and high-speed counting machines, these costs still potentially outweigh the marginal benefits.

These comments relate only to drink containers that would be transferred from a kerbside recycling system to a new CDS. They do not apply to containers that are diverted from the litter stream or would otherwise be landfilled. The Packaging Impacts Decision Regulatory Impact Statement found that there would be larger benefits from diverting containers that would otherwise be littered or landfilled into a recycling stream through a CDS.

Discussion

Studies of the introduction of CDSs in Australia show that stakeholders directly involved in the kerbside recycling system (councils, materials recovery facility operators and possibly ratepayers) may still benefit from the introduction of a CDS, even if most of the containers are diverted from the kerbside to the CDS. There will be transitional costs involved in changing contract arrangements, but overall, as long as there is a large enough financial incentive and the containers remaining in the kerbside system can be redeemed, then there

should be enough money flowing into the system to offset the reduced volumes at the kerbside.

A number of materials recovery facilities may also benefit from participating in the CDS by acting as regional hubs where containers collected through designated collection points are consolidated, compacted and baled for transport to recycling markets. Many materials recovery facilities already have baling presses and glass beneficiation (i.e. glass sorting and preparation for recycling) infrastructure that could be used in the new scheme.

However, from an overall economic perspective, removing containers from the kerbside adds potential costs to the scheme for only small gains. From this perspective, keeping containers in the kerbside system will result in a scheme with lower overall economic costs. Consumers may still pay a deposit and handling fee for containers that they choose to leave in the kerbside bin.

Given that one of the overriding parameters set by the government is for the new scheme to be cost efficient, this points to the need to design the scheme to maximise the use of the kerbside system.

Keeping containers in the kerbside system would also increase the benefit to ratepayers, councils and materials recovery facility operators, assuming that the containers collected through the kerbside system could be redeemed for money and the deposits were passed back to councils from MRFs, as there would be even more value in the materials passing through the system. Under the Local Government Act, where the cost of the waste service is reduced due to deposits redeemed, the financial benefits of this would flow to ratepayers and residents through reduced domestic waste management charges or expanded waste services (see the *Local Government Act 1993* section 504 – Domestic waste management charges).

The question then becomes: should containers collected through the kerbside system be redeemable for money at all? These containers are already being captured in the kerbside system and therefore don't need to carry an incentive to encourage people to return them to a collection facility. Allowing a deposit to be redeemed on these containers has the effect of consumers cross-subsiding the kerbside system. Subsidising the kerbside system is not an objective of the CDS.

Therefore, it is worth considering whether it would be possible to set up a CDS that does not place a financial incentive on containers that would end up in the kerbside system. However, having a scheme in which a deposit applies only to containers that would be consumed away from home would be very difficult to implement. Assuming a deposit were paid at the point of purchase, in practice it would be impossible to know at the point of purchase which containers would be consumed at home and which would be consumed away from home.

If all containers carry a financial deposit, then the next question is: what happens to the deposit for those containers captured at the kerbside? If the scheme is set up so that industry holds the deposits until they are redeemed, then excluding containers collected in kerbside from being redeemable would mean that these funds would be retained by industry. If a large proportion of containers continue to be recovered through the kerbside, this could translate into a substantial windfall profit for the industry at the expense of consumers. Theoretically, competition between beverage companies may help to drive prices down so that some or all of those funds are returned to consumers. However, without a high level of transparency on prices and sales figures, it would be difficult for the community to know whether this was happening.

On the other hand, if containers in the kerbside are redeemable, then these funds would have the potential to flow back to consumers indirectly in their capacity as householders. Ultimately, people are both householders and consumers. If they choose to forego the deposit and place the container in the kerbside system, then the funds are likely to flow to the

council and either come back in the form of lower waste charges or improved waste services (potentially including local litter reduction services).

Furthermore, if the aim is to encourage people to continue to use the kerbside system, then removing the ability for councils to redeem the incentive could have the opposite effect. People may be more likely to forego the deposit and continue to use the kerbside system if they knew the deposit would still be captured and the funds used to offset council waste service fees or improve the waste services offered. Essentially, there would be not only an overall public benefit in keeping the costs of the CDS low, but also a potential private benefit to the individual. It may therefore be easier to convince people to continue to use the kerbside system for drink containers if people could see how their foregone deposits were being used for local community benefit.

Advisory Committee recommendations

- To complement the kerbside recycling system while delivering a cost-effective scheme, the scheme should be designed to encourage the community to continue to dispose of drink containers consumed at home via in the kerbside system.
- The outcomes of the cost-benefit analysis and the community consultations should be considered before deciding whether a refund should be applied to containers collected through the kerbside system.
- If a deposit is applied to containers collected at the kerbside, then the funds received by councils should be used to either offset waste service charges or improve those services.

Key questions

- Should the scheme be designed to keep containers consumed at home in the kerbside recycling system, or should it aim to divert them to the new CDS? Why? Why not?
- Should the scheme allow containers recovered through the kerbside recycling system to be redeemed under the CDS? Why? Why not? Also, by whom and how?
- If the scheme provides a financial incentive, and if councils are allowed to claim the incentive on containers collected through the kerbside system, should they be able to claim:
    - the full value of the incentive on each container? Why? Why not?
    - the same level of handling fee as received by collection-point operators under the CDS?
- If councils are able to claim a financial incentive for containers recovered through kerbside, should they be obliged to use those funds to offset waste service fees to ratepayers, or should they be able to spend the money as they choose? Why? Why not?

Key design element 3: Scope of containers

Introduction

The CDS will need a clear framework around the size, type and material composition of drink containers to be included in the scheme. The range of containers included in the scheme is referred to as the 'scope' of containers.

The scope of containers covered in the NSW scheme should first and foremost be determined by the objectives of the scheme. In this case, the primary objective of the NSW scheme is to reduce the volume of litter. The scope of containers should therefore reflect the types and sizes of containers consumed in away-from-home public places and found in the NSW litter stream. Consumption away from home, in public places, is the main source of drink container litter generation.

In determining the scope of containers for a NSW scheme, it is important to look at the scheme's secondary objective of complementing the kerbside recycling system. If the aim of the scheme is to minimise the number of containers diverted from kerbside, then we need to work out whether there is much of a difference between the types of drink containers consumed at home and those consumed away from home in public places. If there is a difference, then it may be beneficial to shift the scope of containers away from those consumed exclusively at home to help minimise the diversion of materials from the kerbside system.

The analysis should also consider the broader context that the NSW scheme will operate in - particularly its interaction with the existing schemes in South Australia and the Northern Territory and any other schemes that may be under consideration, such as in Queensland and the ACT. The beverage industry operates in a national market. Taking a consistent approach to the scope of containers could help to reduce community confusion and reduce industry costs associated with labelling and cross-border trade. However, the need for consistency should not undermine the scheme's ability to achieve its objectives cost-efficiently.

Evidence

Scope of containers in the South Australian and Northern Territory Schemes

The South Australian and Northern Territory schemes use similar scopes of containers. The South Australian scheme was introduced in 1977 to deal with drink container litter resulting from the introduction of steel single-use containers (EPA South Australia 2015). Over time, more container types were added to the scheme as new types of single-use containers were introduced into the market. The Northern Territory CDS was introduced in 2012 to reduce drink container litter and increase resource recovery (D West et al 2013). The Northern Territory adopted a scope of containers similar to that in South Australia (with the exception of aseptic packs or casks of water).

The current scope of containers for these schemes is shown in Table 3 (refer to the details of the South Australian scheme and the Northern Territory scheme (http://www.epa.sa.gov.au/environmental_info/container_deposit/faqs) (http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0007/135754/factsheet_regulated_containers.pdf)).

Table 3. Scope of containers in South Australia and Northern Territory schemes (Source: EPA South Australia and Northern Territory EPA)

Included 0-3 litres	A broad range of drinks in all container materials
Excluded 0-3 litres	Plain milk
Included 0-1 litres only	Pure fruit juices, flavoured milk (and aseptic packs / casks of water in Northern Territory)

At-home and away-from-home consumption

To understand whether there are any differences between drink containers that are consumed at home compared with in public places, the EPA commissioned a number of waste audits in metropolitan, regional and remote areas of NSW. Household kerbside bins were audited from 9 councils in the Sydney Metropolitan Area, and 2 councils in regional/remote NSW. The public-place bins analysis included local government litter and recycling bins, as well as litter bins at transport hubs and in privately owned public spaces, such as shopping centres. Audits also looked into containers found in stormwater drains and gross pollutant traps[10] to work out the types of containers likely to end up in the marine litter environment.

These audits were designed to compare the sizes and types of containers consumed in NSW households and already recovered through kerbside services with those consumed in public places and at higher risk of being littered. The audits were done between July and October 2015 and represent a snapshot of consumption and disposal during the winter months. The amount of containers used in summer is likely to be higher. Furthermore, drink containers used in commercial settings, for example, office buildings were not audited. It was assumed that these containers were less likely to be littered, as was the case with containers used in homes. Further audits will be done at other times of the year to understand whether there are seasonal differences and, if so, how big they are.

Size of containers

All containers

Figure 8 shows the sizes of containers found in household kerbside bins, public bins, and gross pollutant traps or stormwater traps.

The audits found that 82.9% of the containers in household and public place bins and gross pollutant traps or stormwater traps were between 150 millilitres and 1 litre; 54.5% were between 150 and 500 millilitres and 28.4% between 500 millilitres and 1 litre.

Drink containers between 150 millilitres and 1 litre were the most common drink container in all streams, and this size of drink appeared at a much higher rate in public places (gross pollutant traps or stormwater traps and public-place bins combined) than in household bins. In the audit, 65.1% of all containers in public bins and 68.5% of all containers in gross pollutant traps or stormwater drains were between 150 millilitres and 1 litre, whereas only 49.5% of drink containers in household bins were between 150 millilitres and 1 litre.

[10] Gross pollutant traps are large containers used to capture pollutants (litter and sediments) flowing from stormwater drains into waterways.

In contrast, there were higher percentages of drink containers between 1 and 3 litres in the household bins than there were in public place bins. In the audit, 10.1% of containers in household bins were between 1 and 1.5 litres, whereas only 3.6% of containers collected in public places were of this size; 8.8% of containers in household bins were between 1.5 and 3 litres, whereas only 1.2% of containers found in public places were this size.

Figure 8: Containers in public place bins, household bins and gross pollutant traps (GPTs), by size (Source: A Prince Consulting 2015)

In Figure 9, the above figures were converted into total volumes of containers of each size. This gives an indication of the overall volume of containers consumed at home and away from home. The away-from-home containers are the ones that are more likely to be littered.

Figure 9 shows that containers over 1 litre represent 13.7% of the volume of all containers in public litter bins and 6.1% of the volume of all containers in gross pollutant traps and stormwater pits. Containers over 1 litre represent 45.9% of the volume of all containers in household bins.

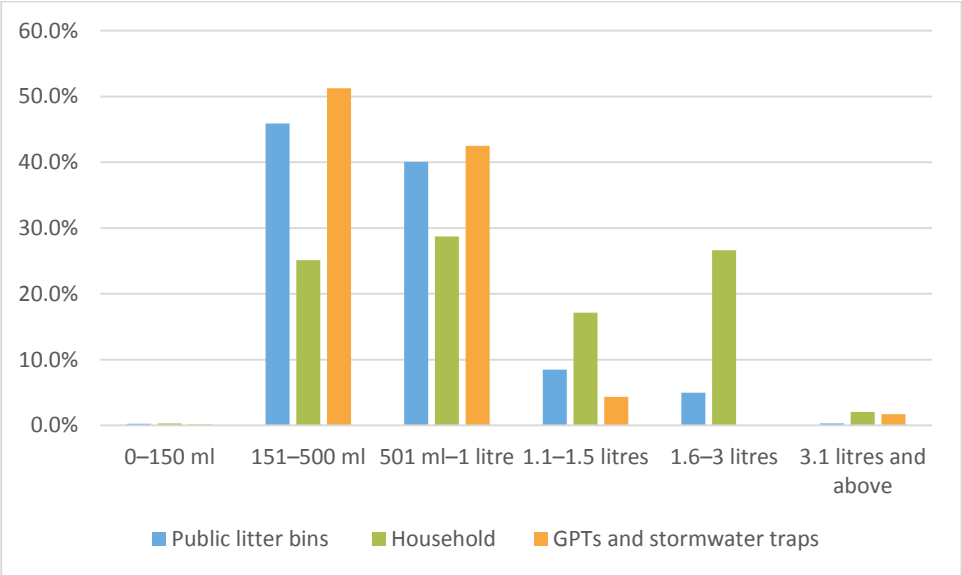

Figure 9: Containers in household bins, litter bins and gross pollutant traps (GPTs), by size – summed average volume of containers (Source: A Prince Consulting 2015)

The sizes of drink containers appearing in the different waste streams appeared relatively consistent across the state (Figure 10).

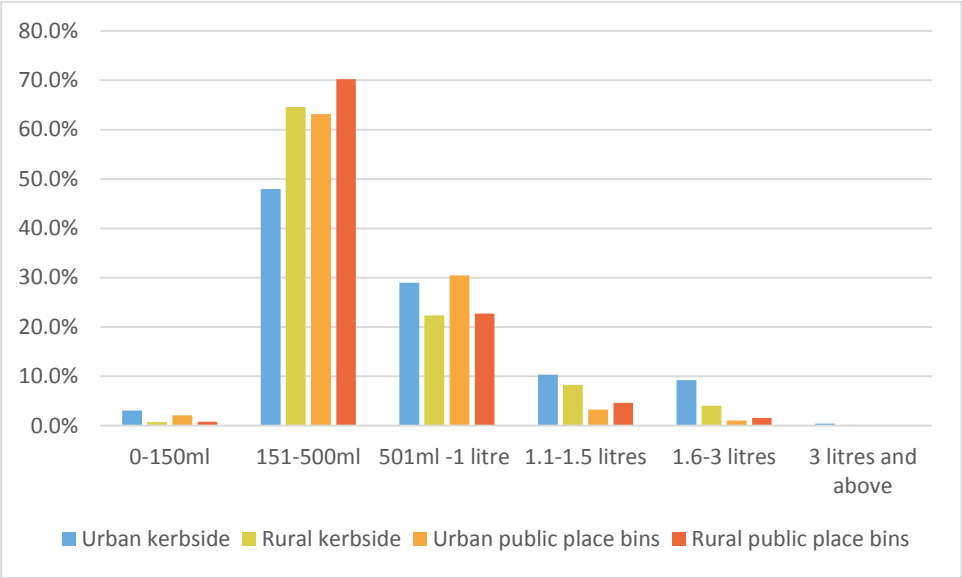

Figure 10: Size of containers in all bins in urban and rural/regional locations, by size. (Source: A Prince Consulting 2015)

The data collected on the size of containers in the waste stream indicates that although there is some overlap in the size of containers consumed in homes and in public places, substantially more containers over 1 litre are consumed at home than in public places.

Plain milk, wine, spirits and pure juice: the South Australian scope of containers

Plain milk in containers of all sizes and materials, wine and spirits in glass bottles, wine in bladders over 1 litre and pure juice and flavoured milk over 1 litre are all excluded from the South Australian and Northern Territory schemes. From a NSW perspective, the question is whether leaving them in or out of the scope of containers is likely to have a marked impact on litter reduction, and whether there is an appreciable difference in the overall cost of the system compared to the costs/savings of leaving them out. These issues are discussed more fully in the Discussion section.

Figure 11 shows plain milk, flavoured milk over 1 litre, wine and spirits containers as percentages of all containers found in both the household and public litter bin audits. Milk makes up 12.4% of containers found in household bins but only 3.9% of containers in public litter bins. Wine in bladders over 1 litre and wine in glass bottles makes up 8.3% of containers found in household bins, but only 0.8% of containers found in public litter bins. Spirits make up 0.7% of containers found in household bins and 0.1% of containers found in public litter bins. Flavoured milk makes up 1.3% of containers in household bins, and 1.8% of containers in public litter bins.

Pure juice is excluded from the South Australian and Northern Territory systems, however it was not included in this analysis as the pure juice data could not be separated from other juice data in the audit.

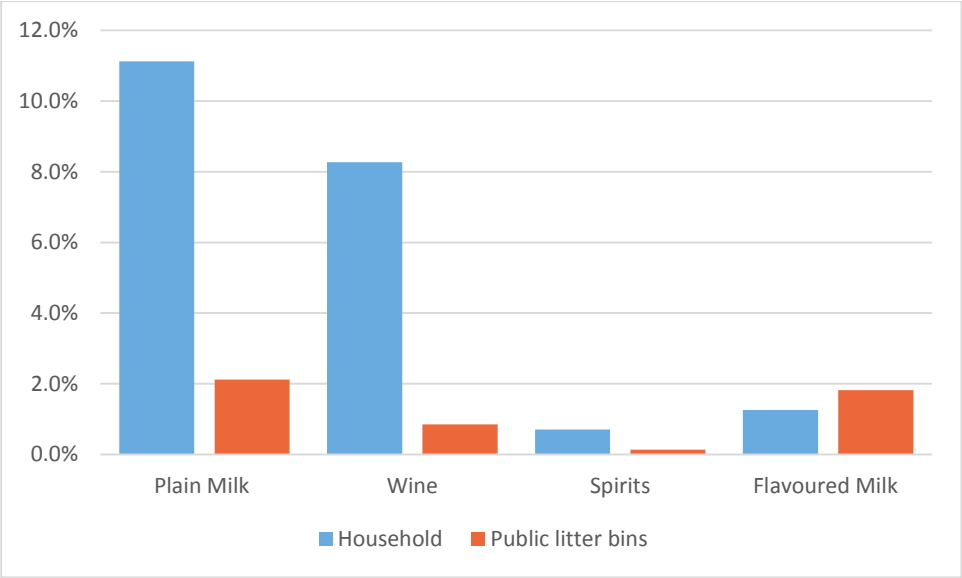

Figure 11. Milk, juice, wine (in glass bottles and in bladders over 1 litre) and spirits containers as percentages of total containers (Source: A Prince Consulting 2015)

An analysis of the National Litter Index data found that plain milk, flavoured milk over 1 litre and wine and spirits made up 9.25% of all container volume in NSW litter in 2014–2015. Plain milk containers made up 4.10%, wine and spirits made up 3.26%, and flavoured milk containers over 1 litre made up 1.89% of the volume of all containers.

Container material types

As demonstrated in Figure 12, the audit found some important differences between the material types of containers consumed at home and in public places. There were similar rates of steel and HDPE (high-density polyethylene) container use across the board, but much higher percentages of PET containers appeared in gross pollutant traps or stormwater traps and public-place bins than in household bins; 63.6% of containers in gross pollutant traps or stormwater traps and 40.2% of containers in public place bins were PET, whereas only 24.9% of containers in household bins were PET.

In contrast, there were much higher percentages of glass containers in household bins than in public-place bins and gross pollutant traps or stormwater traps: 37% of containers in household bins were glass, whereas only 13.7% of containers in public bins and 4.8% of containers in gross pollutant traps or stormwater traps were glass.

The difference between the percentages of aluminium containers in households and public places was less marked, with 29.5% of containers in public places and 17.8% of those in households being aluminium.

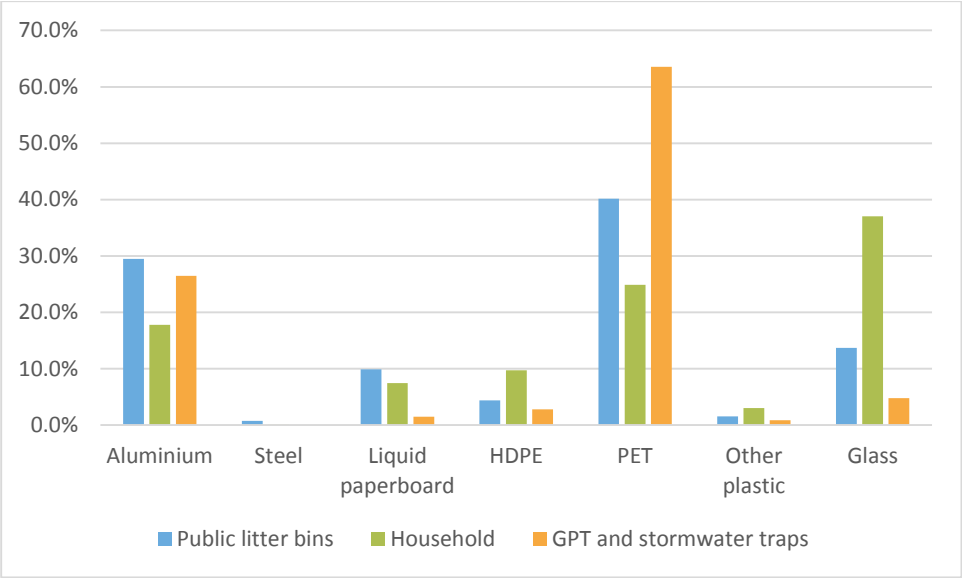

Figure 12: Containers in household bins, public place bins and gross pollutant traps or stormwater traps by material type. HDPE, high-density polyethylene, PET, polyethylene terephthalate. (Source: A Prince Consulting 2015)

There were, however, marked differences in the material types of drink containers consumed in Sydney and rural and regional NSW (Figure 13). More PET appeared in Sydney bins than in rural and regional NSW, both at home and in public places: 45.6% of containers found in Sydney bins were PET, whereas only 26% of containers in rural/regional public bins were PET. Liquid paperboard containers were found in public bins in Sydney at almost twice the rate as in public bins in rural/regional NSW. By contrast, glass and aluminium made up a larger percentage of drink containers in rural/regional public bins, with 10.1% of containers in public bins in Sydney and 23.5% of containers in public bins in rural/regional NSW being glass. Aluminium represented 38.4% of all containers in rural/regional public bins but only 26.2% of containers in Sydney public bins.

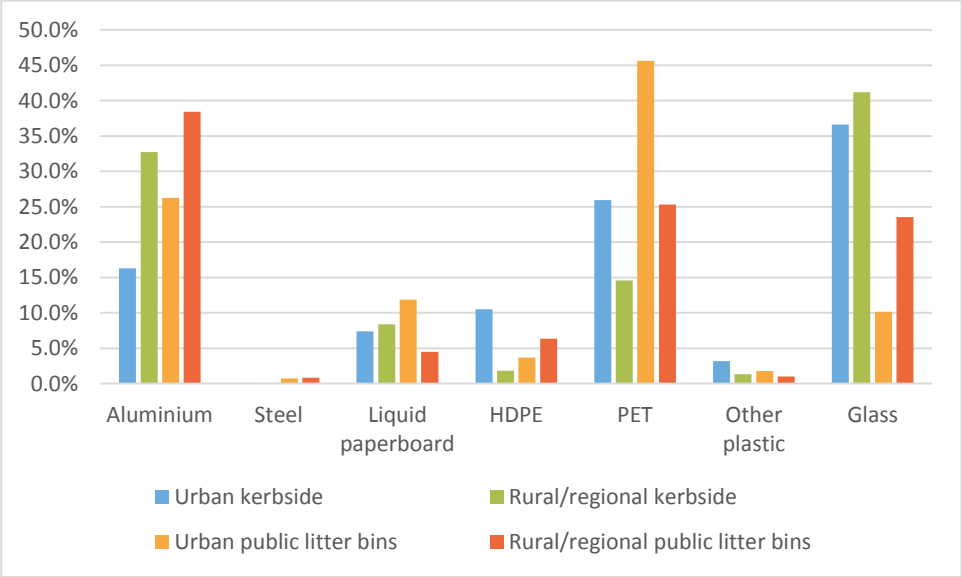

Figure 13: Types of containers in all bins in urban and rural/regional locations. HDPE, high-density polyethylene; PET, polyethylene terephthalate. (Source: A Prince Consulting 2015)

Types of drinks

The proportions of containers that were non-alcoholic drinks, with the exception of milk, were higher in public bins than in household bins (Figure 14). Flavoured water and soft drink containers, for example, made up 41.1% of containers in public bins but only 23.8% of containers in household bins. Alcoholic drinks and milk had markedly higher rates of consumption at home than in public places. Beer, for example, made up 25.3% of containers in household bins and 9% in public bins and plain milk made up 11.1% of containers in household bins and 2.1% in public bins.

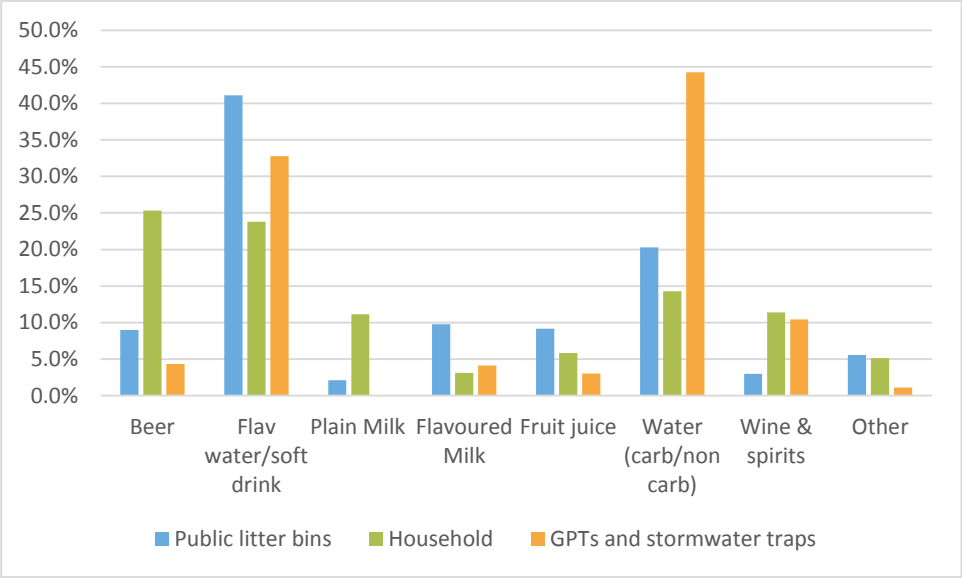

Figure 14: Containers household bins, public place bins and gross pollutant traps or stormwater traps by drink type (Source: A Prince Consulting 2015)

There are marked differences between the types of drinks consumed in rural/regional areas and those consumed in metropolitan areas (Figure 15). Percentages of beer containers in public and household bins are much higher in rural/regional areas than in urban areas. Percentages of wine and spirits containers in rural/regional public bins are much higher than in urban public bins. In contrast, there are much higher percentages of water containers in urban public and household bins than in rural/regional public bins. Note that this analysis does not include consumption in pubs, clubs and restaurants and other commercial locations. Also, milk appears at much higher percentages in urban household bins than in rural/regional household bins.

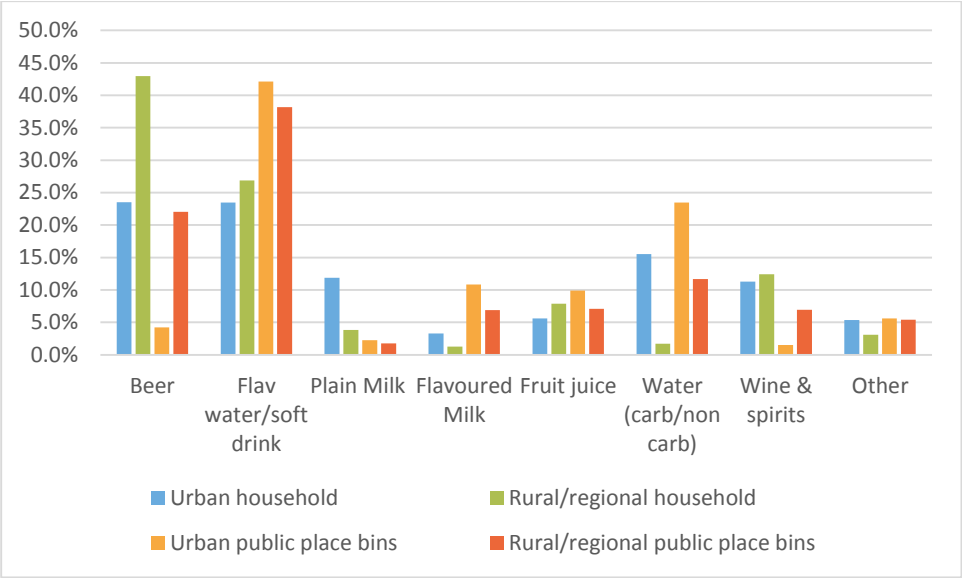

Figure 15: Type of drink containers in litter and household bins in urban and rural/regional areas (Source: A Prince Consulting 2015)

Discussion

Including all drink containers in the scheme

Including all drink containers in the NSW CDS would probably increase recycling rates for all container types; this is supported by evidence from other jurisdictions(P. Bragge and B. Wright 2015).

This option, however, could divert containers that are currently being recycled in the kerbside system into the CDS. If this happens, then collection infrastructure will need to be built and recycling infrastructure repurposed to accommodate this shift. The greater the diversion from existing systems into the new scheme, the more infrastructure that will need to be built or repurposed, adding to the overall cost of the scheme for a potentially marginal benefit.

Including all container types and sizes in the scope of containers used in NSW would also be inconsistent with the scope of containers in the South Australian and Northern Territory schemes. There are a number of potential impacts of this inconsistency:

- **Consumer confusion.** Consumers will need to read all labels to understand which containers are included and which containers are not. The reasons for having a different scope of containers to that in South Australia and the Northern Territory will need to be communicated to the NSW public.
- **Cost to the beverage industry.** As the same labels are used for all drink products consumed in Australia, labels on drinks will need to adjusted to include different information about the different schemes within Australia. Different scopes also require different compliance and reporting requirements in different jurisdictions.

Including only commonly littered containers

Limiting the scope of containers to those between 150 millilitres and 1 litre will target the majority of containers consumed and discarded in away-from-home public places. It is these containers that have the highest potential to be littered. Limiting the scope of containers would also reduce the number of containers that would likely be diverted from the existing kerbside system. In addition, having a smaller scope of containers would reduce the overall cost of the scheme, as there would be fewer containers being handled.

Limiting the scope of containers to between 150 millilitres and 1 litre would not completely resolve the issue of diversion from the kerbside, as containers in this size range also currently appear in large quantities in kerbside bins. However, the limited scope would ensure that larger containers were not diverted from kerbside. Larger containers have higher rates of consumption at home than away from home.

The narrower scope would target the vast majority of containers consumed in public places. However, larger containers are also found in public-place bins and do contribute marginally to the volume of litter when they are littered. If these containers are left out of the scope, then they would probably continue to appear in the litter stream at the current rate. Further analysis is required to determine whether the cost savings from removing them from the scope of containers is greater or less than the benefits of having them within the scope.

Limiting the scope of containers to between 150 millilitres and 1 litre would also mean inconsistency between the NSW system and the scopes of containers in the South Australian and Northern Territory schemes.

Making the scope consistent with those in the South Australian and Northern Territory schemes

There are a number of benefits of adopting the container scopes currently used in the South Australian and Northern Territory schemes. First, a consistent scope of containers across all states with a container deposit system will lead to less confusion for consumers using the system. Second, consistent labelling across the states will reduce labelling costs for the beverage industry. Third, the risk of fraud and cross-border trade impacts between NSW and South Australia/Northern Territory for those containers outside the scope of the scheme will be reduced. These issues would remain and would need to be managed in the case of Victoria, the ACT and Queensland if they do not introduce similar schemes in future.

Matching the scope of containers included in the South Australian and Northern Territory scheme would also be cheaper than having an ‘all container’ scope, owing to reduced diversion of containers from the kerbside. Infrastructure setup costs would also be reduced. However, infrastructure costs with this option are likely to be higher than with the narrower 150 millilitre to 1 litre option, although economies of scale could reduce handling fees per container.

Not including containers under 150 millilitres

A number of stakeholders have suggested removing containers under 150 millilitres from the potential scope of containers for a NSW scheme. This size of container is not abundant in the litter stream and adds only a very small amount to litter volume. Feedback from the South Australian scheme indicates that these small containers are difficult to process. Furthermore, because the price of drinks in these small containers is relatively low, adding even a small refund could substantially affect the retail cost of the product.

Impacts of different scopes on observed litter

Figure 16 is based on a 2014–15 National Litter Index survey of the volume of drink containers and shows the percentages of drink containers (by volume and drink type) that would be captured under different scope of containers. Including all drink containers in the scope of the scheme would cover 100% of the observed container litter. Figure 16 indicates the South Australian scope would cover 86% of littered container volume, whereas focusing on containers under 1 litre would capture 76% of the litter volume based on the 2014–15 National Litter Index survey.

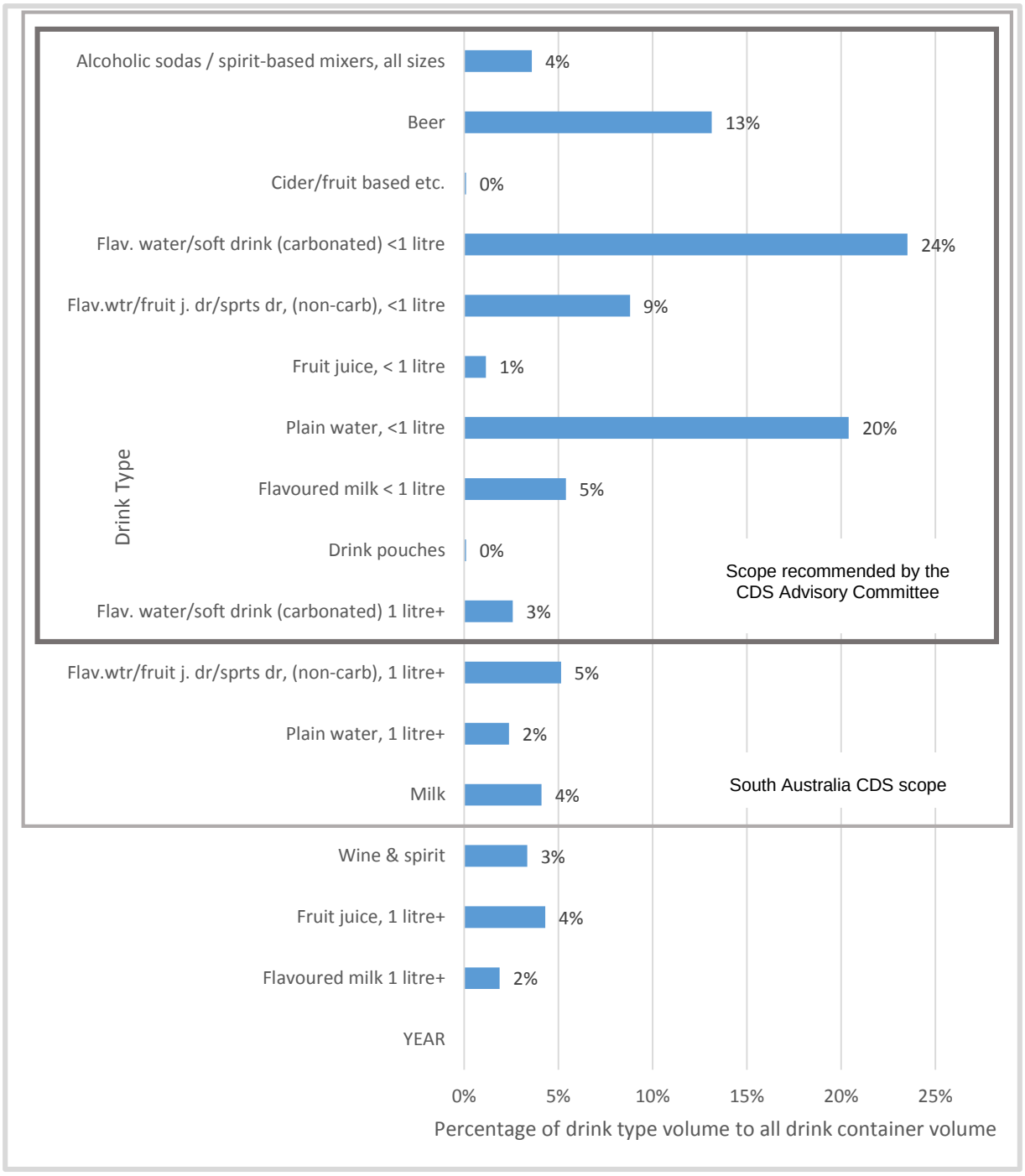

Figure 16: Percentages of drink containers, by volume and type of drink, that would be captured using different scopes of containers, as reported by the NSW National Litter Index 2014–15 (Source: KAB 2015)

The percentages within each of these scopes have fluctuated over time. In 2010–11 and again in 2012–13, the percentage of container volume in the '1 litre and less' scope was 81%. In 2014–15 and 2011–12, this scope covered 76% of container volume. In the years in between the percentages fluctuated between these two levels.

Advisory Committee recommendations

- The evidence on the sizes and types of containers used in public places and found in the NSW litter stream shows that the scope of containers for a NSW CDS targeting litter should include all containers from 150 millilitres to 1 litre, except for containers of plain milk and glass containers of wine or spirits.
- The NSW Government should consider the costs and benefits of expanding the scope of containers to harmonise with the South Australian and Northern Territory schemes. It should particularly consider the need to balance potential cost savings to industry, the need to reduce consumer confusion, and any additional resulting litter reductions against the potential impact on kerbside recycling.
- The NSW Government should also consider harmonising the scope of containers with those in other Australian states that are considering implementing a CDS, as long as doing this would not undermine the objectives of the scheme.

Key questions

- What should be included in the scope of containers in the NSW CDS, particularly if the target of this scheme is the reduction of litter?
- Should the NSW CDS have a container scope consistent with that of Northern Territory and South Australia? Should milk, wine and spirits be included or excluded from the scope of containers?

Key design element 4: Collection infrastructure

Introduction

The type and location of collection infrastructure and its interaction with the incentive is integral to the success of a CDS. For a scheme to work and achieve its objectives, the community must have access to designated collection sites in order to return empty drink containers and receive a reward.

The reward provides an incentive to take the containers to these sites. A large reward will encourage people to go out of their way to access the collection infrastructure. However, if the reward is smaller, the collection infrastructure will need to be both convenient and easy to use to ensure high levels of participation.

In designing the collection infrastructure for a NSW scheme, there are a number of issues that need to be considered. The collection infrastructure:

- must be accessible enough to allow people in urban, regional and remote areas to collect the reward for returning empty containers
- should focus particularly on containers that are used while away from home or picked up from the litter stream
- should not actively encourage the diversion of drink containers out of the existing kerbside recycling system

There are a variety of mechanisms for driving the roll-out of collection infrastructure to meet these aims. Some overseas schemes have used legislation to oblige key stakeholders to provide collection infrastructure at particular sites. Others have relied on incentives or left it up to the market to provide the necessary infrastructure. Whichever approach is used, an education program must be a key component to make sure that the community is aware of the available infrastructure and how to use it.

A further consideration is the use of collection technology, which can help increase convenience and reduce costs. Reverse vending machines are a well-developed form of collection technology that are used in many overseas schemes and are being trialled in a number of states in Australia. The NSW Government is interested in exploring how technology can help to deliver a cost-effective scheme here.

Evidence

Access to collection infrastructure

A key question for the NSW scheme is how it will provide access to collection infrastructure not only in metropolitan areas, where large numbers of containers are consumed, but also in regional and rural locations.

The objective of the scheme is to reduce the volume of litter, not just to recover empty containers. Litter is a universal issue affecting communities across NSW. Evidence from the National Litter Index indicates that litter is found at all types of locations, from beaches and parks to industrial sites and highways. Litter is perceived to be ‘extremely’ or ‘very’ important by most people in NSW, with the degree of community concern consistent across metropolitan, regional and rural areas (Anomaly/UM 2015).

To ensure the effectiveness of the scheme in reducing litter, it is crucial that people in all parts of the state have reasonable access to collection infrastructure.

Approaches to ensuring coverage

Overseas schemes and those in South Australia and the Northern Territory have used different approaches to make sure there is enough coverage of collection infrastructure. This includes setting mandatory requirements for key stakeholder groups to install infrastructure at specific locations, or providing incentives and letting the market decide.

There are two main types of return methods used by existing CDSs:

- return to retail
- return to depot.

Return-to-retail approach

The return-to-retail approach is commonly used in Europe. Most often it has been the retail sector that has been obligated to establish collection infrastructure, with a requirement to accept returns at point of sale. This approach grew out of traditional voluntary deposit schemes in the past for returning refillable bottles: the refillables could be returned to the shop when the consumer bought new ones. The truck delivering the full bottles to the shop would then pick up the empties and return them to the bottling plant on its return journey. In some overseas markets refillables are still used, and this approach offers an efficient means of maintaining a closed loop to keep the containers in the system.

With the phase-out of refillables and the move to single-use drink containers, this closed-loop system has almost entirely disappeared in Australia.

Even without the presence of refillables, the return-to-retail model offers substantial efficiencies, because retail locations - particularly supermarkets - offer a very convenient collection location. Because people shop at supermarkets on a regular basis, co-locating collection infrastructure at these sites would mean that householders would not need to make a separate journey to return their containers. They could combine returning containers with their regular shopping routines.

However, this in effect would make returning containers consumed in the home easy and convenient, which is likely to result in a substantial diversion of containers from the kerbside recycling system into the new CDS.

Return-to-depot approach

The return-to-depot approach is relatively common in North America and is used in South Australia and Northern Territory. A ‘depot’ can be a physical collection centre, a mobile event-based drop-off system, or a reverse vending machine. This approach requires the consumer to put in more effort, as the return infrastructure is characterised by a smaller number of drop-off opportunities in potentially less convenient locations than the return-to-retail approach. Although the consumer has to invest more time and effort, there is a greater aggregation of containers at the depot; this means that the logistics of collecting the containers and getting them to a recycler are simpler (D Hog et al. 2015).

Fixed depots have the capacity to receive and handle bulk loads of containers. Having depots may therefore give consumers the incentive to hold on to containers they may normally have disposed of through kerbside recycling, and to instead return them to a depot in bulk.

Incentives, together with letting the market decide

An alternative approach, which is used both overseas and in Australia, is for the scheme to offer an incentive to potential collection site operators and then let the market decide where the collection infrastructure should be sited. The most common incentive approach is for a handling fee to be charged on each container sold, and to be redeemed on each container

recovered. Market operators then decide whether a site will draw in sufficient containers to be financially viable at the particular handling fee rate.

A key concern with this approach is whether the market would supply infrastructure in areas outside metropolitan centres, where there are fewer containers available and where there are long distances to end-markets for recovered materials. Low population densities and 'tyranny of distance' issues are common reasons why recycling systems in rural and remote areas are not always viable.

The South Australian scheme has overcome this issue by separating the handling fee, which is paid to collectors, from the transport fee, which is paid by the supercollector. This allows collection operators to offer a collection service on a similar footing, regardless of where they are located. The issue of low quantities of containers is overcome by combining the collection service with other activities, such as a service station or the collection of other materials, like scrap metal or cardboard. This way, the operator can share overhead costs across a number of economic activities, as well as offering the community a variety of services to encourage participation.

This approach, combined with the 10-cents incentive, has resulted in a network of collection depots in South Australia that provide sufficient access and convenience to recover close to 80% of containers and keep container litter at a low level. Most South Australians reportedly live within 5 or 6 km of a collection depot (personal communication with Jeff Maguire, Statewide Recycling SA and NT). In Adelaide, although most of the collection depots are not centrally located, traffic problems have not restricted relatively easy access to the system. In contrast, population density and traffic issues in the Greater Sydney area may mean that a network of collection depots on the outskirts of town may not represent as convenient a solution for NSW.

Targeted incentives

An outcome of letting the market decide where the collection infrastructure should be located is that it may end up in locations that will encourage diversion from the household kerbside system. In South Australia, only about 17% of containers consumed in the home are recovered through the kerbside system. This is much lower than the current average of 79% of containers consumed at home being collected through the kerbside system in NSW.

An alternative is to take a more strategic approach by giving site owners incentives to either take on this service or host a service that is run by someone else. Such an approach could target, for example, shopping centres (e.g. in food courts), transport hubs, sporting and entertainment venues, and natural areas (e.g. beaches, parks) where drink containers are often consumed away from home. Recent social research shows there is strong public support for reverse vending machines to be located in public spaces like train and bus stations (70% support; City of Sydney 2014: Project Recycler – Reverse Vending Machines, unpublished). These types of sites would be convenient for people consuming drink containers away from home and on the go.

Although this approach would be more likely to see collection infrastructure set up at strategic locations, the additional incentives and the smaller-scale, distributed collection points would need additional logistics to aggregate containers for further transport and recycling. This may mean additional costs to aggregate containers at a central hub, compared with using a straight return-to-depot model. These additional costs would need to be balanced against the potential improved performance of the scheme in meeting its litter-reduction objectives.

Types of collection infrastructure

There are two primary ways of capturing drink containers as part of a container deposit system, namely by manual and automated collection. Many schemes around the world make use of both.

Manual drop-off centres and depots

In both South Australia and the Northern Territory, most collection depots are run manually. Organised in a 'hub and spoke' format, smaller depots collect containers in outlying areas and return them to a central hub for compacting and baling to reduce further transport costs. These larger hubs can also act as collection depots themselves.

Manual drop-off centres can include permanent sites such as depots, as well as mobile collection cages, which can be moved from site to site on an as-needs basis.

The common feature of manual drop-off locations is that they require staff or volunteers to accept containers and usually rely on manual sorting of containers by material type and (in some cases) by brand.

The advantages of using manual drop-off centres and depots include:

- Manual drop-off centres are able to handle bulk quantities from, for example, litter clean-up activities or charity-fundraising initiatives. In South Australia, the average number of containers taken to a depot is 210 per visit (Harrison Research 2012).
- More than 800 people are directly employed across the South Australian collection depot system (Hudson Howells 2005), supporting local economies.
- Manual drop-centres can be diversified to provide local communities with the opportunity to recycle other, non-drink-container materials. Up to 30% of people that visit manual drop-off centres in South Australia usually or sometimes take 'other materials' when they return their drink containers (e.g. scrap metal and cardboard) (Harrison Research 2012).
- Manual facilities are relatively cheap to establish and can be incorporated into existing businesses. This is important for regional and rural areas, where accepting drink containers may be just one of many services offered at a facility.
- As facilities are usually staffed, these sites are less likely to be vandalised or have non-drink container materials dumped at them.

There are also disadvantages to using manual drop-off centres and depots:

- These facilities often have limited trading hours, making it less convenient for the community to return drink containers. In South Australia, one in four people are not satisfied with the opening hours of their local facility (Harrison Research 2012).
- Waiting times at manual drop-off centres can be considerable, as drink containers are sorted by hand into material type and, in some cases, by brand. The most common length of time taken from arrival at the depot to collection of a refund is up to 15 minutes in South Australia (Harrison Research 2012). However, some depots have overcome this by using high-speed sorting machines (a type of reverse vending machine) to help staff accelerate the sorting process.
- Manual depots can be costly to run, requiring staffing as well as occupational health and safety measures to be in place.
- These facilities can require substantial amounts of space and must be located in appropriately zoned areas, making it a challenge to establish new manual drop-off facilities in highly populated areas.
- Manual drop-off centres often require people to go out of their way to recycle drink containers; they are not usually integrated into litter-generation areas. They rely on the strength of the incentive to bring people to them.
- In South Australia, 88% of drink container returns come through CDS infrastructure, not the kerbside recycling system. A system that encourages people to drive their drink

containers to a manual collection facility on a periodic basis has the potential to draw heavily from the household kerbside system, rather than from away-from-home sources.

- Manual collection facilities are less likely to have effective fraud-prevention mechanisms in place, making it possible to 'reclaim' deposits on containers that have already been returned through the system or to feed in empty containers that were purchased in another state.

Reverse vending machines

The NSW Government would like to see modern technologies, such as reverse vending machines, as part of the new scheme. These machines accept empty drink containers and dispense physical (cash) or electronic rewards to the returner. The latter can be in the form of a credit note (exchangeable for cash), credit on a card (e.g. a store rewards card or transport card), or another type of incentive (e.g. prize draws, charitable donations). Regardless of whether the scheme is based on financial or non-financial incentives, reverse vending machines make it possible to offer consumers a choice in the type of reward they receive.

Reverse-vending machines are used extensively in some overseas schemes. In 2013, an estimated 40% of drink containers under CDSs worldwide were collected through reverse vending machines (Daedal Research 2015). There have been some trials of reverse vending machines in Australia, including in NSW and in South Australia and the Northern Territory, but to date they have not been taken up by the Australian schemes. However, high-speed counting machines have been introduced in both states where they are used in a few of the higher-volume depots and hubs.

There are three broad categories of reverse-vending machine (Rawtec 2015):

- **Stand-alone systems** are about the size of a typical vending machine (0.5 to 2.5 square metres plus access space) and are often used in convenience stores, supermarkets and shopping centres. These systems are best suited to receiving between one and three different types of materials. However, multiple stand-alone machines can be used in a single location to capture the full scope of materials included in a CDS.
- **Front-end with backroom systems** are between 3.5 and 16 square metres in size (plus access space) and are suited to numerous material streams. These systems comprise of a consumer-facing wall with a backroom fit-out complete with conveyors, compactors and storage bins. Front-end with backroom systems are often used in shopping centres and supermarkets, as these sites have high levels of foot traffic and consumer-facing walls. These systems can receive multiple types of materials.
- **High-speed counting machines** are between 80 and 100 square metres (plus access space) and are typically used at recycling depots for counting, sorting and compacting containers that have been collected through manual operations. These types of machines are able to count and sort bulk quantities of containers and are suited to multiple types of materials.

The advantages of using reverse vending machines are:

- These systems can be efficient and cost-effective to run, with little staffing and space required.
- Reverse vending machines can be sited in areas where litter is generated. South Australian research shows that six out of 10 people who do not return containers to a manual collection depot would use a reverse vending machine located at a shopping centre (Harrison Research 2012).

- If machines are located in areas that are integrated with people's existing routines, separate trips to return drink containers will not be required, thus reducing greenhouse gas emissions.
- Reverse vending machines can be used under flexible business models, with machines available for outright purchase or for lease. When machines are leased, a portion of the machine rental fees are based on the quantity of materials collected (Daedal Research 2015).
- These machines can process up to six containers a second (Daedal Research 2015), so waiting times are kept to a minimum.
- The design of the consumer-facing openings of reverse vending machines makes them effective at avoiding contamination from items that are not included under CDSs.
- Reverse vending machines are capable of reading barcodes and have integrated fraud-prevention measures to prevent the return of non-eligible drink containers (Daedal Research 2015). They can also report instantly on each transaction, allowing real-time monitoring of return rates.
- These machines typically crush or compact returned materials, keeping volumes as small as possible and ensuring efficient transport between the redemption point and the reprocessing facility (Daedal Research 2015).

There are also disadvantages to using reverse vending machines:

- These systems have very specific site requirements, such as access to power (some require three-phase power), protection from the elements, and security. In some areas, it can be challenging to find a suitable site that meets all the requirements and is easily accessible to the public (City of Sydney 2015).
- Although reverse vending machines can dispense cash, the ones that do so are susceptible to vandalism (Rawtec 2015). They are best suited to dispensing electronic rewards equivalent to the deposit, although these may be less preferred by people who predominantly rely on cash (e.g. younger people/children or people on fixed incomes).
- Consumer-facing reverse vending machines are not suitable for receiving bulk loads of drink containers collected from litter clean-up activities.
- Reverse vending machines have substantial start-up costs if they are bought outright.

Discussion

Use of reverse vending machines

The NSW Government has committed to using modern technology and has indicated a preference that the scheme will involve at least 800 reverse vending machines. This proposed use of modern technology is strongly driven by the desire for cost efficiency. The use of reverse vending machines is not an end in itself, and it would not make sense to require them to be used if this would result in higher overall costs for the scheme.

The evidence shows that reverse vending machines provide cost efficiencies that are likely to be best suited to densely populated areas, with their collections delivered to local hubs for aggregation (i.e. by a 'hub and spoke' system). These machines typically require:

- smaller amounts of space than do manual depots; this is important in areas where vacant land is scarce and expensive
- power and security, which are more easily accessible in built-up areas

- high volumes of containers to make them financially viable (see Table 4); this is more easily achieved in population centres.

Table 4: Numbers of containers needed for different types of reverse vending machines to be commercially viable (Source: Rawtec 2015)

Type of machine	No. of containers required each month
Stand-alone systems	10,000 to 80,000
Front-end with backroom systems	60,000 plus
High-speed counting machines	450,000 plus

Note: that these estimates are based on the machine installer receiving a handling fee of 4.5 cents per container and the machine*'s* installation being driven by the handling fee only. They ignore other potential drivers and benefits (e.g. enhanced customer service, marketing opportunities and point-of-difference from competitors*)*.

Smaller populations in regional and remote areas across NSW are less likely to have the throughput required to make reverse vending machines a sustainable option. In these areas, manual collection depots may be more suitable. These depots could be supported by a 'hub and spoke' solution, as in South Australia, where multiple smaller collection points feed into a few large 'hubs'. From there, containers can be consolidated and compacted or baled before being transported to a reprocessing facility.

Ultimately, the types of technologies a NSW scheme takes up should be determined by the cost efficiencies they can provide.

Sites for collection infrastructure

Offering incentives for the establishment of sites that attract containers used away from home but not containers consumed at home may prove difficult in practice. Making retailers host collection infrastructure would be highly likely to divert containers from the household kerbside system. However, leaving it up to the market to establish collection sites may end up with a similar result, because the market motivation is to maximise the number of containers moving through the system. Using a strategic approach to siting collection infrastructure may add additional costs without eliminating the risk of diverting kerbside containers.

Ultimately, using the incentive and the placement of collection infrastructure to manage potential collection flows may be too unwieldy to make such fine adjustments. If the scheme uses a financial incentive, then there will be substantial costs involved in changing it once it is set up. Similarly, adjusting the collection network is also likely to be costly. Moving the location of established infrastructure is likely to cause confusion in the community; extensive education may be needed to re-establish behavioural norms.

A more manageable approach would be to use education as the main vehicle to keep containers in the kerbside system once the scheme is set up. Efforts should go into establishing a collection network that focuses on recovering containers consumed away from home. However, once the scheme is established, ongoing education programs can be used to reinforce the message that it is acceptable (and in fact beneficial) for people to continue to use the kerbside recycling system.

Advisory Committee recommendations

- Because all areas in NSW experience litter, the NSW CDS should have state-wide coverage.

- Collection infrastructure should be cost effective and suited to the local area, rather than technology specific.
- The location of collection infrastructure should focus on containers used away from home and should minimise the diversion of containers from the kerbside recycling system.

Key questions

- Should the scheme provide universal access for all NSW residents?
- Where should collection points be located to best achieve the litter reduction target and to minimise the transfer of containers out of the kerbside system?
- How can the scheme give incentives for the take-up of collection infrastructure at sites that focus on away-from-home consumption?
- How can modern technology be used to deliver a cost-effective scheme?

Key design element 5: Governance and the role of government

Introduction

The way a CDS is organised and administered, and the checks and balances that are put in place to drive and verify its performance, are referred to as the scheme's 'governance' arrangements.

These arrangements cover a range of functions that can be performed by a number of different bodies, including various parts of government, industry and other stakeholders. These functions include setting the deposit level; establishing labelling requirements; managing financial flows (including reconciling deposits and refunds); coordinating system infrastructure and logistics; delivering education and communication campaigns; and monitoring return rates.

Existing CDSs in Australia and overseas use many different approaches to govern their schemes. Some schemes are organised and run by government. Others are run by industry as extended producer responsibility schemes, operating under legislation.

Schemes can also be centralised, with a single body coordinating all parts of the scheme, or decentralised, with multiple organisations delivering parts of the scheme.

All of these arrangements can be effective at achieving public policy objectives. However, all approaches can also create risks that can have adverse outcomes if appropriate checks and balances are not put in place to manage them. Lack of controls can mean that there is an increased risk that the scheme will fail to deliver on its objectives. Too much control can add to the cost and make the scheme inefficient.

The aim for the NSW scheme is to set up governance arrangements that will give the various scheme stakeholders the flexibility to minimise their costs, at the same time as making sure that there are enough controls in place to maximise the public policy outcomes.

Evidence and discussion

The following discussion relates primarily to container deposit schemes that use a financial incentive. A number of the issues raised would be less pronounced under a scheme using non-financial incentives. Schemes that also rely on non-incentive-based programs, such as the Thirst for Good proposal discussed in the CDS Models chapter, would have different risks and issues. These are discussed in the CDS Models chapter.

Government schemes

In the United States, a number of CDSs are run by state governments. In these schemes, it is the state that collects and holds the deposit and distributes the refunds when empty containers are returned to approved collection sites. The beverage industry has little involvement in the scheme.

Industry schemes

An alternative approach is to give industry the responsibility for organising the scheme. Beverage companies can then choose to take on that responsibility on an individual company basis or allocate that responsibility to an independent body to do it on their behalf. This body could be a for-profit business that is contracted to provide a particular service or a not-for-profit organisation set up specifically to deliver the scheme. Industry-organised

schemes are common in Europe, and both the South Australian and Northern Territory schemes use this approach.

Giving industry the responsibility for organising the scheme gives them the ability to minimise scheme costs. Generally, industry has a strong incentive to minimise the costs of the scheme because beverage companies must either absorb the costs and reduce their profit margins or pass the costs on to consumers, thus affecting consumer purchasing decisions. Depending on the price elasticity of particular drink markets, price increases have the potential to cause consumers to buy less drinks or move to alternative products. Either way, the additional costs of the scheme can affect companies' bottom lines. It's therefore in the interests of the beverage industry to keep the costs of the scheme as low as possible.

However, in schemes that allow multiple coordination bodies, individual companies may not be able to gain agreement across the total beverage industry to establish a single industry body to coordinate the scheme. This can lead to an overall scheme architecture that restricts the ability of the industry as a whole to realise cost savings. The South Australia and Northern Territory schemes are a case in point. Individual companies or small groups of companies have sought to set up supercollectors to manage and control their own costs and risks but, in doing so, they have created redundant organisational costs and additional sorting requirements to allocate costs between different supercollectors. These inefficiencies are not because some of the supercollectors are run by beverage companies, but a result of the multiple supercollector structure.

In South Australia, through collaborative practises introduced over time, the industry has managed to rationalise the number of supercollectors from five to three and reduced the number of sorts required by collection depots down to nine. This has helped reduce the costs of the scheme, but inefficiencies still remain. In the Northern Territory, this rationalisation has not occurred despite a similar legislative framework. In the Northern Territory, there are five supercollectors and collection depots are required to make up to 29 sorts. This has significant impacts on handling fees, with some depots claiming up to 18.2 cents per container in handling fees (in addition to the 10 cent deposit). In South Australia, handling fees are around 3 to 4 cents per container.

Keeping costs low is also in the interests of the overall community, as long as the objectives of the scheme are being met. A risk here is that, if left unchecked, cost minimisation could undermine the effectiveness of the scheme. For example, costs could be kept low by minimising the number of containers collected. This could be achieved by making the incentive so weak that no one is motivated to return containers, or by under-investing in the collection network to make it difficult for people to return containers.

Costs could also be kept down by pushing risks on to other stakeholder groups, forcing them to cover the costs of any unexpected events. 'Cost-shifting' is a concern often raised by local government, but it can go the other way as well. Schemes that place financial responsibility onto industry, but do not give them ability to control costs can result in costs being driven up by other stakeholders and the industry having little recourse but to pay them. This is currently evident in the Northern Territory system.

It is therefore of key importance for the governance arrangements to mitigate against these issues, while still giving industry the ability to minimise costs where appropriate. To do this, the government may choose to maintain control over some aspects of the scheme or to set requirements that allow the industry to realise scheme wide efficiencies, while still delivering public policy outcomes. For example, in many existing schemes the government maintains control over the setting of the deposit amount. Government can also set minimum collection targets or ensure there is a competitive market for collection services by maintaining control over the setting of reasonable handling fees. If fees are independently set, then the market can invest in collection infrastructure with the confidence they will get a reasonable return on

investment, while at the same time protecting the industry from having to pay very high handling cost claims.

Setting monitoring and reporting requirements are also important to make sure that the scheme is run in a transparent manner, allowing public scrutiny and ensuring community confidence in the efficacy of the overall scheme.

Governments can also choose to have direct involvement in the running of the scheme by having a government representative or representatives on the board of the organisation (or organisations) coordinating the scheme. The government may also choose to specify that the board include a range of other stakeholders or skill sets. The effect is that the governing body of an industry-organised scheme can be more or less independent of the industry, but the scheme is largely funded by the industry and the industry still has a say in how it is run. The involvement of a stakeholder advisory group may also make sure that the views of other stakeholders contribute to the decision-making process.

Single or competing governance organisations

If the scheme is to be organised and run by industry, then a key question is whether there should be a single organisation running the scheme or multiple organisations competing against each other.

A decentralised, competitive approach is used in South Australia and Northern Territory. In both of these schemes, there are 'supercollectors' that take on and fulfil the responsibilities of their respective member companies. The supercollectors do this by running parallel schemes (using common container collection depots) and then billing members for their share of the redeemed containers.

In theory, this has the potential to drive down costs, as supercollectors compete to attract members. However, in practice the supercollectors are often wholly owned by individual beverage companies that have vertically integrated to control their own costs. Therefore, there tends to be little movement of beverage companies between supercollectors. Furthermore, the cost structures of supercollectors are not very different from each other, so there is little incentive for companies to move between supercollectors.

Having multiple organisations running parallel systems also means they would need to set-up separate collection sites that accept only the containers of their respective member companies, or collection sites that must sort containers by brand so that the companies could be billed separately. The latter is the approach used in South Australia and the Northern Territory.

In South Australia, there are three supercollectors. Over time, through negotiation and convention, the number of material and brand-owner categories that containers must be sorted into has been reduced to nine. In the Northern Territory, where there are five supercollectors and the scheme is still relatively new, collection depots are required to make up to 28 'splits' (i.e. category sorts) of containers.

This has marked knock-on effects for transport and logistics. For example, some supercollectors in the Northern Territory accept only whole containers from collection depots. This greatly reduces the number of drink containers per truckload (8000 whole containers compared with 45,000 crushed containers) and makes transport less efficient (D West et al. 2013). The SA and NT systems also lack transparency in regard to the various commercial arrangements and allocation of unredeemed deposits.

By comparison, if a single organisation were running a NSW scheme, only eight splits would be needed. These would be purely materials-based: aluminium, PET, HDPE, liquid paperboard, steel, clear glass, brown glass and green glass. This then leads to more efficient transport and logistics arrangements.

Having a single organisation running the scheme also makes it easier to ensure transparency and accountability for the whole scheme. This would mean there would be a single source of information for performance monitoring and reporting. This could also help reduce costs to the state government for coordinating the collection and reporting of this information compared to gathering this information from multiple organisations. A single coordinating organisation would also ensure consistent messaging for community education and scheme promotion.

Role of government

There is a clear role for government under any legislated CDS, regardless of the governance arrangements adopted. For an industry-organised scheme under an extended producer-responsibility approach, state government regulation provides an independent way to make sure that the scheme is well managed, equitable, accountable, and not susceptible to fraud. Key functions for state government would include preventing free riders from undermining the scheme and controlling cross-border flow of containers that have not had a deposit collected on them.

Preventing free riding

Where schemes place additional costs on industry, some companies may try to avoid these costs by using deceptive or dishonest practices. For example, under a scheme with a financial incentive, a drink manufacturer may try to avoid declaring that its products are on the market so that they do not have to collect the deposit or pay handling fees. At the same time, when their containers are returned and redeemed, other manufacturers would be covering these costs. By remaining 'outside' the system, these manufacturers would have lower costs than their competitors' and therefore could gain a market advantage.

Without mandatory requirements, an industry-run scheme would have little or no power to force companies to participate, and there would be an ever-present incentive to gain a financial benefit by not participating. Therefore, capturing free-riders and maintaining a level playing field in the market is a key role for the government. The government would need to oblige all manufacturers to participate in the scheme.

In the South Australian scheme, it is an offence to supply a drink container for sale, or to sell a drink in a container for consumption, without the approval of the regulatory authority (the South Australian EPA). The South Australian EPA regularly audits retailers to confirm that the products on their shelves are registered as part of the scheme. If a product is found that is not registered, it is confiscated at a loss to the retailer. This provides an incentive to retailers to make sure that all the brands they stock are registered with the scheme. The NSW Government could take a similar approach to tackling any potential free riders.

Once in the scheme, drink manufacturers and importers may also seek to reduce their costs by under-reporting their sales figures. This is particularly an issue in schemes that distribute the costs of the scheme to manufacturers on the basis of their market shares. By under-reporting, a manufacturer could appear to have a smaller share of the drinks market and would thus have fewer scheme-related costs than its competitors. This situation could also lead to the scheme falsely appearing to capture a larger proportion of the drink containers sold than are actually put on the market.

Government compliance officers may find it difficult to recognise this type of free-rider activity. Audits of retail shelves are effective if a product is not registered at all. However, if the product is registered, then the compliance officers will not be able to tell whether or not all of the product on the shelves has been reported to the scheme. In this case, under-reported sales would be easier to capture by the scheme coordinator, who would most likely have a contractual agreement with the manufacturer to be part of the scheme. Part of that agreement would need to be a right for the scheme coordinator to audit the sales figures of the manufacturer, with penalties for incorrect reporting. The scheme coordinator would need

to back this up with a regular audit regime. Continued failure to accurately report sales could be dealt with by expelling the manufacturer from the scheme; this would then place them outside the scheme, where they would be picked up by the government's compliance regime.

Cross-border arbitrage: full drink containers

As indicated in the section on 'Key design element 1: Incentives', having a financial incentive may lead to cross-border arbitrage issues. Arbitrage refers to taking financial advantage of the different prices charged in different markets. The financial incentive under a CDS can create a cost differential between a product sold in NSW and the same product sold outside NSW. This can make it attractive for people to purchase the product outside NSW and bring it across the border for personal use or for resale. Although there will always be a small percentage of containers flowing in and out of the state with tourists and consumers living on the border, this can become a more serious issue for the scheme if commercial quantities are trucked across the border for resale without the deposit, as there is no deposit available to pay back when these containers are then returned for redemption.

The potential scale of this issue depends on the distribution model that manufacturers use. If manufacturers sell directly to retailers, they will have a record of how much of their product is sold in NSW, and the scheme will pick this up in their sales audits. If sales to retailers shift markedly and without explanation, then the scheme will be able to investigate and alert the government for follow-up with compliance checks.

This is potentially more of an issue when manufacturers sell to wholesalers outside of NSW, who then distribute to retailers within NSW. In this case, the manufacturer does not have a direct relationship with the retailers and therefore would not have an exact record of NSW sales.

This situation is not that different from that of overseas manufacturers selling products into NSW. In the case of imported products, it would be the local importer that would have to be the liable party. In the case of wholesaling, it would be the local retailers bringing the product into NSW that would be liable.

The cross-border issue may also resolve itself if neighbouring states also establish similar CDSs. At this stage, Queensland is looking into the possibility of introducing a CDS, and has indicated its preference for a model by which a deposit is paid at the point of sale, and the Australian Capital Territory is watching the NSW process. If schemes are introduced in these two places then NSW would seek to harmonise with them as far as possible. NSW would then border only one non-scheme state, namely Victoria.

Cross-border arbitrage: empty drink containers

Another potential risk is that people will import empty containers into NSW to redeem the financial deposit. If these containers have been purchased and consumed outside the state, they would not have contributed the deposit into the scheme. This kind of activity is more likely to occur with higher value financial incentives, and can, in this scenario, seriously affect the financial sustainability of a CDS.

The size of this problem depends on the marginal returns involved. If the cost to transport the drink containers is low (e.g. if they are crushed and transported in bulk quantities) and the benefit is high, then the problem could be substantial.

In NSW, this issue could be managed by making the marginal returns for this sort of activity as small as possible. This could be done by first, making this activity illegal, with substantial fines for those caught transporting or receiving the containers. This creates a financial risk that there will be no financial benefit - but instead substantial penalties - if those involved are caught. Second, administrative requirements could be put in place for collection sites to accept bulk quantities, for example bulk drink containers could be required to be whole and uncrushed. This substantially reduces the number of containers that can fit in the back of a truck, making it less attractive and more expensive to defraud the scheme in this way on a

large scale. Using the bar code on drink containers is another proposed way of limiting redemptions for containers purchased outside NSW. However, bar codes are the same everywhere in Australia and are not differentiated by state.

Whichever mechanisms are adopted, exemptions to these mechanisms could be put in place for receiving bulk quantities of crushed containers from legitimate sources, such as containers collected through kerbside recycling services (if they are eligible for redemption under the NSW scheme).

Key questions

- What role should the government (state/local) have in the scheme?
- What role should the beverage industry have in a Refund CDS?
- Should a Refund CDS be run by a single organisation or multiple organisations?
- How should the scheme deal with cross-border arbitrage risks?

CDS models

Introduction

This section describes two alternative models for reducing the volume of litter in NSW to help meet the Premier's target to reduce the volume of litter by 40% by 2020. These models have been proposed by members of the CDS Advisory Committee.

After reviewing the data, the analysis of the key design elements, and feedback from the Container Deposit Scheme Working Groups, the Advisory Committee members were invited to propose models for a NSW CDS. Committee members representing the beverage industry, local government and environment groups separately proposed Refund CDS models, by which a deposit and handling fee is paid at the point of sale and a refund provided when the empty container is returned to a collection point.

All three models were very similar in terms of most of the key design elements. The Advisory Committee therefore agreed that these models should be combined into a single option.

This model is detailed in 'Option 1' below.

The beverage industry representative also put forward a second model, proposed by the major beverage companies, called Thirst for Good, which aims to achieve litter reductions at a lower cost than a Refund CDS by building on existing litter reduction initiatives already being run by councils and charities.

The Thirst for Good model is described in 'Option 2' below.

It should be noted that both models will have costs and benefits. The scale of these costs and benefits will be assessed once the models are refined following the feedback from this Discussion Paper.

Option 1: Refund CDS

This option is an amalgamation of the three Refund CDS models proposed separately by three Advisory Committee members, including the beverage industry representative. Although the members developed their models independently, the proposed models were very similar. This option also has a number of similarities with the South Australian and Northern Territory schemes, but also some key differences.

This option proposes a NSW Refund CDS model that is based on a financial incentive of 10 cents, similar to that in the South Australian and Northern Territory schemes. Under this model, a consumer would pay an additional 10 cents on the price of a drink and receive it back if and when the empty container is returned to a designated collection site. Matching the South Australian incentive level would help to manage the risk of cross-border arbitrage between NSW and South Australia.

There would be several options for the community to return empty drink containers:

- They could redeem the container through a reverse vending machine. The machine would read the number of containers inserted and provide a docket, which would be redeemable for cash. Reverse vending machines could also be linked to other electronic payment systems, such as transport cards, loyalty cards or credit cards. Reverse vending machines would probably be located in urban areas, where there is a high level of away-from-home consumption. (If it is technically and practically feasible and will not affect the cost-effectiveness of the scheme, there could be an option for container returners to donate their 10 cents to charity at the point of redemption.)

- They could take the container to a local collection depot.
- They could continue to put containers in their household kerbside recycling system. The containers would be captured at the materials recovery facility (MRF) where recyclable materials collected through kerbside are sorted for recycling. If these containers are eligible for a refund, then the refund could potentially offset the cost of council waste services. These waste services costs are paid directly by home owners through their council rates and indirectly by renters through their rent.
- They could give their containers to a local school or charity, which would take them to a collection point to claim the refund.

The collection network would provide state-wide coverage.

To keep the cost of the scheme low, it would build on existing infrastructure where possible and encourage households to continue to use the existing kerbside recycling system. The scheme would use modern, best-practice technologies to minimise handling costs and reduce the risk of fraud (from claiming more than one refund on a single container) through the use of reverse vending machines and automated collection depots, where cost-effective.

A 'hub and spoke' solution would be used in regional and remote NSW. Multiple smaller collection depots in outlying areas would feed into larger regional collection 'hubs' where containers would be sorted, compacted and baled to save transportation costs, and then transported to a recycling facility. Existing infrastructure, such as MRFs could be used as hubs.

Retailers would not be obliged to take back containers, although they could choose to host a collection depot or a reverse vending machine if they wanted.

The use of reverse vending machine technology would not be mandatory. Instead, the choice of whether to invest in reverse vending machines or collection depots would be left to the market. Focusing on capturing containers used away from home would help determine the best place for investing in infrastructure.

Similar to the South Australian and Northern Territory schemes, this model would be based on an extended producer-responsibility approach. Individual drink manufacturers and importers would be obliged to meet specific container management requirements and would be able to fulfil these responsibilities through a producer responsibility organisation. However, unlike in South Australia and the Northern Territory, which allow multiple supercollectors to provide that service, a single organisation would run the scheme and would act as the clearing house for deposits. This would allow the collected containers to be sorted by material type only, rather than by brand, thus minimising the amount of handling required and reducing costs.

The main difference between the three container deposit models proposed by the Advisory Group members was in the type of organisation that would run the scheme. The local government and environment group models recommended that the scheme be run by a not-for-profit independent body with stakeholders involved in the decision-making process. This arrangement aims to minimise the risk of the beverage industry pursuing cost minimisation at the expense of public policy objectives and potentially undermining community confidence. The beverage industry recommended the scheme be run by a predominantly industry-controlled organisation to allow it to maximise cost efficiencies and reduce the costs paid by consumers.

All agreed that the drink manufacturers would hold the deposit until it was redeemed, so that there would be no pool of unredeemed deposits to manage. The scheme would essentially be a pay-as-you-go operation, with manufacturers asked to pay only for the number of containers returned for a refund (plus handling and administration costs, minus the sale value of the materials). This is similar to the South Australian and Northern Territory models.

All three models proposed the scope of containers to be covered by the scheme should be 150 millilitres to 3 litres. However, on reviewing the evidence of the types of containers predominantly in the litter stream, the Advisory Committee subsequently recommended:

1. The proposed scheme should cover 150 millilitres to 1 litre, with similar exemptions for milk, wine, spirits and juice as applied in South Australia.
2. The broader scope to 3 litres should be tested in a cost benefit analysis before a final decision on the scope of containers covered by the scheme is made.

In summary, the Refund CDS option relies on both preventive and reactive approaches to reduce the number of containers in the litter stream. The use of a reward for returning empty containers to a collection point provides an incentive to potential litterers to hold on to the container and return it to receive the reward. This prevents the container becoming litter in the first place. The reward also provides a reactive incentive for others to pick up and return containers if they do end up in the litter stream before they are broken up and further dispersed.

Based on the demonstrated effectiveness of similar Refund CDSs in Australia and overseas, the EPA estimate that this model would capture the majority of containers consumed in NSW and therefore significantly reduce the number of drink containers entering the NSW litter stream. Many of these schemes have been running for over thirty years and consistently delivered these types of results. There is therefore a high level of certainty that a NSW CDS would have a similar outcome.

Option 2: Alternative industry proposal - Thirst for Good

In addition to submitting a Refund CDS model, the Australian Food and Grocery Council member of the Advisory Committee submitted an alternative model, which was developed by the major beverage companies. This model stems from a strong concern by the beverage industry about the potential costs involved in implementing a Refund CDS. These costs would predominantly fall on consumers and would therefore potentially affect the sale of drinks. The beverage industry proposal aims to reduce the volume of litter in NSW at substantially less cost than a Refund CDS.

The industry proposal, called Thirst for Good, would build on existing infrastructure and current levels of investment in litter management, rather than replacing it. The aim would be to add infrastructure and resources where there is currently an under-investment, such as along highways, where the National Litter Index indicates the largest amount of drink container litter volume is found, and other litter hot spots.

The Thirst for Good proposal would be a $15-million annual investment by the beverage industry in a suite of programs aimed specifically at reducing litter across the state. It employs both preventive and reactive approaches to reducing litter and includes some programs that involve both financial and non-financial incentives to encourage the community to return empty containers. It also includes straight litter clean-up programs.

There are five programs within the Thirst for Good proposal:

- community cash for containers
- litter collectors
- litter bins
- reverse vending machines
- community education

Community cash for containers

The aim of this part of the proposal is to give community groups an incentive to collect drink containers.

The beverage industry would provide all 152 NSW local councils with a single trailer with a collection cage. The councils would then organise to lend the trailers to local community groups to collect empty containers. Once the cage is full (estimated at about 6000 containers per cage), it would be returned to the council and the community group would receive a $300 reward. The council would then take the containers to a local MRF or recycler to sell the materials to offset the council's administration costs for coordinating the use of the trailer. Trailers and cages would be leased by the industry, with maintenance and servicing costs included. Theoretically, a different community group could get to use the trailer each week to fill up over a weekend.

Essentially, this program would be using the $300 payment as an incentive to attract community groups into the program.

The main requirements of the program are that only drink containers are collected and the $300 is payable when the cage is full. Decisions about which community groups would be eligible and which groups would get the trailer at which times would be up to the individual council to decide.

Litter collectors

This part of the initiative is aimed directly at picking up litter along highways and in other locations that are not currently serviced by local governments or other private and public landholders. One hundred litter collectors would be hired by the industry from a labour hire agency, trained, and given all necessary personal protective gear. They would then be sent out in pairs, with a utility vehicle and all necessary equipment, to pick up litter along regional highways. The hire agency would manage them.

This program would aim to clean up all types of litter along highways, not just drink containers. According to the National Litter Index, highways have the highest volume of litter in NSW, with drink containers making up 48% of this volume.

Litter bins

The industry proposes to donate 2,000 new litter bins to local councils for use in litter hotspots where litter bins are not currently located. The industry would also provide funding for the maintenance and emptying of these bins. The industry would work with councils to identify appropriate locations. The aim would be to add to the number of bins in a council area, rather than replace existing council bins. These bins would therefore be in addition to the more than 53,350 litter bins currently in use by councils across NSW. This equates to an additional 3.75% bins state-wide, or 13 extra bins per council.

Similar to the litter collectors program, the litter bins would capture all types of litter, not just drink containers.

The use of litter bins is an important part of managing litter in public places. However, there is no direct correlation between the number of bins placed in public places and the amount of litter reduced. As indicated in the 1997 report *Understanding Littering Behaviour: A Review of the Literature* (Beverage Industry Environment Council 1997), 'there is no conclusive evidence that a paucity of bins will lead to littering' and 'simply increasing the number of bins does not always in itself diminish litter'. The effectiveness of additional bins is influenced by a

range of factors, such as placement, the presence of supporting signage, and education, among other factors. Industry would need to work with councils to ensure that these issues are addressed and that new litter bins would be placed in locations that maximise the collection of additional litter.

Reverse vending machines

The industry would roll out 100 reverse vending machines. These would go in areas with high away-from-home consumption rates. The machines would offer a non-financial incentive to encourage consumers to return empty containers to them. This could include, for example, a chance to win prizes such as tickets to the National Rugby League grand final or movie tickets. The beverage industry would engage with councils and community groups to identify litter hotspots that would benefit from this type of infrastructure. The industry would cover all costs associated with the machines, including leasing, maintenance, cleaning and repair costs, as well as the collection and transport of materials.

The rollout of 100 reverse vending machines would have a similar preventive and reactive effect as the Refund CDS option, which is also modelled on the use of reverse vending machines. As with the Refund CDS option, containers collected through these reverse vending machines would not be exclusively littered containers or containers that would otherwise have been littered. Instead, a proportion would be containers that would otherwise have ended up in existing litter bins or in the household kerbside system.

Community education

The beverage industry would develop and implement a community education program to support the various Thirst for Good programs. This would include, for example, education on how the community cash for containers program would work and how community groups could get involved; information on how the litter collectors program would work and its key outcomes; encouragement to use the new litter bins; and information on how the reverse vending machines would work, where they could be found, and the types of containers that they would accept. It would also need to develop culturally and linguistically appropriate communications strategies and resources to successfully reach people from different cultural and language backgrounds.

Community education campaigns can be effective preventive approaches to reducing litter. Campaigns that target specific littering behaviours can help to raise the 'social cost' of littering by helping people understand the true environmental cost of littering. Education campaigns also change social attitudes towards littering and can create social pressure on those people that do not change their behaviour (a form of social or psychological cost).

The effectiveness of the Thirst for Good community education program would depend to a large extent on how the other Thirst for Good programs are designed and implemented, how well they target littered containers, and how the education program is sustained over time.

Key questions

- Do you support the introduction of a container deposit scheme in NSW?
- If so, what type of container deposit scheme do you support?
- Do you support a Refund CDS?
- Do you support Thirst for Good?

References

Anomaly/UM 2015, *'Hey Tosser' Post Campaign Research Results*.

A Prince Consulting 2015, *Beverage container audit of kerbside bins, litter bins and stormwater pits*, a report for the NSW Environment Protection Authority, Sydney.

Beverage Industry Environment Council 1997, *Understanding Littering Behaviour: A Review of the Literature*.

City of Sydney 2014, *Project Recycler; Reverse Vending Machines* (unpublished).

City of Sydney 2015, *Innovative ways to increase public place recycling and raise awareness of litter issues*, conference presentation, KNSW Congress (unpublished).

D Hog et al, 2015, *A Scottish Deposit Refund System,* Final Report to Zero Waste Scotland, Eumonia Research & Consulting, Bristol, UK, p. 11.

D West, J Angel, R Kelman, A Lazarro, *Independent Review: The Northern Territory Container Deposit Scheme,* a report for Northern Territory Government through the Department of Natural Resources, Environment, the Arts and Sport, Boomerang Alliance, Darwin.

Daedal Research 2015, *Global Reverse Vending Machine (RVM) Market: Trends and Opportunities (2014–2019).*

Environment Protection and Heritage Council 2010, *National Waste Report 2010*, Australian Government, Canberra.

EPA South Australia, *Container Deposits*, available at http://www.epa.sa.gov.au/environmental_info/container_deposit [20 November 2015].

EPA South Australia 2015, *Container Deposit Legislation – a South Australian environmental success story*, Adelaide.

EPA South Australia 2015, *Container Deposit Scheme – which beverage containers can I get a refund on?* Available from http://www.epa.sa.gov.au/environmental_info/container_deposit/faqs [20 November 2015].

Hardesty BD, Wilcox C, Lawson TJ , Lansdell M, Van der Velde T 2014, *Understanding the Effects of Marine debris on Wildlife*, a final report for Earthwatch Australia, CSIRO, Dickson, ACT, p. 20.

Harrison Research 2012, *CDL Awareness & Support Research Report*, a final report to EPA South Australia, Adelaide.

Hudson Howells 2005, *Collection Industry Arrangements for Used Beverage Containers under Container Deposit Legislation*, a consultancy report for EPA South Australia, Adelaide.

Huffman K, Grossnickle W, Cope J, Huffman K 1995, *Litter reduction: a review and integration of the literature,* Environment and Behaviour, 27(2): 153–83.

Impact Environmental, 2015, *Understanding the Potential Impacts of a CDS on Local Government Kerbside Collections,* a report for Local Government NSW, Port Macquarie, NSW.

Keep Australia Beautiful 2015. *National Litter Index Annual Report 2014/15*, Keep Australia Beautiful National Association.

KMH Environmental 2015. *Potential Impact of CDS on NSW Packaging Resource Infrastructure*, a preliminary report for the NSW Environment Protection Authority, NSW.

Law, J, Martin, E.A., A Dictionary of Law (8th edition), 2009, available from http://www.oxfordreference.com/view/10.1093/acref/9780199551248.001.0001/acref-9780199551248 [9 November 2015]

Lawson, K 2015. *Canberra likely to follow NSW into refunds for drink containers*, Canberra Times, available from http://www.canberratimes.com.au/act-news/canberra-likely-to-follow-nsw-into-refunds-for-drinks-containers-20150105-12i7m0.html [9 December 2015].

MRA Consulting Group 2015, *Litter Costs to the NSW Economy*, preliminary report for the NSW Environment Protection Authority, Drummoyne, Sydney.

Northern Territory EPA, *Regulated Containers*, available from http://www.ntepa.nt.gov.au/__data/assets/pdf_file/0007/135754/factsheet_regulated_containers.pdf [20 November 2015].

Northern Territory EPA, Industry Information and Approvals, available from http://www.ntepa.nt.gov.au/container-deposits/industry [20 November 2015].

National Environment Protection Council Service Corporation 2014, P*ackaging Impacts Decision Regulation Impact Statement,* Canberra.

NSW EPA 2014, D*omestic Kerbside Waste and Recycling in NSW: Results of the 2011 Waste Audits,* NSW Environment Protection Authority, Sydney.

NSW EPA 2015, *Waste Avoidance and resource Recovery Strategy*, available from http://www.epa.nsw.gov.au/wastestrategy/warr.htm [9 December 2015]

NSW Government 2015, *State Priorities,* available from https://www.nsw.gov.au/making-it-happen [9 December 2015]

P Bragge, B Wright 2015, *Effectiveness of Container Deposit Recycling Schemes: A Rapid Review of the Literature*, a report for the NSW Environment Protection Authority, BehaviourWorks Australia, Monash Sustainability Institute, Monash University, Victoria.

Queensland Government 2015, Department of Environment and Heritage Protection, *Container Deposit Scheme Advisory Group*, available at https://www.ehp.qld.gov.au/waste/container-deposit-scheme.html [9 December 2015]

Rawtec 2015, Investigations into Critical Success Factors for Reverse Vending Machines, a final report for the NSW Environment Protection Authority, Rawtec, South Australia.

Spehr K, Curnow R 2015. *Litterology.* Environment Books, Frankston, Victoria, p. 87