Government of **Western Australia**
Department of **Water and Environmental Regulation**

Consultation Regulation Impact Statement

Western Australian Container Deposit Scheme

Department of Water and Environmental Regulation
August 2018

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Summary

This consultation paper provides a preliminary assessment of the costs and benefits of the proposed container deposit scheme (CDS) and seeks comment on those costs and benefits.

It is estimated that around 1,800 million beverages are consumed in Western Australia, every year. While most of those beverages come in recyclable containers (such as drink bottles and cans) many of them end up in landfill or become litter.

The Western Australian Government is committed to implementing a CDS from 2020. The CDS will reduce litter, increase recycling, protect the environment and help engage the community in active and positive recycling behaviours.

Guided by the results of public consultation undertaken in 2017, Western Australia's proposed CDS aligns with the state's waste strategy and litter strategy and container deposit schemes in South Australia, New South Wales, Queensland, Northern Territory and the Australian Capital Territory.

Key features of the proposed CDS are:

- a ten cent refund would be applied to eligible drink containers between 150 millilitres and 3 litres; and
- all eligible containers will display a refund mark.

The cost benefit analysis results indicate that the Western Australian CDS will deliver net present value benefits of $153 million to the economy. The benefit-cost ratio result is 1.37, indicating that $1.37 of benefits will result for every $1 of cost.

The analysis in this paper suggests that there will be net benefits of the proposed CDS to Western Australia driven by significant environmental benefits and a small net cost on the beverage industry.

The estimated net benefits are not sensitive to changes in key assumptions, aside from the community's willingness to pay for reductions in litter and increased recycling. It is noted that these results are comparable to studies in other jurisdictions.

Feedback on the proposed container deposit scheme closes at 5:00pm on 9 September 2018 and should be submitted to cds@dwer.wa.gov.au.

1 Statement of the problem

It is estimated that around 1,800 million beverages are consumed in Western Australia, every year (KAB, 2016). While most of those beverages come in readily recyclable containers (such as glass, plastic, aluminium and cardboard), many of end them up in landfill or become litter.

Beverage containers make up 45 per cent[1] of the volume of litter in our streets, waterways, parks and on roadsides (KAB, 2016) and they are a highly visible part of the waste stream.

Discarded containers can create environmental risks, including by breaking down over time, contributing to the pollution in waterways and other parts of the environment and to ingestion by wildlife.

Data from other jurisdictions shows that the introduction of a CDS is likely to significantly reduce the volume of litter and increase recycling rates. In South Australia, where there has been a CDS for over 40 years, in 2015-16 beverage containers made up 17 per cent of litter by volume and in the Northern Territory, which introduced a CDS in 2012, beverage containers made up 24 per cent of litter by volume.[2]

This consultation Regulation Impact Statement (RIS) examines the costs and benefits of a proposed CDS in Western Australia, key components of which are designed to align with the existing and proposed schemes in other Australian jurisdictions.[3]

1.1 Market failure

Market failures are an important consideration when assessing the case for government intervention. Markets take account of many of the costs and benefits of managing waste, providing incentives to reduce waste and recycle more.

Market failures such as the complexity of considering environmental impacts, including the ingestion of container plastics by wildlife and the degradation of amenity from litter, in economic models can reduce the effectiveness of incentives.

The market failures associated with beverage containers include:

- *Weak incentives to recycle*

  Consumers of packaged products do not have a strong financial incentive to recycle their residual packaging or dispose of it through the regular disposal systems.

  In addition, the producers of packaged goods do not bear the whole cost of disposing of packaging nor do they benefit from the value that arises from recycling instead of disposing of materials to landfill. This means that they are often faced with incentives to increase the use of non-recyclable materials to enhance attractiveness and presentation.

1 Analysis of National Litter Index survey data 2010-16 for litter volumes.

2 Ibid.

3 The proposed CDS excludes containers below 150 millilitres. This aligns with current and proposed schemes in New South Wales, Queensland and the Australian Capital Territory, however differs from South Australia's and the Northern Territory's CDS's – which include these containers.

- *Externalities*

  Littering negatively affects social amenity, human health (for example, through toxins and broken glass) and the environment (for example, through animals' ingestion of plastic).

The cost of cleaning up litter is mostly borne by governments, not the producers of packaged goods. As such, the producers do not have a financial incentive to minimise impacts when packaging is littered. Likewise, the incentives faced by consumers are mixed (externalities).

These market failures can result in two undesirable outcomes:

- beverage containers become litter; and
- containers that could be recycled instead go to landfill.

Australian governments often intervene in markets to improve their efficiency and to achieve economic, social and environmental benefits. CDS are a mature and proven product market intervention.

The cost of litter

Litter is waste that is improperly disposed of outside of the regular disposal system. In an economic context, it is best described as a side-effect of producing goods and services.

The need for policy intervention to prevent littering arises because several social costs associated with littering are inadequately priced by the producers and consumers of beverage containers; that is, they are an externality. Consequently, those costs are borne by society and the clean-up costs are borne by ratepayers.

The costs of littering that are imposed on the economy and community include:

- *Economic costs*

  The Western Australian Litter Prevention Strategy 2015-2020 identifies that in 2001 state and local governments spent approximately $16 million a year on cleaning up litter in Western Australia and estimated that clean-up costs had significantly increased during the past 12 years. This is money that could be spent on other things.

- *Environmental damage*

  Litter damages natural environments and harms terrestrial and riverine wildlife.

- *Visual costs*

  Litter is unsightly and attracts more litter, adversely affecting amenity and the environment.

- *Human costs*

  Litter such as broken glass and syringes can injure people. The presence of litter makes it more likely that other antisocial behaviours will occur, such as graffiti and property damage.

- *Resource costs*

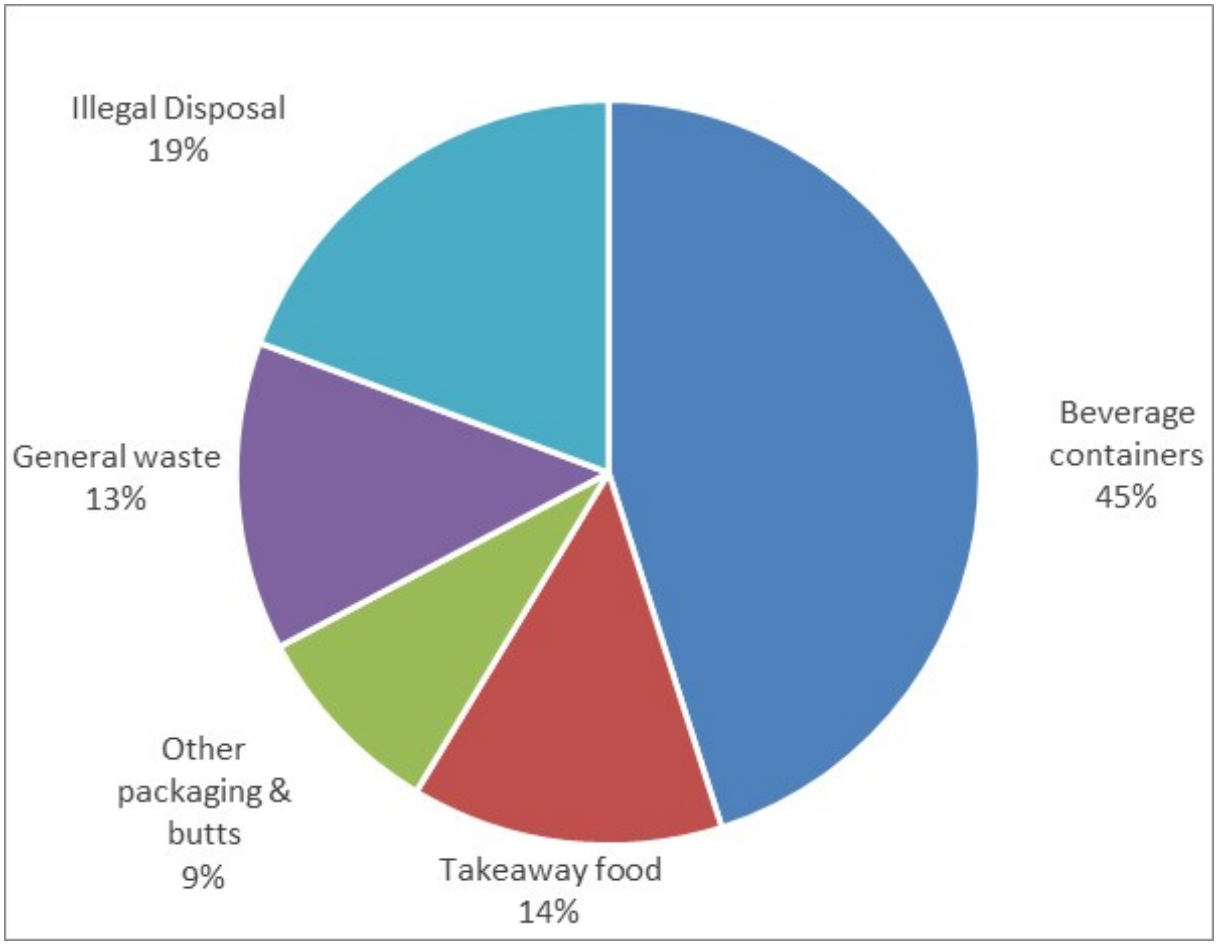
  Easily recyclable and valuable resources, such as beverage containers, are lost when people litter. Even if littered items are subsequently collected, they are often too contaminated to be recycled.

The cost of litter removal to minimise harm is borne largely by the Western Australian Government, as well as volunteer community groups. Importantly, the costs of littering are not borne by producers of packaged goods, except to a limited extent, and those producers do not have a direct incentive to design their packaging to minimise its impact when littered. This is an example of a market failure.

Beverage container litter in Western Australia

The National Litter Index found that beverage containers make up the largest proportion (45 per cent) of litter volume in Western Australia (Figure 1) over the period from 2010 to 2016.

Figure 1: Volume of litter in Western Australia, by category



Source: *Analysis of national litter index data*, November 2010 to May 2016

Beverage container litter in Western Australia is a function of beverage container consumption and the rate at which used containers are not littered.

It is estimated that approximately 1,800 million beverage containers were used in Western Australia in 2017, using around 156,000 tonnes of container packaging.[4] Of those containers, it is estimated that 690 million (38 per cent) are likely to have been recycled, 1,050 million (58 per cent) ended up in landfill, and the rest (80 million, four per cent) are likely to have directly entered the litter stream.[5]

While most beverage containers are disposed of appropriately, the extremely large number of containers used results in a significant litter problem. Allowing for the continuation and stabilisation of trends in litter reduction evidenced in recent years, analysis by Marsden Jacob for this report estimates that more than 3.1 billion additional beverage containers will have entered the litter stream by the end of 2036.

In 2006, the Productivity Commission's Inquiry into Waste Management found that (PC 2006, Finding 8.5, p. xlix):

> Regulation and enforcement for litter and illegal dumping are necessary but not sufficient to achieve the best result for the community. Accompanying measures, such as education, community involvement and moral suasion, can make regulation more effective.

Littering is likely to continue to be an ongoing problem that is best addressed using a range of policy initiatives.

1.2 Beverage container disposal in Western Australia

The contents of approximately 1,800 million beverage containers are consumed each year in Western Australia.

Based on information from other states, between 20 and 30 per cent of this is consumed away from home (that is, up to 540 million containers).

Previous analysis by Marsden Jacob Associates found that containers that are consumed away from home are more likely to either become litter or be disposed of to landfill (MJA, 2013). Reasons for this include the fact that litter bins tend to result in highly contaminated litter streams – which therefore go to landfill.

1.3 Requirement for a regulatory impact statement

The Western Australian CDS requires an amendment to the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act) and its regulations. These legislative changes trigger the need for a regulatory impact statement (RIS) in line with the *Regulatory Impact Assessment guidelines for Western Australia* (DTF, 2010).

In addition, the proposed CDS would require an exemption under the *Mutual Recognition Act 1992* (Cwlth) (MR Act) and the *Trans-Tasman Mutual Recognition Act 1997* (Cwlth) (TTMR Act), as set out below. For that to occur, a RIS is required for consideration by the Council of Australian Governments (COAG).

This consultation RIS, and subsequent decision RIS, aim to fulfil the requirements of both regulatory bodies.

[4] Marsden Jacob Associates, *Estimate of the total number and eight of containers sold in Western Australia 2018*, 2018, unpublished.

[5] Marsden Jacob Associates, *Modelling of the disposal fate of calculations, 2018*, unpublished.

Mutual recognition principles

The MR Act and the TTMR Act apply as laws of Western Australia by virtue of the *Mutual Recognition (WA) Act 2010* and the *Trans-Tasman Mutual Recognition (WA) Act 2007*, respectively.

In relation to goods, the MR Act and TTMR Act apply the 'mutual recognition principle'. The principle, as explained in section 9 of the MR Act, provides that goods produced in or imported into one state, that may be lawfully sold in that state, may, by virtue of the MR Act, be sold in another state.

The Trans-Tasman mutual recognition principle, as explained in section 10 of the TTMR Act, is that goods produced in or imported into New Zealand, that may be lawfully sold in New Zealand, may by virtue of the TTMR Act be lawfully sold in an Australian jurisdiction.

These Acts provide that sales of goods to which the principle applies do not require compliance with 'further requirements' of a type set out in the Acts that might otherwise be required under the laws of the importing jurisdiction. Those requirements include quality or performance standards, inspection requirements and labelling standards.

The amendments to the WARR Act will include a requirement that all eligible beverages sold in Western Australia carry a label that meets the requirements prescribed in the regulations. Further, beverage suppliers will need to obtain an approval for their beverage containers and suppliers that bring containers into Western Australia will need to enter into a supply arrangement with the CDS scheme coordinator appointed by the Government. These requirements, and some other elements of the scheme, may be considered to impose 'further requirements' under the MR Act or TTMR Act. For this reason, an exemption is required under the MR Act and TTMR Act.

These make provision for specific goods or laws to be permanently exempted from their scope by their inclusion in schedules to the MR Act or TTMR Act. The process for adding permanent exemptions requires the relevant ministerial council to seek the unanimous agreement of the COAG to the exemption, the making of regulations by the Commonwealth to amend the relevant schedules to the MR Act and the TTMR Act and the prior signification of consent to the amendments by all jurisdictions by Gazette notice.

The permanent exemption of the Western Australian CDS under the MR Act would follow the precedent set by the Northern Territory CDS, which was exempted in 2013, and the New South Wales CDS, which was exempted in November 2017.

1.4 Scope of the proposed mutual recognition exemption

The wording of the exemption is yet to be determined, but the exemption would apply to:

1) the relevant parts of the WARR Act;
2) all other provisions of that Act, to the extent that they relate to the CDS established by that part; and
3) regulations made under that Act, to the extent that they relate to that scheme.

2 Objectives of government action

The Western Australian CDS discussion paper (DWER 2017a) states that the objectives of the Western Australian Government action are to:

- reduce litter;
- increase recycling rates;
- protect the environment; and
- help engage the community in active and positive recycling behaviours.

The proposed objectives will complement the Western Australian waste strategy and litter prevention strategy.

The CDS has been designed to support the achievement of the strategic objectives in the waste strategy which is currently being reviewed[6]. The strategy's proposed revised objectives are to:

- minimise the environmental impact of waste;
- reduce waste generation; and
- increase the recovery of resources from waste.

Additionally, efforts have been made to ensure that key elements of the CDS are aligned with other jurisdictions to simplify implementation; address competition and constitutional issues; reduce costs to industry; and provide consumers with a consistent experience.

Key features of the proposed Western Australian CDS that align with existing and proposed schemes include:

- the types of containers that are eligible for refunds;
- the types of containers that are excluded from the CDS;
- the refund amount; and
- the need for a refund mark to identify eligible containers.

[6] www.wasteauthority.wa.gov.au/about/waste-strategy/review-of-waste-strategy (accessed March 2018).

3 Options to address the problem

Through the policy development and consultation processes, the Western Australian Government identified and assessed a range of options to reduce the prevalence of beverage containers in litter and increase the recovery of resources through recycling.

By choosing a CDS that aligns closely with the scheme introduced in New South Wales and those proposed for Queensland and the Australian Capital Territory, Western Australia has sought to minimise the costs to the beverage industry and avoid confusion for both industry and consumers.

The two options considered in detail in this RIS are the same as those considered by other COAG members:

- Option 1: No change – no Western Australian CDS and/or no exemption of the Western Australian CDS.
- Option 2: Development of a CDS for Western Australia and a supporting permanent exemption of the Western Australian CDS.

The Western Australian Government considered alternative approaches including non-regulatory options proposed by industry; a national harmonised approach; and an alternative configuration of the CDS in identifying these two options.

An industry-proposed non-regulatory option[7] was found to be inadequate in meeting the Western Australian Government's litter reduction objectives and to pose implementation problems.

A national CDS is not currently on the national policy agenda and so was not considered feasible.

A variation of the CDS requiring retailers to accept returned containers was found in primary analysis to deliver similar benefits to Option 2, but at a much higher cost.

As further detailed below, only Option 2 is considered viable.

3.1 Option 1: No Western Australian CDS

Under Option 1 Western Australia does not implement a CDS and/or COAG members do not grant an exemption for the Western Australian CDS under the MR Act and the TTMR Act.

As this would result in the scheme not being implemented, this option also forms the base (business-as-usual) case against which Option 2 can be assessed.

Because Option 1 maintains the status quo, it would not achieve the reform objectives, but would also not impose any additional costs. However, it would result in ongoing damage by littering, resulting in environmental costs.

3.2 Option 2: Development of Western Australian CDS

Under Option 2 Western Australia implements a CDS and COAG members grant a permanent exemption of the Western Australian CDS under the MR Act and TTMR Act.

[7] 'Thirst for good' (AFGC 2016). This is discussed in section 3.3

This would allow Western Australia to implement the CDS under an amended WARR Act.

There is some precedent for this as both New South Wales and the Northern Territory have previously been issued exemptions for their CDS.[8]

The Western Australian Container Deposit Scheme

The Western Australian Government has worked with other jurisdictions to align its proposed CDS to their schemes wherever possible.

The Western Australian CDS will allow anyone that returns an empty eligible beverage container to an approved Western Australia collection depot or reverse vending machine to receive a 10 cent refund.

In summary, the features of the scheme are:

- Beverage containers of between 150 millilitres and 3 litres in volume purchased in Western Australia can be returned to refund points for a refund, with some exceptions (which are outlined below). These exceptions are similar to the exceptions in the NSW, South Australian and Northern Territory CDS, to aid consistency.
- The refund amount is ten cents for eligible drink containers that are returned to refund points. This amount is consistent with the refund in South Australia, New South Wales and the Northern Territory and proposed for the Australian Capital Territory.
- All eligible containers are required to display an approved refund mark to advise consumers of the eligibility of the container. It is envisaged that a common refund mark will be used. Many containers sold in Western Australia already carry markings used in South Australia and the Northern Territory.[9]
- Beverage suppliers (manufacturers, importers, wholesalers or retailers) that bring eligible containers into Western Australia will be responsible for funding the refund and associated costs.
- Eligible containers in kerbside recycling will be able to be redeemed. The proposed scheme will allow material recovery facilities to use an approved method for accurately estimating the number of containers recovered in the facility and to claim the refund from the scheme coordinator. Under the proposed approach, a material recovery facility would only receive the refund amount and would not be able to claim a handling fee. It would not need to separate out containers or substantially change its existing recovery processes. The proposed scheme would also provide a regulatory incentive for material recovery facilities and local governments to share any benefits that may result from these arrangements.
- The proposed governance and administrative arrangements for the CDS are:
  - The Minister for the Environment will be responsible for the administrative and governance arrangements.
  - A scheme administrator will be responsible for selecting and contracting with the industry co-ordinator, approving eligible beverage containers, monitoring

[8] As the CDS in South Australia predates the Mutual Recognition Act, it does not require an exemption.

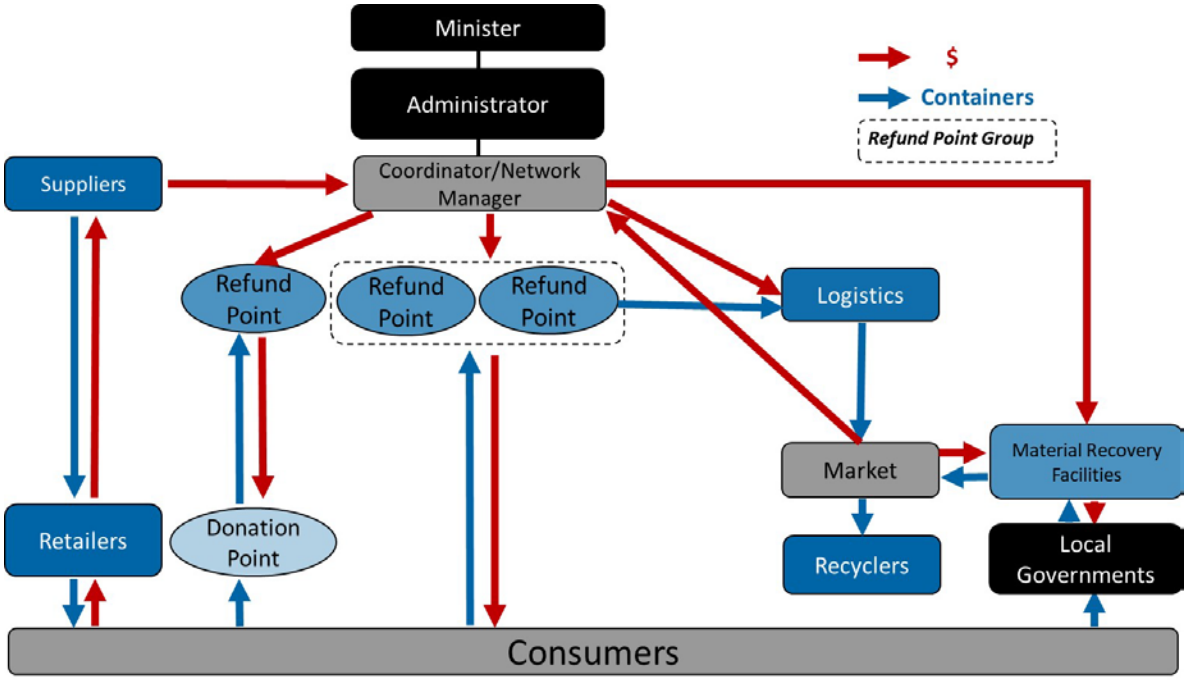
[9] Containers are labelled by beverage industry to meet existing requirements in other jurisdictions.

compliance and reporting to the Minister for Environment. It is envisaged that the Department of Water and Environmental Regulation (DWER) will undertake this oversight role.

- The scheme administrator's role will also include managing the scheme's financial arrangements (including the allocation of scheme costs to beverage suppliers), establishing a network of refund points through arrangements with network operators, monitoring and reporting against the scheme's requirements and targets and informing consumers about the scheme.

Figure 2 provides a conceptual model of the administrative arrangements of the Western Australian CDS. The details of the roles and structures are being finalised in consultation with a CDS advisory group which includes representatives from retailers, beverage manufacturers, recycling and waste industries as well as local government, community and environmental representatives.

Figure 2: Conceptual model of the Western Australian CDS administrative arrangements



Source: DWER (2017)

Containers to be included

The CDS will apply to most beverage containers between 150 millilitres and 3 litres in volume. The scope of containers to be covered by the scheme will be defined in the regulations made under the WARR Act[10] and be consistent with the scope of containers covered by the existing New South Wales, South Australian and Northern Territory

10 The definition of containers will be provided in the WARR Act, with the scope of eligible containers established through the Act's regulations.

CDSs, as well as the proposed schemes in the Australian Capital Territory and Queensland.[11]

The containers to be **excluded** from the CDS include:

- plain milk (or milk substitute) containers;
- flavoured milk containers of one litre or more;
- pure fruit or vegetable juice containers of one litre or more;
- glass containers for wine and spirits;
- casks (plastic bladders in boxes) for wine and casks for water of one litre or more;
- sachets for wine of 250 millilitres or more
- containers for cordials and concentrated fruit and vegetable juices; and
- containers for registered health tonics.

Beverage containers that are excluded from the scheme are those that are more likely to be consumed in the home and are therefore less likely to be littered.

Table 1 shows that, regardless of the type of material, most containers used in Western Australia in 2017 are proposed to be covered by the scheme.

Table 1: Containers to be covered by the Western Australian CDS (2017 financial year)

Container material	Number of containers in the CDS (150mL – 3L)	Proportion of total covered by CDS (150mL – 3L)	Weight (tonnes) of containers to be covered by the CDS (150mL – 3L)
Liquid paperboard	31,289,547	49.19%	652
Glass	373,018,069	70.07%	82,893
PET	375,027,510	91.37%	12,932
HDPE	19,225,126	6.32%	961
Aluminium	501,439,748	100.00%	7,163
Total	**1,300,000,000**	**71.74%**	**104,601**

PET = polyethylene terephthalate; HDPE = high-density polyethylene.

Source: Marsden Jacob Associates, 2018.

Refund points and infrastructure requirements

The Western Australian CDS is likely to make use of the existing network of community recycling centres, depots and material recovery facilities in Western Australia. However, some additional depots and reverse vending machines will open to receive the empty containers.

[11] Note, while the proposed scope is consistent with that of South Australia's and the Northern Territory's CDS's, it will not include containers below 150 millilitres.

Due to the size and population spread in Western Australia, there will be both full-time and 'flexible' refund points. Flexible points include regular part-time, mobile refund points and seasonal refund points. Seasonal refund points are targeted at tourist areas, where the population increases significantly at specific times of the year.

Based on the approach adopted in New South Wales and Queensland, DWER estimates that there will be a minimum of 192 refund points distributed across the state: 101 full-time refund points and 91 flexible refund points.[12]

3.3 Other approaches considered

Two alternatives that were previously considered: an industry proposal and a national packaging recovery scheme. These alternatives are not viable options for the reasons detailed in this section.

An industry proposal: 'Thirst for good',

As part of consultation on the New South Wales CDS, the beverage industry proposed an alternative litter collecting approach, which was considered as an option instead of the final CDS. Called 'Thirst for good' (AFGC 2016). The approach was non-incentive based and stemmed from industry concerns about potential costs involved in implementing a refund-based CDS, which would predominantly fall on the consumer (New South Wales Government 2015).

The industry proposal aimed to build on existing infrastructure and current levels of investment in litter management, rather than replacing it. It proposed a $15 million annual investment by the beverage industry to enact programs aimed at reducing litter. The five elements in the proposal were:

- 'Cash for Communities'—one trailer for container collection per council (152 in total);
- 100 litter collectors;
- 2,000 litter bins for local governments to use in litter 'hotspots';
- 100 reverse vending machines in public areas where large numbers of drinks are consumed; and
- a community education program to change behaviour and reduce littering over time.

The litter collectors were the key litter reduction element of the proposal. The approach involved engaging around 100 litter collectors to complete the proposed task of cleaning 6,406 kilometres of highways and industrial roads eight times a year. It was proposed that the collectors could target litter 'hotspots' that were not currently serviced by waste collection.

As part of a review of the proposal, road access and the suitability of locations for litter collection were reviewed.

The review found several issues:

- Discussions with the Roads and Maritime Services confirmed that litter collectors would not be granted access to urban motorways, urban freeways and rural

[12] This estimate is based on a full-time refund point for each 20,000 people and a flexible refund point for each centre with a population over 500 people. In addition, there is likely to be many donation points, e.g. at surf clubs or other non-profit community organisations.

freeways. Litter pickers would be able to access other roads, but traffic control plans would first need to be developed and approved.

- Accessing other roads would be conditional on traffic management requirements being met, including reducing the speed limit to 40 kilometres per hour (which would result in travel time impacts). A second vehicle may have been needed to slow down or alert drivers to maintenance activity ahead, and workers would have needed to be appropriately trained to mitigate occupational health and safety risks, such as vehicle-related, environmental, hazardous litter and other hazards. Those hazards include exposure to a harsh climate; slips, trips and falls; hazardous litter, such as asbestos; hazardous wildlife, such as snakes and spiders; and risk relating to passing vehicles.
- Depots would have been needed to store the vehicles and equipment, because the vehicles would have required specialised signage and lighting. Moreover, additional time and resources would need to have been allocated to the litter disposal task.

As a result of that review, revised estimates indicated that a significantly larger workforce (approximately 210 staff) would be needed to complete the industry-nominated task of 'cleaning up each of these areas eight times per year'.

As a part of the New South Wales process, independent consultants considered the potential to increase the number of litter collectors to provide state-wide litter reduction outcomes. The consultants estimated that a collection team of approximately 1,500 litter collectors would be needed to cover an additional 62,000 kilometres of rural highway and secondary roads (the estimated relevant road length) six times a year. Additional vehicles and depots would also be needed.

This alternative was considered in detail in previous consultation documents and in a cost-benefit analysis. However, the proposal would not achieve the policy objective and was found to have substantial problems, such as posing significant health and safety risks for litter pickers. Finally, the proposal was found to have a benefit-cost ratio around one-tenth of the proposed CDS.

The Western Australian Government reviewed this alternative proposal and considered that concerns raised by the NSW Government would be exacerbated in the Western Australian context, because of the geographic scale and distributed population of the State. As a result, the proposal was considered to not be viable, and is not considered quantitatively in this RIS.

National packaging recovery scheme

A nationally harmonised approach to packaging (whether a CDS or another strategy) would be an alternative to the proposed state-operated CDS.

A national packaging strategy was previously considered by COAG and was the subject of a consultation RIS and a decision RIS (NEPC 2014). The RIS was considered by environment ministers in April and December 2014, but no consensus was reached on suitable reforms (NEPC undated).

As a result, a national scheme will not be introduced in the foreseeable future. For this reason, this alternative is considered to not be viable, and is not considered quantitatively in this RIS.

In principle, the Western Australian Government supports a national CDS and has sought to align the design of the proposed scheme with existing Australian schemes, including in relation to refund marks and amounts.

4 Impact analysis

4.1 Cost-benefit analysis

A cost-benefit analysis was undertaken to assess the net economic impacts of the Western Australian CDS. The analysis compared the base case (no reform) scenario against the introduction of the CDS.

Assumptions and scope

General assumptions underlining the analysis were as follows:

- The base year of the appraisal is the 2018 financial year and the assessment is conducted over a 20 year period.
- Prices and results are in 2017 dollars unless otherwise indicated.
- The evaluation period is 20 years from the 2018 to 2037 financial years.
- The discount rate applied is seven per cent (real) and sensitivity testing is applied at three and 10 per cent.
- The development period for the scheme is during 2018-19, and the scheme commences in mid-2019.

The cost benefit analysis was undertaken using a geographical scope of Western Australia. Some broader impacts identified in the distribution analysis (Section 4.5) and the qualitative consideration of effects outside Western Australia (Section 4.6) were considered.

The results of the cost benefit analysis are presented using two key metrics:

- the net present value, which is the present value of economic benefits delivered by the CDS less the present value of the economic costs incurred; and
- the benefit-cost ratio, which is the ratio of the present value of economic benefit to the present value of economic costs.

The net present value measures the expected benefit (or cost) to society of implementing the policy and is expressed in monetary terms, whereas the benefit-cost ratio identifies the option that provides the highest benefit per unit of cost.

The cost benefit analysis results indicate that the Western Australian CDS will deliver net present value benefits of $153 million to the economy. The benefit-cost ratio result is 1.37, indicating that for every $1 of cost, $1.37 of benefits will result (Table 2).

Table 2: Cost–benefit analysis results

Variable	Present value results
Incremental cost (present value)	$412 million
Incremental benefit / avoided cost (present value)	$565 million
Net present value	**$153 million**
Benefit-cost ratio	**1.37**

Source: Marsden Jacob Associates, 2018.

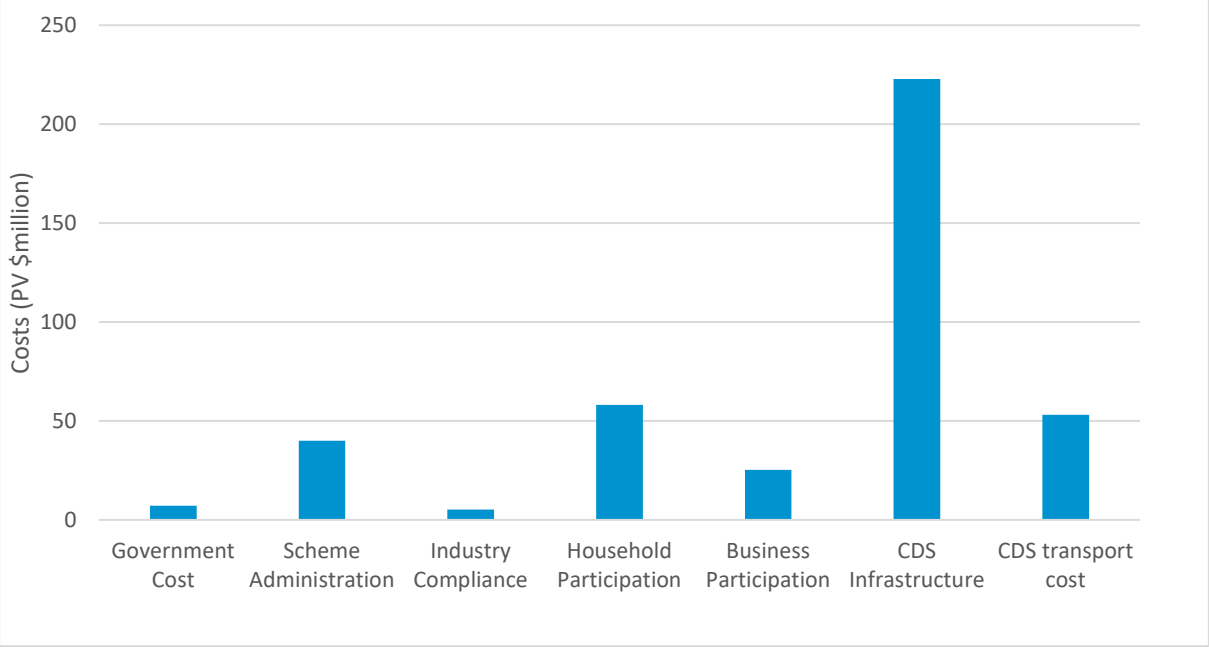
Costs

Cost outcomes from the cost benefit analysis are divided into several broad categories:

- scheme design and administration costs, including avoided costs (government);
- scheme administration and coordination (scheme coordinator and network operator);
- business compliance costs (beverage industry);
- household participation costs;
- business participation costs;
- container redemption infrastructure costs (refund points and reverse vending machines); and
- processing and transport costs associated with containers redeemed through the CDS.

Figure 3 shows the magnitude of the each of the cost outcomes.[13] Further detail on each of the cost items and their underlying assumptions is provided in the Appendix.

Figure 3: Summary of cost outcomes ($ million, present value)



Source: Marsden Jacob Associates, 2018.

[13] The Technical Appendix provides detailed discussion of the assumptions used in the cost benefit analysis.

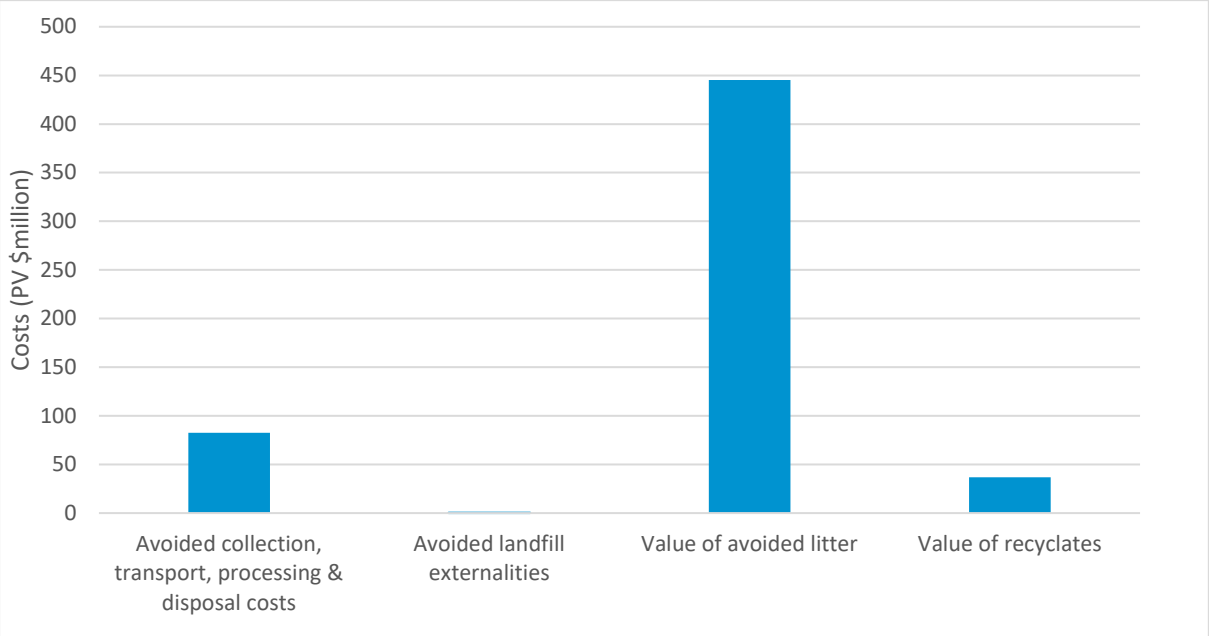
Benefits (avoided costs)

Benefit outcomes from the cost benefit analysis include:

- avoided waste collection, transport, processing (at material recovery facilities for recyclables) and/or disposal to landfill costs (incurred by local governments and passed through to ratepayers);
- avoided landfill externalities;
- avoided litter costs; and
- the value of resources recovered through recycling.

Figure 4 shows the magnitude of each of the benefit outcomes.[14] Further detail on each of the benefits items and their underlying assumptions is provided in the Appendix.

Figure 4: Summary of benefit outcomes ($ million, present value)



Source: Marsden Jacob Associates, 2018.

Risks

A RIS is required to identify potential risks of the proposed reform. As the proposed CDS is based on existing programs that are used in other States and Territories in Australia, it is considered to be low risk. It is also noted that the recent consultations on CDSs in New South Wales and the Australian Capital Territory did not identify significant risks for any stakeholder groups.

[14] The Technical Appendix provides detailed discussion of the assumptions used in the cost benefit analysis.

4.2 Limitations

In this analysis, it has not been possible to quantify all the benefits and costs. Also, as in all projection-based analyses, there are uncertainties in the data and projections.

Unquantified benefits

Several potential economic benefits of implementing options are not directly valued in markets. Because of this, it can be difficult to ascribe dollar values, or at least values that provide a true reflection of their economic value, to those benefits.

In the cost benefit analysis, it has not been possible to assign values to:

- avoided environmental externalities due to reduced resource depletion (although some costs are captured in the value of recyclates);
- specific reductions in riverine and marine litter, because there is a lack of data on this issue;[15] and
- broader benefits of changed behaviour.[16]

Broader benefits of behavioural change include flow-on benefits to other litter sources because of reduced beverage container litter. While the financial incentive (the redeemable deposit) will drive behaviour change where beverage containers are concerned, this incentive may also flow through to other litter sources and thus reduce littering of other material.

The absence of full valuation of non-market benefits restricts the analysis because it is only possible to make definitive statements about the efficiency of options when all costs and benefits have been fully valued. Where data assumptions have the potential to significantly affect outcomes, uncertainties have been tested using sensitivity analysis (described in Section 4.3). Including those unquantified factors would only improve the cost benefit analysis outcome.

Costs are passed on to consumers

The cost benefit analysis assumes that container deposits and any additional costs will be passed on to consumers by the beverage manufacturing industry.[17] This approach is consistent with previous RISs for container deposit schemes[18] and reflects the nature of the beverage market.[19]

While this assumption does not affect the cost benefit analysis, it is reflected in the distributional analysis set out in Section 4.5. It is also noted that while the cost burden has been modelled to fall on consumers, it might not always be possible for the food and

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15 Estimates of the global cost of marine plastics are $13 billion USD. UNEP (2014) *Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry*

16 Similarly, there could perceivably be unintended negative changes to behaviour such as the impact of homeless people going through bins to retrieve bottles (although, homeless people are probably already exposed to such hazards for other reasons). Such costs have not been included nor have any additional cost by government been included to accommodate such hazards.

17 This would result in the cost to consumers per beverage being 10 cents plus the cost of administration.

18 https://ris.pmc.gov.au/sites/default/files/posts/2018/03/final_decision_ris.pdf

19 While no explicit analysis of this has been undertaken, it is noted that Coca Cola Amatil announced that in New South Wales, it intends to pass on the full CDS refund amount and fees to customers (ASX Announcement, 18 August 2017).

beverage industry to pass costs on to consumers. Although no demand response was been included in the modelling because the price elasticity of demand is assumed to be low for a CDS, a discussion on elasticities and a qualitative discussion of the impacts is provided in the Appendix.

Data and projection uncertainties

Although considerable background analysis has been undertaken to assign suitable values to the variables, in practice there are still uncertainties. Even variables that are directly valued in the market (such as the value of recovered material) are subject to uncertainties such as fluctuations in market values over time and differences in market values from region to region and internationally.

Furthermore, all options are subject to uncertainty because of the inherent difficulty of projecting any variable over the 20-year analysis period.

The impacts of the following factors may be subject to change in the future:

- the return rates;
- recycling levels and decisions of various parties, including local governments, households and businesses, which are also influenced by the use-value of recycling in the absence of additional regulation;
- packaging consumption trends, which are affected by factors such as technology, logistical innovations, trade agreements, and food and beverage prices;
- the value of the Australian dollar;
- unknown future impacts that may affect the ability of the options to achieve the outcomes specified; and
- unintended consequences arising from regulatory intervention and incentives, based on human and market responses that are not always predictable.

4.3 Sensitivity tests

Sensitivity testing can help to identify those input values and assumptions that can materially change the results.

This cost benefit analysis identified key variables and sensitivity tests were undertaken by adjusting the input values of:

- discount rates;
- the analysis period;
- the number of containers;
- alternative home and away consumption splits;
- the kerbside diversion rate;
- recyclate values;
- willingness to pay to avoid litter and increase recycling;
- willingness to pay threshold analysis;
- propensity to litter; and
- the number of refund points.

Sensitivity tests are focussed on key variables and where input values are uncertain. While a range of other variations to the scheme could be considered (such as refund values), consistency with other jurisdictions was a key objective to minimise public confusion and regulatory burden for industry.

Discount rate

The stream of costs and benefits (in real terms) has been discounted using a real discount rate of seven per cent. Sensitivity testing uses real discount rates of three and 10 per cent. These values align with the discount rates proposed by the Australian Government's Office of Best Practice Regulation (OBPR 2016).

The results from discount rate sensitivity tests are set out in Table 3, which shows that the benefit-cost ratio result is not highly dependent on the assumed discount rate.

Table 3: Discount rate sensitivity test

Variable - discount rate	Net present value ($ million)	Benefit-cost ratio
7%	153	1.37
3% (sensitivity)	235	1.40
10% (sensitivity)	115	1.35

Analysis period

A 20-year period is used in the analysis because it is assumed that the CDS will take several years to be established and for participation to develop. This analysis period accords with the Office of Best Practice Regulation's *Cost-benefit analysis guidance note*.

Table 4 reports the results when the analysis period is reduced to ten years. The shorter analysis period reduces the net present value from $153 million to $67 million. The benefit-cost ratio outcome declines from 1.37 to 1.28.

Table 4: Analysis period sensitivity test

Variable - analysis period	Net present value ($ million)	Benefit-cost ratio
20 years	153	1.37
10 years (sensitivity)	67	1.28

Number of containers

The business-as-usual case assumes a 'container universe' of around 1,800 million beverage containers, of which 1,300 million containers are redeemable under the CDS. There is some uncertainty about the container universe, so sensitivity testing (+/–10%) was performed on that assumption (Table 5).

The cost benefit analysis results are not particularly sensitive to this assumption. A one per cent increase in the number of containers leads to a small decrease in net present value from $153 million to $150 million, whereas the benefit-cost ratio remains relatively stable. Conversely, a decrease in the container universe increases the net present value to $157 million.

Table 5: Number of containers sensitivity test

Variable - number of containers	Net present value ($ million)	Benefit-cost ratio
1,812 million*	153	1.37
+10% (sensitivity)	150	1.35
–10% (sensitivity)	157	1.40

* Actual number used in model, rounded to 1,800 in text of this document.

Alternative home and away consumption splits

The analysis assumes that 67 per cent of beverage containers are consumed at home and that the rest are consumed away from home.[20] Discussions with the advisory committee confirmed that there is considerable uncertainty about this split, so a range of sensitivity tests were performed (Table 6).

Varying the consumption split does not change the number of containers recycled because the number of containers recycled is reasonably certain. However, changing the consumption split does affect the propensity to litter and the number of containers redeemed in public place locations.

The net present value result is somewhat sensitive to the consumption split. For instance, shifting from a 67:33 to a 50:50 consumption split improves the net present value result by $27 million, from $153 million to $180 million.

Table 6: Consumption split (At home: Away from home) sensitivity test

Variable - consumption split	Net present value ($ million)	Benefit-cost ratio
50:50 (sensitivity)	180	1.43
60:40 (sensitivity)	164	1.40
67:33 (base case)	153	1.37
80:20 (sensitivity)	143	1.35

[20] This estimate was derived by the New South Wales Environmental Protection Agency but is not supported by strong data. For this reason, a large range was used in the sensitivity analysis.

Kerbside diversion rate

The volume of containers diverted from the kerbside depends largely on the scheme design and accompanying advertising and education campaigns. Therefore, there is some uncertainty about the kerbside diversion rate.

The analysis assumes that kerbside diversion increases over the first ten years of the scheme, peaking at 40 per cent. Sensitivity testing examined the impact of 30 per cent and 50 per cent diversion peaks (Table 7).

The result is not particularly sensitive to this assumption, largely due to the fixed costs associated with container refund points. Reducing the assumed diversion rate from kerbside recycling to 30 per cent improves the net present value by about five per cent.

Table 7: Kerbside diversion rate sensitivity test

Variable - kerbside diversion	Net present value (NPV; $ million)	Benefit-cost ratio
Maximum 40%	153	1.37
Maximum 30% (sensitivity)	161	1.42
Maximum 50% (sensitivity)	146	1.34

Recyclate value

The sale price of recyclates is a key input variable for the cost benefit analysis. Two alternative price scenarios were identified for the different material types as set out in Table 8.

To ensure that the primary cost benefit analysis result is conservative, a low average value of recyclates is used as a central estimate. The recyclate value of each component is discussed in the following sections.

It is important to understand that the cost benefit analysis is a long-term assessment, therefore, long term trends should be considered rather than short term changes.

Table 8: Recyclate value

Recyclate type	Central estimate**	Industry assumptions*	CDS premium
	($/tonne)		
Paper/cardboard	30	0	0
Glass	0	0	+40
PET	90	230	+30
HDPE	90	620	+30
Aluminium cans	1,300	1,500	+100

* Based on commercial feedback from Western Australia reflecting current prices.

** To ensure that the value of recyclates is conservative, the central case assumes a significantly lower average price for recyclates than that provided by industry, with the exception of paper/cardboard. In this case the current price provided by industry was not assessed to be reflective of long-term trends.

Recent changes to China's import policy for recyclates (China's "National Sword" Policy) is a case in point. The short-term impact of this policy change may be to depress the

price of some recyclates. It is not envisaged to have a long term impact on prices as other markets are considered likely to emerge.

Glass

Where glass is concerned, there is a declining market interest. However, there are currently two markets. There is a market for glass in a form prepared for glass re-processing ('pre-processed') and a market for glass that has not yet been pre-processed. As pre-processing involves a cost, the market value for pre-processed glass would be higher than the market for glass not yet pre-processed.

It was also clear from stakeholder discussions undertaken for previous projects that a wide range of values are being observed. This variation stems from the highly concentrated industry structure.

The selected market values are based on recycling industry sources, specifically relating to material not yet pre-processed, representing a large proportion of the market and verified against prices received by suppliers of that material. These are:

- nil value ($0 per tonne) for glass from non-CDS sources; and
- $40 per tonne for glass from CDS sources.

Aluminium cans

Market prices for aluminium from a CDS have increased recently, but it is unclear whether this is a long-run structural shift in the market or a short-run price shift. Therefore, the analysis assumes a long-run value for aluminium of $1,300 per tonne, with a $100 per tonne premium for CDS material. Sensitivity testing was undertaken using a long-run value of $1,500 per tonne.

Plastics

Previous MJA projects suggest a higher average value for plastics from CDS sources compared with plastic from conventional sources based on:

- the polymer mix from CDS sources having greater proportions of higher value polymers; and
- the material from a CDS being of higher quality.

The recyclate value for plastics has decreased in recent years. For this analysis, the assumed long-run value of plastic is $90 per tonne, with a $30 per tonne premium for beverage plastics (PET and HDPE) owing to the higher quality of materials. Sensitivity testing was undertaken using a long-run value of $230 per tonne for PET and $620 per tonne for HDPE.

Liquid paper board

Stakeholder discussions have identified that the value of liquid paperboard has fallen significantly. It is unclear whether this is a long-run structural shift in the market or a short-run price shift. This analysis assumes $30 per tonne, with no premium for CDS-sourced liquid paperboard.

The impact of using the higher recyclates values on the cost benefit analysis results are is shown in Table 9.

Table 9: Recyclate value sensitivity test

Variable - recyclates value	Net present value ($ million)	Benefit-cost ratio
Low (central estimate)	153	1.37
High (alternative scenario)	164	1.40

Willingness to pay to avoid litter and increase recycling

Some non-market benefits of recycling and litter reduction may not have been fully captured in the cost benefit analysis. Non-market benefits will include environmental, amenity and existence values.

Two 'willingness to pay' measures were considered in the analysis of the CDS:[21]

- Willingness to pay to avoid litter is assumed to be $21,947 per tonne in the metropolitan area and $1,822 per tonne in regional and remote areas, based on stated preference valuation.
- Willingness to pay for recycling ($717 per tonne), based on stated preference valuation, has also been included in the sensitivity tests (Table 10).

It appears likely that there are overlaps between the community's willingness to pay for recycling and its willingness to pay to avoid litter. For this reason, we consider these benefits separately and do not believe they should be added. When applying the willingness to pay for recycling, the willingness to pay to avoid litter and the landfill externalities are excluded (to avoid any double counting of benefits that may have already been included in recycling willingness to pay estimates).

Based on the analysis, the willingness to pay value for avoiding litter and the willingness to pay value for recycling are key inputs for the cost benefit analysis and affect whether the analysis produces a positive net present value and a benefit-cost ratio greater than 1.0. Further discussion of the willingness to pay is provided in Appendix A to this report.

These results need to be interpreted with caution because an assessment of the willingness to pay has not been undertaken in this analysis and the projects referenced to identify willingness to pay estimates are subject to qualifications.

The high willingness to pay estimate ($21,947 per tonne) is consistent with the estimates used in the New South Wales and Australian Capital Territory regulatory impact statements and is used in the central case of the cost benefit analysis for that reason.

Table 10: Willingness to pay sensitivity test

Variable – willingness to pay	Net present value ($ million)	Benefit-cost ratio
To avoid litter: $21,947	153	1.37
For recycling: $717 (alternative scenario)	-104	0.75

The high value for willingness to pay to avoid litter is used in the cost benefit analysis. This value was selected from well-conducted studies in the literature; however, it does not necessarily reflect the willingness to pay to avoid marine and/or riverine litter.

[21] The calculation of these values is set out in Table 16 on page 61 of this report.

Willingness to pay threshold analysis

Threshold analysis was also undertaken on the values for the willingness to pay to avoid litter. The analysis identified the value at which the present values of the costs and the benefits are equal. It found that the willingness to pay to avoid litter would need to be around $14,194 per tonne in metropolitan Western Australia.

Propensity to litter

There is some uncertainty about the estimates for propensity to litter, so sensitivity tests (+/-10%) were performed on this assumption (Table 11).

This analysis reveals that changing the propensity to litter by 10 per cent changes the net present value result by almost 30 per cent, so the result is quite sensitive to changes in this assumption.

Table 11: Propensity to litter sensitivity test

Variable - propensity to litter	Net present value ($ million)	Benefit-cost ratio
Propensity to litter	153	1.37
+10% (sensitivity)	197	1.48
–10% (sensitivity)	109	1.27

Refund points

There is also some uncertainty about the number of refund points, so sensitivity tests were performed on this assumption. While the number of refund points do impact the benefit-cost ratio, it does not affect the decision about whether to introduce a CDS or not.

Table 12: Number of refund points[22]

Variable - number of refund points	Net present value ($ million)	Benefit-cost ratio
Number of refund points	153	1.37
+10% (sensitivity)	139	1.33
–10% (sensitivity)	169	1.43

4.4 Litter volume impacts

Impacts on litter volume are driven by several assumptions in the model. Beverage consumption projections, changes in disposal methods and the projected impact of the CDS on litter are covered in this section.

Beverage consumption projections

Beverage container consumption for the base year, 2017, was estimated using data provided by the beverage industry.[23] The beverage container universe in 2017 consisted

[22] Plus/minus 10 per cent on fixed and flexible refund points.

[23] Advice provided by the Western Australian CDS advisory group, February 2018

of approximately 1,800 million containers (KAB, 2016). Projections of beverage container consumption for the analysis period were developed assuming an annual growth in consumption of 0.73 per cent over the period from 2017 to 2022, falling gradually to annual growth of 0.54 per cent by the 2032-2038 period [24] This means that per capita consumption falls, albeit slightly, over the period of the analysis.

Because the propensity to litter is higher in public places, the analysis considered the consumption of beverage containers split across three locations (MJA 2013):

- at home (70 per cent);
- away from home—public places (20 per cent); and
- away from home—non-public places (10 per cent).

There is some uncertainty about the estimated splits between different locations, so several sensitivity tests were also undertaken (see 4.3).

Under the base case, of the beverage containers used in 2017, 688 million containers (or 38 per cent) were recycled, 1,045 million (58 per cent) are estimated to have ended up in landfill, and the remaining 80 million (four per cent) are likely to have directly entered the litter stream.

Changes in disposal methods

Following use, beverage containers are disposed of through one of three main disposal streams. They may be recycled, enter the litter stream or be directly disposed of as landfill.

The material flows analysis that underpins the cost benefit analysis uses estimates of current and future recycling rates and changes in the propensity to litter under the business-as-usual option and the CDS option. The number of containers that move directly into the landfill stream then becomes a balancing item (based on total beverage consumption projections).

Projected impact of the CDS on litter

Based on the effectiveness of similar CDSs in South Australia and the Northern Territory, the Western Australian CDS is expected to steadily reduce the proportion of beverage containers littered.

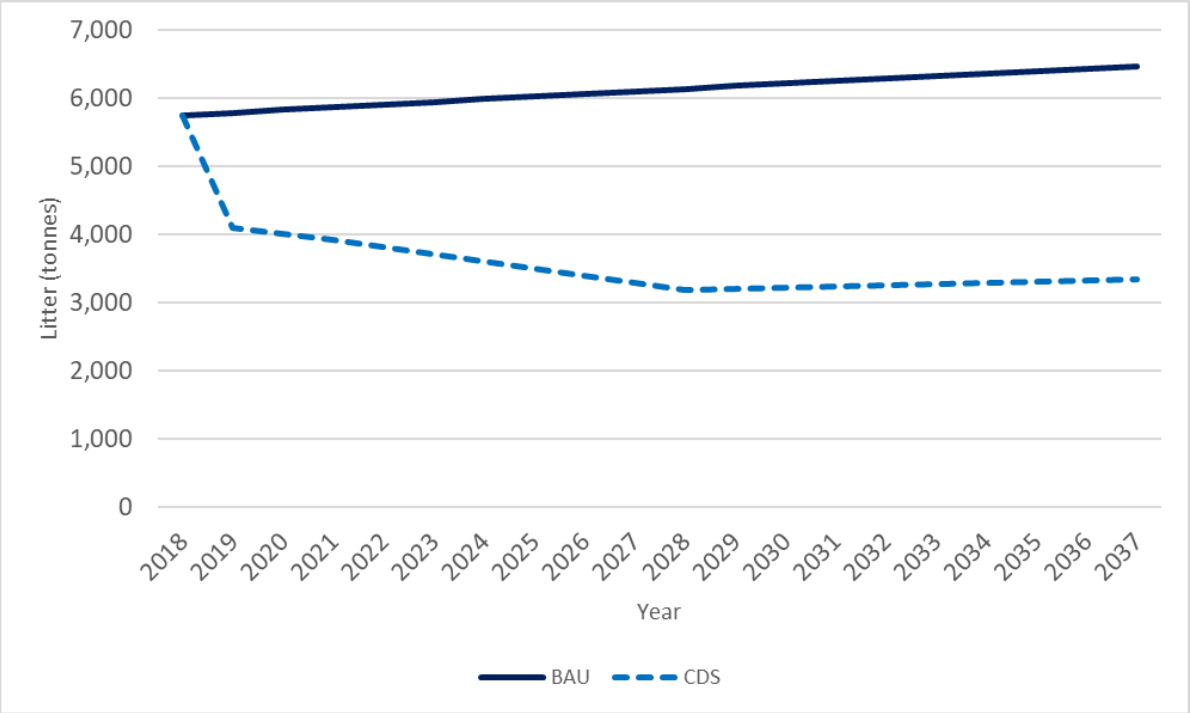
The estimation of the impact of the CDS on litter volumes uses the same framework, assumptions and data sources that were used in the Packaging Impacts Decision RIS (NEPC 2014). Section 3.3 of Attachment K to that RIS details the approach, assumptions and sources that were used (MJA 2013). The apparent impact of the South Australian CDS on beverage container litter is described in detail Appendix A to this RIS.

When applying this approach to the cost benefit analysis of the Western Australian CDS, the only key change was to ensure that the propensity to litter reflects Western Australian circumstances, instead of the national propensity in the Packaging Impact Decision RIS. These changes also introduce a degree of conservatism into this analysis compared to the Packaging Impact Decision RIS analysis.

[24] This is same assumption as used in the recent New South Wales CDS RIS process. This is seen as a conservative approach which may reflect changes in community behaviours but may also be a proxy for producers moving to lighter weight containers.

Figure 5 shows the impact of the business-as-usual and CDS options on the proportion of beverage containers littered, by tonnage. The total weight of container packaging in Western Australia is estimated to be around 156,000 tonnes and around 4 per cent of containers are currently littered. This equates to a current estimate of slightly under 6,000 tonnes of beverage containers in the litter steam. The graph shows that without the CDS (solid line marked as BAU) the quantity of litter will increase slowly over time. However, under the CDS (dashed line) the quantity of litter will decrease sharply before steadying and then increasing slowly from 2028.

Figure 5: Beverage container litter, 2017 to 2038 (tonnes)



Source: Marsden Jacob Associates, 2018.

The projected impact of the CDS on litter, landfill and recycling rates can also be considered in terms of container numbers. By 2037, the CDS is estimated to result in a total accumulated impact (over 20 years) of:

- 706 million fewer beverage containers being littered;
- 5,902 million fewer beverage containers ending up in landfill; and
- 6,608 million more beverage containers being recycled.

4.5 Distributional impacts and regulatory burden measurement

In addition to assessing the impact of the proposed reform on the Western Australian economy, it is useful to consider the distribution of the costs and benefits among stakeholder groups.

Stakeholder groups

The stakeholder groups considered for the distribution analysis are consistent with those selected for previous distributional impact assessments of container and packaging deposit schemes. The analysis focuses on the following stakeholders:

- The Western Australian Government;
- the Australian Government and the governments of other states and territories;
- Western Australian local governments;
- service providers (material recovery facilities and refund point operators);
- charities and community groups;
- the food and beverage industry;
- beverage consumers; and
- the environment.

Table 13 summarises the impacts of the CDS, both positive and negative, on each of the stakeholder groups.

Table 13: Impacts by stakeholder group

Stakeholder	CDS impacts
Western Australian Government	The development and implementation of a CDS will affect the Western Australian Government. Cost impacts are assumed to include costs for: • scheme development, including regulation and oversight mechanisms; • approval responsibilities for container refund marking; • ongoing administration of the scheme; and • monitoring and enforcement. The CDS will increase beverage container prices because scheme- and deposit-related costs will be passed on to consumers, which will mean that goods and services tax (GST) revenue increases. The analysis assumes that four per cent of additional GST revenue that results from the price rise would benefit the Western Australian Government. [a]
Australian Government and governments of other states and territories	It is assumed that 96 per cent of any additional GST revenue that results from the price rise would benefit other state and territory governments. [a]
Western Australian local governments	Benefits to local governments will accrue from reduced kerbside collection costs[25], while revenue may decrease due to diversion of redeemable containers. The analysis assumes that net benefits are directly passed on to residents and businesses, as a reasonable long-term assumption for councils.

[25] While frequency is not likely to change, wear and tear may be reduced and the speed with which collections occur may be increased.

Stakeholder	CDS impacts
Service providers (material recovery facilities and refund point operators)	Material recovery facility impacts include: • reduced processing and lost value of recyclates; and • benefit from increased revenue (deposit redemptions) over and above additional operating costs. In the short term, benefits to the material recovery facilities may be elevated unless contracts are renegotiated with suppliers. Refund point operators will incur capital and operating costs, but those costs are more than offset by handling fees.
Charities and community groups	Charities and community groups, schools and sporting clubs that set up container return points as part of events or fundraising activities will benefit from the return of containers that would otherwise be captured by beverage consumers. Due to uncertainties, those are not modelled quantitatively.
Food and beverage industry	The food and beverage industry will incur costs associated with the transition to and implementation of the scheme. Those costs could be partially offset by revenue from the scrap value of recyclates. Based on consultation with the industry in the preparation of this report, it is assumed that the vast majority of those costs will be passed on to consumers. However, the analysis assumes that some costs, particularly producer surplus-related impacts that result from reductions in beverages sold, cannot be passed on to consumers.
Beverage consumers [c]	Consumer-related impacts include: • price increases when scheme operation costs, deposits, handling fees and taxation are passed on; [b] • participation costs; and • reduced waste management charges.
Environment	Environmental impacts include: • reduced landfill externalities; • reduced litter externalities; and • increased recycling.
Other	Change in harm to others (externality impacts) from a reduction in alcohol consumption is likely. Change in employment opportunities for long-term involuntarily unemployed people, resulting from social enterprise initiatives at beverage container redemption points, is likely. Due to uncertainties, these changes are not modelled quantitatively.

a. CGC 2017.

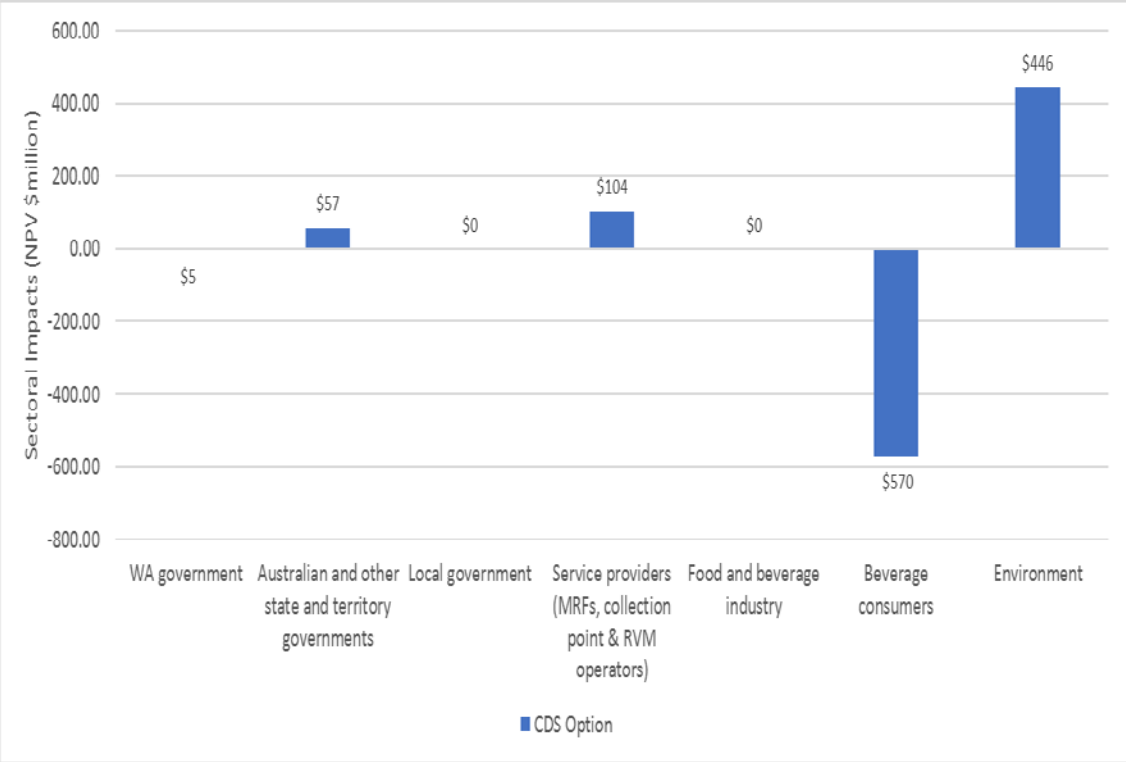
b. The impacts of price changes on consumption were considered but were not quantified due to uncertainty about price elasticity for different kinds of beverages. In addition, there would be flow-on effects, such as potential health costs and benefits, from any changes in consumer behaviour.

c. Note: rate payers are not discussed separately to avoid double counting.

Results of distributional impact analysis

The CDS requires additional expenditure to fund litter and recycling outcomes. The outcomes of the distribution analysis are summarised in Figure 6. The analysis highlights where stakeholder groups benefiting from the scheme differ from the stakeholder groups that ultimately bear the costs of the additional expenditure.

Figure 6: Distributional analysis ($ million, net present value)



Source: Marsden Jacob Associates, 2018.

The key conclusions from the distributional analysis are as follows:

- Consumers experience the highest negative impact of $570 million (present value).[26]
- The environment receives the highest benefit of $446 million—a benefit that is (indirectly) experienced by residents of Western Australia (and thus container consumers).
- Service providers and governments also benefit from the introduction of a CDS.

Community and charitable organisations may also benefit from the scheme by using the scheme as another way to raise funds or receive donations, or by partnering with the network operator to operate refund points.

The drivers of overall results for each sector are discussed in the following sections.

Western Australian Government

The net impact to the Western Australian Government is a cost of $5 million. While the Government receives an increase in GST revenue due to the scheme, the development and ongoing administrative costs of the scheme outweigh those GST benefits. The cost benefit analysis assumes that the Western Australian Government receives four per cent of the GST revenue from the sale of beverage containers under the CDS.

[26] Indications on the total change in cost per container can be drawn from New South Wales, where the cost per container charged to beverage manufacturers for the first three months of the CDS was as follows: *the total estimated range of fees for the first three months will start at 13.54c [cents per container] and go down to 10.94c for aluminium, 14.07c and go down to 11.36c for glass, and 13.78c and go down to 11.13c for PET* (http://www.exchangeforchange.com.au/ReturnAndEarn_MediaRelease.pdf)

The analysis assumes that the full cost is being passed through from the beverage industry. The net impact on consumers depends on the extent to which the consumer captures the refunds of consumed beverages.

Australian Government and governments of other states and territories

Benefits to the Australian Government and other states and territories are driven by GST revenue. The cost benefit analysis assumes that 96 per cent of GST revenue from the sale of beverage containers is distributed to the Australian Government and other state and territory governments (Dale 2014). The net benefit for those governments is $57 million.

Local governments

Where municipal services are concerned, the net impact of the CDS on local governments is zero. While service levels are not expected to change, this result is driven by the assumption that all cost savings from the reduced collection, transport, processing and disposal of kerbside rubbish and from recycling are passed through to residents and other customers. The cost benefit analysis benefits transferred from Western Australian local governments in their capacity as providers of municipal services to customers of those services are estimated to be cost neutral ($0) over the 20 year period.

Service providers

Service providers (material recovery facilities and refund point operators) will benefit from expanded business opportunities and, in the case of the material recovery facilities, a reduction in net processing costs.

Material recovery facilities will also benefit from the redemption of deposits on containers that are returned through kerbside recycling.

It is also expected that community not-for-profit and charitable organisations will partner with the network operator to operate refund points ('social enterprise sites'). Community not-for-profit and charitable organisations may also establish donation points where the community can donate containers for the organisation to then return the containers and collect the refunds for the organisation.

Beverage manufacturing industry

The net impact on the beverage manufacturing industry is estimated to be zero, as all costs will be passed on to consumers.

Beverage consumers

Beverage consumers will receive benefits from cost savings passed through from reduced waste management service costs and from the material recovery facilities in the form of reduced fees.

In addition, those people who deposit beverage containers at depots will receive the scheme refund of ten cents per container.

Consumers will face higher prices for beverages covered by the scheme, as the scheme costs and increased compliance costs incurred by beverage manufacturers will ultimately be passed on to them.

The impact of the scheme on consumers of beverages covered by the scheme is $570 million (NPV) over the 20 year period. As noted above, this equates to an annualised cost of $54 million or 40 cents per person per week, although consumers

are ultimately the primary beneficiaries from environmental benefits delivered by the scheme.

The environment

The main beneficiary from the Western Australian CDS will be the environment (land, waterways and marine areas). As noted above, the community will be the primary beneficiaries from environmental improvement. The scheme is expected to enable $446 million that would otherwise have been borne as costs by the environment to be retained by the environment.

Benefits to the environment have been quantified as:

- avoided landfill externalities of $444,000; and
- reduced litter costs of $445 million (based on the willingness to pay estimate).

This assessment omits any consideration of the benefits arising from reduced riverine litter because they could not be quantified.

Regulatory burden measurement

The Western Australian Better Regulation Unit requires the consideration of regulatory burden on businesses, community organisations or individuals as part of the RIS.[27]

The cost benefit analysis includes consideration of administrative compliance costs, substantive compliance costs and delay costs. To avoid the double counting of costs on business that are then passed onto consumers, the cost benefit analysis assumes that most costs are paid by consumers.

The analysis estimates that the regulatory burden of the CDS would be an average of $44.09 million per annum over its first ten years.

The cost estimates used in this BCA are consistent with cost used in other jurisdictions, which have received exemptions.

4.6 Qualitative effects outside Western Australia

The cost benefit analysis set out above considers the impact of the proposed reform on the economy and community of Western Australia.

While the quantitative analysis is focused on Western Australia, the impact on other jurisdictions is expected to be small due to the alignment of the currently operating and proposed CDS in Australia and the limited opportunity to import containers into Western Australia to collect refunds from states that do not have CDS.

Neighbouring jurisdictions have a CDS

All Australian states and territories, except for Victoria, have either implemented a CDS scheme, or announced plans to introduce a scheme.

[27] COAG's decision on whether to grant a permanent exemption for the Western Australian CDS under the MR WA Act and TTMR WA Act would impose minimal regulatory burden. For this reason, an analysis of the regulatory burden measurement has not been set out in previous RIS's on CDSs.

Of the jurisdictions that border Western Australia, South Australia has a CDS[28] that has been in place since 1977 (APH Senate 2016) and the Northern Territory's CDS (which was modelled on the South Australian scheme) has been in place since 2012 (Northern Territory Government 2012).

On the east coast of Australia:

- New South Wales implemented a CDS on 1 December 2017;[29]
- the Australian Capital Territory is establishing a CDS, which should be operating in early to mid-2018, (TCCS 2018);
- the Queensland Government has announced that it intends to introduce a CDS in 2018 (Miles 2016); and
- Tasmania is considering establishing a CDS (Groom 2017).

Alignment with other jurisdictions to minimise red tape

The Western Australian Government has worked with the New South Wales, Queensland, South Australian and Northern Territory governments to align the CDS wherever possible. This has included discussion and an in-principle agreement on a common refund mark that suppliers will be able to use in all states and territories.

Consistency across all jurisdictions will simplify the process for industry, minimise red tape and reduce the need for any future changes to the refund marking.

Cross-border movement of empty containers

As outlined above, the consistent approach to the CDS by Western Australia, the Australian Capital Territory, New South Wales, Queensland, the Northern Territory and South Australia means that there is unlikely to be a net movement of containers between states that have CDS. For this reason, the introduction of the CDS in Western Australia is likely to reduce the cross-border movement of empty containers compared to the base case as both the Northern Territory and South Australia already have schemes in place.

In addition, Western Australia has a limited number of population centres (such as Kununurra and Eucla) that are close enough to the border for residents to consider the export of containers to be viable.

GST

As noted in the distributional analysis (Section 4.5), the Australian Government and other jurisdictions would benefit from additional GST that would be collected under the scheme. This would arise because the GST would apply to the deposit on each container.

The cost benefit analysis estimates the net present value of those benefits at $59 million over the initial 20 year period of the scheme for all Australian governments.

[28] http://www.epa.sa.gov.au/environmental_info/container_deposit

[29] http://returnandearn.org.au/

Impacts on beverages manufactured in other jurisdictions and sold in Western Australia

Western Australian imports a range of beverages from other jurisdictions that are covered by the MR Act or TTMR Act but that do not currently plan to have a CDS (mainly New Zealand[30] and Victoria).

Many beverages that are imported and sold in Western Australia, such as wine, will be excluded from the CDS, as noted in the CDS discussion paper.

For beverages that are not captured in the CDS, the proposed reform will have no impact.

For beverages that are captured in the CDS, the key cost impacts for any beverage that is imported are as follows:

- The producer will pay for an approval of the container[31] and refund marking.[32]
- The costs of all beverages included in the scheme are likely to increase. It is expected that a portion of those costs will be passed on to consumers.
- The distributor or importer will contribute to scheme costs, which will be based on market share (to cover handling fees). It is expected that this cost will be passed through to consumers.

Producers of beverages that are currently exported from New Zealand into the Australian market may need to amend refund marking that is specific to the South Australian and Northern Territory CDSs (companies have two years to change the refund marking). For products that are imported in small volumes, a sticker that is added to the label may be acceptable and the easiest solution for an interim period of two years. Western Australia would welcome input from stakeholders on this topic, and further clarification may be provided in the Decision RIS.

However, as the provisions in the Western Australian CDS (including those for container approvals and the refund marking) will align with the requirements of the New South Wales, Australian Capital Territory and Queensland CDS, the additional costs to beverage producers and suppliers are expected to be negligible.

4.7 Competition analysis

The Western Australian Government has considered whether the proposed reform would restrict competition. This analysis included consideration of impacts on:

- buyer power;
- supplier power;
- barriers to entry or exit;
- the availability of substitutes; and

[30] It is estimated that approximately 6 per cent (21.6 million) of New Zealand's beverage container exports to Australia are consumed in Western Australia, about 1.7 per cent of the 1,300 containers within the scope of the container deposit scheme. Data sourced from Comtrade; based on assumed container sizes and that Western Australians consume these products in line with population figures.

31 The Western Australian Government is not proposing to charge a container approval fee, but it is expected that most containers will be approved in New South Wales (and will then be deemed to be approved in Western Australia). The New South Wales charges an $80 fee for a 5- year container approval period.

32 The cost of adding a refund marking is not known, but it is expected that most containers have a marking anyway–due to the requirements of other states and territories with existing CDSs.

- internal levels of competition in the market.

It was noted that the requirement to gain container approval could impose barriers to market entry and that those burdens may be heavier for smaller beverage producers than for larger ones. However, as the Western Australian Government has committed to closely harmonising its CDS requirements with those of other jurisdictions, the marginal impact of the Western Australian CDS is expected to the negligible.

It is expected that the Western Australian CDS will also allow for a container approved in another CDS jurisdiction (such as South Australia) to be taken to be approved in Western Australia, thereby imposing no additional regulatory burden on the beverage industry. The only additional cost for businesses that operate in Western Australia and other jurisdictions is a requirement to report twice on sales into Western Australia - once to the Australian Tax Office and once to the scheme coordinator.

Hence, the analysis concluded that the Western Australian CDS would not restrict competition in the market for beverages sold in sealed disposable containers.

5 Consultation

5.1 Consultation undertaken to date

Implementation of a CDS was an election commitment of the Labor Party during the Western Australian state election of March 2017. Bipartisan support for the reform is expected, as the former Liberal National Government had commenced developing a similar scheme (Western Australian Government 2016).

Since mid-2017, the Western Australian Government has provided multiple media statements and consultation opportunities on the proposed CDS:

- In August 2017, the Western Australian Government published a dedicated webpage which provides the community with information, answers to frequently asked questions and contact details to provide input.[33]
- In August 2017, the *Western Australian Container Deposit Scheme discussion paper* was released. The paper was circulated to provide stakeholders and the community with an opportunity to provide input on options and a conceptual model. During the consultation period, interested stakeholders and members of the community were provided with opportunities and methods to provide input including:
  - 12 stakeholder briefings were held during the consultation period as well as one online presentation.
  - 160 submissions were received and published on the website (DWER 2017a).
  - An online survey was completed by 3,256 people. A summary of results from the six questions is available online (DWER, n.d.).
- The development of the CDS is being informed by a Western Australian CDS advisory group that includes representatives from:
  - beverage manufacturers;
  - retailers;
  - local government;
  - waste management and recycling industries;
  - environmental non-government organisations; and
  - community groups.

The development of the Western Australian CDS has benefited directly from work done by New South Wales, the Australian Capital Territory and Queensland, all of which are in various stages of developing or implementing their own programs. The New South Wales consultation considered a broad range of proposals from industry and other stakeholders before determining that a CDS was the preferred option. Several representatives on the Western Australian CDS advisory group have direct experience in the development and implementation of the New South Wales and Queensland CDSs.

[33] www.der.wa.gov.au/our-work/programs/111-wa-container-deposit-scheme (accessed February 2018)

5.2 Current consultation period

This papers and the questions below follow from the Western Australian Government's previous consultations.

The period of submissions on this consultation RIS will be four weeks.

Submissions on the proposed reform should be submitted to cds@dwer.wa.gov.au.

Submissions will close at 5 pm on **Sunday 9 September 2018.**

The Department has provided some guide questions that may assist stakeholders in preparing their submission to this consultation RIS.

1) Do you think that the reform objective (set out in section 2) is appropriate?
2) Do you think that the proposed CDS (Option 2 – set out in section 3.2) will achieve the reform objectives in Western Australia?
3) Do you support the introduction of the proposed CDS (set out in section 3.2) in Western Australia?
4) Do you believe the proposed CDS will deliver a net benefit to Western Australia (Cost benefit analysis is set out in section 4.1)?
    a) Do you believe that the analysis of the costs and benefits under-estimates, over-estimates or omits any of the costs or benefits arising from the proposed scheme?
5) Do you believe the proposed CDS will result in an appropriate distribution of the costs and benefits between stakeholder groups (set out in section 4.5)?
6) Do you think there would be any unintended consequences from the proposed CDS?
    a) Yes / No
    b) If Yes, then please specify
7) Do you think the proposed implementation process and timing are appropriate?
8) Do you have concerns with Western Australia obtaining exemptions under the MR Act and the TTMR Act?
9) Any further comments from stakeholders.

6 Evaluation and conclusion

As demonstrated through this consultation RIS, Option 2 (the development of a CDS for Western Australia and a supporting permanent exemption of the Western Australian CDS[34] under the MR Act and TTMR Act) is the only option that will allow Western Australia to achieve its policy objectives of reducing litter, increasing recycling and protecting the environment.

As set out in sections 3 and 4, the Western Australian Government has assessed alternative strategies and has determined that aligning the Western Australian CDS with those of other jurisdictions would be the most effective way to minimise costs and confusion for both industry and consumers.

Importantly, the Government has designed the scheme to minimise costs and to work with existing schemes, such as kerbside recycling. As a result, although the results of the cost-benefit analysis are dependent on some key inputs, the program is expected to deliver a net benefit to Western Australia. The economic analysis is detailed in Section 4 of this RIS.

The economic analysis also demonstrates that the program will have minimal impacts outside of WA, as New South Wales, South Australia and the Northern Territory all have similar schemes, with the Australian Capital Territory and Queensland are implementing similar schemes in 2018.

Based on this analysis, it is recommended that Western Australia introduce the proposed reform through amendments to the WARR Act and that COAG progress the permanent exemption of the Western Australian CDS under the MR Act and the TTMR Act.

[34] As implemented through an amendment to the WARR Act.

7 Implementation and review

7.1 Commencement

The Western Australian CDS is planned to commence in 2020.

The amendments to the primary legislation (the WARR Act) have yet to be considered by Parliament.

7.2 Review

The WARR Act includes a provision for a review every five years. In addition, the Minister can require a review of and/or amend the regulations at any time. This would allow alignment with any multi-jurisdictional review of the scope of eligible containers or the value of the refund.

The performance of the scheme coordinator and network will be reviewed on a regular basis through the reporting required of the scheme coordinator, and through regular reviews by the Western Australian CDS's administrator, DWER.

Shortened forms

CDS	Container deposit scheme
CO_2e	Carbon dioxide equivalent
COAG	Council of Australian Government
DWER	Department of Water and Environmental Regulation
GST	Goods and services tax
MR Act	*Mutual Recognition Act 1992* (Commonwealth)
RIS	Regulation or regulatory impact statement
TTMR Act	*Trans-Tasman Mutual Recognition Act 1997* (Commonwealth)
WAAR Act	*Waste Avoidance and Resource Recovery Act 2007* (WA)

Glossary

Donation point	Donation points are expected to be operated by charities, and not-for-profit and community organisations, which may take containers to a refund point to receive refunds.
Eligible container	A beverage container that meets the requirements to receive a ten cent refund.
Handling fees	Fees to support the collection, processing and transport of eligible containers from refund points to recycling facilities.
Material recovery facility	A facility at which recyclable materials are sorted, processed, and packaged for sale to recyclers.
Refund amount	The monetary value of a refund, currently ten cents, paid to return an eligible container to a refund point.
Refund mark	The identifying mark indicating that a container is eligible for a ten cent refund.
Refund point	A location at which empty drink containers can be returned in exchange for a ten cent refund. A refund point may be a permanent or mobile facility. Automated refund points are referred to as reverse vending machines.
Refund point operator	An approved operator of a refund point.
Return rate	The number of eligible containers returned under the container deposit scheme divided by the total number sold.
Reverse vending machine	A device that accepts empty beverage containers and provides a refund (typically in the form of a voucher exchangeable for cash). A reverse vending machine may be a single container/material feed machine or accept bulk feed/material types.
Scheme administrator	The role that provides regulatory oversight and evaluation of the CDS. In most jurisdictions, this is the environmental agency responsible for administering the CDS legislation.
Scheme coordinator	The role that is responsible for the operation of the CDS, including financial and performance management, and fraud minimisation.

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Appendix A — Technical Annex

This technical annex accompanies the cost benefit analysis report on the Western Australian CDS. It provides background for key assumptions presented in the main document, including:

- data on the impact of CDS;
- reduced kerbside collection, transport, processing and/or disposal cost;
- avoided landfill externalities;
- household participation costs;
- business participation costs; and
- willingness to pay.

The framework for the material flows analysis underpinning the cost–benefit analysis is also briefly discussed.

Data on the impact of container deposit schemes

The likely impact of the CDS in Western Australia can be estimated based on litter data for South Australia, as an example of an existing scheme. The following text has been adapted from Attachment K (MJA 2013) to the Packaging Impacts Decision RIS (NEPC 2014).

National Litter Index data from two years (2011 and 2012) was broken down for this study to separate beverage container, non-beverage container packaging and non-packaging litter data for South Australia and the rest of Australia. That data was used to develop estimates of beverage container and other packaging litter rates in South Australia compared to the rest of Australia.

The estimates used are based on South Australia data that shows beverage container litter rates in that state were only 41 per cent of beverage container litter rates Australia wide (on a weight basis). Litter rates of other packaging were similar in South Australia to those in the rest of Australia.

Avoided (kerbside) collection, transport, processing and/or disposal costs

The introduction of the CDS will divert containers away from garbage and recycling kerbside collection and public litter and recycling bins. Specifically, the CDS will result in part of the following costs being avoided:

- kerbside collection going to and being processed at material recovery facilities;
- kerbside collection going to and being disposed at landfills;
- commercial and industrial collection going to and being processed at material recovery facilities;
- commercial and industrial collection going to and being disposed at landfill;
- public place collection going to and being processed at material recovery facilities; and
- public place collection going to and being disposed at landfill.

To estimate the economic benefit associated with reduced collection, transport, processing and/or disposal costs, the cost benefit analysis drew on data provided by the Western Australian Government. Based on that information, the average cost of garbage and recycling collection, transport, processing and disposal has been estimated for the different regions:

- urban:
  - waste: $228 per tonne
  - recycling: $179 per tonne
- regional and remote:
  - waste: $143 per tonne
  - recycling: $295 per tonne

Notably, the operating costs do not include waste levies. Waste levies are a transfer from one stakeholder group (waste producers/managers) to another stakeholder group (state governments) and, as such, do not constitute an economic cost. As a result, these costs are significantly lower than the financial costs of landfilling that may be seen in the market.

The avoided cost of collection, transport, process and/or disposal is calculated in the cost benefit analysis as the product of the operating costs on a per tonne basis multiplied by the tonnage of containers that is expected to be diverted away from kerbside, commercial and industrial and public garbage and recycling bins, because households are now assumed to be redeeming containers at refund points. These avoided costs are more than offset by the household and business participation costs and infrastructure development costs assumed in the cost benefit analysis.

Assumptions

Cost assumptions

Table 14 provides a brief description and discussion of each cost item, with reference to underpinning assumptions.

Table 14: Description of cost assumptions

Cost category	Description of item	Basis of estimate
Scheme design and administration, including avoided costs Present Value of $7 million)	Government costs associated with the design and administration of the CDS include regulation design and implementation costs, government participation costs, communications costs, and government costs to administer regulations (including compliance and enforcement).	The assumed government scheme design and implementation costs are based on discussions with the Western Australian Government and the advisory panel members.
Scheme administration and coordination Present Value of $40 million)	One scheme coordinator is assumed to be required to report to the Government on return rates. The coordinator will also manage system efficiency targets; verify collection data from redemption points; and make	Estimates are based on information provided by the Western Australian Government and the beverage industry.

Cost category	Description of item	Basis of estimate
	refund, handling and other payments to the collection network or network operator and the material recovery facility operator.	
Business compliance costs—beverage industry Present Value of $5 million)	Business compliance costs are limited to reporting and any contractual arrangements with the scheme coordinator. Minimal additional burden is assumed to be imposed by the Western Australian Government beyond arrangements of other states' CDS.	Estimates are based on analysis by Marsden Jacob Associates
Household participation Present Value of $58 million)	Households face participation costs due to the time it takes to transport beverage containers to refund points and process the container. The material flow analysis used in the cost benefit analysis assumes that five per cent of containers that are consumed at home are diverted from kerbside recycling at the start of the scheme and that this proportion increases to 40 per cent by the end of the scheme. Cost categories include vehicle operating costs, in-vehicle travel time and container deposit redemption time. The time is costed at $30 per hour. Households are already involved in current waste management practices, so the accumulation time spent collecting empty containers is assumed to be nil.	Value of time is based on NSW LLS (Local Land Services), *Volunteer Co-ordinators Network manual: a guide for managing environmental volunteer programs*, 4th edition, NSW Local Land Services, Greater Sydney, Penrith Westfield NSW (2015). Vehicle operating costs and vehicle travel time are based on Transport for NSW guidelines; Nolan-ITU, *Victorian CDL financial impact analysis*, EPA Victoria, Southbank, Victoria; 2003 and ISF–UTS (Institute for Sustainable Futures and University of Technology Sydney), *Independent review of container deposit legislation in NSW*, prepared for the Minister for the Environment, NSW, 2001.
Business participation Present Value of $25 million)	Businesses are assumed to incur some costs in accumulating and returning empty beverage containers as part of the scheme. Business and/or workplace participation costs are defined as costs incurred by employees taking beverage containers to temporary storage infrastructure and cleaners or other staff consolidating this in larger storage infrastructure, such as skip bins. Additional cleaner costs are assumed for businesses with a turnover of more than $2 million per annum.	Number of commercial businesses is based on Australian Bureau of Statistics (ABS), *Count of Australian businesses*, cat no. 8165, ABS, Canberra, 2017. Value of time for cleaners and costs for trips to transfer containers are based on previous analysis: MJA (Marsden Jacob Associates), *Distributional and cost benefit analysis for the Packaging Impacts Decision Regulation Impact Statement: data assumptions*, Attachment K to the *Packaging Impacts Decision Regulation Impact Statement*, Marsden Jacob Associates, Melbourne, 2013.
Container redemption infrastructure costs Present Value of $223 million)	The analysis assumes that there will be a minimum of 191 refund points at scheme commencement: • 109 full time refund points (a mixture of reverse vending	Estimates are based on information provided by the Western Australian Government and analysis by Marsden Jacob Associates.

Cost category	Description of item	Basis of estimate
	machines and manual refund points); and • 82 flexible refund points. Cost estimates for manual refund points include additional infrastructure required at existing depots (for example, collection cages and information systems) and changes in operating costs. The reverse vending machines are all assumed to be installed as new. Capital costs (including for installation), fixed operating costs (computer replacements and vandalism) and variable operating costs (container collection, cleaning and maintenance) are included in the analysis. The reverse vending machines are assumed to be co-located in retail and commercial areas, similarly to standard vending machines, so the redemption throughput does not change in sensitivity tests. Cost estimates for flexible refund points include infrastructure (for example, collection cages and information systems), labour and transport of containers to aggregation points.	
Container processing and transport cost Present Value of $53 million)	Processing and transport costs of redeemed containers include additional costs for baling and sorting of containers as well as the transport of containers from refund points to recyclers.	Estimates are based on information provided by the Western Australian Government and analysis by Marsden Jacob Associates.

Benefit assumptions

Table 15 provides a brief description and discussion of each benefit item, with reference to underpinning assumptions

Table 15: Description of benefit assumptions

Type	Description of item	Basis of estimate
Collection, transport, processing and/or disposal costs (Present Value of $83 million)	Collection, transport, processing and disposal costs are incurred by local governments (and passed through to residents) for existing waste management kerbside collection services. While the current level of services is to be maintained, the CDS is expected to divert some of the existing costs of providing	Cost and contamination estimates are based on the *Western Australian local government waste and recycling census (*2013-14, 2014-15 and 2015-16). Material flows are also described in further detail in the following section of Appendix A.

Type	Description of item	Basis of estimate
	these services. Although the CDS is expected to increase recyclates, Western Australian material recovery facilities (as distinct from CDS processing sites) are not expected to experience a significant change in the volume of recyclates that they process. Material recovery facility operators indicate that processing glass increases the wear and tear on the plant. A reduction in glass beverage containers may provide a benefit by reducing maintenance costs. Contamination rates are applied in the material flows analysis to containers going through the recycling stream, and the cost benefit analysis modelling automatically applies the prevailing assumptions relating to landfill operating costs and externalities for this portion of the containers.	
Avoided landfill externalities (Present Value of $0.4 million)	The CDS is expected to divert a portion of beverage containers away from landfill and into recycling streams resulting in avoided landfill externalities (for example, greenhouse gases, noting that the greenhouse gas potential of most beverage containers is very low). The average externality costs of greenhouse gas emission reductions are based on several variable factors: ● the extent of landfill gas capture at landfills; ● the average efficiency rate of landfill gas capture; ● the 'emissions factor' of the material being deposited in landfill; and ● the monetary value of environmental damage caused by greenhouse gases. The CDS is also expected to reduce the potential for groundwater contamination from chemicals released as some containers degrade. An example	Landfill externalities are based on previous analysis: Marsden Jacob Associates, '*Distributional and cost benefit analysis for the Packaging Impacts Decision Regulation Impact Statement: data assumptions*, Attachment K to the *Packaging Impacts Decision Regulation Impact Statement*, Marsden Jacob Associates, Melbourne, 2013. This is described in further detail in this Appendix. For ground water contamination see Wowkonowicz and Kijeńska (2017) *Phthalate release in leachate from municipal landfills of central Poland*. PLoS ONE 12(3): e0174986. https://doi.org/10.1371/journal.pone.0174986 (accessed March 2018).

Type	Description of item	Basis of estimate
	is phthalates which are a group of chemicals that are soluble in groundwater and can be released as PET bottles degrade.	
Avoided litter costs (Present Value of $445 million)	The avoided costs of litter are estimated based on willingness to pay to avoid litter, and sensitivity tests are conducted using an estimate of willingness to pay to increase recycling. WTP to avoid litter reflects the value that households and the broader community place on litter avoidance. The willingness to pay to increase recycling reflects the amount households would pay to reduce the amount of materials going to landfill. The two types of willingness to pay are used independently of one another to avoid the potential for benefits to be double counted. There is also potential for reduced emergency care and hospitalisation costs from glass container lacerations.	Estimates of willingness to pay to avoid litter are based on recalibrated analysis from PricewaterhouseCoopers (PwC), *Estimating consumers' willingness to pay for improvements to packaging and beverage container waste management,* prepared for the Environment Protection and Heritage Council, PwC, 2010. WTP to increase recycling is based on R Gillespie, J Bennett, *Willingness to pay for kerbside recycling the Brisbane Region*, research report no. 97, Environmental Economics Research Hub, Canberra, 2011. WTP estimates are described in further detail in Appendix A to this report.
Value of resources recovered through recycling (Present Value of $37 million)	The value of resources recovered through recycling reflects the use value of beverage container materials. Projections of market values were developed for recoverable beverage container materials, including glass, aluminium cans, plastics and liquid paperboard. A premium for materials recovered from the CDS was also estimated for each type of material. Under the CDS, the different container types are separated at the point of redemption. As such, the materials are less contaminated than those collected through kerbside recycling (for example, when broken glass and other waste is incorrectly placed in bins) and their recycling potential is higher.	Estimates for aluminium cans, plastics and liquid paperboard align with those used in the national Packaging Impacts RIS. Discussions with stakeholders indicated a wide range of values for glass; the estimates used reflect recycling industry sources for material not yet processed.

Demand impacts arising from changes in price

As set out in section 4.2, the CBA does not include any demand impacts from price changes, because the price implications (net of the refund) and elasticity response are assumed to be low and some uncertainty exists around the scale of any demand response.

The technical term for the impact of price changes on demand is the "elasticity of demand". Measured as a ratio of the percentage change in demand for a one percent change in price, elasticities are almost always negative (apart from some luxury goods). That is, an increase in price reduces demand. For simplicity the negative sign is often assumed and the extent of the change is most important:

- Unit elasticity - An elasticity of one (or unit elasticity) means that a one percent increase in price results in a one percent decrease in product sales.
- Elastic - If the elasticity is greater than one then it is considered elastic. This means a one percent increase in price results in more than a one percent decrease in sales.
- Inelastic - If the elasticity is less than one then it is considered inelastic. This means a one percent increase in price results in less than a one percent decrease in sales.

The relevant recent literature on elasticity demand is summarised below.

Estimation of elasticities from a CDS

A search of the literature did not identify any contemporary, peer reviewed literature on the price elasticity of demand for CDS in Australia.

However, where studies were identified they consistently found that the demand elasticity in relation to Australian CDS's is low. For instance, ahead of the CDS being implemented in New South Wales, Macquarie Wealth Management (2016) estimated the elasticity to be around 0.25 for products produced by Coca-Cola Amatil.

To support an investigation by the New South Wales Independent Pricing and Regulatory Tribunal (IPART), the Centre for International Economics (2018) provided an analysis of impacts on beverage expenditure and consumption. The study does not estimate the elasticity explicitly but did include a specific discussion on elasticity which stated that "*changes in consumer purchasing patterns may not occur immediately. There may also be complicated responses to the CDS within beverage types. For example, people may substitute to larger products, because these have a lower proportional CDS levy … Within different regions there could also be different effect.*"

The Centre for International Economics analysis presented some preliminary results on expenditure and consumptions which found that the CDS may have marginally reduced consumption of non-alcoholic beverages and found no clear evidence of impacts for alcoholic beverages. However, the report stated that "*There are good reasons to be cautious in interpreting the findings of the impacts of the CDS at this stage*.

- *There is a significant amount of variation in the underlying consumption trends. This makes it more challenging to identify the impacts of the CDS versus the impacts of other factors.*

- *There are strong seasonal effects (beverage consumption is typically higher through summer) which coincides with the introduction of the CDS, and different seasonal patterns across states."*

Recent studies for other policy interventions

A number of studies have estimated elasticities for beverages in relation to taxes or policy changes that affect beverage consumption, such as a sugar tax or changes in alcohol taxes. For instance, a report by Oxford Economics for the British Soft Drinks Association (2016), considering the economic impact of the United Kingdom's soft drinks levy, identified elasticities for a range of bottled beverages and identified that there are different impacts across three key markets. Using Australian terminology these could be described as:

- Hotels, restaurants and cafes (for consumption on site);
- Convenience stores (served cold for immediate consumption off site); and
- Retailers (may be sold warm and available in large volume containers and multi-packs).

The report concluded that elasticities range from 0.81 for sugar-sweetened beverages to 1.17 for water. However, these estimates of elasticity are of limited value when considering the demand impacts for a CDS, because:

- the net price change associated with a CDS (net of refund) is much smaller than the price changes that have typically been modelled for sugar taxes;
- the price signal from a CDS is confounded by the consumers ability to redeem the deposit; and
- most importantly the cost impact of a sugar tax would only be on some beverages – those containing sugar. This means that diet beverages and sugar free beverages (such as water) would not be impacted, and so customers might be encouraged to switch from a beverage with sugar to a diet version of the same product. In contrast, a CDS will impact on almost all beverages that would be considered an alternative choice. This suggest a much lower elasticity for containers generally, which is consistent with our assumptions.

Conclusion

The two studies specific to CDSs confirm that it is difficult to identify a precise elasticity of demand and suggest that demand is inelastic. It is noted that the effect is unlikely to be uniform as different segments of the market will be affected largely to the degree consumers may shift to different (less costly) containers. In particular, multi-packs of beverages, such as sold in a supermarket, may be impacted more than the sale of individual containers. For example, rather than buying six cans of soft drink (incurring 60 cents in deposit) a single two litre bottle would contain a similar volume of product and only incur 10 cents in deposit. This form of substitution would appear to have limited impact on consumer surplus or on producers.

Avoided landfill externalities

Two types of avoided landfill externalities were included in the analysis:

- avoided greenhouse gas emissions; and
- other avoided landfill externalities, including other emissions and dis-amenity.

Greenhouse gas emissions reductions

The average externality costs of greenhouse gas emissions reductions for a given region depend on several factors:[35]

- the extent of landfill gas capture at landfills;
- the average efficiency rate of landfill gas capture;
- the 'emissions factor' of the material being deposited in landfill; and
- the monetary value of environmental damage caused by greenhouse gasses.

The cost benefit analysis drew on previous analysis that derived a specific externality cost for greenhouse gasses based on the region in which a tonne of given material is being deposited and the material type (MJA 2013). In Western Australia, it is assumed that the proportion of greenhouse gasses to which emissions factors and environmental values should apply is 40 per cent for urban Western Australia and 96 per cent for regional and remote Western Australia. This is consistent with the value used in decision RIS for New South Wales' CDS.

Valuing the environmental benefit of reductions in greenhouse gasses is a highly contested issue, and there are several possible approaches. At one end of the spectrum, it is argued that Australia's greenhouse gas emissions make a minuscule contribution to global emissions, and that the latter are more important when considering global warming and associated welfare losses. At the other end of the spectrum, preliminary estimates of the marginal social cost of carbon in the United Kingdom's 2006 Stern review were US$85 per tonne CO_2e (tCO_2e) (Stern 2006). However, the review's methodology (notably its use of a very low discount rate) drew some criticism. The forecast cost of abatement and the traded market price of carbon permits in Australia may also serve as proxies for the value of changes to greenhouse gas emissions. The cost of abatement is expected to increase in line with increasingly stringent pollution caps, ranging from approximately \$30/tCO_2e to approximately \$150/tCO_2e, according to modelling by the Australian Treasury (2011). The traded price of carbon permits will be heavily influenced by the expected price of carbon in the European Union Emissions Trading Scheme, which is uncertain, although current permits under that scheme are trading at approximately \$10/tCO_2e or less.

The estimate used in the cost benefit analysis, consistent with Australian Treasury modelling (2011), is a value of \$30/tCO_2e, adjusted for inflation.

The analysis also assumes that only liquid paperboard containers would emit greenhouse gasses if they were landfilled, as all other container types are inert from a

35 For consistency the analysis should capture the greenhouse gas emissions from other processes in the CDS. For example, the additional collection/transport activities and the emissions embodied in the construction of new infrastructure would ideally be captured. However due to difficulties in estimating the marginal change in emissions these have been omitted from the analysis. Additionally, Marsden Jacob Associates note that the assumed economic cost of transport is based on the values recommended in the Transport for NSW economic appraisal guidelines, which include various amenity impacts: www.transport.nsw.gov.au/sites/default/files/media/documents/2017/principles-and-guidelines-for-economic-appraisal-of-transport-investment.pdf (February 2018).

greenhouse gas perspective. As a result, the incremental greenhouse gas benefit from the diversion of containers under the CDS is very small because liquid paperboard makes up only 1% of the beverage container universe (by tonnage).

Other air emissions

The cost benefit analysis assumed that the diversion of waste from landfills will also deliver air emissions benefits. Externality costs for other air emissions (excluding greenhouse gasses) were derived from the 2010 *Review of the application of landfill standards* and were assumed to be $0.23/tonne (urban) and $0.28/tonne (regional/remote) (WCS 2010).

Leachate

Consistent with previous analysis, including the 2017 New South Sales CDS Decision RIS, leachate costs are assumed to be negligible. In part, this stems from the generally low level of hazardous materials in beverage containers susceptible to causing leachate. In any case, leachate control is now generally well established in landfills, especially in metropolitan areas. Therefore, the cost benefit analysis model assumes no externality cost for leachate.

Dis-amenity

The diversion of waste from landfills is also assumed to result in avoided dis-amenity benefits. The avoided dis-amenity benefits are assumed to be $1.17/tonne (urban) and $1.65/tonne (regional/remote). This estimate was derived by considering litter and odour management practices derived from the 2010 *Review of the application of landfill standards* (WCS 2010).

Household participation

The material flow analysis assumes that five per cent of containers that are consumed at home are diverted from kerbside recycling at the start of the CDS (in 2018), increasing to 40 per cent by 2027 (MJA, 2013).

In the cost benefit analysis, households face participation costs due to the time it takes to accumulate beverage containers and transport them to refund points. These costs are divided into four main subcategories: accumulation time, vehicle operating costs, in-vehicle travel time, and container deposit redemption time. The estimated values are summarised in Table 16.

Table 16: Consumer participation cost

Cost element	Assumption	Sources
Value of time	$30/hour	New South Wales Local Land Services, *Volunteer Co-ordinators Network manual: a guide for managing environmental volunteer programs*, 4th edition, New South Wales Local Land Services, Greater Sydney, Penrith, Westfield NSW, 2015
Accumulation time	Nil	Households are already involved in current waste management practices
Vehicle operating costs and in-vehicle travel time	2 km for urban trips, 11.6 km for rural trips, with fuel and maintenance costs being 15.4c/km	South Australia data; Nolan-ITU, *Victorian CDL financial impact analysis*, EPA Victoria, Southbank Victoria, 2003; Institute for Sustainable Futures and University of Technology Sydney, *Independent review of container deposit legislation in NSW*, prepared for the Minister for the Environment, NSW, 2001
Container deposit redemption time	1.6 minutes for reverse vending machines and 10 minutes for other refund points	Based on assumed throughput of reverse vending machines; Harrison Research, *CDL awareness and support research report*, EPA South Australia and Zero Waste SA, Adelaide, 2012.

It is noted that the change in littering behaviour will arise from a combination of people:

- holding onto their beverage container so it can be recycled (rather than disposing of it incorrectly); and
- picking up litter that would otherwise not have been picked up.

However, there is a lack of data on the importance of each process and on the time and cost of each changed behaviour. For those reasons, the costs are not estimated in the analysis.

Based on the assumptions outlined above, annual household participation costs were estimated over the course of the analysis. The cost increases over time, reflecting increased return rates and therefore increased redemption times. In 2022, for example, costs are estimated to be $3.38 million, increasing to $7.56 million in 2027.

Households and the broader community place a value on recycling that includes a range of market and non-market values. These values are separately accounted for in the cost benefit analysis (see the willingness to pay sections below).

Business participation costs

Business and workplace participation costs are defined as costs incurred by employees taking beverage containers to temporary storage infrastructure and cleaners or other staff consolidating containers in larger storage infrastructure, such as skip bins.

Clean-up costs are based on the following assumptions:

- An additional trip every four days will be needed to transfer containers to larger storages (averaged over all participating businesses).

- The number of commercial businesses with a turnover of more $2 million per annum was estimated to be 16,766, based on ABS data (ABS 2017).
- The value of time is assumed to be $44.70 per hour for cleaning costs (including salaries, on-costs and normal margins). This function could be completed by existing staff or could be outsourced without affecting the economic outcome.

Drawing on these assumptions, business participation costs are estimated for each year. In 2022, for example, costs are estimated to be $2.45 million. It is noted that businesses are not compelled to participate, so could choose not to, if the costs are believed to outweigh the benefits.

Non-market values: willingness to pay

As with recycling, households and the broader community place a value on litter avoidance. That value is not fully reflected in observable market values (or costs). Willingness to pay is an all-encompassing measure of consumer surplus that identifies the value of a good or service, including both market and non-market values.

To inform the economic analysis of the CDS, previous willingness to pay studies were reviewed, to understand community preferences for waste collection.

The approach used in each of the studies is suitable for determining community preferences; however, neither study directly estimates community members' willingness to pay.

The key inputs to the cost benefit analysis are the public's:

- willingness to pay to reduce packaging waste going to landfill; and
- willingness to pay to reduce litter arising from packaging waste.

The sources of utility underpinning the willingness to pay to reduce visual litter in public places and the willingness to pay to increase recycling overlap. They can include:

- avoided environmental and social externalities associated with the operation of landfills (such as pollution);
- avoided environmental externalities due to reduced resource depletion (although this is partially captured in the value of recyclates);
- a sense of 'civic duty' that accompanies recycling and waste avoidance;
- general disutility from visual litter in public spaces (unsightly, negative environmental impacts);
- avoided damage costs of litter in public spaces (such as from stepping on syringes);
- avoided landfill externality costs (leachate, smell);
- avoided land cost from waste disposal in landfill; and
- preservation of resources for future generations (option values).

As recycling and reduction in visual litter may have common sources of utility, the values placed on each form of willingness to pay are strictly non-separable. For this reason, the results of the cost benefit analysis consider only one form of willingness to pay at any one time (to avoid potential double counting).

The cost benefit analysis report makes use of the willingness to pay to increase recycling with the willingness to pay to avoid litter estimates. It draws from recalibrated estimates

of the PricewaterhouseCoopers (PwC) study of willingness to pay for metropolitan NSW regions used in the sensitivity analysis (PwC 2010).

The approach for valuing packaging waste recycling and public litter reductions follows the frameworks and approaches set out in the Office of Best Practice Regulation's *Cost-benefit analysis guidance note* (OBPR 2016) and the Australian Government's best practice regulation requirements for environmental valuation (OBPR 2014). The approach also draws on recommended approaches for best-practice value transfer from the Productivity Commission (Baker & Ruting 2014) and the United Kingdom Government's recommended values for including local environmental factors in economic analyses.

Willingness to pay to avoid litter

To assess the willingness to pay to avoid litter, two key studies were identified for the purpose of value transfer:[36]

- PwC, *Estimating consumers' willingness to pay for improvements to packaging and beverage container waste management*, report prepared for the Environment Protection and Heritage Council (EPHC), 2010; and
- M Wardman, A Bristow, J Shires, *Estimating the value of a range of local environmental impacts*, report prepared for the United Kingdom Department for Environment, Food and Rural Affairs, University of Leeds and Loughborough University, April 2011.

PricewaterhouseCoopers Australia study

In 2010, PwC was commissioned by the EPHC to undertake a study of households' willingness to pay for recycling (PwC, 2010). The study was previously recalibrated to estimate the willingness to pay to avoid litter for the NSW CDS Decision RIS. The PwC study was reviewed with the aim of conducting a similar recalibration for Western Australia. However, the PwC report found that the average willingness to pay of Western Australia regional households to reduce visual litter was not statistically different from zero.

Based on the revised estimates, Table 17 presents the benefit-transfer based the willingness to pay to reduce public space litter. The conversion of the willingness to pay of Western Australian households to a $ per household and $ per tonne estimate is based on the number of households and tonnes of materials recycled.

These estimates are used in the standard modelling, and values as outlined below are used in sensitivity testing.

36 Value transfer: In an ideal world, environmental values would be estimated for each proposed policy, considering all the details of the specific policy. However, the use of primary research to estimate environmental values can be costly and time consuming, and in real-world policy processes the time and money required are often not available. Value transfer is the process of estimating environmental values in a location of interest (the policy site) by transferring values from studies already completed in another location (the study site). This removes the need for primary research.

Table 17: Willingness to pay to reduce public space litter, Western Australian households ($2017)

	Value of litter reduction	Lower 95% CI	Upper 95% CI
Ten per cent reduction in public place litter	$22,180,000	$2,890,000	$45,800,000
One per cent reduction in litter ($/household/year)	$4.34	$0.57	$8.97
Litter reduction ($/tonne)	$21,947	$2,860	$45,318

Department of Environment (United Kingdom), Food and Rural Affairs study

In 2011, the United Kingdom Department of Environment, Food and Rural Affairs commissioned a study to estimate the economic value of local environmental amenity factors (Wardman et al. 2011). The factors were:

- urban quiet areas;
- fly-tipping;
- litter;
- fly-posting;
- graffiti;
- dog-fouling;
- chewing gum;
- trees;
- light pollution; and
- odour.

The benefit-transfer estimates resulting from this study are the United Kingdom Government's recommended parameters for incorporating local environmental values for things such as litter, noise pollution, graffiti and other urban waste into cost benefit analyses.

Using benefit transfer, Marsden Jacob Associates estimates the willingness to pay using recalibrated study results from the United Kingdom to be between $67.78 and $81.37 per person per year.

These benefit transfer estimates are significantly higher than the original 2010 PwC estimates (for Western Australian metropolitan regions). Several points should be noted here:

- Because of the elevated results (in comparison to the PwC study), Marsden Jacob Associates have contacted the United Kingdom study leaders, who confirmed that the results have been correctly interpreted and adjusted for an Australian and/or Western Australian context.
- An advantage of the United Kingdom study is that willingness to pay valuations for improvements in local environmental factors were all expressed on a common 0–10 scale (from bad to good). This translates directly to 10 per cent incremental improvements from any baseline condition.
- We think there are several reasons that the willingness to pay values are higher than the PwC estimates:

  - Payments are for local litter reduction, and people may be often willing to pay more for this proximity benefit.
  - The litter-related images used in the study are particular to the United Kingdom (Figure 7). In particular, the considerably narrower kerbsides may mean that people are willing to pay more for this proximity benefit.
  - In the United Kingdom study, 'litter' means all litter, not just packaging waste. As a result, the United Kingdom study estimates are for all public litter, not just packaging waste.
- We have adjusted the United Kingdom value estimates for purchasing power parity differences. A key assumption is that United Kingdom and Western Australian populations experience similar loss of amenity from public space litter.
- We have restricted the aggregation to people over the age of 18 years in Western Australia, given that the valuation survey did not survey people younger than 18.

Figure 7: Litter images, United Kingdom study

Source: DEFRA 2013.

Cautions and issues remain:

- The study is not sufficiently disaggregated to the level of being able to indicate the extent (if any) to which the estimated willingness to pay values include market benefits (such as the value of recyclates) and litter reductions and other non-market benefits estimated in the cost benefit analysis.
- The values transferred in the United Kingdom study were not estimated with reference to the specific environmental changes being examined in the Western Australian study. As a result, there remains uncertainty about the Western Australian community's actual willingness to pay. At best, benefit transfer can provide an indication of the order of magnitude of the community's willingness to pay for environmental services.

Willingness to pay to increase recycling

Households and the broader community place a value on recycling that includes a range of market and non-market values. Market values have been fully captured in the main analysis, but non-market values only partly so.

Potential non-market values of recycling include:

- avoided environmental and social externalities associated with the operation of landfills (such as pollution and noise);
- avoided environmental externalities due to reduced resource depletion; and

- a sense of 'civic duty' that accompanies recycling and waste avoidance.

A review of the literature identified willingness to pay for kerbside recycling in the Brisbane region as being preferred for the application of benefit transfer to packaging waste recycling (Gillespie and Bennett 2011).

Gillespie and Bennett's review investigated respondents' willingness to pay for an existing household kerbside recycling scheme in the Brisbane region and the amount of waste that goes to landfill or is recycled. Materials recycled are paper, cardboard, glass, plastic and aluminium.

Using benefit transfer, Marsden Jacob Associates estimate that willingness to pay for a 1% increase in the level of packaging waste recycling in Western Australia by Western Australian households in 2017 is in the range of $1.31 million to $1.99 million per annum ($2017), and $13.1 million to $19.9 million for a 10% increase. This equates to between $575 and $876 per household per tonne per annum (Table 18).

Table 18: Willingness to pay to increase waste packaging recycling, Western Australian households ($2017)

Willingness to pay - kerbside recycling	**Value of recycling**	**Lower 95% Confidence Interval**	**Upper 95% Confidence Interval**
One per cent change in waste packaging ($/year)	$1,632,000	$1,308,000	$1,993,000
Ten per cent change in waste packaging ($/year)	$16,316,000	$13,078,000	$19,928,000
$/household per year)	$152	$122	$186
$/tonne recycled)	$717	$575	$876

The estimated willingness to pay of $717 per tonne has been used in sensitivity tests in the cost benefit analysis. Because this value overlaps with the willingness to pay to avoid litter, the two willingness to pay values have not been used at the same time, as that would result in double counting. We have therefore excluded the willingness to pay to avoid litter when the willingness to pay for increased recycling is used in sensitivity tests.

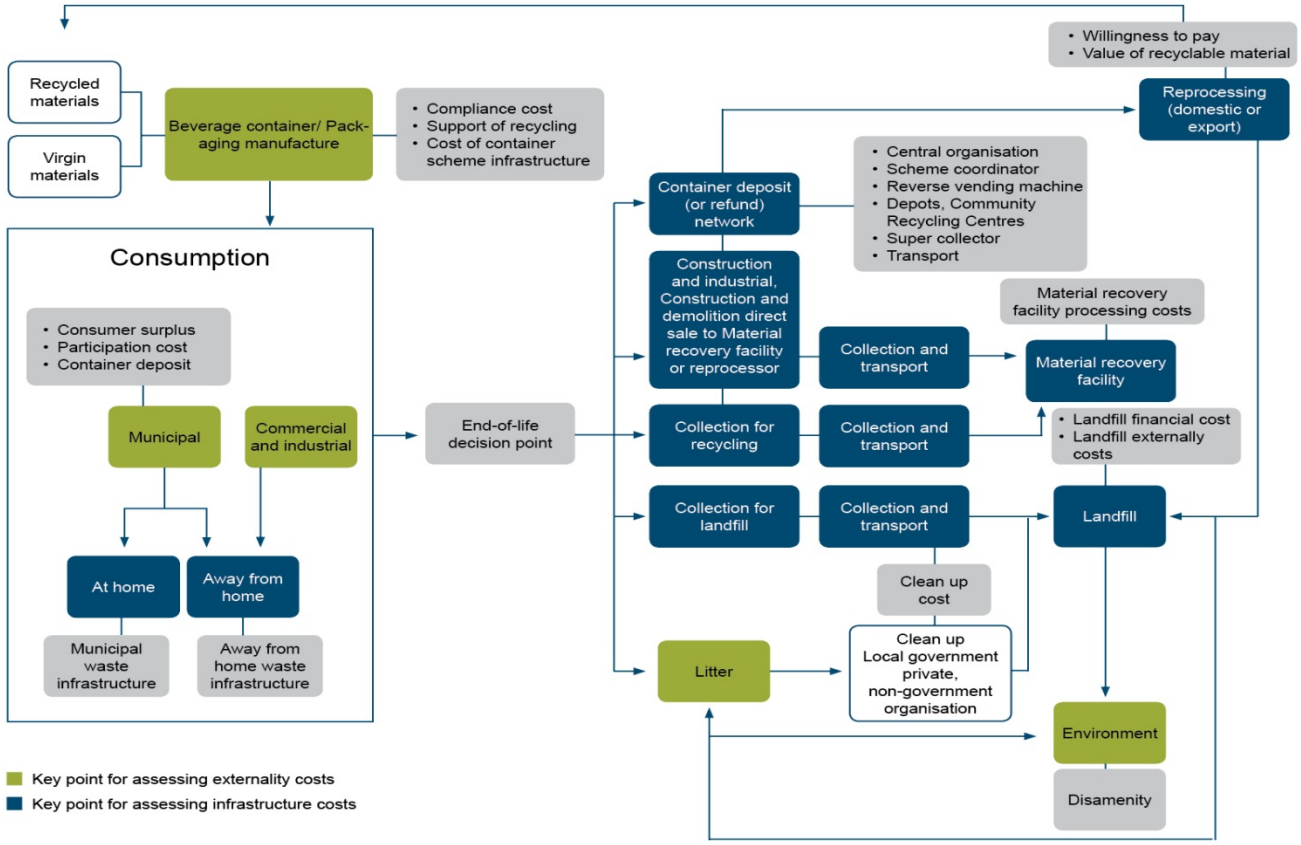
However, Marsden Jacob Associates note that the value overlap between the two willingness to pay measures is not absolute; therefore, the results of both sensitivity tests are somewhat conservative.

Material flows analysis

The cost benefit analysis presented in the consultation RIS considers both the economic impacts (costs and benefits) and the relevant subset of financial (distributional) impacts. This approach reflects the fact that all costs and all market benefits associated with options will have a financial impact on one or more stakeholder groups. However, financial transfers between stakeholder groups have been excluded from the cost benefit analysis because they do not result in a net economic cost or benefit.

To achieve this disaggregation required the integration of the cost benefit analysis model with a material flows analysis. Note that the physical flow of beverage container waste ultimately drives many (although not all) of the costs, benefits and distributional impacts of the options (Figure 8).

Figure 8: Chain of 'physical flows' and associated costs and benefits



Source: Mutual Recognition Amendment (NSW Container Deposit Scheme) Regulations 2017, Explanatory statement.

Costs and benefits that have been assessed in the cost benefit analysis are set out in Table 19. The categorisation of costs and benefits is not rigid, and several the variables listed as costs are presented in the analysis as avoided costs (that is, benefits) for at least some options.

Table 19: Costs and benefits

Costs	Benefits
Administration costs • government regulation development, administration and enforcement • scheme coordination CDS infrastructure and operating costs • refund point infrastructure and operations • container collection and transport Participation costs • households engaged in recycling • businesses engaged in recycling • beverage and retail industry costs • compliance and transition costs	Avoided landfill costs • garbage and recycling collection and transport • material recovery facility processing • landfill operating costs • landfill externalities Avoided costs of litter Value of recovered material/recyclates • paper/cardboard • glass • plastics • steel cans • aluminium cans